March 1985

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE

CoCo & Co.
Our Business And Finance Issue

TEN PRACTICAL PROGRAMS TO HELP YOU:
Process the Payroll
Manage Rental Properties
Track Your Finances
Analyze Investments

WATCH APRAISAL ANTIQUE CLO

THREE NEW GAMES:
Lurkley Manor Graphics Adventure
The Demon's Defiance
And Hi-Res Racer

PROF. J. ALEXANDER CMW

PLUS
Twelve Monthly Columns, Eight Continuing Departments, a New Adventure Contest, and More Than Two Dozen Software and Hardware Reviews.
The first screen objective is to catch enough of Elsie's kisses (those Red Heart Shaped Things) to fill in the squares on the Sailorman's house. If you can time your punch just so, you can send the punching bag over to knock the bucket down and, with a little bit of luck, right onto Bigfatbadguy's head. This will give you a little (but not much) time to catch all those RHSTs.

You must avoid contact with Bigfatbadguy who is actively pursuing you. You must also be careful of Olduglyseawoman who will appear at higher difficulty levels to chuck empties at you. Either avoid the flying bottles or punch them (with the fire button) to keep from being knocked into the water.

The second screen objective is to collect enough notes to play Elsie a little love song. You may jump off and onto the other end of Fatguyeatingahamburger's teetertotter to fly up a deck and even two decks if you manage to catch hold of Smartaleckkid's grab handles. Time it right and away you go.

The third screen objective is to collect enough letters (thrown by Elsie's cries for H-E-L-P) to complete a ladder all the way to the crow's nest where Elsie is calling you. Beware of the Crow, however, who thinks you are after her eggs!

On all screens, eating a can of collard greens (labeled "S" for Collard and grasped by punching the can just right) will give you amazing speed, strength and agility and allow you to send Bigfatbadguy into the drink with a single punch.

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NEXT MONTH: April is our Simulations issue. Prepare yourself for a Simulations excursion as we reveal the two grand prize winning programs of our second annual contest, and announce the names of the remaining winners. We’ll also include games and a program designed for helping you write animated graphics. For hardware hackers, we’ll feature such projects as a Color BASIC ROM switch that allows you to install two different versions of Color BASIC into your computer. And, while you’re waxing creative on the Adventure you’re devising for our third annual Adventure contest, you may want to check out Eric Tilenius’ article on Adventuring for hints on how to compose some lively ideas.

Look for THE RAINBOW for the best articles, programs and reviews anywhere on the Color Computer!
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PRODUCT REVIEWS

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Back One Step — Manually?

Editor:

I am a registered owner of the OS-9 operating system and BASIC09. Recently, I lent my copy of the BASIC09 Reference Guide to a friend of mine to let him try to translate the long decimal algorithm listed in the manual. He lost the manual.

Being the gracious, gentlemanly type, he offered to buy a replacement copy. As you may have heard by now, Radio Shack will not issue for sale any BASIC09 reference material without the actual software. Does this mean they want everyone to pay $100 for a replacement manual?

I don’t need to go on about the marginal durability of the original manual, or how on a multiuser system one might have a need for more than one manual, or that humans sometimes spill coffee, own paper-eating dogs and have destructive children.

I feel this is a definite step into the past for Tandy. I have experienced nothing but excellent support for my CoCo since its purchase. Now that Tandy is offering excellent, high level software, are they going to return to their previous infamous low-level support? I certainly hope not!

Jim Taylor
Meriden, KS

Editor:

Thank you for forwarding the letter from Jim Taylor and giving us an opportunity to help and comment.

There is a mechanism for purchasing replacement copies of any software manual which is lost or destroyed. It’s done on a case-by-case basis, through our Customer Services department in Fort Worth. I’m sorry his local store didn’t make him aware of it, but we will take care of his problem from here.

We’d like to be able to furnish replacement manuals freely, but there is a reason why we can’t. I don’t need to explain the well-publicized problem of “software piracy.” Disks are easily copied, and the only thing needed becomes the manual. Understandably, software authors/publishers are cautious about requests for manuals — especially since most of our disks are not copyright-protected, for the user’s convenience. In an effort to protect the software authors, we have had to tightly control the availability of spare manuals. But, I emphasize, single copies are available when legitimately needed.

The industry hasn’t decided on the question of multiuser systems or local area networks. Perhaps site licenses, perhaps a fairly high price for additional manuals, perhaps some type of hardware or software protection.” It’s not an easy problem, and unfortunately no solution is likely to be acceptable to everyone.

Ed Juge
Director of Market Planning
Radio Shack
Fort Worth, TX

‘GRANTING’ A WISH

Editor:

Sometime back I purchased OS-9, BASIC and the C Compiler programs for my CoCo (with two Radio Shack disk drives). The documentation I received with these packages left a great deal to be desired.

It took a number of calls to Fort Worth to learn how to load the BASIC09 program. Now I am trying to use the C Compiler package, and find that the manual tells me nothing about the mechanics of using the two disks that are furnished, i.e., which disk goes in which drive at what point in the program development cycle. Again, I have had to depend on the phone to obtain step-by-step instructions.

During the Civil War, General U.S. Grant kept a colonel on his staff for a single purpose. This colonel was not the smartest of people, and Grant would have him read every order Grant wrote prior to publishing it. Grant believed that if the colonel understood the meaning of the order, then it was safe to send it out, as every member of the command would understand it.

My fondest wish is that people who write manuals for hardware and software would take Grant’s lead, and utilize someone such as myself (or Grant’s colonel) to test the instructions in the manual prior to its release.

Arthur E. Schmidthans
Marysville, WA

SIGN ON

Editor:

I have a cassette-based upgraded 64K CoCo. I am wondering if there is anyone interested in having a deaf pen pal. I am deaf myself, and have enjoyed using the CoCo since 1982. Please write to me at 30 Lowenthal Road, #2166, 14623-5669.

James Sharer
Rochester, NY

HINTS AND TIPS

Editor:

I look forward to reading your fine magazine every month and I have a programming tip I would like to share with my fellow readers.

If you have made many changes to a program that contains GOTOs and GOSUBS, type RENUM nnnnn, nnnnn where “nnnn” is any number larger than the last line number of your program. This will give you a UL Error for every GOTO and GOSUB line that you deleted without changing any line
numbers of the present program in memory. Now it is quite easy to fix these deletions because your present LISTING is still valid. Only after a successful RENUM should you renumber the program the way you intended.

Richard F. Sganga
Brentwood, NY

MACHINE LANGUAGE TIME-SAVER

Editor:
For those readers who dread typing all those "&H"s in front of the machine language source code, or who don't like converting the code to decimal, here's a time-saver for making and reading data statements in your BASIC program to poke the machine language program into memory.

FOR X = [address] TO [address]
READ A
B = VAL ("&H" + A$)
POKE X, B
NEXT X

Source code is put directly into data statements, resulting in about half of the normally required memory to be used.

Also, could you explain the use of the "speed poke" and its limitations?

Kenty Maneth
Manhattan, KS

Editor's Note: The speed-up poke POKE 65495,0 switches the CoCo from its normal speed mode into one where the computer runs at twice its normal speed much of the time. In this mode, the SAM (synchronous address multiplexer) chip switches between the two speeds, depending on what operations the 6809 processor is performing. Unfortunately, many CoCos can't run at high speed reliably and many more start to have problems when a disk controller is attached.

I/O DILEMMA SOLVED

Editor:
I recently solved a tape 1/O problem that may not be common, but I would like to pass it on in hopes it might help someone else with a similar problem.

I had a long program on tape that developed an 1/O problem near the end of the tape, and I had no backup. I disassembled the ROM routine for cassette loads and noted that ROM does a NEW when it encounters an 1/O. I noticed on the cassette counter where the 1/O occurred and pressed the Reset button just before reaching the 1/O. I peeked the beginning of the program from bytes 25 and 26. In direct mode, I ran a loop from the start of the program through to the end of RAM in which each memory byte was peeked, and the value peeked was converted to a CS ave and printed to the screen. When the loop reached the end of the program in memory, I broke the loop and asked for the value of the loop variable. I then poked that value into bytes 27 and 28 (end of program pointer). I then did a CS ave.

This routine allowed me to salvage almost all of the program up to the 1/O. I loaded what I had, typed in the missing lines that had been lost due to the 1/O, and re-saved.

Of course, the begin and end locations of a program have to be converted into most significant and least significant bytes before poking them into the BASIC pointers 25 through 29.

This procedure saved the program from the dreaded 1/O, and was a lot faster than retying the whole program. Still, it remains the best policy to backup anything you don't want to lose. Hope this is helpful.

Paul N. Despres
West Wareham, MA

SPOOKED BY NO GHOSTS'

Editor:
I made many unsuccessful attempts to CS ave the short program entitled No Ghosts which appeared on Page 147 in the January 1985 issue of THE RAINBOW.

I finally called the customer service representative at our local Radio Shack Computer Center and he informed me that sometimes a POKE command in a program will prevent the program from being saved on tape. He suggested I type the program into the computer and then try putting it on tape without running it first, and it worked.

This is the first time I have ever run into this situation, and thought some of your other readers may have experienced the same problem at one time or another.

I have been receiving THE RAINBOW for over two years and think it is a wonderful magazine.

Dale W. Reed
Massillon, OH

SEVERAL SLEUTH SOLUTIONS

Editor:
In the January 1985 issue of THE RAINBOW [Page 10], Mr. Eric W. Lund asks if anybody knows where to get more evidence in Computerware's Sam Sleuth on Level 2. I wrote this Adventure/Simulation for Computerware and may be able to help out. Sam Sleuth is set up so every time you try to solve each of the three cases, the program picks randomly from several different possible criminals, clue locations, and so on. The point I'm making is if you find evidence somewhere during one session, that same evidence might not be there the next time you play. The game was created this way so you can play the same cases many times before figuring out all of the possible solutions.

It seems Mr. Lund has figured out the case and is just having trouble proving it. Ask people questions and examine everything (even empty lots!). Even how a person's day has been going can sometimes provide information. Writing down notes about objects on the map included in the instruction booklet may also help out. Good luck!

Steve Hartford
Glendale, CA

THE LONG AND WINDING RIBBON

Editor:
This is just some information that may be of use to one of your writers whose address was not in your magazine. Mr. R. George, 1V of Terrace, N.M. ["Letters To Rainbow," December 1984, Page 8.]

I do not have a printer like that described, but I do have the very old Centronics/Radio Shack printer that uses the very long ribbon (not a printer is Cat. No. 26-1152 — but I cannot find the ribbon number). The last time I looked, the Computer Store stocked these ribbons in a pack of three. It won't be easy to adapt this ribbon for use in another printer, but at least the ribbon itself should be long enough!

Paulette Grantham
Palo Alto, CA

TAROT HARMFUL?

Editor:
Like everyone else, I am a great lover of THE RAINBOW and the day of its arrival is cause for great excitement. The October 1984 issue, [Page 74], however, contained an article that disturbed me a great deal. I am referring to the Tarot program. To some it may seem like a harmless game, but a great many people have fallen under the influence of the Devil just by "playing" with seemingly "harmless" things such as this program.

I have removed the offending program from my copy of the magazine and destroyed it, the only time I have ever cut it. If this comment causes someone to stop and think for a moment before including such things in a future issue, this letter has served its purpose.

I know it's a hard job to try and please everyone all the time and I think you do a good job overall. Keep up the good work!

Charles Britt
Canion, OH

KUDOS

Editor:
I am really enjoying your magazine and especially like the "Personable Pascal" column, Keep that one coming!

Doc M. Pepper
League City, TX

FLATTERY FOR FRED

Editor:
Congratulations to Fred Crawford for his January 1985 RAINBOW cover. It's a classic, with the same feel as a Norman Rockwell. His other covers have been OK; this one is tremendous.

Dean Rector
Knoxville, TN

DISK LIBRARY

Editor:
I have subscribed to THE RAINBOW and RAINBOW ON TAPE for two years, I look forward to each month's issue with great anticipation. THE RAINBOW gives a feeling of belonging to a CoCo Community of users from all over the world.
Recently, I have taken the advice of many letter writers and authors in THE RAINBOW and purchased my first disk drive. Wow! Now only did the speed impress me, but it added a new dimension to my computing. Getting out my old copies of THE RAINBOW, I was very pleased to find I already had a library of disk software at my disposal, and thanks to RAINBOW ON TAPE, ready to run. RAINBOW, you're the best!

Stephen Duff
Kinderlsey, Saskatchewan

INFORMATION PLEASE

Editor:
I hope the folks at Tandy appreciate your magazine. I don't know that I would own a CoCo if it weren't for RAINBOW. You show a concern for your readers not seen in other publications. With your reviews, articles, certifications, RAINBOW ON TAPE, plus other services, RAINBOW is an essential peripheral to the Color Computer.

I am a novice CoCo user and would like some advice as to where I can get books or other sources of information on ASCII, machine language, Hex, technical data, etc. Write me at 41 Joe Avenue, 04901.

Larry Jackson
Winslow, ME

POKES, DISKS AND TAXES

Editor:
I would like to ask if anyone knows of a way to use the POKE 65495,0 with a disk drive. It always crashes when I try to use it.

Also, I would like to know if anyone knows of a good program that will help you fill out your income tax return. Write to me at 7821 Lland Ave., 76116.

Thanks a bunch and keep up the good work.

Chris Young
Fort Worth, TX

PIGGYBACK PREDICAMENT

Editor:
I was really excited about the article on "128K The Easy Way" [December 1984, Page 162]. There is a term in the article I have seen elsewhere with respect to upgrading to 64K and I am not too sure what is meant by it. I am referring to "piggybacking." I guess I just don't know as much as I thought.

In another article in the December issue, there is a reference again to piggybacking. It sounds as if one IC was being soldered to the other IC (i.e., pin 1 to pin 1, pin 2 to pin 2, etc.) then replacing the IC combination in the IC socket. Not being familiar to the days of piggybacking 16K chips, etc., I must admit to not knowing what it is I am being asked to do.

Help, please! Thanks.

Rev. Ted Power
Assiniboia, Saskatchewan

Editor's Note: The way it sounds to you happens to be precisely right. The reference to "piggybacking" is the soldering of one IC to another.

PHYSICIAN'S FRIEND

Editor:
I would like to know if anyone has written patches to the Telewriter-64 to allow either an auto-repeat function when any key is held down, or a key-beep option.

Also, I would like to know if there are any other physicians who are using their CoCos for small record keeping in their offices.

Write to me at 4944 N. Larkin, 53217.
Thank you for your time.

Stephen A. Haughey, M.D.
Whitefish Bay, WI

GAME-MAKER

Editor:
Can anybody tell me where I can get software to make games? The Apple uses the Arcade Machine. Any help would be appreciated. Send all information to 816 Belleville Street, 62254. Also, I think your magazine is really great.

Charles Farris
Lebanon, IL

INTO THE WILD BLUE YONDER

Editor:
I love your magazine and am always excited to see my next issue. I am

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RAINBOW CERTIFICATION SEAL

THE RAINBOW
March 1985
especially interested in flight simulators. Could you give the names of some of the companies and their flight simulators? Again, your magazine is the best for my CoCo!

Todd Winter
Chicago, IL

Editor’s Note: Check the August 1984 RAINBOW for the article “CoCo Takes Flying Lessons,” Page 74. Also, Worlds of Flight, by Tom Mix Software (ad on Page 11, January 1985 RAINBOW).

BOUQUETS

Editor:
I want to say a word for Darren Croft of Color Connection Software. From a RAINBOW ad I ordered The Puzzler to use for my fifth grade class in Vinalhaven Island, Maine. It would not screen-dump the crossword puzzle to my Prowriter. After notifying Color Connection, I immediately received a new disk to try and a kind apology from Darren Croft. The new disk worked fine. In 10 minutes I can type in 10-15 vocabulary words with definitions and get a marvelous printout of the puzzle, key and list of definitions to run off on the duplicator. It is an excellent device for teachers. I am more than pleased with the way the program works. And, I’m thoroughly pleased with Color Connection Software.

May I say that I find the RAINBOW more useful in my profession than all the computer periodicals combined that are published for educators. I use five CoCos.

Charles McCabe
Lincoln School
Vinalhaven, ME

A GOOD WORD FOR WORD-PAK

Editor:
After reading the January 1985 “Letters To Rainbow,” it occurred to me that I couldn’t recall anyone mentioning one of my favorite CoCo peripherals, the PBJ Word-Pak. I first learned of it at the 1984 Chicago RAINBOWWest (an exceptionally well-run and worthwhile convention). The Word-Pak plugs into the ROM-pack port and provides a true 80-column screen (naturally, this requires a monitor). It is really one fantastic product.

But that is only half of the story. PBJ’s ads in the RAINBOW emphasize the “PBJ support.” This is no joke. I had a problem with my Word-Pak after I bought it. PBJ’s Al Alberta patiently worked with me until it was resolved to my satisfaction. I am not only able to use Word-Pak with Radio Shack BASIC, but I also use it with OS-9, and I understand that there is also a driver for FLEX.

I have noticed a few software companies selling programs that are written for use with Word-Pak. I hope this trend continues. Now it only my favorite word processor. Telewriter-64 would work with Word-Pak. How about it Cognitex? I would buy it in a minute!

Tim Fiel
West Allis, WI

BULLETIN BOARDS

Editor:
We here at The Great Gamma BBS would like to hear from other CoCo BBS SYSOPS to share ideas. You can either write or leave a message on our BBS at (804) 887-5302. Our address is 16 Embers Lane, 23185.

George Marsh, Jr.
Williamsburg, VA

Editor:
The Singing River Color Computer Club, Inc. is pleased to announce a new bulletin board system (903) 776-8261. We operate at 300/1200 bps, 24 hours a day, seven days a week. Our SYSOP is Ed Setthorn.

Tommy R. Sanders
Midlands 80 Computer Club
Columbia, SC

Editor:
We are pleased to announce our BBS Colorama of Yonkers is now online seven days a week, 24 hours a day. Colorama BBS has downloads, boutique, want ads, magazine, graphics, E-mail, and other special features. (914) 965-7600.

Fred Studyn
SYSOP
Yonkers, NY

Editor:
I am pleased to announce a new bulletin board system in Chandler. The CoCo Pub BBS is online 24 hours a day at (602) 899-1350 (voice) and 963-1931 (modem). Our theme is fantasy and science fiction. There is usually some kind of fantasy story being written by the users. We also like to hear reviews of science fiction books, movies, etc.

The CoCo Pub supports messages, downloads (text and programs), CoCo character graphics, bulletin boards and SYSOP Chat.

Stephen Roberson
Chandler, AZ

Envelope Of The Month

R. Bungay
Birmingham, AL

ARTS AND LETTERS

The RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, Falsoft, Inc., 9529 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. Letters should include the writer’s full name and address. Letters may be edited for purposes of clarity or space.
Combine the Color Computer 2 and the new

At $219.95, Our Best Color Computer 2 Has a Lot of People Talking

Radio Shack's most powerful Color Computer 2 has always been a popular topic among computer enthusiasts. Our new low price of $219.95—a savings of $40—makes it an even hotter one. But now there's a new voice in the crowd, because our Color Computer 2 can speak for itself.

Get Sound and Speech for Just $99.95

Add sound effects and up to three voices to your BASIC programs with our Sound/Speech Cartridge (26-3144, $99.95). Put special sound effects in your personal game programs—or create your own stories and animated programs with the computerized voice of a narrator!

Our new cartridge is easy to use and plugs into your computer's Program Pak port or Multi-Pak Interface to add brand new challenges to your home programming. Simple PEEK and POKE commands let you access the Sound/Speech Cartridge for an almost endless number of exciting programming possibilities.

Get a Computer Designed for Serious Programmers

Our 64K Color Computer 2 was designed for the serious programmer—but it's easy enough to use for a beginner to learn on! It's the ideal choice for your family's first venture into computing or for upgrading your present "out-dated" home system for new challenges.

This is no kiddie computer: the 64K Color Computer 2 has enough power and room for expansion to...
Sound/Speech Cartridge and hear what you see

see you through high school, college and beyond. But we've made it easy to start home computing with the Color Computer 2 right away. Just connect it to your TV set and start programming in Extended BASIC (we include an easy-to-use manual to show you how), or choose from our ready-to-run software for games, educational programs and more.

The 64K Color Computer 2 makes it easy to create stunning color graphics with simple one-line commands. For even more challenge, try color animation—or create your own arcade-style games with music and sound effects.

For advanced programmers, the 64K Color Computer 2 can handle string arrays up to 255 characters, trigonometric functions and multi-character variable names, full-featured editing and more.

The Color Computer 2's Extended BASIC also lets you access 32,000 characters of memory right away. Just add a disk drive and operating system and you'll have a full 64K to work with.

Expand Your Computer As Your Needs Grow
Your Color Computer can grow as your needs do. Add a disk drive and you can choose from our large selection of educational, entertainment and professional software. Or add a printer, plotter, modem, joysticks, Color Mouse and more for even greater versatility.

See the Color Computer and Accessories Today
Radio Shack makes it easy to start home computing with the Color Computer 2 and our new Sound/Speech Cartridge. Visit your nearby Radio Shack Computer Center or participating Radio Shack store or dealer today for a hands-on demonstration. Be sure to see all the Color Computer accessories while you're there.

Mail To: Radio Shack, Dept. 65-A-348
300 One Tandy Center, Ft. Worth, TX 76102

Prices apply at Radio Shack Computer Centers and at participating Radio Shack stores and dealers. 64K Color Computer 2 (26-3127) was $259.95 in Cat. RSC-12.
You will notice a slightly new look to THE RAINBOW this month. One of the changes is to make your reading and understanding a bit easier.

In most of the articles and tutorials, you will see the keywords and commands that you type into your CoCo in a different style of type — one that looks a lot like the letters that actually appear on the screen.

This is the evolution of a process which began in the early days of THE RAINBOW when, using a dot matrix printer, we used quotation marks to make the commands look a little different. From there, still with the dot matrix printer, we experimented with condensed type and, finally, italic type.

Once we got into typesetting, after our first year, we continued using italic type; this was better because of the typeset quality. We continued that for some time, always looking for something better.

Three months ago, after a lengthy search, we took delivery of a new typesetting system — a digital machine with a hard disk, three terminals, image previewing and other “bells and whistles.” One of its specialties was the ability to use a large number of type styles at the same time, whereas before, we were limited to 16 at a time. From among these added possibilities, we chose the digital typeface to designate the commands you type into your computer.

So, now, we have something new. I have always believed the easier we make it to read THE RAINBOW, the better you can use it. This is a step in that direction.

We're taking other steps, too. You will notice some parts of the magazine have undergone what our art department calls a “redesign” in the past few months. Rather than make a big deal out of this, we are just doing it as we go along. The object, of course, is to make it easier for you to read and use THE RAINBOW. For example, you will see that our assembly and BASIC09 listings are done on a daisy wheel printer — because it makes them easier to read.

Look for more changes. And let me know your reaction to them. Some may be subtle, but we think they will help in your overall ability to use THE RAINBOW.

By the way, the change in the way we show commands on our pages will be incorporated in our other magazines, PCM and SOFT SECTOR, as well. Mention of PCM brings me to share some information on a major change in that publication which might be of interest to some of you.

Beginning with last month’s issue PCM began coverage of the new Tandy 1000 and Tandy 1200 computers, as well as the Tandy 200 — the new portable. As many of you know, PCM heretofore covered the Tandy 2000 and the Model 100 portable. Of course, our coverage of these two machines continues.

Actually, the 200 is fully compatible with the 100 in BASIC — the language most of PCM’s programs are written in, anyway. And the 1000 and 1200 — like the 2000 — are MS-DOS machines, which means much of the BASIC, all of the tutorials and many of the programs we run anyway will work on all three machines. So, we see this expansion as a logical step.

Moreover, we see the 1000, 1200, 2000, 100 and 200 as the “hot” Tandy machines of the latter half of the 1980s. I personally think the 1000 is going to be a “star” in the MS-DOS market. It is a heck of a bargain for the price! You might want to check out PCM.

Over the last half year, I have written a couple of columns on specific subjects — one about the Apple Macintosh and another about the need of new software for the CoCo.

I said that I thought the Mac was an interesting machine, but that its concept was a little difficult to use for any real computing because of the necessity to “switch” back and forth between the mouse and the keyboard. At the time, though, I particularly praised the MacPaint graphics program.

On the subject of “new” software, I was talking about the need to develop new kinds of software for the CoCo. Interestingly, there is a new product out for the CoCo that combines those two ideas.

It'll be difficult to miss the ad in THE RAINBOW from Colorware. But what
3 display formats: 51/64/85 columns × 24 lines
True lower case characters
User-friendly full-screen editor
Right justification
Easy hyphenation
Drives any printer
Embedded format and control codes
Runs in 16K, 32K, or 64K
Menu-driven disk and cassette I/O
No hardware modifications required

THE ORIGINAL
Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkered board letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with true lower case characters. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter’s chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter’s advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

TELEWRITER-64
But now we’ve added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE
Telewriter-64 runs fully in any Color Computer - 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don’t need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)
Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command. The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don’t even allow editing.

RIGHT JUSTIFICATION & HYPHENATION
One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII, VII, DMP-100, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Termitest), etc.
Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, graphics, etc.
Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.
Menu-driven control of these parameters, as well as: page at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, global search and replace (or delete), wildcard search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text, page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing 'modes.' This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

PROFESSIONAL WORD PROCESSING
You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.) To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

Add $2 for shipping. Californians add 6% sales tax.

Now available at Radio Shack stores via express order

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Technical Writer
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THE COLOR COMPUTER FROM
triad pictures corp.
p.o box 1299 sequim, wa 98382

14 THE RAINBOW March 1985
GOOD LOOKIN' AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

· The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

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Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 46,600 characters (34,900 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

SMOOTH WALKIN' AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

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

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

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

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COMPATIBLE WITH TELEWRITER (ASCII) & OTHER WORD PROCESSORS.

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

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

WHAT THE REVIEWERS SAY

"AUTOTERM is the Best of Class."
Graham, RAINBOW, 6/83

"The AUTOTERM buffer system is the most sophisticated — and one of the easiest to use..."
Banta, HOT CoCo, 9/84

"Almost a full featured word processor..."
Ellers, RAINBOW, 11/84

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Please hire the mentally retarded. They are sincere, hard working and appreciative. Thanks! Phyllis.
A Magazine’s Heart is Its Printer . . .
Comments on Dot Matrix and Daisy Wheel . . .
And, Announcing a New Typography Style . . .

One of THE RAINBOW’s stalwart veterans made a quiet, unceremonious exit a few weeks ago. As I reflect on it, I’m glad I wasn’t present when the old workhorse’s harness was slipped off and she was sent out to pasture in favor of a prancing new colt which promises to run twice as fast and with more grace and style than the old lady was ever able to muster up. Yes, I’m glad someone less sentimental than me pulled the plug on our Epson MX-80 F/T.

Call it maudlin if you will, but I’m the sort who finds it difficult to say goodbye to the old family car when trading time comes around. The same thing goes for anything else which through time and experience I’ve grown to know and trust. Give me old boots, old jeans, old dogs and old machines. No, we didn’t have a pet name for the old Epson, but she was a trusted friend and, from the day she arrived, was used to print virtually every listing appearing in THE RAINBOW until her retirement. Her record of service was unblemished and I’d gladly provide a testimonial if she should be nominated for the dot matrix hall of fame.

Well, the new printer is also an Epson — the Epson FX-80 — and it already shows bright promise. But, until it proves itself, it’s still an “it” and has no staunch advocate. So, this means we’re in a period in which we can challenge the Epson’s territory. Toward that end, you may have noticed that our machine language listings are now being done with one of our daisy wheel printers. We think it’s such an improvement that now we’re considering doing all of our listings on a daisy wheel printer. This clearer “correspondence quality” printing becomes even more important if we elect to go to three-column listings, such as the trial balloon listing on pages 44 through 53. But, then, it should also tidy up things even if used with our present two-column format (compare pages 80 and 81). What do you think?

Why have we stuck with the dot matrix printouts? Well, we feel it’s what most of our readers are accustomed to seeing since the majority of you who have printers have the dot matrix type. We believe using a familiar type style enhances readability and helps you when you’re comparing your printout to ours. It’s the same sort of logic we follow in making our listings 32 characters wide — the same width the lines appear on the screen; it facilitates comparison of your listing to ours. In fact, many clever readers print out their freshly-typed-in listings at a 32-character line width and then overlay their printout right on top of THE RAINBOW page, a very handy way to spot differences when debugging!

Clearly, though, daisy wheel printouts improve the overall appearance of the magazine and, since they have much better definition, may be easier on the eyes, too. Perhaps we should retire the new Epson before the new even wears off. Maybe we’ll experiment around a bit and get your reaction.

Along these same lines, we hope you like our new “digital” font we’re using in the text of articles whenever BASIC command words, such as CLEAR, LIST and GOSUB, are used. We think it’s helpful — especially to beginners — for us to set these words apart, and we feel the digital type style does this with less distraction than our previous practice of putting BASIC commands in all capitals and italics (for example, LLIST). We hope you agree it gives a better “flow” to the text lines. Enhancing readability is what it’s all about.

Since this is our business and finance issue, here’s an investment tip: Enter a year’s subscription to THE RAINBOW and you’ll save both time and money, and enhance readability, too, by ensuring that each month there’s a RAINBOW with your name on it.

— Jim Reed
As a result of the programming language requirement of the Advanced Placement (AP) Tests, Pascal has become the standard language used in High Schools and Colleges today. On the Color Computer, DEFT Pascal is the standard.

**DEFT Bench $49.95**
- **DEFT Edit**
  - Full screen editor
- **DEFT Linker**
  - (see DEFT Pascal)
- **DEFT Lib**
  - create and maintain program object libraries

**DEFT Pascal Compiler $79.95**
- **DEFT Debugger**
  - debug Pascal machine programs symbolically
- **DEFT Linker**
  - combines multiple program objects into one binary program
- **DEFT Macro/6809**
  - supports entire 6809 instruction set, lets you define your own instructions
- **DEFT Lib**
  - instruction set, create and maintain program object libraries

**DEFT Pascal Workbench $119.95**
- **DEFT Pascal**
  - complete Pascal language, generates machine language object
- **DEFT Linker**
  - combines multiple program objects into one binary program

All DEFT software and programs developed with DEFT software are BASIC ROM independent and use all of the memory in your Color Computer without OS-9. All you need is DEFT software and a TRS-80 Color Computer with Extended Disk BASIC, at least 32K of RAM and One Disk Drive. With DEFT Pascal ($79.95) you will also need a text editor to write your programs. Software licensing arrangements are available for schools. Dealer inquiries welcome.

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DEFT Systems, Inc.
Suite 4, Damascus Centre
Damascus, MD 20872
Finding The Ultimate Bargain
By Paul Myers

The following program is an example of an operational research (also known as scientific management) technique. Its purpose is to identify the most economic quantity for any type of stock that is relatively steady in its consumption.

(Paul Myers is a programmer/analyst for Technicon Corp. His nine years of data processing experience include working with both large scale and mini-computer systems.)
and does not have a short shelf life. For example, although you may know your family consumes five dozen eggs a month, you wouldn’t want to buy a whole year’s supply at once, even at a bargain price; the eggs have a very short shelf life.

Again from the kitchen, here is a good example of how EOQ Calc could be put to use. Let’s say your restaurant serves about 1,000 cans of corn a year. Since canned goods have a fairly long shelf life, this program could be used to determine how many cans should be purchased at one time in order to spend the least amount of money annually.

The heart of the program is the following formula.

\[
\sqrt{\frac{2 \times AU \times OC}{HC \times UC}}
\]

\begin{align*}
AU &= \text{Annual Usage} \\
OC &= \text{Order Cost} \\
HC &= \text{Stock Holding Cost} \\
UC &= \text{Unit Cost}
\end{align*}

The Annual Usage value represents the total amount of a product used in one year. Unit Cost is how much it costs to buy one of the product. The Order Cost represents several costs involved with placing an order.

If you are placing an order for a company of some kind, there is a cost involved with processing the paper work. The more people who must handle this purchase order before it is approved, the higher this cost becomes. The Order Cost also should include any shipping charges the order may incur.

And finally, once the order arrives at the company’s facility, someone must receive it, which usually takes still more paper work and handling.

You may think if we were dealing with a situation such as a housewife doing her shopping, this cost would be nothing. Not true! There are two basic expenses that come quickly to mind. If she drives, there is an expense for the gasoline, and possibly parking fees. Plus, while she is shopping, she cannot be doing any other work. There is cost involved with her valuable time. If you were paying a maid to do it, you’d see the expenses more easily.

The last variable, Stock Holding Cost, is the catch-all for all of those hidden expenses for storing merchandise. Some examples:
While your money is tied up in stock, it can't be earning interest in a bank. That's costing you money you could be making. There is a cost involved with keeping up a building, usually referred to as overhead. If you didn't need to store products, you would require less space. Therefore, you would be able to get by with a smaller building, which would probably cost you less money to maintain.

The Stock Holding Cost in this formula represents a percentage of these upkeep costs that each product must bear. Generally speaking, this figure will fall somewhere between 10 to 50 percent. This would depend on what proportion of the building is used to store materials.

**Using the Program**

The following keys are available for your use.

- Up-Arrow
- Down-Arrow
- Left-Arrow
- ENTER
- @ Key

After you have closed the program, type **RUN** and press ENTER. A question mark will appear in the left-hand side of the field where the next input will be placed. After you have pressed the proper numbers, pressing the **ENTER** key will accept the value and move you to the next field.

If you make a mistake while entering a number, press the left-arrow and it will clear what has been typed. If you wish to skip up or down without changing the value at the current position, use the corresponding arrow key.

When you are ready to perform the calculation, press the '@' key. The values will remain as you selected them after the calculation is complete. This will allow you to experiment with changing one field or another without needing to retype all of the values again. Also, **EOQ Calc** will not allow you to calculate if any of the values are zero.

One final note about the program. I did not wish to use the SQR (square root) function since it is not available on a 4K system. For those of you who do have a system with Extended BASIC, you may wish to replace lines 590 through 650 with

```
590  EO=INT(SQR(OW)*10+.5)/10
```

This should help speed up the calculation function.

---

**The listing:**

```
10 'E.O.Q. CALCULATOR
20 'BY PAUL MYERS 1984
30 FOR X=1024 TO 1279
40 POKE X,128:POKE 1535-(X-1024),128
50 NEXT X:B$=CHR$(128):C$=CHR$(133)
60 PRINT@5,"economic"+B$+"order"+B$+"quantity";
70 PRINT@44,"calculator";
80 PRINT@97,"annual"+B$+"usage";
90 PRINT@129,"unit"+B$+"cost";
100 PRINT@161,"order"+B$+"overhead"+B$+"cost";
110 PRINT@194,"includes"+B$+"cost"+B$+"of"+B$+"handling";
120 PRINT@226,"paper"+B$+"work"+C$+"shipping"+B$+"charges"+C$;
130 PRINT@258,"and"+B$+"delivery"+B$+"handling";
140 PRINT@289,"stock"+B$+"holding"+B$+"cost";
150 PRINT@322,"includes"+B$+"cost"+B$+"of"+B$+"tying"+B$+"up";
160 PRINT@354,"capital"+B$+"in"+B$+"stock"+C$+B$+"and"+B$+"storage";
170 PRINT@386,"costs"+B$+"(percentage)";
180 PRINT@419,"e"+B$+"o"+B$+"q";
190 PRINT@118,";
200 PRINT@150,";
210 PRINT@182,";
220 PRINT@310,";
230 P=118:50SUB 700
240 IF I$<>CHR$(13) THEN WO$=STR$(ALJ)
250 AU=INT(VAL(WO$)*.5)
260 X=9-LEN(STR$(AU))
270 FOR Z=121 TO X:PRINT@118+Z,CHR$<143>:
280 IF l$=CHR$(94) THEN 490
290 IF !$="@" THEN 580
300 IF I$=CHR$(94) THEN 490
310 P=150:60SUB 700
320 IF I$<>CHR$(13) THEN WO$=STR$(UC)
330 UC=INT(VAL(WO$)*100+.5)/100
340 X=9-LEN(STR$(UC))
350 FOR Z=0 TO X:PRINT@150+Z,CHR$<143>:
360 PRINT@150+Z-1,UC:PRINT@159,B$;
370 PRINT@150,"$";
```
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- NUMBER OF SECTORS ALLOCATED AND USED
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MASTER DESIGN comes with its own screen dump routine which interfaces with all popular dot matrix printers that have dot addressable graphic ability.

See reviews in:
- July '84 Rainbow, Oct. '84 Hot CoCo
- Telewriter-64 © 1983 by Cognitec

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VIP Writer™

By Tim Nelson

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"Among word processors for the CoCo, VIP Writer stands alone as the most versatile, most professional program available." May 1984 "Computer Shopper"

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Radio Shack Catalog No. 90-0141
32K (Comes with tape & disk) $69.95
VIP Writer — VIP Speller Combo comes in VIP Writer Binder.

VIP Speller™

WITH A 50,000 WORD INDEXED DICTIONARY!

By Bill Argyro

Gone are the eyestrain, boredom and fatigue from endless proofreading. VIP Speller™ is the fastest and most user-friendly spell checker for your CoCo. It can be used to correct any ASCII file — including VIP Library™, files and files from Scrips6™ and Telewriter™. It automatically checks files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the word in context, with upper and lowercase. VIP Speller™ comes with a specially edited 50,000 word dictionary which, unlike other spellers for the CoCo, is indexed for the greatest speed. The shorter your file, the quicker the checking time. And words can be added to or deleted from the dictionary or you can create your own dictionary. VIP Speller™ also comes with the Library's mini disk operating system.

Radio Shack Catalog No. 90-0142
32K DISK ONLY $49.95
Hi-Res Lowercase displays not available on this program.

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By Kevin Herboldt

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Radio Shack Catalog No. 90-0143
32K (Comes with tape & disk) $69.95
32K does not have hi-res displays, sort or edit.
VIP Terminal™
RATED BEST IN JANUARY 1984 “RAINBOW”
By Dan Nelson

From your home or office you can join the communication revolution. The VIP Terminal™ opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source of CompuServe bulletin boards, other computers, even the mainframe at work.

For your important communication needs you’ve got to go beyond software that only lets you chat. You need a smart terminal so that you can send and receive programs, messages, even other VIP Library™ files. VIP Terminal™ has more features than communications software for CP/M, IBM and CP/M 86 computers.” Herb Friedman, Radio Electronics, February 1984.

FEATURES: Choice of 8 hi-res lower case displays * Memory-Sense with BANK SWITCHING for full use of workspace * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive Library files, Machine Language & BASIC programs, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits 1-9 * Local linefeed to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffs to perform repetitive pre-entry log-on tasks and send short messages * Programmable delay for send data * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

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Radio Shack Catalog No. 90-0139
32K (Comes with tape & disk) $49.95
(Tape works in 16K but without hi-res displays)

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VIP Database™
“ONE OF THE BEST” JULY 1984 “RAINBOW”
By Tim Nelson

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As with all other Library programs, the Database features the powerful Mini Disk Operating System.

Radio Shack Catalog No. 90-0140
32K DISK $59.95
64K Required for math package & mail merge

VIP Disk-ZAP™
RAYED ABOUT IN THE APRIL 1983 “RAINBOW!”
By Tim Nelson

Your database file disk, form letter disk, or BASIC program disk goes bad. An I/O error stops loading, or even backing up of the disk. Weeks, even months of work sit on the disk, irretrievable. Now catastrophic disk errors are retrievable, quickly and with confidence, using the VIP Disk-ZAP™. It is the ultimate repair utility for simple and quick repair of all disk errors. Designed with the non-programmer in mind, the VIP Disk-ZAP™ will let you retrieve all types of bashed files, BASIC and Machine Code programs.

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Radio Shack Catalog No. 90-0144
16K DISK $49.95
Hi-Res Lowercase displays not available with this program.

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To Order Direct Call:
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VIP Technologies
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A significant problem for a program author is the variety of printers that may be hooked up to a given machine. About the only thing that's standard is the interface hardware. Otherwise, printer control codes vary with each manufacturer's product line, sometimes they are different for various machines from the same manufacturer. Even worse are those machines which need something more than just a carriage return to print a blank line.

Fortunately, the situation is improving as most of the large volume printers sold over the past two years have DIP switches that can be set to configure the printer to match a computer for at least printing text. (Printing graphics is a different can of worms that we won't get into.)

A BASIC program still needs to have some adaptability to the system's printer. Ability to change the Baud rate covers most circumstances. In the Serial mode, Radio Shack printers support either 600 Baud or a choice of 600 or 1200 Baud.

Most other modern printers can most easily be purchased with a standard parallel interface and connected to the CoCo with one of the serial to parallel interfaces advertised in RAINBOW. Some users then run their CoCos at 2400 or 4800 Baud. I bought a serial to parallel interface to use with my old LP VIII and run at 9600 Baud with no trouble.

In the CoCo, Baud rate is determined by the values in memory locations 149 and 150. After a cold start, 149 carries a zero while 150 is set at 87 corresponding to 600 Baud. Most owners will be able to send to the printer at 300 Baud or higher and can forget about memory location 149. The exceptions are those running old teletype machines at 110 Baud or less.

There is a table in the Color BASIC manual which shows what to POKE into 150 for various Baud rates. This system isn't perfect. I know of some CoCos that need a seven in 150 instead of a six to produce an acceptable 4800 Baud. The POKE 150,1 for 9600 Baud is not documented in the manual, but works for all machines I know of. I do a lot of printing and the benefits of 9600 Baud versus 1200 are well worth a $60 adapter.

The printer routine for the CHECKBOOK program starts in Line 600. The first order of business is a rather fancy routine to calculate the currently set Baud rate and give the user the option to change it.

First, we assure that CoCo is running at the standard clock speed with the POKE65494,0. Next, we get the value in 150 into variable BP.

The next operation is to find a value that can be divided into 9600 to yield the currently set Baud rate. This is done in the complicated INSTR function. INSTR looks through
a target string for an occurrence of a search string, and
reports the number of character positions from the
beginning of the target string that it finds the search string.

Let’s say by some weird happening, your Baud rate got
set to 2400. The value in 150 would be 18. If we convert
this to a string and use it to search the string
"16*10**41**6**7**8**100", there will be
a match starting at character position 4. Divide four into
9600 and you have 2400. If the computer was set to 9600,
the search string would be one and the first match occurs
in character position 1, which INSTR puts into variable BU.

But, there is a rat in BASIC’s woodpile. When a number
is converted to a string, a space is hooked onto the beginning
like STR$(1)="1". To get a first character position match,
we need to strip off the space; it gets a little complicated.

If we go step by step through the code
RIGHT$(STR$(BP), LEN(STR$(BP)) -1) it will make sense.
STR$(BP) converts the number in BP to a string.
LEN(STR(BP)) finds the length of the string including the
leading space. Subtract one and we have the length of the
characters in the string without that space. When we get
the right portion of the string for length -1 with RIGHTS,
we will have the characters only as we need.

Is there an easier way? Searching DATA in a loop is one
other way. If Baud rate was the only use for DATA in your
program it would be easier. I like Line 605, since all the
code is on one line, it does not require looping, and is
a useful example to show how both INSTR and STRS work.

In Line 610, we clear the screen, print an entire menu
which includes the Baud rate we just determined, and set
a counting variable, CT1. The commas are the key—they
move the print position to either character position
(column) 17 on the screen, or to the beginning of the next
line if the print position is at or past Column 17.

After printing RESET BAUD RATE, the print position
is past Column 17, so one comma moves to the beginning
of the next line. Two more commas create a blank line.
Note that "PRINT" does not reach Column 17, so four
commas are needed to create the blank line between PRINT
and RETURN.

In Line 615, for a choice and the program goes off to the INKEYS subroutine in Line 1. The remainder of the line decodes the keystroke
that INKEYS put into IS. CT may be indexed up or down
within the 1-3 range, and the ‘>’ pointer is moved accordingly
on the menu. If the user makes a choice by hitting ENTER, the ASCII character 13, a carriage return
is returned and the ON CT GOTO 62, 630, 100 is used to initiate
the chosen action.

The allowed Baud rate choices are 300, 600, 1200, 2400,
4800 or 9600. Each value starts with a digit that is unique.
This means we can get the user’s choice in a string, strip
off the leftmost character and use that to search a target
string with INSTR to get a value. This is done in Line 620
which also includes an error trap that sends the user back
to the menu.

In Line 625, the values to be poked for each Baud rate
are defined in the BU(X) array. BU=BU(1): POKE150, BU uses
BL which has the number returned by INSTR to choose
which value to use and then pokes that value.

With the Baud rate now selected, the user is returned
to the menu presumably to select PRINT, but with a chance
to verify that the selected Baud rate is correct, or choose
not to print and return to the data entry routine.

Lines 630 and 640 print the page heading information
to start the report listing all transactions in the current
file. These entries are then printed with a FOR...TO...NEXT
loop starting in Line 650. Print positions are set using TAB
as in PRINT$-2,TAB(9)***: PRINT USING is used to format
the data printed. Separate PRINT statements are needed
with PRINT USING so we cannot string sequences of text
and variables after one PRINT.
If our file is big, it will require a number of pages. Of course, we want this neatly done with bottom and top margins on the pages, and headings on the top of each added page. Some of the new fancy printers may do some of this, but with my old one, it's "I print, you keep track." So, PG=PG+1 counts lines as they are sent to the printer. 

```
655 PG=PG+1: IFPG>1THENFORX=1TO7: PRINT",",": NEXT: PRINT",",": RETURN
```

Can do. It automatically copies all cleared items. Load questions. So far, in fact, that starting next month "Bits And Bytes" will begin a series on CoCo spreadsheets and their use.

However, the code that starts in Line 400 of the CHECKBOOK program does what no CoCo spreadsheet can do. It automatically copies all cleared items to a monthly file of cleared items on tape or disk, and writes the current file to a backup file called CURRENT/BAK on disk. It then strips all cleared items from the current file in memory and returns to the data entry mode. This new in-memory file only includes items that have not yet cleared the bank.

There was a bug in the code as published in the January RAINBOW which we will set right in this discussion, and perhaps learn a thing or two in the process.

One needs to be very careful in automatic file naming, particularly if the code is to work on both tape and disk. The name CURRENT/BAK produces an FN Error (filename) in the tape save mode. Further, I found that when I had loaded the backup file using CURRENT/BAK and then tried to use this module, the computer tried to save the backup file as CURRENT/BAK/BAK. What a no-no!

```
400 CLS:PRINT"0",CHR$, " STRIP & SAVE CLEARED ITEMS"
11111 TAB(0)TAPE",11111 TAB(9)"DISK":GOSUB11:
IF D="D" THEN D=1 ELSE IF D="T" THEN D=-1
ELSE 400
410 PRINT: PRINT"TAPE FILE"
ELSE PRINT"DISK FILE"
415 PRINT: PRINT"FILENAME": IF D=1 THEN PRINT"AND EXTENSION"
420 LINEINPUTCFS$:GOSUB4:CT=0:FORCR=ITOLR-1:
GOSUB16: IF CS$="C" THEN CT=CT+1: NEXT ELSE
```

Lines 400-420 provide the entry menu that gets the disk/tape choice and then the filename, CF$, in Line 420 for the file of cleared items. Line 4 is called to allow users to change the date if they wish. The rest of Line 420 goes through the file in memory counting the number of cleared items. In order for the cleared item file to be reloaded, the number of the next record to be added (if one is to be added) must be the first entry.

```
425 OPEN",",D,CF$: PRINT",",CT=1: PRINT",",BB:
PRINT",",C:
PRINT",",ATM: FORX=1TOLR-1: PRINT",",A$X:
IF CS$="C" THEN PRINT",",A(CR,1):
```

Line 430 opens the file, prints the standardized beginning variables and then goes through all the records in memory, finding those that are cleared and saving these to the file.

```
435 CLOSE: CT=0:OPEN",",D,"BACKUP": PRINT",",LR:
PRINT",",BB: PRINT",",D:
PRINT",",A(CR,1): FORX=1TOLR-1: PRINT",",A$X:
PRINT",",A(CR,1): NEXT: CLOSE
```

In Line 435, we close the cleared-item file, open the backup file and fix a bug. The open statement used to read OPEN",",D," BACKUP", which I guarantee will bomb a tape save or disk save where NM$ is something like "CURRENT/BAK." All records in memory are saved

---

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to this file. In a disk system, this will write over the existing backup file which should no longer be needed. The current file in memory is assumed to be correct before being stripped.

```
448 FOR CR=1 TO LR-1: GOSUB16: IF CS$="O" THEN
  CT=CT+1: A$(CT)=A$(CR): A$(CR,0)=A$(CR,1):
  A$(CT,1)=A$(CR,1): NEXT ELSE NEXT
```

Line 440 strips cleared items from the file. The procedure is very simple. The count variable CT was set to zero in Line 430. Each record is checked to see if its status CS$ is 'O' (for outstanding). If so, the count is incremented and the string and numeric components are copied into the CT array members. Outstanding items are copied into array members that previously contained records that have been cleared. When CR reached LR-1, all array members up to A$(CT), A$(CT,0) and A$(CT,1) will contain data relative to outstanding records.

```
445 FOR X=CT+1 TO LR-1: A$(X)="": NEXT:
  LR=CT+1: CR=CT: RETURN
```

Finally, we'll do some housekeeping. All strings in the array members from A$(CT) to A$(LR-1) are null. This looks neat, but is like washing the plates as you take them from the dishwashing machine at the end of the cycle. If you save the current file and then reload it later, these strings and their addresses will long since be gone from memory. If you should immediately do some more records, the addresses to the new data string will be set in the variable table and the old strings will be lost and wiped out during the next garbage collection.

Some things will look like just the right thing to do, but be totally unnecessary. Is it important to get this out of the program? As long as memory usage is not an issue and you don't mind waiting a few tenths of a second, the answer is "no." If ability to change the program in the future is important, the answer is "yes." Useless code only confuses. Once this column is done, I have some program editing to do.

The last part of Line 445, LR=CT+1: CR=CT: RETURN is very important, for here the current stripped file size is specified and CR is set to point to the last record. RETURN sends the program back to the data entry module where the user has the option to save the new current file and exit the program, or continue with data entry or editing.

For my current needs, the program works well. But, running around in the back of my mind are ideas on how to write the world's greatest checkbook balancing program in a spreadsheet. I may inflict you, poor reader, with another of these beasts yet!

---

**Hint . . .**

**Format Your Printouts With This Disk Utility**

This short program by Ted Cizadlo Selig will let you format your LISTings for any column width you please. One use for it is in debugging programs you key in from RAINBOW listings: by making your printout the same width (32 columns) as our printed listings, you can more easily see any errors you might have made. If you have a 9½-inch wide carriage printer and usually use ordinary 9½-inch fanfold paper, you can make listings 80 columns wide so they won't spill off the right side.

To use the program, simply save the program you want to LIST in ASCII on disk (SAVE "program/ext",A) and run this program. Enter the column width you want and the filename including the extension, and away it goes.

A short note: The IF F THEN . . . statements in lines 140 and 150 are correct, even though they don't have a number to compare 'F' to or even a sign. When an IF/THEN statement is expressed this way, BASIC checks to see if the variable is equal to zero.

**The listing:**

```
5 CLEAR500:CLS:INPUT"NUMBER OF CHAR$/LINE";CL
10 INPUT"FILE NAME WITH EXTENSION (MUST BE IN ASCII FOR THAT)";N$
20 C=0:F=1
30 OPEN"I",#1,N$
50 LINEINPUT #1,A$
60 IF EOF(1)==-1 THEN F=0
70 X=LEN(A$)
75 IF X<=CL THEN 150 ELSE IF X=0 THEN 50
90 N=1
100 FOR J=1 TO INT(X/CL+1)
110 PRINT#2,1:ID$(A$,N,CL):C=C+1
120 N=N+CL
130 NEXT J
140 IF F THEN 50 ELSE CLOSE#1:END
150 PRINT#2,A$:C=C+1:IF F THEN1
60 ELSE CLOSE#1:END
160 GOTO 50
170 CLOSE#1:END
```

---

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See Page 114
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By Charles Springer

Strike up the band and unfurl the flags, please, because we have an exciting announcement:

It's time for THE RAINBOW's Third Annual Adventure Contest!

From the barrage of entries we received for last year's contest, many of you anticipate these climactic events and are already at work on a new Adventure. Approximately 150 entries were received from almost every state in the union and from several countries.

The Adventure has come a long way since our first contest in 1983 and we'd like to think (blush) that THE RAINBOW's contests have played a significant role in advancing the art.

As we've noted before on these pages, the staff enjoys these contests as much as the participants because the competitive atmosphere is an obvious catalyst for programming breakthroughs.
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By now you've solved last year's grand prize winners — Rescue on Alpha II, by Steven C. Mitchell, and The Head of the Beast, by Mark Nelson (both appeared in our December 1984 issue) — and take note of their original approaches, along with the innovations, and have a good idea of what is required to wind up on top. Other winning entries will be published in The Second Rainbow Book of Adventures, which is in the early stages of production.

What we're looking for in Adventure contests are original concepts that appeal to a wide audience. An Adventure should be challenging, yes, but above all it should be fun to play. Arriving at a solution should require only a healthy portion of plain old common sense, not the ability to read the mind of an author you've never met.

The aspect of creativity is one that cannot be overemphasized. While we can appreciate scenarios involving castles and dungeons as much as the next person, a steady diet of them would cast the Adventure as a fad and it would end up in a heap in one of those 1,200-room mazes.

A creative program that comes to mind is Yellow Submarine, a graphics Adventure by Mark Fetherston of Kenosha, Wis. Look for it in the second Adventure book because the subject obviously has great appeal. The mere title suggests this is one of those programs which could cause permanent damage to your knuckles in your haste to position it in the disk drive.

We're also looking for programs that demonstrate new capabilities for the Color Computer. Remember the excitement of loading in the first graphics Adventure? It gave all of us a collective sense of accomplishment and a renewed determination in fulfilling CoCo's incredible potential, as evidenced by the slew of graphics entries we received in last year's contest. We also received some entries that required joysticks.

"What we're looking for in Adventure contests are original concepts . . ." We do expect some surprises because CoCo users have, time and again, proven themselves to be an innovative group.

Now, let's get to the rules. Our desire for fairness dictates that we establish a uniform set of guidelines. We've already mentioned creativity, of course. Other considerations include originality, clarity of instructions and/or documentation, ease of loading, grammar, resolution, responsiveness, level of challenge and, most importantly, enjoyment.

Please remember that each program must be "memory resident"; that is, self-contained after being loaded into the Color Computer. For practical reasons, entries that access the disk while the program is running will not be considered. Disk-accessing leads to excessive length in programs. All entries should run on standard Radios Shack computer equipment, with no special modifications required because of the program.

We will consider only original, unpublished and unmarketed programs. One of the primary purposes of the programming competition is to bring new ideas and concepts to the CoCo. Conversions of existing programs, therefore, are not acceptable. Also, entries should be self-contained and not dependent upon other commercial programs for their execution.

In writing the Adventure, be careful not to pack the lines so tightly that we are unable to LIST or LLIST a line. If a program contains machine language, fully-commented source code must be provided as well as a working, assembled

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**THE RAINBOW** March 1985

36
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- "The Wait is Finally Over"
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- The CBASIC COMPILER
- Now anyone can create fast efficient Machine Language Programs
- without the Nudgery of using as Assembler.

CBASIC is a fast Machine Language Integer Basic Compiler that can convert Color Basic programs into fast machine language programs. CBASIC features over 100 Basic Commands and functions that fully support Disk, Tape, Screen and Printer I/O, Hi & Lo Resolution Graphics, Sound, Play and String Operations just like Color Basic. CBASIC also includes a powerful full featured Basic program Editor using a $1.64 or 85 by 24 line display. The Hi-Resolution display can be automatically included in your compiled program for enhanced display capability and allow mixed text and graphic displays.

- Graphics Commands:
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- Sound Commands:
  - PLAY, SOUND

- String Functions:
  - CHR$, LEEF$, MID$, RIFS$, RIGHTS$, LEFT$, INSTR$, SET$, RESET, TRMS$, STRS$, STRINGS$, INKEYS$, MNK

- Numeric Functions:
  - ABS, POS, TIMER, RND, ASC, TAB, CAL, JOYSTICK, PEEK, POKE, LOW, LOWE, EOE, FREE, CYN, ERR, VARPTR, SWAP

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- Screen Enhancement Program Comparison Chart

- Program Control:
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- Directives:
  - ORG, REM OR', END, END, END, BASE, RAM, ON, OFF, RAM4K, HIRES, GENERATE, DPSET, STACK

- Editor Commands:
  - LINE EDIT, AUTO EDIT, COPY, MOVE, RENUM, AUTO LINE+, PRINTER, LIST, DELETE, SEARCH, REPLACE, BAUD RATE, PRINTER, CBASIC, TAPPEND, SHR, SIZE, LOAD, SAVE, APPEND, KILL, DIR, and much more.

- Program Features:
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This is it — the single most impressive, awe-inspiring arcade game you can buy for your Color Computer. High-resolution graphics, awesome sound effects, four-voice music, and quality you have to see to believe! Experience the realism of DRACONIAN today!

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32K MACHINE LANGUAGE
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SR-71 is a fast-action game in which you are the pilot on a mission to take photographs of missile sites in Russia and deliver them to our processing laboratory in Japan. So real you will feel as if you are in the cockpit on a real spy mission. Elude Russian missiles as well as their detection devices. Another Tom Mix exclusive. A must for the adventures. Fantastic graphics, color and sound. 32K Ext. Basic.

TAPE $28.95 DISK $31.95

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Journey through the warehouse seeking out the Mutants who are out to destroy you. WATCH OUT! They will push crates trying to crush you! Outstanding realism — high resolution graphics — multiple screens.

JOYSTICKS REQUIRED
16K MACH. LANGUAGE
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MS. MAZE

MS. MAZE is remarkable in that it combines brilliant color, high resolution, detailed graphics, and music with a very playable game. Anything that could be done to make the Color Computer look and play like the arcade version has been done. MS. MAZE is without question the closest thing to the arcade maze games that I have seen for the Coco.

JOYSTICKS REQUIRED
32K MACHINE LANGUAGE
TAPE $24.95 DISK $27.95

PAK-PANIC

Pakman is steered thru a maze eating dots and powerpills. Pakman is pursued by four monsters who try to catch and kill him. If Pakman eats a powerpill he becomes powerful and can eat monsters. Monsters try to avoid a powerful Pakman. As monsters are eaten their ghosts appear on the top of the screen. When seven ghosts have appeared one will fly across the screen or they will fly together forming a centipede that will travel thru the maze. Pakman has no power against ghosts and centipedes and must avoid them or be killed.

JOYSTICKS REQUIRED
32K MACHINE LANGUAGE
TAPE $24.95 DISK $27.95

PAK TWINS BOTH MS. MAZE & PAK PANIC FOR ONLY 44.90 TAPE 50.90 DISK

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GRAND RAPIDS, MI 49506

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QUALITY EDUCATIONAL SOFTWARE
VOCABULARY MANAGEMENT SYSTEM

16K Extended basic/32K for printer output
The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 11 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

- As many as 300 vocabulary words and definitions may be in the computer's memory at one time.
- Words and definitions may be saved on disk or tape.
- Remarks and/or comments can be saved with word files.
- A disk loading menu allows students to load disk files without typing file names.
- Word lists may be quickly alphabetized.
- The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.

TAPE $39.95
DISK $42.95

FRACTIONS - A Three Program Package
- 32 K EXT. BASIC
TAPE $30.95
DISK $35.95

MIXED & IMPROPER
1. Review converting mixed numerals and improper fractions.
2. Practice converting improper mixed fractions into improper fractions.
3. Practice converting improper fractions into mixed numerals.
4. Practice of both types (mixed to improper & improper to mixed)
5. Review converting mixed numerals to mixed numerals.
6. Practice converting improper fractions to mixed numerals.

EQUIVALENCE
1. Definitions of terms and review of finding equivalent fractions.
2. Practice finding equivalent fractions.
3. Practice finding sets of equivalent fractions.
4. Review of finding if one fraction is equal to, not equal to, less than or greater than another.
5. Practice finding if one fraction is equal to, not equal to, less than or greater than another.

LOWEST TERMS
1. Review of placing fractions into lowest terms by finding the greatest common factor (GCF) of the numerator and denominator.
2. Practices placing fractions into lowest terms by finding the GCF of the numerator and denominator.

TEACHER'S DATABASE
TEACHER'S DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive:
- Information on as many as 100 students (more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record.
- The program will run from cassette or disk.
- Cassette and disk files are completely compatible.
- The program is menu driven.
- Records may be easily changed, deleted, combined or added.
- Information about students may be numerical or text.
- Records may be alphabetized.
- Records may be sorted by various criteria.
- The program will run on a 16K TRS-80 Color Computer.

MATH DUEL is a challenging mathematics game that pits you against the computer at a game of wits. You must use all of your knowledge of factors, multiples and prime numbers to develop a strategy that allows you to gather more numbers and thus more points than that the computer.

The game is deceptively simple. You select the number of students you want the playing field to be composed of from 8 to 100 numbers. You must then choose which numbers that will give you the maximum number of points and the computer the least number of points. There are only 6 rules:
1. Any number that you chose must have at least one factor still on the playing field.
2. You receive points equal to the face value of the number that you chose.
3. The computer receives points equal to the face value of all of the remaining numbers that you chose.
4. All of the numbers that were awarded to you or to the computer are removed from the field.
5. The game continues until there are no numbers with factors remaining.
6. At the end the computer receives points equal to the value of all of the remaining numbers.

TAPE $24.95
DISK $29.95

ESTIMATE
ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the Color Computer. It has many features that make its use particularly attractive.
- Up to 5 students may use the program at the same time.
- Up to 10 students may use the program at the same time.
- Up to 10 students may use the program at the same time.
- Up to 10 students may use the program at the same time.
- Up to 10 students may use the program at the same time.

PRE-ALGEBRA I
INTENDERS is a series of four programs designed to give students practice in working with addition, subtraction, multiplication, division and the comparison of integers. It has many features that make a very valuable tool for introducing and/or maintaining skills:
- Up to 4 students may use the program at the same time.
- Up to 4 students may use the program at the same time.
- Up to 4 students may use the program at the same time.
- Up to 4 students may use the program at the same time.

TAPE $28.95
DISK $33.95

PRE-ALGEBRA II
The second PRE-ALGEBRA PACK is composed of two programs, EQUATION SOLVER AND EQUATION DUEL, that are designed to give students practice in using and solving equations. It has many features that make a very valuable tool for introducing and/or maintaining skills:

- In both programs students may choose the range of numerical values that will be included in the equations so that the difficulty may change as their skill increases.
- In EQUATION SOLVER the computer generates a random equation, shows the numbers that it used in the equation and asks the student to create his/her own equation that uses the same numbers and results in the same answer.
- In EQUATION DUEL the student and the computer race to see who will be the first to create an equation from the same set of random numbers.
- Both programs give detailed reports of the student's and the computer's performance in creating and solving equations including time used, score and percentage correct.

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DISK $33.95

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WRITE FOR FREE CATALOGUE - MOST OF OUR INVENTORY IS NOT SHOWN HERE!
MODEL 101 INTERFACE 54.95
The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). It comes with a "UL" listed power supply that can be unplugged from the interface if your printer supplies power (Most do). The 101 is only 4" x 2" x 1" and comes with all cables and connectors for your computer and printer.

MODEL 102 SWITCHER 35.95
The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modern, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

MODEL 103 COMBO 85.95
With the turn of a knob the model 103 switches your computer's RS232C serial port to any one of 3 outputs — 2 serial and 1 parallel. The serial ports may be used for moderns, serial printers or even another computer. The parallel port can be used with any Centronics compatible printer. The 103 has the best features from the 101 and 102: color coded position indicator lights, 6 switch selectable baud rates, heavy anodized aluminum cabinet, "UL" listed power supply and many more.

The Model 101, 102 and 103 will work with any level COCO basic, any memory size 4K-64K and are covered by a 180 day warranty.

The Model 101 and 103 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Gorillia, C.1toth, Okidata and many others. They support basic print commands, word processors and graphic commands.

CASSETTE LABEL PROGRAM 6.95
This fancy printing utility prints 5 lines of information on pinfeed cassette labels. "Cassette Label" is menu driven and is very easy to use. It uses the special features of your printer for standard, extended or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.

OTHER ITEMS
High quality 5-screw shell C-10 cassette tapes $7.50/dozen
Hard plastic storage boxes for cassette tapes $2.50/dozen
Pin feed cassette labels $3.00/100

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Free shipping on orders over $50.00. Ohio residents add 5.5% sales tax.

We manufacture these products. Dealer inquiries are invited.

Good luck. We're looking forward to another great contest!
ANNOUNCING
THE THIRD ANNUAL
RAINBOW ADVENTURE
CONTEST

Calling all veteran and novice Adventurers. The RAINBOW Adventure Contest is back by popular demand! Here’s your chance to shine.

Your Adventure can encompass any setting you can imagine. Write it in 4K, 16K, 32K or 64K, in BASIC or machine language, graphics or traditional text-only style. No specific categories. Send it in. We simply want your best!

Watch for Adventure tutorials in upcoming issues of the RAINBOW. Check back issues for dozens of articles on Adventures and sample games. The Rainbow Book of Adventures is another excellent source.

Originality counts plenty, as does proper attention to documentation. Include a complete solution to the Adventure, along with features and aspects that deserve the judges’ attention. In writing the Adventure, don’t pack so tightly that we can’t LIST or LIST an entire line. If the program includes machine language, fully-commented source code must be provided, as well as a working, assembled version of your program. After all, we do want to share your gems with our readers. Indicate the minimum system needed to run your program, i.e., 32K ECB. Your program should run on standard Radio Shack equipment with no special modifications required and should not rely on commercial software for its execution. Put the accompanying article, the documentation, complete loading instructions and cover letter on paper. Include your name, address and telephone number on each page of all materials.

It is mandatory that several saves of your Adventure be submitted on good-quality tape or disk; if it won’t load, it will not be judged. We will not type in even the shortest of entries. Be sure to write-protect your disk or punch out the tabs on your tape to avoid accidental erasure and label each with the name of the program and your name and address. As in any contest, packaging does make a difference.

Above all, get your entry in by July 1, 1985 in bug-free condition. Each entrant will receive a free pass to the RAINBOWfest of his or her choice. You could win any of the prizes donated by these generous businesses.

### Prizes

<table>
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<tr>
<th>Company</th>
<th>Prize</th>
</tr>
</thead>
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<tr>
<td>Ankia Research</td>
<td>$50 software of your choice.</td>
</tr>
<tr>
<td>Aurora Software</td>
<td>Stock Broker program.</td>
</tr>
<tr>
<td>Cer-Comp</td>
<td>$50 gift certificate.</td>
</tr>
<tr>
<td>Classical Computing</td>
<td>Adventure Cracker, Speak Up!</td>
</tr>
<tr>
<td>Cognitec</td>
<td>Teletwir-64.</td>
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<tr>
<td>ColorWare</td>
<td>Puzzler, Megamunk, 10Key.</td>
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<td>Colorware</td>
<td>CoCo Max.</td>
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<tr>
<td>Delker Electronics</td>
<td>DMP 105 Printer.</td>
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<tr>
<td>Derby City Software</td>
<td>PP Color Dump, Disk Sort &amp; Order, Gemini Epson Screen Dump.</td>
</tr>
<tr>
<td>Derringer Software</td>
<td>Pro-Color-File series package.</td>
</tr>
<tr>
<td>Duggers Growing Systems</td>
<td>$50 software of your choice.</td>
</tr>
<tr>
<td>E.A.P. Company</td>
<td>Gold Plug disk module.</td>
</tr>
<tr>
<td>Four Star Software</td>
<td>Coco Paint, Bugs II, Galactic Fighter.</td>
</tr>
<tr>
<td>Great Plains Computer Company</td>
<td>STYLO-Spell (OS-9 or FLEX).</td>
</tr>
<tr>
<td>Kelly Software Dist.</td>
<td>$50 software of your choice.</td>
</tr>
<tr>
<td>Microtech Consultants</td>
<td>XTerm, XWord, XMenu, XScreen (OS-9).</td>
</tr>
<tr>
<td>The Other Guy’s Software</td>
<td>Keep-Trak, Bob’s Magic Graphic Machine, AMT.</td>
</tr>
<tr>
<td>Owl’s Nest Software</td>
<td>$100 software of your choice.</td>
</tr>
<tr>
<td>Polycony</td>
<td>$50 gift certificate.</td>
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<tr>
<td>REM Industries</td>
<td>CoCo Cooler.</td>
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<tr>
<td>Saguro Software</td>
<td>Eagle &amp; Sketchpad, both on disk.</td>
</tr>
<tr>
<td>Triad Pictures Corp</td>
<td>Animator series of four programs.</td>
</tr>
<tr>
<td>Triad Pictures Corp</td>
<td>New BASTXT and New Disk Assembler.</td>
</tr>
<tr>
<td>YCOS</td>
<td>Utility One, Utility One &amp; OS9 BASIC, Utility One &amp; Two, plus OS9 BASIC.</td>
</tr>
</tbody>
</table>

### Rules

All programs must be original, unpublished and unmarketed works, no "conversions." Entries must be postmarked prior to July 1, 1985, and become the property of Fallof, Inc., publisher of the RAINBOW. Decision of the judges is final. Duplicate prizes will be awarded in the event of ties. Winning programs will be featured in a special RAINBOW Adventure issue. Address entries to "Adventure Contest Editor" and send to THE RAINBOW, 9529 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059.
It's Halloween. You're locked in Lurkley Manor with an assortment of bizarre people and other unearthly things. You must use your skill and logic to escape the house without getting bumped off.

*Lurkley Manor* comes wrapped in a “fiendishly” long program listing which requires 32K and Extended Color BASIC. I hope you'll find the program worth the work, for it's an all-graphics logic puzzle with 16 scenes, 11 characters, animation and text in the Extended graphics mode. You will see the instructions when the program runs.

If your computer does not support the POKE 65495,0 “speed poke,” you must delete it from lines 2 and 1830 of the listing.

If you wish the text to stay on the screen longer before erasing, in Line 2630 increase the timer loop from FOR T=1 TO 1000 to FOR T=1 TO 2000 or greater. The title sequence and instructions may be skipped by inserting GOTO 160: at the start of Line 120. Do not renumber lines 1 to 64; this will cause the program to work incorrectly.

A self-addressed, stamped envelope gets you the step-by-step instructions for escaping *Lurkley Manor*. Send your request to 1493 Mt. View Ave., Chico, CA 95926.

(Richard Ramella has written two books and numerous articles on TRS-80 topics. He is a writer for a California hospital.)
The listing:

```plaintext
1 REM * LURKLEY MANOR * TRS-80 E
2 CLEAR 500: POKE 65495, 0
3 W$ = "DIRECTION"; I$ = "NEW"; W$ = "YOU RUN INTO A WALL."
   RETURN
4 X = X - 6: RETURN
5 Z$ = "30335388": RETURN
6 Z$ = "11135053": RETURN
7 Z$ = "203609603930797": RETURN
8 Z$ = "790000040474747979094049": RETURN
9 Z$ = "1111797927": RETURN
10 Z$ = "79000077557777557755777755": RETURN
11 Z$ = "3033": RETURN
12 Z$ = "4022222727274": RETURN
13 Z$ = "40622667674": RETURN
14 Z$ = "434724242626646666": RETURN
15 Z$ = "42481575": RETURN
16 Z$ = "2937": RETURN
17 Z$ = "2757": RETURN
18 Z$ = "4949": RETURN
19 Z$ = "7009": RETURN
20 Z$ = "602001829697871622": RETURN
21 Z$ = "2340040482959": RETURN
22 Z$ = "0200206067337575707090": RETURN
23 Z$ = "979": RETURN
24 Z$ = "02002060673375757575757575768": RETURN
25 Z$ = "000606765505": RETURN
26 Z$ = "79000040446446464646466": RETURN
27 Z$ = "790000040474747979094049": RETURN
28 Z$ = "3033": RETURN
29 Z$ = "01101060671733644414": RETURN
30 Z$ = "40303011405508808191969697878757": RETURN
31 Z$ = "27559": RETURN
32 Z$ = "720557": RETURN
33 Z$ = "1272515": RETURN
34 Z$ = "0275557": RETURN
35 Z$ = "0220020606717373644643": RETURN
36 Z$ = "563434141405050707181866": RETURN
37 Z$ = "092020505077974": RETURN
38 Z$ = "0000369637871864404644": RETURN
39 Z$ = "7160010101001809119696": RETURN
40 Z$ = "7000000009790565": RETURN
41 Z$ = "1530": RETURN
42 Z$ = "9000369697575727250500": RETURN
43 Z$ = "1530": RETURN
44 Z$ = "0000369697575727250500": RETURN
45 Z$ = "1530": RETURN
```

GOSUB 1530: GOTO 47205
```
10,1,.5,0,: CIRCLE(220,40),10,
2,.5,5,0,: A$="YOU JUMP!": GOSUB
B 1530: A$="YOU FOOL!": GOSUB 15
30: FOR VB=240 TO 1 STEP -5: SOU
ND VB,1: NEXT VB: A$="THE END":
KZ=1: GOSUB 1530: GOTO 2610
1040 CIRCLE(220,60),2,6,2,2,.5,1:
DRAW"C2; B1200,60; E5F5E5F5E5F5E5
F5"
1050 CIRCLE(220,15),10,1,.5,0,. 5 :
CIRCLE(21J,25),5: CIRCLE(228,25)
1060 GH=1: A$="A GHOST APPEARS I
N MID-AIR, SAYING.. • RECON SIDER I
GH AS=E-A-E-I-K!": GOSUB 1530:
GOTO 1000
1070 GOSUB 2650: A$="LAB ORATORY 
OF\=GOSUB 1530: GOSUB 2510: GOSUB
2530
1080 FOR V=40 TO 80 STEP 10: FOR
V1=100 TO 140 STEP 10: LINE(VI,
V)-(V1+10,V+10),PSET,B: NEXT V1,
V: DRAW"C1; B160,40; R20": DRAW"Bt
50,95;R40 
1090 COLOR 2,1: LINE((70,120)-(2
15,134),PSET,B: NEXT VI, V: DRAW"C1;
B160,40; R20": DRAW"BM(V)+V$+J$:
1100 FOR V=60 TO 23 STEP 5: R$="T
3R(V)+",17": IF V<16 THEN J$="G
5FS" ELSE J$="FS5S"
1110 FOR V=1 TO 100: PAINT(101+R
ND(42),43+RND(43)),RND(2)*2,3: P
SET(176+RND(34),71+RND(48),RND(2)
*2): SOUND RND(240),1: NEXT
1130 A$=WS: GOSUB 1530: GOSUB 26
60: IF HY=2 AND CV=1 THEN CV=0:
GOSUB 2100: GOTO 1070 ELSE IF HY
=3 THEN 1340 ELSE A$=WS: GOSUB
1530: A$="THIS GIVES YOU A CHAN
E TO WATCH SOME MORE AS...": GOS
UB 1530: GOTO 1110
1140 GOSUB 2650: A$="FLA GO N SPIL
LING ROOM": GOSUB 1530
1150 GOSUB 2510: FOR V=1 TO 100:
PSET(RND(25)+2,RND(15)+2,2):
NEXT V
1160 A$="IHE:RE ARE STRANGE SttAJ , L
THING S ALL AROUND.": GOSUB 1530
1170 IF FL$="ORANGE" AND FL$="BU
LE": THEN 1270
1180 A$="T\= THIS IS THE FLAGON SPlL
LING ROOM. YOU HAVE A FLAGON. YO
U SPILL IT.": GOSUB 1530: A$="TH\= E
FURIES REANIMATE MUFIFIEP SPD\=
ERS WHICH GROW HUG E AND ATTACK."): KZ=1: GOSUB 1530: PCLS 1
1190 D1H A(1,23),B(7): PCLS 1: C
RICLE(15,14),3,5: CIRCLE(15,10
),13,6
1200 FOR V=8 TO 23 STEP 5: V$=ST
R(V)+",17": IF V<16 THEN J$="G
5FS" ELSE J$="FS5S"
1210 DRAW "R"+V$+J$": NEXT V: PS
ET(11,7,4): PSET(18,7,4)
1220 GET(2,2)-((33,33),A,G: PCLS
1
1230 X=RND(7)-1: P=X*RND(8): FOR J
=1 TO RND(25): B(X)=B(X)+1
1240 PUT(F,B(X))-(P+31,B(X)+25),
A
1250 IF B(X)>110 THEN 1270
1260 NEXT J: GOTO 1230
1270 A$="HI WHAT A SAD ENDING!":
GOSUB 1530: PAINT(0,0),4,3: COL
OR 1,1: A$="E-E-E-E-E-E-K!": KZ=1:
X=64: Y=160: GOSUB 1540
1280 PLAY "T": GOSUB 1820: GOTO
1280
1290 A$="YOU'RE VERY LUCKY... FOR
SOME REASON": GOSUB 1530
1300 GOSUB 2650: A$="DIRECTION?" :
GOSUB 1530: GOSUB 2660: IF HY=
3 THEN 480 ELSE A$=WS: GOSUB 15
30: GOSUB 2660: GOTO 1140
1310 A$="YOU WALK DIRECTLY INTO
THE FIREPLACE.".: GOSUB 1530
1320 A$="YOU MUST THINK THIS TESTS
A CINCH. FOR YOU IT'S A SIN
GE...": GOSUB 1530: GOTO 2610
1330 A$="THE DOOR BEHIND YOU IS
LOCKED. REMEMBER?": GOSUB 1530:
GOTO 160
1340 GOSUB 2650: A$="GYMNASIUM:"
This is one of those rare programs that will captivate everyone in your family.... No one can see CoCo Max and not want to try it!

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THE COMPLETE COCO MAX SYSTEM, with software on DISK .............. $69.95
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A SKELETON IN THE CLOSET. IT SAY
S ...": GOSUB 1530: A$="YOU CA
HE HERE TOO SOON, YET YOU ARE NO
W... THE LATE." : GOSUB 1530
2230 A$="YOU TAKE A PERMANENT PL
ACE ON THE OTHER SIDE OF THE MIDDLE DOOR." : GOSUB 1530
2240 CIRCLE(128,95),30,2,5,1:
X=107: Y=70: A$="R 1 P." : GOSUB 1560
2250 COLOR 2,1: FOR X=90 TO 166:
LINE(X,100)-(X-3-RND(6)),100-R
ND(15)),PSET: NEXT X: COLOR 3,1:
2260 A$="IT LEADS TO A SECLUDED
GLEN JUST BEHIND LURKLEY MANOR.
YOUR FINAL STOP." : KZ=1: GOSUB 1
530: GOTO 2610
2270 A$="NOIRA DARK ASKS IF YOU HAVE
SOMETHING TO DRINK. <Y>ES OR <N>
O." : GOSUB 1530
2280 IF X$="N" THEN A$="DON'T FORGET HE." : GOSUB 1530
RETURN
2290 IF X$="N" AND FL$="BL" THEN A$=
"IT'S BLUE! I HATE PRUNE JUICE, OR WHATSOEVER IT IS!" :
GOSUB 1530: RETURN
2300 IF X$="N" THEN A$="THE SKELETON MUST O.KAY THIS FIRST." : GOSUB 1530: RETURN
2310 IF X$="N" AND FL$="ORANGE" THEN FL$="": A$="TASTE IT V ERY GOOD! IF YOU WISH.
IT NOT THEN AS="I WILL SMTP YOU." :
GOSUB 1530: RETURN
2320 X$=INKEY$: IF X$<>"Y" AND X
$<>"N" THEN A$="SHE PRODUCES A BOMB." :
GOSUB 1530
2330 FOR X=10 TO 35: FOR V=4 TO 1
STEP -1: COLOR V,1: CIRCLE(163
X),2,2; V: NEXT V: PLAY "T25;01;C
": NEXT X
AND FL$="BLUE" THEN A$="SEE MY OH! I MEAN MY MULLY - TO GET THIS APPROVED BEFORE I DRINK IT.

NEXT V,X: COLOR 3,1
OR v=0 TO 1: SCREEN l,V: LINE (l6)
HIS TEACH YOU NOT TO FIB?": KZ = l
$<>"Y" THEN 2450 ELSE IF X$= "Y"
3,40)-(RND(255),RND(l34)),PSET:
GOSUB 1530: GO TO 2610
2440 A$="BLURTON SAYS: I SEE YOU
2410 COLOR 4,1: FOR X-1 TO 60: F
SI THE END.": GOSUB 1530: GOSUB
ON AND KEEPS IT.": GOS UB 1530: A
2470 IF X$="N " THEN A$="BLURTON
2460 IF X$="Y" AND LEFT$ (FL$, 2 )=
8+RND( 20 ) ,60+RND(20)),3,4: NEXT:
15,40)-(125,95),PSET,B: LINE(40,40)-(0,0),PSET: LINE(2
2550 DRAW"BI225,105;U50E20D90": PAINT(228,101),2,3: RETURN
2580 A$="IT IS DAWN AS YOU ESCAP
5),3,4: POKE 65494,0: PLAY"T32; 0
2540 LINE(DS,50)-(DS+30,95),PSET:
8+RND(20) ,60+RND(20)),3,4: NEXT:
2530 DRAW"BT225,105;U50H20D90": PAINT(228,101),2,3: RETURN

SUB 1530: RETURN
2460 IF X$="Y" AND LEFT$ (FL$, 2 )=
"OR" THEN A$="IT'S ORANGE STUFF,
2490 FOR V=l TO 10: CIRCLE(159,4)
IF X$="N" OR X
15,40)-(2 55,0),PSET: LINE(215,95
15,40)-(2 55,0),PSET: LINE(215,95

SUB 1530: RETURN
2470 IF X$="N " THEN A$="BLURTON
2440 A$="NO ONE SURVIVES. WILL T
5),3,4: POKE 65494,0: PLAY"T32;0
15,40)-(2 55,0),PSET: LINE(215,95

NEXT V,X: COLOR 3,1
OR v=0 TO 1: SCREEN l,V: LINE (l6)
HIS TEACH YOU NOT TO FIB?": KZ = l
$<>"Y" THEN 2450 ELSE IF X$= "Y"
3,40)-(RND(255),RND(l34)),PSET:
GOSUB 1530: GO TO 2610
2440 A$="BLURTON SAYS: I SEE YOU
2410 COLOR 4,1: FOR X-1 TO 60: F
SI THE END.": GOSUB 1530: GOSUB
ON AND KEEPS IT.": GOS UB 1530: A
2470 IF X$="N " THEN A$="BLURTON
2460 IF X$="Y" AND LEFT$ (FL$, 2 )=
8+RND( 20 ) ,60+RND(20)),3,4: NEXT:
15,40)-(125,95),PSET,B: LINE(40,40)-(0,0),PSET: LINE(2
2550 DRAW"BI225,105;U50E20D90": PAINT(228,101),2,3: RETURN
2580 A$="IT IS DAWN AS YOU ESCAP
5),3,4: POKE 65494,0: PLAY"T32; 0
2540 LINE(DS,50)-(DS+30,95),PSET:
8+RND(20) ,60+RND(20)),3,4: NEXT:
2530 DRAW"BT225,105;U50H20D90": PAINT(228,101),2,3: RETURN

SUB 1530: RETURN
2460 IF X$="Y" AND LEFT$ (FL$, 2 )=
"OR" THEN A$="IT'S ORANGE STUFF,
2490 FOR V=l TO 10: CIRCLE(159,4)
IF X$="N" OR X
15,40)-(2 55,0),PSET: LINE(215,95
2550 CIRCLE(159,45),3,1: CIRCLE(8+RND(20),60+RND(20)),3,4: NEXT:
POKE 65495,0: RETURN
2510 LINE(40,40)-(215,95),PSET,B: LINE(40,40)-(0,0),PSET: LINE(2
2520 DRAW"BI225,105;U50E20D90": PAINT(228,101),2,3: RETURN
2530 DRAW"BT225,105;U50H20D90": PAINT(228,101),2,3: RETURN
2540 LINE(DS,50)-(DS+30,95),PSET:
12,4: PAINT(200,80),4,4: LINE(1,120)-(1,120),PSET: FOR V=1 TO 25
5 STEP RND(15)-10: N=NNl
2460 N=N+1: IF N<2=INICH(2) THEN
V=80+RND(20) ELSE V=100+RND
2350 GOSUB 2650: CIRCLE(200,80),
2370 LINE-(V,Vl),PSET: NEXT: LIN
2670 FOR V=l TO 15: CIRCLE(22,60)
2390 GOSUB 2600: GOSUB 2650: GOS
UB 1600: A$="IT'S IGOR! HARUMP! I
NEVER HOPED-- I MEAN EXPECTED T
SEE YOU AGAIN.": GOSUB 1530: GOTO
2610 PLAY "T1": GOSUB 1820: GOTO
2610 PLAY "T1": GOSUB 1820: GOTO
2610 CELL(1,P1)-(32,P2),PRES ET, B
2630 FOR V=1 TO 10: CIRCLE(200,80),
2650 RETURN
2660 X$=-INKEY$: HY=INSTR(DI$,X$)
2670 FOR V=l TO 15: CIRCLE(22,60)
2680 RETURN
2680 7-1: END-OF-LISTING
Constructing 16K Of EPROM For Your Disk Controller

By Tony DiStefano
Rainbow Contributing Editor

A lot of people call or write to me with suggestions about doing this and trying that, and I plan to start doing some of them soon. Some of the most popular ones are quite good, but I'll not mention them right now. I wouldn't want to say something and not live up to it later.

I would like to apologize to my readers for the errors that sometimes appear in "Turn Of The Screw." You see, all of the projects that appear in this article, I have built, tested and debugged. The biggest problem is when it is time to write the article, I have to take my prototype and transfer all the hardware information into type. That means diagrams, parts lists, text and schematics. This is where I am most vulnerable to errors. Once I have finished the rough draft, I read it over again, then when all is completed, I read the whole thing once more. Errors, however, do creep in; please bear with me, I do my best.

If, when constructing one of my projects, you do come across something that does not seem right, don't continue. Stop and study the situation. If you don't come to a solution, contact me either by letter (include a SASE) to THE RAINBOW, or by calling me on any Monday night at (514) 473-4910. Never try to do something unless you are sure of what you are doing. Be forewarned, the computer is not very forgiving. One error can cause a lot of damage. I know, I have burnt out a few chips in my time and occasionally still do.

Now to get to this month's topic. One of the memory mapped areas I described in last month's article is the area reserved for the cartridge ROM pack. I also said that when you plugged in the disk controller, the Disk Operating System (Disk BASIC) used this area. This month, we will look into expanding Disk BASIC hardware.

To recap this area, the *CTS pin on the controller controls the ROM chip that contains the disk software. The *CTS select line can access a total of 16,128 bytes. (Better known as 16K.) It is memory mapped from 49,152 ($C000) to 57,343 ($DFFF). All references to the "lower 8K" will be at this address. That leaves the upper 8K, from 57,344 ($E000) to 65,279 ($FEFF), of unused memory. All references to the "upper 8K" will be this area.

Actually, this memory is not unused. It is memory mirrored to the lower 8K. This means it is not properly decoded and when the upper 8K accesses, the lower 8K chip responds. For example, type in:

```
PRINT PEEK(49152) ENTER
```

and

```
PRINT PEEK(57344) ENTER
```

Both responses will be the same. Now, if we were able to properly decode this area, we could use the free space to add another chip, usually an EPROM. This chip could be used as an extension of Disk BASIC or often-used utilities.

For example, the Spectrum DOS, by Spectrum Projects, could be burned into EPROMs, and whenever you turned the computer on, it would be
right there. (I will not go into how to work with or use EPROM programmers. There are several on the market and all seem to be good; it all depends on price and ease of use. Usually the more you pay, the easier it is to use. I will leave the software programming up to you.)

What I intend to do in this article is describe the chip that is in the Radio Shack controller when you buy it, and the way you can interface two 8K EPROMs or one 16K EPROM.

The 8K EPROM I will use is the Intel 2764; it is the most economical one I have found. The 16K EPROM is the Intel 27128 (a little more expensive, but a little less trouble). Other manufacturers make the same chip, but make sure it is the Intel pinout as opposed to the TI pinout. You can use the TI pinout chip, but you'll have to figure out the pinout changes for yourself. Another note: If you like to use the high speed poke, for POKES 65495.0 you must use a 300 ns access time chip, or faster, in order for it to work. The slower 450 ns chip works in the regular mode, but not at the faster rate.

Now, the chip that contains the Disk Basic software is made by Motorola. This chip is a masked ROM — ROM means Read Only Memory. That means the data contained in this chip can never be changed, erased or lost (unless you burn out the chip). The data is permanently printed directly on the chip itself at the time of production. It costs less to produce a ROM as long as the quantity is high.

The chip used here is an MCM68A364. It is an 8K by 8 ROM. Figure 1 shows the pinout of this chip. By the way, the BASIC and Extended BASIC chips are also the same chip, just different masks.

The first way of using all of the 16K memory in the cartridge area is to use a 16K EPROM. Figure 2 shows the pinout of an Intel 27128 EPROM. Examine the diagram and compare it to Figure 1.

What is wrong with this picture? There are 28 pins on this chip. The 8K ROM has only 24. This is a bit of a problem, but certainly not unsurmountable. It's time to get the oil' soldering iron and wire out. The following is a step-by-step procedure to modify and solder up a 27128 EPROM to fit (kind of) into a 24 pin socket. I recommend only those experienced in soldering attempt this.

The first thing we must do is study the pinout for this chip. Examine Figure 2, the Intel 27128 chip. The first thing we notice is that it has 28 pins, four more than the socket. Pin numbers 1, 2, 27 and 28 are the odd pins. If you line up pin #3 of the EPROM and pin #1 of the ROM, the rest of the pins are almost the same as the ROM. The different pins between an Intel 27128 and an MCM68A364 are as follows:

<table>
<thead>
<tr>
<th>Pin #</th>
<th>EPROM</th>
<th>ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (-)</td>
<td>Vpp</td>
<td>N/C</td>
</tr>
<tr>
<td>2 (-)</td>
<td>A12</td>
<td>N/C</td>
</tr>
<tr>
<td>20 (18)</td>
<td>CE</td>
<td>A11</td>
</tr>
<tr>
<td>22 (20)</td>
<td>OE</td>
<td>CE</td>
</tr>
<tr>
<td>23 (21)</td>
<td>A11</td>
<td>A12</td>
</tr>
<tr>
<td>26 (24)</td>
<td>A13</td>
<td>Vcc</td>
</tr>
<tr>
<td>27 (-)</td>
<td>PGM</td>
<td>N/C</td>
</tr>
<tr>
<td>28 (-)</td>
<td>Vcc</td>
<td>N/C</td>
</tr>
</tbody>
</table>

When it is time to insert this chip into the 24 pin socket, let the odd pins hang out. Pin #3 on the IC will plug into pin #1 on the socket. Make sure you get pin #1 right. It is usually marked with a small hole or a notch.

Step 1 — Bend pins #20, #23 and #26 (on the IC) out far enough so when you insert the chip these pins will not enter the socket. Make sure it does not touch anything.

Step 2 — Solder a short piece of #30 wire from pin #20 to pin #22 on the IC.

Step 3 — Solder another piece of #30 wire from pin #1 to pin #28 and pin #27 on the IC.

Step 4 — Solder one end of a one-inch piece of #22 wire to pin #28 on the IC. Strip ¼ inch of insulation from the other end. This end will insert into the empty pin #24 of the socket.

Step 5 — Solder one end of a two-inch piece of #22 wire to pin #2 on the IC. Strip ¼ inch of insulation from the other end. This end will insert into the empty pin #21 of the socket.

Step 6 — Solder one end of a one-inch piece of #22 wire to pin #23 of the IC. Strip ¼ inch of insulation from the other end. This end will insert into the empty pin #18 of the socket.

Step 7 — Solder one end of a four-inch piece of #30 wire to pin #26 on the IC. Solder the other end of this wire to pin #37 on the edge connector, the side that plugs into the computer. That is the second to last pin closest to you on top, on the right-hand side if you are looking at the front of the controller. That's it! Carefully insert the chip into the socket making sure there are no shorts. You now have a 16K EPROM in your controller. If you want to erase this EPROM, just remove all of the solder spots and start over again.

If you do a good job in soldering and de-soldering, the EPROM could stand about 10 or so recylings.

If you don't want to use a 16K EPROM, or your present programmer cannot handle 16K chips, then using two 8K EPROMs is the answer. There are two problems with using two 8K EPROMs. The first problem is how to decode the two separate chip select lines and the last address line. Figure 3 shows the pinout of an Intel 2764.
Notice that pin #27 is the pin used in the programming of this chip. However, if this pin is low during a read cycle, the chip "deselects" — the chip does not respond to a read. It stays deselect all the time this pin is low. If we were to attach the last address line to it (A13) when this line was low, the chip would not activate. The fact that A13 is low means you are accessing the lower 8K block. Since the chip deactivates when it is low, it meets the decoding needs of the upper block.

On the other hand, pin #20 of the 2764s to fit in a 24 pin socket and be accessed as a 16K chip.

Step 1 — Program the first chip with the data that goes into the lower 8K and mark it as the lower chip. Program the second with the data that goes into the upper 8K and mark that as the upper chip. It is important not to get the two mixed up, they are not wired up the same way.

Step 2 — Take the lower chip and bend pins #20 and #23. Take the upper chip and bend pins #20 and #27.

Step 3 — Mount the upper chip on top of the lower chip so pin #1 is on pin #1, 2 on 2, and so forth, leaving a small gap for air circulation. Solder all the unbent tips of the upper chip to the bases of the lower chip. Even if the lower pin is bent, in the case of pin #23.

Step 4 — Solder a one-inch piece of #30 wire from pin #20 to pin #22 on the upper IC.

Step 5 — Solder another piece of #30 wire from pin #1 of the lower IC to pin #28, #27 and #26 of the lower IC.

Step 6 — Solder one end of a two-inch piece of #22 wire to pin #20 on the upper IC. Strip ¼ inch of insulation from the other end. This end will insert into the empty pin #21 of the socket.

Step 7 — Solder one end of a two-inch piece of #22 wire to pin #23 on the upper IC. Strip ¼ inch of insulation from the other end. This end will insert into the empty pin #18 of the socket.

Step 8 — Solder yet another two-inch piece of #30 wire from pin #20 of the lower IC to pin #27 of the upper IC. Solder one end of another four-inch piece of wire to pin #27 of the upper IC and solder the other end of that to pin #37 of the edge connector. See the first Step 7 for proper location of this pin.

You are now ready to plug the "spider" (as I call it) into the socket. Remember pin #3 in the spider goes into pin #1 of the socket. The other four pins sticking out over the socket are #1, #2, #27 and #28.

By popular request, for those of you who do not want to build this project, there is a board adapter available, built and tested, that you can buy from R.G.S. Micro which does the same thing. See their ad in this magazine. It fits inside only the J&M controller and is made for two Intel 2764 EPROMs.

That is it for now, enjoy your 16K Disk BASIC.
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If you own a small business and have any employees, then you know what a hassle payday can be. Now you can put your CoCo to work doing your payroll and allow yourself more time for important matters.

Here's a payroll package that's patterned after one used by a large American corporation. But this one only requires a 16K CoCo, a disk drive and a printer.

*Payroll Package* is a sophisticated set

(Dennis Weide is a communications technician for AT&T Communications where he is assigned to the electronic switching system. His hobbies include designing and making toys and computers.)

**Table 1**

<table>
<thead>
<tr>
<th>Payroll System Program Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(As listed on Disk Directory)</em></td>
</tr>
<tr>
<td>COMPUTE/BAS — Computes payroll for all employees. Calculates net and gross pay. Keeps track of employee attendance. Generates all data for all databases.</td>
</tr>
<tr>
<td>EMPLOYEE/BAS — Prints pay checks, pay stubs and employee mailing list.</td>
</tr>
<tr>
<td>EMPLOYER/BAS — Database manager for payroll database. Allows editing of the database.</td>
</tr>
<tr>
<td>PAYROLL/DAT — Database for all employee data. Used to compute pay and print paychecks.</td>
</tr>
<tr>
<td>EMPLOYER/DAT — Database for all employer records. Used to compute payroll for employer</td>
</tr>
</tbody>
</table>
The Paymaster
By Dennis H. Weide

of four programs that should make your business life easier. It shows the usefulness of the CoCo in small business applications. These four programs will compute the payroll, write the paychecks, and keep employee and employer payroll records as well as attendance and vacation records.

It can be modified to analyze or print the stored data in any format desired. You can modify it to print the W-2 forms Uncle Sam requires from everyone. Table I gives a brief description of each program and its function.

The programs are straightforward with no fancy gimmicks (PEEKs and POKEs), so they will work on any version of the CoCo with 16K or more and Disk BASIC. The variables are listed along with an explanation at the beginning of each program so any experienced programmer can easily modify them.

How it Works
On a normal weekly, bi-weekly or monthly schedule, load and run the payroll program. Enter the payroll codes for each employee, then ask for the paychecks to be printed and sit back and relax or go play a fast round of golf.

A hard copy of the employee’s payroll data is provided for the employee and employer to sign and save for reference. After the payroll data has been entered for all employees, you can command the program to print the paychecks and pay stubs.

Setting up the System
This month we’ll see how to build and manage the data files used in the package. To get started, key in program listings 1 and 2 one at a time. It’s not necessary to key in any lines using REMarks, however, it will make it easier to modify the programs later.

After you have keyed in each program, save it to disk using the program name listed in Line 1,000 of that program. You can save a lot of time if you notice that some subroutines and remarks are common to several programs. Save them to disk using the ASCII option and merge them with each program as needed. Since you’ll be reading and writing to disk, it’s a good idea to make a backup copy of
the finished programs before running them.

**Employee Data File Manager**

Now let's take a look at the data files and the programs that manage them. The employee data file consists of a program and file for storing all employee payroll information. Each employee is assigned a record number in the file. A built-in editor allows you to correct and the programs that manage them.

**Finding a Record Number**

To use the editor routine, you must know the employee's record number. This number represents the order the record is stored on disk. To find the record number, enter '6' from the main menu of the EMPLOYEE program (LIST RECORDS). The program will read all records on the disk and print each record number and employee name on the screen.

**Editing an Employee Record**

To edit an employee record, enter '4' from the main menu and follow the prompts. To make corrections, enter the new data at the appropriate prompt then press ENTER. If no correction is required for a prompt, press ENTER and the program will jump to the next prompt without changing the data.

Prompts showing commas require more than one entry. If all data should remain unchanged, press ENTER until the next prompt appears. If one entry of a multiple input entry is changed, you must make an entry for each input. Always verify data when finished by requesting a printout of the edited employee's file.

**Printing a Record**

To print an employee's record on paper, enter '3' from the main menu. You'll be prompted for the employee's record number. If you enter ALL, the program will print a record for every employee on file. If you enter NONE, the program will return to the main menu.

Entering any number from one to 10 will print the record for that employee. A sample employee printout is included (Figure 1). It is self-explanatory, so when you practice using the package, you shouldn't have any trouble understanding it.

**Moving and Deleting a Record**

When an employee leaves or retires from the company, you may want to remove that record from disk. Use the edit function of the EMPLOYEE program to change the employee's name to NO NAME. The program will now disregard the entire record.

If you wish to overwrite that record, select '5' from the program menu (MOVE EMPLOYEE RECORD). The program will prompt you to verify that the overwrite is correct. The program will only overwrite a NO NAME record. This prevents accidentally overwriting the wrong one and destroying valuable data. If you change a record to NO NAME by mistake, change it back to the correct name by editing it again.

**The Employer Data File**

The employer data file program stores all the pay period, monthly and year-to-date (y-to-d) totals for the employer's records. It can print, edit or create files much the same as the employee data record program. Prompts and inputs are similar to the employee program so I won't go into much explanation.

You should note that making any changes in the employee data file will most likely require a change in the employer data file, also. Again, a sample employer printout (Figure 2) is shown here and is self-explanatory.

**Using the Package**

To use these programs, first build the employer and employee data files. Start by typing RUN 'EMPLOYEE' and enter. The EMPLOYEE program will load from disk and a menu will be displayed on the screen.

Enter '2' to reserve disk space for your employee file. You'll reserve 10 separate records in the employee file, each labeled NO NAME. A warning will appear on the screen telling you you're about to erase all data. This is to prevent accidental erasure of the data file. Since there is no data file yet, enter 'R' to reserve space.

Enter '1' from the main menu to input employee data into the data file. You'll be prompted for the field entries. The
This program records all pay period and employee data in a file. It's important to get a hard copy of all the data by entering '3' from the main menu and running the program.

All employee data will be output to the printer, allowing you to verify each record. If any displayed commas must have been confirmed correct, enter '8' to load its capacity to over 500 employees by changing the proper loop values in the programs. Table 2 shows the program variables and their values. The capacities of the variables are as written, you can increase the number of employees as you see fit.厂家

When the menu is displayed, enter '1' to reserve file space on disk. Again, you will be warned about erasing valuable data, but at this point, there is no employer data, so enter 'R' to create the file on disk. There are no other entries required for the employer data file. The information stored in this file is computed by the COMPUTE program.

All employee data is stored in the EMPLOYEE/DATE file while employer data is stored in the EMPLOYEE/DIR file. You can verify these files on disk using the directory DIR command. I used direct access files to save as much disk space and time as possible.

Some Final Notes

Next month, we'll take a look at the programs which actually compute the payroll and print the paychecks. In the meantime, it would be a good idea to practice using the two data file managers we have just discussed. Try creating an employee data file and editing and deleting records from it.

For anyone not wishing to key in the programs, I'll tell you how to get copies next month. If you have any questions or comments, you can write to me at 14201 Marquette N.E., Albuquerque, NM 87123. Please include a SASE. If you have a major program bug, be sure to send along a program listing and sample printouts.

##

```
2900 .... .49 20300 .... .232
4800 .... .154 22200 .... .85
6700 .... .91 24100 .... .190
8400 .... .120 25400 .... .57
10000 .... .30 27100 .... .41
12000 .... .213 28400 .... .147
14000 .... .191 30000 .... .199
16700 .... .59 31800 .... .146
18500 .... .91 END .... .146
```

Listing I:

Employee

```
 Employee

1000 '  EMPLOYEE
1100 '  EMPLOYEE DATA BASE
1200 '  FOR PAYROLL PACKAGE
1300 '  BY DENNIS H. WEIDE
1400 '  (C) 1983
1500 '  
1600  CLS: CLEAR 1000: F1$ = "########################################################.
##  " POKE 153, 20
1700 '  
1800 '  VARIABLE TABLE
1900 '  USE REM STATEMENTS
2000 '  
2100 '  
```

```
2200 '  BUFFER #1-EMPLOYEE VA
2300 '  RIABLES
2400 '  (A$) 12 LN$=EMPLOYEE LA
2500 '  (B$) 8 GN$=EMPLOYEE GI
2600 '  (C$) 1 MI$=EMPLOYEE MI
2700 '  (D$) 20 AD$=EMPLOYEE ST
2800 '  REET ADDRESS
2900 '  (E$) 12 AC$=EMPLOYEE CI
3000 '  (F$) 2 SA$=EMPLOYEE ST
3100 '  (G$) 5 ZC$=EMPLOYEE ZI
3200 '  (H$) 9 SS$=SOCIAL SECU
3300 '  (I$) 1 DN$=NUMBER OF D
3400 '  (J$) 5 HW =HOURLY WAGE
3500 '  (K$) 5 UD =UNION DUES
```
It's time we put our chips on the table

and showed you our best deals on computer hardware.

<table>
<thead>
<tr>
<th>HARDWARE SPECIALS</th>
<th>Price</th>
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<td>Extended Basic w/ 3k</td>
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<tr>
<td>64k (DE) Memory Upp.</td>
<td>$59.95</td>
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<tr>
<td>26-3192 CoCo Drive</td>
<td>$399.00</td>
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<td>26-1161 CoCo Drive 1</td>
<td>$229.00</td>
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<tr>
<td>HJ Keyboard (D,E,F,2)</td>
<td>$79.95</td>
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<td>26-3127 64K Extended CoCo2</td>
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<td>26-3127 Model 100 BK</td>
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<td>26·3138 Model 100 BK Upg</td>
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<td>Volksmodem 1200</td>
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<td>$69.95</td>
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<td>Newton J·Cat Modern</td>
<td>$129.95</td>
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<td>$179.95</td>
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<tr>
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<td>$179.95</td>
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<td>Hayes SM·300 Modern</td>
<td>$239.95</td>
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<tr>
<td>USR Password·1200</td>
<td>$429.00</td>
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<td>CoCo Switcher</td>
<td>$39.95</td>
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<tr>
<td>Elephant Disks sssd</td>
<td>$22.95</td>
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<tr>
<td>NEW! Dual Sided Drives</td>
<td>$475.00</td>
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<tr>
<td>case, power supply &amp; cable</td>
<td></td>
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<tr>
<td>NEW! 26-3128 64K</td>
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<td>MSI DISKUTIL</td>
<td>NEW $19.95</td>
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<td>COLOR FINANCE I</td>
<td>$49.95</td>
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<tr>
<td>COLOR FINANCE II</td>
<td>$69.95</td>
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(UD): LSETL$=MKN$(CM)
9600 LSETM$=MKN$(SP): LSETN$=MKN$(GI): LSETO$=MKN$(CC)
9700 LSETS$=MKN$(SW): LSETT$=MKN$(FW): LSETU$=MKN$(LW)
9800 LSETV$=MKN$(SY): LSETW$=MKN$(FY): LSETX$=MKN$(LY)
9900 LSETY$=MKN$(CY): LSETZ$=MKN$(UY): LSETR$=MKN$(TS)
10000 LSETA1$=MKN$(BY): LSETA2$=MKN$(ST): LSETP$=PC$
10100 LSETA3$=MKN$(PA): LSETA4$=MKN$(PV): LSETA5$=MKN$(UA)
10200 LSETA6$=MKN$(VA): LSETA7$=MKN$(AA): LSETA8$=MKN$(RH)
10300 LSETA9$=MKN$(OH): LSETB2$=W E$ : LSETQ$=MKN$(MW)
10400 LSETB3$=MKN$(GE)
10500 RETURN
10600 ' CONVERT 5 BYTE CODED STRING
10700 ' 10800 ' 960121 LSETM$=MKN$CSP>: LSETN$ =MKN$
10900 LSETO$=MKN $(CC)
11000 LSETP$=PC$
11100 LSETA3$=MKN$(PA): LSETA4$=MKN$(PV): LSETA5$=MKN$(UA)
11200 LSETA6$=MKN$(VA): LSETA7$=MKN$(AA): LSETA8$=MKN$(RH)
11300 LSETA9$=MKN$(OH): LSETB2$=W E$ : LSETQ$=MKN$(MW)
11400 LSETB3$=MKN$(GE)
11500 RETURN
11600 ' CREATE A NEW FILE
11700 ' 11800 ' 11900 ' 12000 ' 12100 ' 12200 ' 12300 ' 12400 ' 12500 ' 12600 ' 12700 ' 12800 ' 12900 ' 13000 ' 13100 ' 13200 ' 13300 ' 13400 ' 13500 ' 13600 ' 13700 ' 13800 ' 13900 ' 14000 ' 14100 ' 14200 ' 14300 ' 14400 ' 14500 ' 14600 ' 14700 ' 14800 ' 14900 ' 15000 ' 15100 ' 15200 ' 15300 ' 15400 ' 15500 ' 15600 ' 15700 ' 15800 ' 15900 ' 16000 ' 16100 ' 16200 ' 16300 ' 16400 ' 16500 ' 16600 ' 16700 ' 16800 ' 16900 ' 17000 ' 17100 ' 17200 ' 17300 ' 17400 ' 17500 ' 17600 ' 17700 ' 17800 ' 17900 ' 18000 ' 18100 ' 18200 ' 18300 ' 18400 ' 18500 ' 18600 ' 18700 ' 18800 ' 18900 ' 19000 ' 19100 ' 19200 ' 19300 ' 19400 ' 19500 ' 19600 ' 19700 ' 19800 ' 19900 ' 20000 '
THE RAINBOW March 1985
**ANNOUNCING**

**CALINDEX I**

- Uses a single disk for all calendar entries.
- It is an excellent, low cost calendar for family or personal use. Keep track of your appointments and important dates such as birthdays, anniversaries, etc. with this perpetual calendar.
- Each member of your family can have a separate calendar on the same disk, and all calendars can be scanned quickly and efficiently. A simplified chain of command feature allows entries not taken care of to be shown on the overdue file at the top of the supervisory ladder.

**CALINDEX II**

- Utilizes separate disks for calendar memo files and the database list function.
- CALINDEX II was designed for business, club and professional uses where it is necessary to supervise a number of people or projects. Detailed flow charts can be created and keyed into the calendar to supervise complex projects.
- A sophisticated chain of command feature automatically bumps up the supervisory ladder entries not taken care of by the appropriate due date at lower levels. Four levels of authority and the potential for operating fifteen individual calendars provide a management at workhorse low cost.

**BOTH CALINDEX I & II**

- Are user friendly programs. They feature the ability to create and supervise up to fifteen individual calendars. The calendars can be used by individuals or can be different projects that you wish to supervise.
- The CALINDEX features as listed to the right provide a power packed program that will make you and those who use the program more efficient. This translates into more leisure time, more money and more enjoyment out of life. Try it! If you are not satisfied we will happily refund your money.

**FEATURES**

- Easy to write file cards
- Chain of command supervisor
- Automatic tickler file
- Multiple calendar management
- Perpetual calendar entries
- List creation feature
- Archive for satisfied entries
- Automatic scan selection
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**PLEASE SEND THIS PROGRAM!**

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☐ CALINDEX I: Single Disk Personal/Family Calendar ........................................ $39.00
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NOTE: Both calendars require minimum 32K + 1 Disk Drive

Please Send To:
NAME ________________________________
ADDRESS ____________________________
CITY ______________________ STATE ______ ZIP ________
☐ My check for ______________ is enclosed (Calif. residents add 6.5% sales tax)
READ DATA FILE": PRINT FP$;
17300 GOSUB B600
17400 FOR X=1 TO 10
17500 GET #1, X; GOSUB 10900
17600 PRINT#-2, LP$; "DISK FILE READ"
17700 IF LEFT$(A$, 7) = "NO NAME" THEN
17800 PRINT#-2, A$; GOTO 21700
17900 PRINT#-2, LF$; LP$; "EMPLOYEE NAME AND ADDRESS"; SP$; LF$
18000 PRINT#-2, DP$
18100 PRINT#-2, E$", "F$ "G$
18200 PRINT#-2, LF$
18300 PRINT#-2, LP$; "EMPLOYEE STATUS"; SP$; LF$
18400 PRINT#-2, "SOCIAL SEC. #", "DEPENDANTS", "HOURLY WAGE", "COMMISSION"
18500 PRINT#-2, H$; TAB(25) IF: TAB(42) "; "PRINT#-2, USINGF1$; &&&
18600 PRINT#-2
18700 PRINT#-2, "UNION DUES", "SAVINGS PLAN", "GROUP INSUR.", "CONTRIBUTIONS"
18800 PRINT#-2, USING F1$; UD; SP; GI; CC
18900 PRINT#-2, LP$; LF$; LF$; "WITH HOLDING THIS PAY PERIOD"; LF$; SP$
19000 PRINT#-2, "SOCIAL SEC.", "FED. INC. TAX", "STATE TAX", "MISC. WTHHELD"
19100 MW=SP+CC+GI+UD: IF FPC$="N" THEN
19200 PRINT#-2, USING F1$; SW; FW; LW
19300 PRINT#-2
19400 PRINT#-2, "YEAR-TO-DATE WITHHOLDING"; LF$; SP$
19500 PRINT#-2, "SOCIAL SEC.", "FED. INC. TAX", "STATE TAX", "CONTRIBUTIONS"
19600 PRINT#-2, USING F1$; SY; FY; LY; CY
19700 PRINT#-2
19800 PRINT#-2, "UNION DUES", "GROSS EARNINGS"
19900 PRINT#-2, USING F1$; UY; GY; ST; GE
20000 PRINT#-2, LP$; LP$; LF$; LP$; "EMPLEE ATTENDANCE": LF$; SP$
20100 PRINT#-2, "ABSENCE ALLOWED", "PAID ABSENCE", "UNPAID ABSENCE"
20200 PRINT#-2, TAB(4) AA"DAYS", PA
"DAYS",UA"DAYS"
20300 PRINT#-2,LF$;"VACATION ALL QUOTED","VACATION USED"
20400 PRINT#-2,TAB(4)VA"DAYS",PV"DAYS"
20500 PRINT#-2,LP$;LF$;LF$;"PAYCHECK FOR WEEK ENDING ";WE$:LF$;SP$;
20600 IF PECS="N"THENPRINT#-2,LP$;"NO PAYCHECK THIS PERIOD";SP$:PRINT#-2,STRING$(20,10):GOTO20700
20700 PRINT#-2,"REGULAR HOURS","OVERTIME HOURS"
20800 GA=(RH+(DH*1.5))*HW+(TS*CM)
20900 TW=MW+FW+SW+LW
21000 PT=GA-TW
21100 PRINT#-2,TAB(6)RH;TAB(25)OH
21200 PRINT#-2,"TOTAL SALES","GR Y AMOUNT","TOTAL WITHHELD","NET AMOUNT"
21400 PRINT#-2,"ENTER SOCIAL SECURITY NUMBER":INPUTSS$
21500 PRINT#-2,STRING$(16,10)
21600 IF OA=1THENCLOSE#1:GOTO6700
21700 IF OA=1THENCLOSE#1:GOTO6700
21800 GOTO6700
21900 EDIT EMPLOYEE FILE
22000 EDIT EMPLOYEE PAY STATUS
22100 EDIT EMPLOYEE NAME & ADDRESS
22200 CLS:PRINTFP$;PRINTTAB(7)"EDIT EMPLOYEE FILE":PRINTFP$;
22300 PRINT:INPUT"ENTER EMPLOYEE RECORD ";X
22400 IF X<1THEN6700
22500 GOSUB6600:GET#1,X:GOSUB10900
22600 CLS:PRINTFP$;PRINTTAB(7)"EDIT EMPLOYEE FILE":PRINTFP$;
22700 PRINT@130,"1.EMPLOYEE NAME AND ADDRESS"
22800 PRINTTAB(2)"2.EMPLOYEE PAY STATUS"
22900 PRINTTAB(2)"3.WITHHOLDING THIS PAY PERIOD"
23000 PRINTTAB(2)"4.WITHHOLDING YEAR-TO-DATE"
23100 PRINTTAB(2)"5.EMPLOYEE ATTENDANCE RECORDS"
23200 PRINTTAB(2)"6.PAYROLL COMPUTATION"
23300 PRINTTAB(2)"7.END EDIT FUNCTION"
23400 PRINT:INPUT" ENTER ONE OF THE ABOVE":OA
23500 CLS:ON OA GOTO24000,25100,
26600,27500,28500,29800,30600
23600 GOSUB33200:GOTO22200
23700 EDIT EMPLOYEE NAME & ADDRESS
23800 EDIT EMPLOYEE NAME & ADDRESS:PRINTFP$
24100 PRINT:PRINT"ENTER EMPLOYEE NAME":PRINT"(LAST,FIRST,INITIAL)"
24200 INPUTLN$,GN$,MI$:IF LN$=""THEN24300ELSE LSETA$=LN$:LSETB$=GN$:LSETCH$=MI$
24300 PRINT:PRINT"ENTER EMPLOYEE STREET ADDRESS"
24400 INPUTAD$:IF AD$=""THEN24500ELSEAD$=AD$
24500 PRINT:PRINT"ENTER CITY (12),ST (2),ZIP (5)"
24600 INPUTAC$,SA$,ZC$:IF AC$=""THEN24700ELSE LSETA$=AC$:LSETF$=SA$
24700 GOTO22600
24800 EDIT EMPLOYEE PAY STATUS
25100 EDIT EMPLOYEE PAY STATUS:PRINTFP$;
25200 PRINT:PRINT"ENTER SOCIAL SECURITY NUMBER":INPUTSS$
25300 IF SS$=""THEN25400ELSE LSETHEN250000SELSETA$=SS$
25400 PRINT:PRINT"ENTER NUMBER OF DEPENDANTS":INPUTDN$
25500 IF DN$=""THEN25600ELSE LSETHEN255000SELSETI$
25600 PRINT:PRINT"ENTER HOURLY WAGE":INPUTB1$:IF B1$=""THEN25700ELSE T$=MKN$(VAL(B1$))

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25700 PRINT "ENTER UNION DUES": INPUT B1$: IF B1$ = "" THEN 25800 ELSE SET K$ = MKNS$ (VAL (B1$))
25800 PRINT "ENTER COMMISSION PER CENT": INPUT B1$: IF B1$ = "" THEN 25900 ELSE SET L$ = MKNS$ (VAL (B1$)) / 100
25900 PRINT "ENTER SAVINGS DEDUCTION": INPUT B1$: IF B1$ = "" THEN 26000 ELSE SET M$ = MKNS$ (VAL (B1$))
26000 PRINT "ENTER GROUP INSURANCE": INPUT B1$: IF B1$ = "" THEN 26100 ELSE SET N$ = MKNS$ (VAL (B1$))
26100 PRINT "ENTER CHARITY DEDUCTION": INPUT B1$: IF B1$ = "" THEN 26200 ELSE SET O$ = MKNS$ (VAL (B1$))
26200 GOTO 22600
26300
26400 EDIT WITHHOLDING THIS PAY PERIOD
26500
26600 PRINT FP$: PRINT "EDIT WITHHOLDING THIS PAY PERIOD": FP$
26700 PRINT "EDIT SOC. SEC. WITHholding": INPUT B1$: IF B1$ = "" THEN 26800 ELSE SET P$ = MKNS$ (VAL (B1$))
26800 PRINT "EDIT FICA WITHHELD": INPUT B1$: IF B1$ = "" THEN 26900 ELSE SET Q$ = MKNS$ (VAL (B1$))
26900 PRINT "EDIT STATE TAX WITHHELD": INPUT B1$: IF B1$ = "" THEN 27000 ELSE SET R$ = MKNS$ (VAL (B1$))
27000 PRINT "EDIT MISCELLANEOUS": INPUT B1$: IF B1$ = "" THEN 27100 ELSE SET S$ = MKNS$ (VAL (B1$))
27100 GOTO 22600
27200
27300 EDIT YEAR-TO-DATE WITHHOLDING
27400
27500 PRINTFP$: PRINT "EDIT YEAR-TO-DATE WITHHOLDING": FP$
27600 PRINT "EDIT SOC. SEC. TOTAL": INPUT B1$: IF B1$ = "" THEN 27700 ELSE SET T$ = MKNS$ (VAL (B1$))
27700 PRINT "EDIT FICA TOTAL": INPUT B1$: IF B1$ = "" THEN 27800 ELSE SET U$ = MKNS$ (VAL (B1$))
27800 PRINT "ENTER STATE TAX TOTAL": INPUT B1$: IF B1$ = "" THEN 27900 ELSE SET V$ = MKNS$ (VAL (B1$))
27900 PRINT "ENTER CONTRIBUTIONS TOTAL": INPUT B1$: IF B1$ = "" THEN 28000 ELSE SET W$ = MKNS$ (VAL (B1$))
28000 PRINT "ENTER UNION DUES TOTAL": INPUT B1$: IF B1$ = "" THEN 28100 ELSE SET X$ = MKNS$ (VAL (B1$))
28100 PRINT "ENTER GROUP INSURANCE": INPUT B1$: IF B1$ = "" THEN 28200 ELSE SET Y$ = MKNS$ (VAL (B1$))
28200 PRINT "ENTER SAVINGS TOTAL": INPUT B1$: IF B1$ = "" THEN 28300 ELSE SET Z$ = MKNS$ (VAL (B1$))
28300 PRINT "ENTER GROSS EARNINGS": INPUT B1$: IF B1$ = "" THEN 28400 ELSE SET A$ = MKNS$ (VAL (B1$))
28400 GOTO 2022600
28500
28600 EDIT EMPLOYEE ATTENDANCE RECORD
28700
28800 PRINTFP$: PRINTTAB (4) "EDIT PAYROLL COMPUTATION": FP$
28900 PRINT "EDIT REGULAR HOURS": INPUT B1$: IF B1$ = "" THEN 29000 ELSE SET B$ = MKNS$ (VAL (B1$))
29000 PRINT "EDIT OVERTIME HOURS": INPUT B1$: IF B1$ = "" THEN 29100 ELSE SET C$ = MKNS$ (VAL (B1$))
29100 PRINT "EDIT TOTAL SALES": INPUT B1$: IF B1$ = "" THEN 29200 ELSE SET D$ = MKNS$ (VAL (B1$))
29200 GOTO 2022600
29300
29400 EDIT PAYROLL COMPUTATION
29500
29600 PRINTFP$: PRINTTAB (4) "END EDIT FUNCTION": FP$
29700
29800 CLS: PRINTFP$: PRINTTAB (6) "MOVE EMPLOYEE RECORD": FP$
29900 GOSUB 860100: PRINT "ENTER OLD EMPLOYEE RECORD": PR$ = "NONE" THEN 30000 ELSE PR$ = PR$
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One of these days when you run out of things to do with your printer, you can use this one-liner to print diskette jackets. The program should work with any ordinary printer. After printing, cut along the dotted line, fold the two halves together and fold and tape the tabs.

The listing:

```
1 FOR I = 1 TO 71: PRINT # - 2, ".": NEXT: PRINT ";": NEXT: PRINT # - 2, " ": "FORI=1T071:PRINT#:2","":NEXT:PRINT#:2,"":FORI=1T022:PRINT#:2","":TAB(7);"":TAB(63);"":TAB(70);"":NEXT:FORI=1T071:PRINT#:2","":NEXT:PRINT#:2,"":FORI=1T028:PRINT#:2,TAB(7);"":TAB(63);"":NEXT:PRINT#:2,TAB(7);"":FORI=7T063:PRINT#:2,"":NEXT:END
```

George Yeager
Saint Albans, WV

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Simulations and its companion Rainbow Simulations Tape.)
Listing 2:
Employer

| 1000 | ' | EMPLOYER |
| 1100 | ' | EMPLOYER DATA BASE PROGRAM |
| 1200 | ' | FOR PAYROLL PACKAGE |
| 1300 | ' | BY DENNIS H. WEIDE |
| 1400 | ' | COPYRIGHT 1983 |

1600 CLS: CLEAR1000: POKE153, 20: F1 $="$#####.##": DIM MN$(12): GOTO39000 |

1700 |

1800 |

1900 |

2000 | ' | BUFFER #2-EMPLOYER VALIDABLES |

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CVN(D4$):YS=CVN(D5$)
6000 TF=CVN(D6$):YF=CVN(D7$):TU=
CVN(D8$):TC=CVN(D9$)
6100 YC=CVN(E1$):YL=CVN(E2$):TL=
CVN(E3$):IT=CVN(E4$)
6200 IY=CVN(E5$):MO$=D1$
6300 RETURN
6400 ' EMPL0YER DATA BASE PR
6500 ' OGRAM
6600 ' 6700 CLS:PRINTFP$:PRINTTAB(3)" EMP
LOYER DATA BASE PROGRAM"
6800 PRINTFP$:PRINTTAB(10)"PROGRAM MENU"
6900 PRINT:PRINTTAB(5)"1. RESERVE FILE SPACE"
7000 PRINTTAB(5)"2. RETREIVE DATA RECORD"
7100 PRINTTAB(5)"3. EDIT DATA RECORD"
7200 PRINTTAB(5)"4. COMPUTE PAYROLL"
7300 PRINTTAB(5)"5. WRITE CHECKS"
7400 PRINTTAB(5)"6. EMPLOYEE DATA BASE"
7500 PRINTTAB(5)"7. END PROGRAM"
7600 PRINT:INPUT" ENTER ONE OF THE ABOVE; DA"
7700 ON DA GOTO8300, 9501, 12400, 17300, 17400, 7900
7800 GOSUB17800:GOSUB5100
7900 END
8000 ' RESERVE FILE SPACE
8100 ' 8200 ' 8300 GOSUB18500:IFE2$="R"THEN840
0ELSE6700
8400 CLS:PRINT:PRINTTAB(6)"RESERVING FILE SPACE"
8500 GOSUB45000:GOSUB5100
8600 FORX=1TO12:LSETLD1$=MN$(X)
8700 PUT#2,X:NEXTX:CLOSE#2:RESTORE
8800 ' 8900 ' DATA STATEMENTS
9000 ' 9100 DATA:JANUARY, FEBRUARY, MARCH, APRIL, MAY, JUNE, JULY, AUGUST, SEPTEMBER, OCTOBER, NOVEMBER, DECEMBER

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12000 ' RETRIEVE DATA RECORD
9300 ' CLS: PRINTFP$; PRINTTAB(6) "INPUT"
9400 ' IFM1$="ALL" THEN 10200 ELSE IFM1$=
1$="NONE" THEN 6700
9600 ' GOSUB 45000: FORX = 1 TO 12
9900 ' IFLEFT$(M1$, 3) = LEFT$(M1$, 3) THEN GET#2, X: IF X = 72 THEN F2 = 1
1000 ' NEXTX: IF F2 = 0 THEN CLOSE: GOTO 9500
10100 ' GOSUB 45000: FORX = 1 TO 12: GET#2, X
10300 ' GOSUB 59000: GOSUB 10700: CLOSE #2: GOTO 6700
10200 ' GOSUB 45000: FORX = 1 TO 12: GET#2, X
10500 ' PRINT DATA RETRIEVAL
10600 ' 10700 ' PRINT# - 2, LF$: LP$: "EMPLOYER RECORD FOR " M1$
10800 ' PRINT# - 2, LF$: "MONTHLY TOTALS"; LF$: SP$
10900 ' PRINT# - 2, "PAYROLL TOTAL", "SOC. SEC. TOTAL", "FED. INC. TAX", "STATE TAX TOTAL";
11000 ' PRINT# - 2, USING F1$: PT; T2; TF; TL
11100 ' PRINT# - 2, LF$: "YEAR-TO-DATE TOTALS"; LF$: SP$
11200 ' PRINT# - 2, "PAYROLL TOTAL", "SOC. SEC. TOTAL", "FED. INC. TAX", "CONTRIBUTIONS"
11300 ' PRINT# - 2, USING F1$: PY; YS; YF;
11400 ' PRINT# - 2, LF$: "STATE TAX TOTAL", "INSURANCE TOTAL"
11500 ' PRINT# - 2, USING F1$: YL; IY
11600 ' PRINT# - 2, LF$: "PAY PERIOD TOTAL"; LF$: SP$
11700 ' PRINT# - 2, "UNION DUES", "CONTRIBUTIONS", "INSURANCE TOTAL"
11800 ' PRINT# - 2, USING F1$: TU; TC; IT
11900 ' PRINT# - 2, STRING$(36, 0)
12000 ' PRINT# - 2, LF$: LF$: LF$: LF$: R
12100 ' 12200 ' EDIT DATA RECORDS
12300 ' 12400 ' CLS: PRINTFP$; TAB(6) "EDIT DATA RECORDS"; PRINTFP$;
12500 ' PRINT: PRINT"ENTER MONTH TO EDIT"; M1$
12600 ' IFM1$="NONE" THEN 6700
12700 ' GOSUB 45000: F2 = 0
12800 ' FORX = 1 TO 12
12900 ' IFLEFT$(M1$, 3) = LEFT$(M1$, 3) THEN RN = X: F2 = 1
13000 ' IF F2 = 0 THEN GOSUB 17800: CLOSE
13100 ' GET#2, RN: GOSUB 59000
13200 ' CLS: PRINTFP$; PRINTTAB(10) "EDITOR MENU"; PRINTFP$
13300 ' PRINT: PRINTTAB(2) "1. EDIT MONTHLY TOTALS"
13400 ' PRINTTAB(2) "2. EDIT YEAR-TO-DATE TOTALS"
13500 ' PRINTTAB(2) "3. EDIT PAY PERIOD TOTALS"
13600 ' PRINTTAB(2) "4. END EDIT FUNCTION"
13700 ' PRINT: INPUT"ENTER ONE OF THE ABOVE"; OA
13800 ' ON OA GOTO 14300, 15100, 16100, 0, 16900
13900 ' GOSUB 17800: GOTO 13200
14000 ' 14100 ' EDIT MONTHLY TOTALS
14200 ' 14300 ' CLS: PRINTFP$; TAB(6) "EDIT MONTHLY TOTALS"; PRINTFP$; PRINT
14400 ' PRINT"PAYROLL TOTAL": INPUT TB1$: IF TB1$="THEN 14500 ELSE SEPT = VAL
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THE RAINBOW MARCH 1985
Answer The Challenge Of The Demon’s Defiance

By Fred B. Scerbo
Rainbow Contributing Editor

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

The “Wishing Well” is a little over a year old now, and the ideas and wishes keep pouring in at a steady pace. Some are quite good; others are totally off the wall.

The biggest problem I have found in writing this kind of column is trying to come up with material which is useful and interesting to the greatest number of readers and CoCo users. Unfortunately, too many readers have not taken this into consideration when making suggestions. Please do not be offended if I cannot elect to write the one program you need that no one else in the world could use.

Still, quite often, some wishes will have a thread of an idea which will serve as the stimulus for a full-blown project and program listing. This month’s listing is one such example.

Some readers have asked when they would get to see another “Scerbo Color Computer Game.” As I gave it some thought, I realized that I had not published a real game since the appearance of Snail’s Revenge in the Second Anniversary Issue in July of 1983. Seeing that this is now 1985, I came to the conclusion that the “Wishing Well” was in need of a game. (After all, being almost two years between games is stretching it a bit, so I figured the time was ripe for a little fun and games.)

Therefore, if this month’s “Wishing Well” looks shorter than usual, don’t be surprised. A game does not require the technical detail and background that some other articles have required. Don’t worry. You’re not getting cheated. Those of you who still don’t haveRAINBOW ON TAPE will find that this short listing will be easy to type in. Besides, I really believe that the game you have listed here will be equal in speed, color and challenge level to some games you may be paying for.

The Wish

Almost two years ago I purchased the first of my two MC-10 Color Computers. As you are well aware, software for this compact little model was and still remains largely nonexistent. I quickly wrote up a number of programs which would fit into 4K and still take advantage of the beauty and color of the Microsoft BASIC which Tandy so wisely put into its computers.

One such program was a mini-arcade game called Demon’s Defiance. The game was much like the space-bird games available for home arcade games and incorporated some of the features of the color Breakout-style games which date back to the early days of Pong.

To fit into 4K, the BASIC code I wrote had to be extremely small and efficient. Every single byte had to be efficiently utilized. There was no room for waste. Therefore, Demon had almost nothing for a title-card, no skill levels, and had to rely totally on the keyboard and space bar for action since the MC-10 had no provision for a joystick.

The resulting program was delivered to The Programmer’s Guild. Unfortunately, the market for MC-10 software appeared to be as big as the market for the MC-10 itself. (Tandy dropped
the MC-10 from its line last year due to poor sales.) So much for Demon.

When I decided to offer up a game here in the “Well” in response to your requests for one, the idea came along to revive Demon in a new and enhanced form. With a little work, Demon became Demon’s Defiance II. The code is still very efficient but some new features have been added.

First, Demon II can use either the right joystick or the arrow keys and space bar for action. Next, I have included the option for using the high-speed poke to allow for a fast or slow game. Believe me, you are going to be very surprised to see how good and rapid a game we can generate without using Hi-Res graphics.

The Program

A few things should be kept in mind before you try typing in or using this program. First, since it uses the POKE65495,0 for high speed, keep in mind that some CoCos might not be able to use the poke (especially the older ones or some Color BASIC machines). If your CoCo cannot use the POKE or if you have only Color BASIC, then delete lines 240, 250, 260 and 270.

Secondly, make sure you save the program before running it. If you do run it first, be sure to POKE65494,0 to slow down the computer before you try to save it or you will lose the whole program.

Next, since the program uses a lot of screen POKEs, be sure to check the accuracy of your typing before running the game. A wrong POKE, and poof goes the program into the twilight zone of a locked-up computer.

Another area of concern should be your accuracy in typing in the DATA statements at the beginning. Some lines have groups of just commas, so do not leave any out. The DATA creates the colorful title card which was missing from the original Demon.

You will notice that some lines include lowercase letters in the listing. Be sure to press SHIFT 0 to get the reversed lowercase letters. Shift again to finish typing any uppercase letters. This should be no problem for any of you who are old pros at CoCo programming but might be new to our newer owners.

Finally, those of you with 16K Extended computers may wish to PCLEAR 1 before keying in the listing.

This should free up enough memory for those of you who need it. (It is always hard for me to tell how these will fit since I do the programming on a 64K machine. A PCLEAR 1 never hurts, but 16K Color BASIC users will not need or be able to use this command.)

The Illusion

There are a few tricks which I used in this program to greatly speed up the action. One trick involves the positioning of the shots you fire up the screen. Rather than draw the shot all the way up the screen and have to reset it after each appearance, I only have the shot appear a few times on the screen. This will give the illusion of it traveling up the screen but do not waste the time and memory of drawing it all the way up the screen. When you see the results, you will be amazed how well this technique works.

Also, rather than check to see if a square is set or not, I have stored that information in a multi-dimensional array. Checking the array is much faster than testing the screen. The speed we pick up is impressive and you will never notice that this is the method we are using.

The Demon bird actually appears to fly by printing two different positions of the bird on top of each other over and over again. This flapping gives the illusion of a flying bird.

Overall, these simple illusions go a long way toward making this game look arcade quality.

Playing the Game

Demon’s Defiance II is actually quite easy to play, but tough to master. You control a cannon at the bottom of the screen. A Demon bird hovers over you firing laser bolts at you. You can shoot the bird, but your main goal is to blast out the colorful force shield at the top of the screen.

Unfortunately, the Demon has help. A neutralizer beneath your cannon will destroy you if you fire while the red square is directly below your cannon. You only get five lives to start with.

Clear the screen and you will gain a new life. Your score and lives are recorded at the bottom of the screen.

Sound easy? Well, here is where the skill level comes in. As you blast out the shield, the Demon will rebuild parts of it. Level one does not rebuild the shield but higher levels will at increasing speed. This new feature really makes Demon II a lot of fun and rather difficult to completely master. When the game has ended, pressing ENTER will rerun the program.

In time, I expect to see some of you listing your high scores in THE RAINBOW Scoreboard.

Is this efficient BASIC code? Well, the actual game lines only take up about 60 short lines. By the efficient placing of IF-THEN statements, the program runs in a relatively straight line with little looping or messy, misplaced subroutines.

Another way in which I kept the speed fast was by not making this listing work on an MC-10 as some of my other recent Color BASIC programs have. As you may recall, in those I included a variable MC which was equal to the offset value for the screen pokes on the MC-10. If I had included this value, the program would really have slowed down and taken up much more memory.

Besides, it would never still fit in 4K as the original Demon did. Therefore, those of you with MC-10s will have to try to track down a copy of the original Demon if you really want it. (My guess is that very few CoCo programmers have only an MC-10. Odds are, if you have RAINBOW, you have a regular CoCo as well.)

Conclusion

There you have it: a small, efficient, rapid, colorful CoCo game. I tried translating this to the VIC-20 just to see how it would work and let me tell you, I gave up after a week. Many of you don’t realize how lucky you are to have such an easy-to-use language in the CoCo. The Commodore language is an absolute nightmare when it comes to screen positioning of character codes.

Now that I have gotten my feet wet into game programming again, you may see a few more brand new games popping up in upcoming months. I might even create Snail III or Snail: The Final Chapter for an upcoming issue like the anniversary issue. Some
of you might want to suggest some game concepts or ideas in your wishes.

Somewhere inside me, I do have a graphics Adventure floating around, but I am waiting for just the right stimulus to come along so I can make it an absolute killer. (Wait! Maybe a game with killer bees would work, or a Michael Jackson takeoff game or... see how easy it is to get started?) Only time will tell.

Oops! Some Corrections

I have taken great care in trying to keep the "Wishing Well" free from errors, but as can be expected, some quirks have worked their way into the mechanism.

For example, some copies of the Text Version of the Screen Quiz Programs on RAINBOW ON TAPE ended up with the word NEXT included in every single DATA line. I don't know how it got there. It is not on the paper list, but somehow it crawled onto the RAINBOW ON TAPE. If you have such a copy, just edit out the word NEXT in each DATA line at the end.

Another reader wrote to point out that the check sum values do not work on some listings if you are using them (you know, those funny numbers at the top of the list). Since I write these programs using a full screen editor, sometimes a few blank spaces get included at the end of the line. This totally throws off the check sum values. I have tried to solve this by using the regular EDIT command to reedit the end of each line after the program is finished so that this does not occur again. Sorry!

Finally, a few readers had problems with the CoCo Tournament Programs from a few months ago. There are not any real errors in the listing. The errors some of you have gotten have come from not understanding fully how to use the logic of the program, which is probably my fault anyway.

For example, in an eight-man bracket, some of you found the computer would lock up if you included eight names and only ranked the first seven.

If you stop to think about it, you are asking the computer to solve a problem which it cannot do with the formula I have written. Logically, if you have ranked seven of eight players, you have, in fact, ranked the remaining player in position eight. Therefore, this problem is avoided if you only rank six, or rank all eight in the DATA line. The same goes with 15 out of 16, just rank all 16.

Also, you cannot rank zero players. You must rank at least the first or you will get an OD Error. Again, this is the way logic in the formula has to be written or else we would have to include quite a few IF/THEN statements.

Finally, when you are doing the ranking of all eight, or all 16, you should include the following line:

For eight bracket:

194 IF NW=8 THEN FOR I=1 TO NW:
PR$(I)=PL$(I): NEXT: GD TO 274

For sixteen bracket:

194 IF NW=16 THEN FOR I=1 TO NW:
PR$(I)=PL$(I): NEXT: GD TO 278

Somehow, these lines got left out of the listings. This should clear up any problems some of you may have with the programs.

Again, thanks for pointing these out. The instances in which these errors would occur just never came up because of the way in which I was using the program.

The listing:

10 REM***************************
20 REM* DEMON'S DEFANCE II *
30 REM* BY FRED B. SCERBO *
40 REM* 149 BARBOUR ST. *
50 REM* NORTH ADAMS, MA 01247 *
60 REM* COPYRIGHT (C) 1984 *
70 REM***************************
80 CLS$;
FA=0: THENA=128
90 POKEl,A:NEXTI
100 PRINT@238,CHR$(221)CHR$(222);CHR$(221)CHR$(222);
110 PRINT@270,CHR$(215)CHR$(219);
120 DATA,255,252,251,,255,252,252
2,255,242,241,255,,255,252,255,
255,251,240,255,,253,,255,252,
252,,250
130 DATA,255,240,255,,255,252,25
2,255,244,248,255,,255,240,255,
255,244,251,255,,,252,252,25
140 DATA,252,252,248,,252,252,25
2,252,240,240,252,,252,252,252,
252,240,244,252,,252,252,252
150 DATA175,172,171,,175,172,172
,,175,172,172,,164,175,168,,167,
172,171,,175,171,160,175,,175,17
2,172,,175,172,172
160 DATA175,160,175,,175,172,172
,,175,172,172,,160,175,168,,175,
172,175,,175,164,171,175,,175,16
0,160,,175,172,172
170 DATA172,172,168,,172,172,172
,,172,160,160,,164,172,168,,172,
2,172,,172,172,172
180 CLEAR888; U$=CHR$(128)
190 PRINT@328,"by"U$" fred"U$"b"U$"scerbo":POKE1354,32:POKE1359,
32:POKE1361,46
200 PRINT@359,"copyright"U$"c";
;POKE1392,32:POKE1393,40:POKE1395,41:POKE1396,32:POKE1397,49:POKE1398,57:POKE1399,56:POKE1400,5
2
210 PRINT@389,"oystick"U$"o"
297elli"k"U$"eyboard":POKE1412,4
O:POKE1414,4l:POKE1422,32:POKE14
25,32:POKE1426,40:POKE1428,41
20 X$=INKEY$:IFX$=""THEN220
K"THEN JS=0 ELSEIFX$="" THEN220
230 IFX$="J"THEN JS=1 ELSEIFX$="" THEN220
240 PRINT@425,"fast"US"slow"; :POKE1448,40:POKE14
50,4l:POKE1454,32:POKE1457,32:POKE1458,40:POKE1460,41
250 X$=INKEY$:IFX$="F"THEN260ELSEIFX$="S"THEN270ELSE250
260 POKE65495,0:GOT0280
270 POKE65494,0
280 PRINT@452,"select"US"skill"US"level";:POKE1482,32:POKE1488,3
2:POKE1494,32:POKE1495,40:POKE14
96,49;POKE1497,45:POKE1498,57:POKE14
99,41
290 X$=INKEY$:IFX$=""THEN290
300 SL=VAL(X$) :IFSL<lTHEN290ELSEIFSL>9THEN290
310 WL=109-(SL*8)
320 DIM T(l4,l4):CLS0:U=1:G=12:Y=
13:B$=U$:PD=4
330 KA$=CHR$(152)+CHR$(146)+CHR$(152):KB$=CHR$(146)+CHR$(148)+CHR$(148)
340 UB$=B$+CHR$(230)+CHR$(236)+CHR$(226)+CHR$(225)+CHR$(236)+CHR$(233)+B$:
UL$=B$+CHR$(244)+CHR$(244)+CHR$(248)+B$
350 DB$=B$+CHR$(228)+CHR$(227)+B$+B$+CHR$(227)+CHR$(232)+B$+CHR$(249)+CHR$(246)+B$:+GOSUB3
60:GOTO390
360 QW=0:FORI=lT014:FORY=lTQ4:T(I,Y)=O:NEXTY,I
370 PRINT@I+32,CHR$(207) ;:PRINT@I+64,CHR$(223);:PRINT@I+96,CHR$(175):NEXTI
48
380 FORWW=418T0445:PRINT@WW,CHR$(252):NEXTWW:PRINTCHR$(248):PRINT@500,"live
390 FORWW=418TO445:PRINT@WW,CHR$(252):NEXTWW:PRINTCHR$(248):PRINT@500,"live
400 G$=B$+B$+CHR$(215)+CHR$(213)+CHR$(210)+B$+B$+CHR$(213)
410 PRINT$B$+B$+CHR$(215)+CHR$(213)
420 IFQW>112THENGOSUB360
430 W=RND(6):IFW>3THEN450
440 Y=Y+1:GOTO460
450 Y=Y-1:IFY<=0THENY=0
See You At
RAINBOWfest CHICAGO
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There've Been Some Changes Made ...

By Ed Ellers
Rainbow Technical Writer

I'm departing from the usual Q & A for a bit to fill you in on some recent CoCo developments. First of all, there has been a lot of talk about the Korean CoCo. (Bob Rosen, of Spectrum Projects, suggests it should be called the KoCo!) So far, the CoCos made by TC Electronics Korea have been 16K models only (the model numbers are 26-3134 for non-Extended and 3136 for Extended). A 64K Extended model from Korea (26-3137) is expected in a few months after stocks of the 64Ks made in Fort Worth dwindle.

There are actually two different versions of CoCos made in South Korea for the U.S. market. (A writer from Holland sent me pictures of the Korean CoCo for the European PAL color TV system; it's similar to the first version in the U.S.) The first machines were very much like the American-made CoCo 2s, with a few minor changes and the fact that many of the chips are now soldered in. The RAM chips are arranged somewhat differently, with five on the bottom row of the board (under the keyboard) and the other three on the row above them. Upgrading this version to 64K is just as easy as on earlier CoCo 2s; you just replace the RAMs with a set of eight 4164 chips and solder across two holes in the board, which are now in a box marked 64K. Incidentally, many suppliers are now selling 64K RAMs in sets of nine; these are for the IBM PC and many of the "compatibles" (including the Tandy 1200), which use the ninth bit for a parity checking feature. If you find that you can buy a set of nine from one supplier cheaper than sets of eight from others, there's nothing wrong with buying nine and using eight. (The extra chip might come in handy for repairs later.)

Few computers use the "standard" 4116 16K-by-1 bit RAM chips anymore (the CoCo is the only one still on the U.S. market that I know of). The later CoCo 2s from Korea (the 26-3134A and 3136A) are now using Texas Instruments 4416 RAM chips. These are 16K-by-4 bit chips, so only two are used, instead of the previous eight. These new chips take an addressing scheme different from that of regular chips; so Motorola's new 74LS785 SAM chip is used instead of the 74L5783 (formerly 6883) used with "standard" RAMs. Color BASIC has been patched (again!) to set up the SAM chip for the 4416s; this new version, called Color BASIC 1.3, apparently is otherwise identical to the "new ROM" 1.2 version. Marty Goodman of Cheshire Cat Software disassembled 1.3 and compared it to 1.2, and he tells me that he believes all programs that work on "new ROM" machines will still work. (Extended BASIC 1.1 was not changed, and Disk BASIC 1.0 and 1.1 still work fine.)

Sadly, for those of us who "do it ourselves," the "A version" Korean CoCos are much more difficult to upgrade than the previous models. First of all, the upgrade to 64K RAM is complicated by the fact that the new machines won't accept 64K-by-4 bit RAMs (the SAM can't address them, and BASIC 1.3 doesn't have the needed code) and there are no sockets for regular 64K chips. There are two 12-pin edge connectors on the board that apparently will take a "piggyback" board for 4164 RAMs, but Tandy doesn't have this available yet. (The upgrades that they are doing are apparently done by putting in an entire main board with regular RAMs; since the old 16K boards can then be used to repair defective 16K machines, this may actually be cheaper for them with the amount of repair and upgrade work Radio Shack does.) Secondly, the two ROM sockets (one for Extended BASIC) have been replaced by a single 28-pin socket that takes either a 24-pin Color BASIC ROM or a 28-pin ROM for both Color BASIC and Extended BASIC. (In the 3136A model which is factory-equipped with Extended BASIC, the ROM is soldered in.) To put in Extended BASIC you will have to order a different part, which should be no problem if you are ordering from Tandy's.
National Parks Department, but may be trouble if you try to get it from a mail-order house (they should have it soon, though). I'm also told by Bob Rosen that this socket can be modified with one wire to take either Tandy's ROM or a 27128 EPROM. There are also a number of jumpers that have to be changed when upgrading to Extended BASIC; these are marked 128K, which refers to the 128K-bit total of a 16K-byte ROM.

There have also been some changes in the CoCo product line. The Multi-Pak Interface (26-3124) has been redesigned to match the size of the CoCo 2, and the first disk drive kit (26-3129) now uses "thinline" drives, meaning you can put two drives in a single case. Finally, the TRS-80 nameplate is going by the boards; all new computer products sold by Radio Shack (and many existing ones, like the CoCo, in a few months) will carry the Tandy name already found on the 200, 1000, 1200 HD and 2000.

Now to the letters.

Video Output for PAL Computers

- As my family and I are proud owners of a CoCo 2 (16K Extended), my problems have started to develop. The Tandy Group in Holland is not very helpful in supplying the information I require, except that after four months one of their representatives mentioned your magazine, which is hard to get in Holland and rather expensive. I hope you are willing to answer some questions, and not only in the magazine, as this will take me a long time to wait.

  What type of board do we have?

  How do I connect a monitor to the CoCo via video input or, even better, the RGB input?

Wolfgang Beekman
Oisterwijk, The Netherlands

From looking at the pictures you sent, it looks like your machine is nearly the same as the first version of the Korean CoCo sold in the U.S. Upgrading it to 64K should pose no problem if you just insert the 4164 RAMs and solder across the 64K jumper as I explained in my commentary above.

Unfortunately, hooking up a monitor may be more difficult. The U.S. CoCo (made for the NTSC system) uses a 6847 video generator and an MC1372 encoder chip together to generate the TV signal. The PAL (Phase Alternation by Line, the system used in most European countries) version also uses these two chips, but also has some added circuitry to generate the PAL phase alternation. Because of this, the commonly available video output modification kits (such as the ones sold by Moreton Bay, Mark Data, Computerware and others) may not provide a proper PAL signal. I've never seen a PAL CoCo, since they aren't sold in this country, so I really don't know. If you want to use a monochrome monitor, one of these kits should do the job, since the monochrome signal goes from the 6847 to the 1372 in the same way and the kits take it off there.

Screen Print Troubles

- I have a problem with Radio Shack's screen print program. I realize that this program was designed for a 16K computer, but I have a 64K machine. I tried upgrading it to 32K with the utility described in the October issue without success.

  Bob Conklin
  Milwaukee, WI

- I'm wondering if other people have had trouble using Radio Shack's Hi-Res Screen Print Utilities with the CGP-220 Ink-Jet Printer. A Radio Shack salesmen has been unable to give me any help, despite making several phone calls.

  Richard Volans
  Ogdensburgh, NY

I'm going on the assumption that Radio Shack's current screen print driver (BWDUMP on one side, CORDUMP on the other) is being used. To use either of these programs in a 32K or 64K machine, you first CLEAR 280,31232 and then CLRDPM **program**,16384:EXEC. The value 16384 tells the CoCo that the program should be loaded 16384 bytes (exactly 16K) higher than the addresses in the file. The EXEC address is correct.

On the color dump program, the printer should be set to 2400 Baud using the switch on the back (see the CGP-220 manual for details). CORDUMP sets the CoCo to 2400 Baud automatically. If you have a serial-to-parallel interface, you can run at speeds as high as 9600 Baud, but you will need to poke in the appropriate value after executing CORDUMP. (The CGP-220 doesn't have a switch to select parallel or serial input; just plug into one connector or the other and disconnect whatever was plugged into the other jack.)

The Multilingual CoCo

- I will be attending college soon, and am in need of programs that will assist me in the data processing field. The languages studied will be COBOL and PASCAL. I would appreciate any information on this subject.

  James Allen Hall
  Castlewood, VA

There are several PASCAL compiler packages on the market for the CoCo; one that comes to mind is DEFT Pascal from DEFT Systems. COBOL will be more difficult; I've heard that there are COBOL compilers available for OS-9 based systems, but I don't know who sells them or even if they will run on OS-9 Level I (which is the version used on the CoCo). From looking at packages for other systems (MS-DOS, UNIX, CP/M, etc.) I'd say that a COBOL compiler would also be very expensive.

Deluxe, Advanced, Super-Duper, New and Improved...

- I have just purchased a 64K CoCo 2 and I've noticed some interesting things in the new Getting Started With Extended Color BASIC manual. On pages 199 and 200 there are notes in the margin to "Deluxe Color Computer" and "Advanced Color BASIC." In the text, it mentions that on the Deluxe CoCo we should use the "CTRL key" instead of the up-arrow in some situations. Did I just buy a new computer that is going to be replaced?

  Eugene J. Resch
  Alexandria, VA

I've seen some of these references, though I hadn't heard of Advanced Color BASIC. Rumors about a Deluxe CoCo (a.k.a. CoCo 3), with such goodies as 128K RAM, true lowercase and a parallel printer port have been floating around for over a year now. The best that I've been able to make of it is that Radio Shack was planning to introduce the Deluxe CoCo (hence the notes in the manual) but dropped it at the last minute, I don't see any indication that the CoCo 2 will be dropped, however.

More BASIC Differences

- I own a SpectraVideo SV-328, and its BASIC appears to be very similar to that of the CoCo. My machine uses Microsoft BASIC, with the main added commands being PLFY, SOUND, BLEEP, PSET, PRESET and DRAW. These commands make the listings look very similar. Do you know where I could get a list of CoCo commands and explanations on how they work?

  Todd Davies
  Donnybrook, West Australia

The best things to look at are Radio Shack's own Color BASIC and Extended Color BASIC manuals, which are available at any Radio Shack store (Tandy Electronics stores overseas). Microsoft, which wrote the BASIC interpreters for the CoCo, the SpectraVideo machines and most other microcomputers, generally puts the same BASIC syntax in each, though which actual commands are there depends on what the manufacturer wants for his product, how much memory is available and what sort of video display, sound, joystick and other circuitry is available. I suspect that most CoCo programs, which have gotten very sophisticated, will have to be reworked extensively to run on your computer. (You might also look into some of the British magazines, which are now carrying listings for the MSX computers; MSX magazine published in Japan, carries listings as well, though the articles are in Japanese.)
COLOR TERM + Plus +

Select:
Half, Full Duplex or Echo
Odd, Even, Mark, Space or No Parity
7 or 8 Bit Words
1 or 2 Stop Bits
All Caps if needed
Several Printer Formats
Trapping of incoming characters

BAUD Rates:
110-4800 (communicate)
600-9600 (printer)

Screen Format:
32 x 16, 42, 51, 64 or 85 x 24
Send all 128 characters from keyboard
Buffer:
Merge text or programs
49K to 53K memory
Four Buffer Send Modes
Display Bytes Used/Remaining
Editor—Move forward and reverse thru buffer. Insert, type over, delete lines, characters or words. Block delete.

10 Macro keys
Automatic Capture of incoming files
X on / X off capabilities
Send True Line Break
Transmit/Receive BASIC Programs, Files or Machine Code. No need to translate BASIC programs to ASCII Format.
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TRACK 35,36,40,80 . change number of tracks.
DOUBLE . enable the double sided option.
PDIR . print your directory to printer.
DUMP ON/OFF . send programs without a terminal program.
RATE 6,35 . change the head stepping rate.
VIDEO ON/OFF . reverse video without a hardware mod.
SCROLL 1-255 . change your screen scrolling speed.
COMMAND . will list all new commands.
DUPE 0,1,2 . will allow copy & backup from one side of a drive to another!
DATE . . you can enter the month, day and year as an extension to your programs when they are displayed during a DIR command.

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**DOUBLE TERM + Plus +**

This program is the ultimate in CoCo communicating! Double Term + is used with a plug-in 80 column board. Supports either Double 80 Plus, Color Power II or Word Pak.

Here are just some of the features Double Term + has to offer:

**Select:**
- Half, Full Duplex or Echo
- Odd, Even, Mark, Space or No Parity
- 7 or 8 Bit Words
- 1 or 2 Stop Bits
- All Caps if needed
- Several Printer Formats
- Trapping of incoming characters

**BAUD Rates:**
- 110-4800 (communicate)
- 600-9600 (printer)

**Screen Format:**
- 80 x 24 upper/lowercase
- Send all 128 characters from keyboard

**Buffer:**
- Merge text or programs
- 49K to 53K memory
- Four Buffer Send Modes
- Display Bytes Used/Remaining
- Editor—Move forward and reverse thru buffer. Insert, type over, delete lines, characters or words. Block delete.

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- Y-Cable .......................................................... $29.95
- Double 80 Plus ................................................... $99.95
- Complete Package .................................................. $189.95 + S&H

*Requires PC Pak from PBJ, Inc.

---

**DOUBLE 80 PLUS**

**TRUE 80 COLUMN OUTPUT**

**BUILT IN SWITCH FOR COCO OR DOUBLE 80 PLUS**

**ADJUSTABLE VIDEO OUTPUT**

**GOLD PLATED EDGE CONNECTOR**

**DRIVERS AVAILABLE FOR BASIC, OS9 and FLEX**

**DISPLAY ALL ASCII CHARACTERS**

**ALTERNATE CHARACTER SETS AVAILABLE**

**METAL CASE (not cheap plastic)**

**DOUBLE TERM + available for this board**

**BACKED BY A 90 DAY PARTS AND LABOR WARRANTY**

**DOUBLE 80 PLUS (80 column board) .......................... $99.95**

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**BASIC DRIVER .................................................... $12.95**

**OS9 DRIVER ...................................................... $12.95**

**FLEX DRIVER (available soon) ................................ $12.95**

**DOUBLE TERM + (disk only) ................................... $55.95**
TO PRESERVE QUANDIC — NEW!!!
It has been a long time since we were really excited about
an adventure game. Adventure In Wonderland was and is
the best text adventure ever written for the Color Computer.
We said so, and reviewers agreed!
We are now proud to offer TO PRESERVE QUANDIC. We
believe that this is the best GRAPHICS adventure ever
written for the Color Computer.
Although it works just fine on a one drive system, the game
COMPLETELY FILLS two disks. Over 300K of programming.
It is four times as big as any adventure you have seen on
the Color Computer.
Quite simply, TO PRESERVE QUANDIC sets a new
standard for adventure games on the Color Computer.
The game itself is a work of art in every way. The puzzles
are fun and challenging, you can use complete sentences,
abbreviations, short phrases, and there are several mile­
stones on the way to success. The whole game is done in
full color highest-resolution graphics. Of course you can
save the game in progress.
TO PRESERVE QUANDIC, you must find and return the
missing piece of the time machine, and the clock is
running ... If you think you are ready for the best graphic s
adventure ever written for the Color Computer, don 't miss
TO PRESERVE QUANDIC. Packaged on two disks in a
quality vinyl library case. Requires 32K and 1 disk drive. If
you don 't have a disk drive, it will be worth buying one just
for this game. $39.95

ALL TIME FAVORITES
Adventure In Wonderland — Rainbow magazine re­viewers agreed this was the best adventure ever written
for the color computer. It incorporates an artificial intelli­
gence and has a vocabulary of over 500 words. Don‘t miss
TO PRESERVE QUANDIC. Packaged on two disks in a
quality vinyl library case. Requires 32K and 1 disk drive. If
you don’t have a disk drive, it will be worth buying one just
for this game. $39.95

FUN AND GAMES
Color Disk Trivia — Our trivia program has 1 100 questions
in 5 categories. Play alone or with up to 4 players. Use the
development system included to write your own question
disk game and development disk — $29.95. Four differ­
ten question disks are available for use with the Color
Disk Trivia game.
Bible Questions - $19.95
Sports Questions - $19.95
Entertainment Questions - $19.95
Children's Questions - $19.95
Order any of these additional question disks with the Color
Disk Trivia game and pay only $14.95 each.
Gangbusters — Try your hand at running a criminal
empire. 2-6 players · requires 16K. Tape · $24.95; Disk ·
$29.95
Viking II — See if you have what it takes to become King or
Queen. For 1-4 players, save the game feature, requires
32K. For 16k users try the original Viking. Tape · $24.95;
Disk · $29.95
Monsters & Magic — This fantasy text simulation is a
combat oriented game for fantasy gamers. It contains 50
different monsters to fight, a dungeon with over 1000
different place descriptions and lots of surprises. Tape ·
$24.95; Disk · $29.95

STATISTICS
Lizpac — Absolute the most complete statistics package
we have seen for ANY computer anywhere. Lizpac is
850,000 Bytes of programming filling 7 disks with an
eight disk containing data files to be used in the
examples. The 200 page manual completely explains all
that Lizpac has to offer. It is user friendly. Req. 32K disk
only. $195.00

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Tucson, Arizona 85749
(602) 749-2864
Home Financial Statement

. . . Forming habits beneficial to your financial health

I don’t know how it is in your family, but these days it seems that no matter how careful we are with our money, there never seems to be enough at the end of the month. I always wondered where it all was going.

As a result, I knew that this would be a perfect job for a great record-keeper, my Color Computer. So, I wrote a program that would not only show how much money was going to individual expenses each month, but that would accumulate expenses for the year-to-date, as well as express every expense as a percentage of gross income.

This would be a great help at tax time, too. By forcing myself to keep a daily record of expenses, and keeping all the receipts, I have a pretty good idea what I spent, for instance, on items on which sales tax was paid. By making simple calculations, maybe I could beat the sales tax tables (which always seem too low!).

If you are really serious about keeping track of your finances, you must keep a detailed record of what you spend and what you spend it on. I keep a clipboard on my desk, where every day I write down this information as soon as I walk in the door. You may want to keep a small tablet handy to make notes throughout the day. I admit, it’s somewhat of a nuisance, but it quickly becomes habit. At least, this is a habit that could be beneficial to your financial health.

About the Program

The program uses a little over 8.5K, so it will work on a 16K Extended BASIC machine. It’s designed for one disk, but can be adapted to work on a cassette-based machine with not too much effort.

As is the case with most financial type programs, this one also requires a printer. In this instance, the printer codes are for an Epson MX-80.

Epson Printer Codes:
The printer codes in lines 640, 850, 930, 940, and 950 may vary for your printer. For an Epson they are as follows:

CHR$(14) - Double Width Letters

<table>
<thead>
<tr>
<th>Sources of Income</th>
<th>Month</th>
<th>Percent</th>
<th>Y.T.D</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Husband’s salary</td>
<td>2,554.36</td>
<td>48.5</td>
<td>31,896.10</td>
<td>48.7</td>
</tr>
<tr>
<td>Wife’s salary</td>
<td>2,049.60</td>
<td>39.0</td>
<td>27,121.80</td>
<td>41.4</td>
</tr>
<tr>
<td>Overtime</td>
<td>413.12</td>
<td>7.9</td>
<td>3,780.15</td>
<td>5.8</td>
</tr>
<tr>
<td>Interest earned</td>
<td>242.55</td>
<td>4.6</td>
<td>2,573.08</td>
<td>3.9</td>
</tr>
<tr>
<td>Miscellaneous income</td>
<td>2.25</td>
<td>0.0</td>
<td>94.32</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,261.88</strong></td>
<td><strong>100.0</strong></td>
<td><strong>65,465.45</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Withholding and Payments

| F.I.C.A. | 165.01 | 3.1 | 2,070.94 | 3.2 |

By Roland B. Portillo

(Roland Portillo is an auditor with 14 years experience and has had his Color Computer for two years. His primary interest is programming for home money management.)
CHR$(12) - Form Feed
CHR$(15) - Turns on Condensed Letters
CHR$(18) - Turns off Condensed Letters

Definition of Variables:
01 A$ - Account and heading names
M - Monthly dollar amounts
MM - Monthly percent of each item
Y - Year-to-date amounts
YY - Year-to-date percent

Operation of the Program
The program is user-friendly. Just follow the instructions on the screen.
When using this program for the first time, you are asked if there are any cumulative year-to-date totals that need to be entered. Answering "None" will take you to the start of the data input routines.

Accounts
All the account names and group headings are in the data statements starting at Line 1040. Changes can be made easily to customize these items to meet your specific needs. One word

One-Liner Contest Winner ...
In this space game, you maneuver your ship through an asteroid field to reach the base. If you hit an asteroid it turns blue; the goal is not to hit any.
The listing:

```
```

Garry Shelton
Kannapolis, NC

One-Liner Contest Winner ...
Music Box is exactly that, a program that plays a single tune. The author decided that somebody had to write a music program to go with all those beautiful graphics!
The listing:

```
5 A$="02L2CE9E03C026E8": B$="03L1": CL2CE6E04C03BAL1:. GP4L26FD028B703D": C$="04L2C03AFCO2A03CFACAL1:. GP4L26FD028B03D": PLAY "T11X": X A$; XB$: FECAL1:. GP4X; 02B03C02G03 EL1:. CP4X; FECAL1:. GP4X; 02B03L1:. CP4": GOTO 05
```

Bob Leiter
North Platte, NE

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Simulations and its companion Rainbow Simulations Tape.)
of caution here. If you do change the account names, be sure to keep the same number of accounts in each grouping, or the totals and percentages will be off.

A note about the sales tax calculation. In my state the rate is 6.5 percent. You will need to change Line 460 for your particular circumstances.

For quick reference to the numerous accounts, after typing in the program, run it up to where it says ENTER STATEMENT DATE:. At that point, hit the BREAK key, turn your printer on, and type in the following direct command:

```
FOR N=1 TO 71:PRINT#:1.2,N;A$(N):NEXT
```

Pressing ENTER will send the various account names with their corresponding numbers to the printer which will be verified when you enter your data into the program. You can then either type CONT or run the program from the beginning.

After all your data has been entered, you can enter SUM to see a summary of your figures, just to be certain that you haven't forgotten anything. When the screen freezes, hitting any key will always continue the program. If you are satisfied that all your data is accurate, simply type END.

You will be asked if these are the final figures for the month or whether more will be added at a later date. If you answer "No" to any additions, the program will calculate the data. Once again, before the statement is printed you can request a preview, to quickly see the final results on the screen.

A check will then be made to see if the printer is ready. If not, you will be asked to put it online before continuing the program.

A note about the printer check. If you keep your printer unplugged for any reason (mainly to use the outlet), then the routine will be effective. I use a power strip with an on/off switch, so if I forget to turn the power on to the printer, my data won't be sent to nowhere. Of course, if this should happen, simply hit the BREAK key, turn your printer on, type in GOTO 600, and press ENTER. This will take the program back to the beginning of the print routine without a loss of your data.

I hope you find a use for this program. I consider it to be one of my most useful. Hopefully, by finding where I'm spending too much money, I can save enough to buy more computer equipment.

<table>
<thead>
<tr>
<th>Licenses and fines</th>
<th>0.00</th>
<th>0.0</th>
<th>68.00</th>
<th>0.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>67.51</td>
<td>1.3</td>
<td>665.88</td>
<td>1.0</td>
</tr>
<tr>
<td>Less reimbursements</td>
<td>0.00</td>
<td>0.0</td>
<td>-777.60</td>
<td>-1.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>221.61</td>
<td>4.2</td>
<td>704.49</td>
<td>1.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Automobile Expenses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wife's car:</strong></td>
</tr>
<tr>
<td>Insurance</td>
</tr>
<tr>
<td>Repairs and maintenance</td>
</tr>
<tr>
<td>Licenses and fines</td>
</tr>
<tr>
<td>Gasoline</td>
</tr>
<tr>
<td>Less reimbursements</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Other Expenses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Union dues</td>
</tr>
<tr>
<td>Life insurance</td>
</tr>
<tr>
<td>Health/Hospital insurance</td>
</tr>
<tr>
<td>Medical/Dental</td>
</tr>
<tr>
<td>Pet expenses</td>
</tr>
<tr>
<td>Meals out</td>
</tr>
<tr>
<td>Food purchases</td>
</tr>
<tr>
<td>Appliances, dishes, etc.</td>
</tr>
<tr>
<td>Small tools, etc.</td>
</tr>
<tr>
<td>Work related expenses</td>
</tr>
<tr>
<td>Computer expenses</td>
</tr>
<tr>
<td>Stereo/video/photo</td>
</tr>
<tr>
<td>Hobby expenses</td>
</tr>
<tr>
<td>Entertainment</td>
</tr>
<tr>
<td>Physical fitness expenses</td>
</tr>
<tr>
<td>Personal grooming and hygiene</td>
</tr>
<tr>
<td>Vacation</td>
</tr>
<tr>
<td>Clothing</td>
</tr>
<tr>
<td>Laundry and cleaning</td>
</tr>
<tr>
<td>Gifts, etc.</td>
</tr>
<tr>
<td>Flowers</td>
</tr>
<tr>
<td>Contributions</td>
</tr>
<tr>
<td>Magazines and books</td>
</tr>
<tr>
<td>Bank/finance charges</td>
</tr>
<tr>
<td>Collectibles</td>
</tr>
<tr>
<td>Miscellaneous</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Total Expenses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>3933.38</td>
</tr>
</tbody>
</table>

| ***Change in Savings*** | 1328.50 | 25.2 | 10504.73| 16.0 |

---Sales tax paid--- 94.09 1045.88
The listing:

10 ' ************************************
20 ' HOME FINANCIAL STATEMENT
30 ' BY
40 ' ROLAND B. PORTILLO
50 ' VERSION 2.2
60 ' JULY, 1984
70 ' ************************************

100 CLS: PRINT @ 164, "HOME FINANCIAL STATEMENT": FOR X = 1 TO 150: NEXT
110 VERIFYON: DIM A$(75), M(75), Y(75), YY(75)
120 X$ = "#######,.##": D$ = "$$#####'.##": Y$ = "###.###"
130 CLS: PRINT @ 131: "ARE THERE ANY MIDMONTH TOTALS": PRINT @ 171, "TO ENTER:"
140 PRINTTAB(15); LINEINPUT R$: IF R$ = "Y" OR R$ = "YES" THEN GOSUB 1210
150 CLS: PRINT @ 1:32, "To Enter CUMULATIVE TOTALS": PRINT @ 171, "press << ENTER >>": PRINT @ 25, "If no prior totals, enter 'NONE'"
160 PRINT @ 20, "Enter as a negative amount"
170 PRINT: LINEINPUT "ENTER A MOUNT: $ "; AM$
180 AM = VAL(AM$): M(A) = M(A) + AM: AM = 0: GOTO 210
190 M(7) = M(7) + AM: Y(N) = Y(N) + AM: NEXT: Y(7) = Y(7) + AM
200 FOR N = 2 TO 6: MC75 = MC75 + M(N): YCN) = YCN) + MCN): NEXT: Y(7) = Y(7) + MC75)
240 M(44) = M(36) + M(43): Y(44) = Y(36) + Y(43)
270 'to calculate sales tax
280 FOR N = 53 TO 71: M(75) = M(75) + (.85 * M(51))
290 M(75) = M(75) + M(50) - M(59) - M(62) - M(64) - M(67) - M(69)
300 M(75) = M(75) - (M(75) / 1.065): Y(75) = Y(75) + M(75)
310 'to compute %

90 THE RAINBOW March 1985
ARE YOUR WALKING FINGERS GETTING FOOTSORE?

Tired of typing in those long, but wonderful, programs from issues of THE RAINBOW? Now, you can get RAINBOW ON TAPE and give those tired fingers a rest. With RAINBOW ON TAPE, you'll be able to spend your time enjoying programs instead of just typing . . . typing . . . typing them! All you need to do ever again is pop a RAINBOW ON TAPE cassette into your recorder, CLOAD and RUN any one you want.

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VISA, MasterCARD and American Express accepted. All subscriptions begin with the current issue and back issues are available beginning with April 1982. Tapes are sent first class mail to arrive approximately the same time as your current issue of THE RAINBOW.
The CoCo Calligrapher

The CoCo Calligrapher works on these printers:
- Epson: MX80, FX80, 100 (8 1/2 x 11 size only), and all models with graphtrak
- Gemini: 10, 10X, 15, 15X (8 1/2 x 11 size only)
- Radio Shack: LP7, LP8, DMP100, 110, 120, 200, 420, 510, 2100
- Okidata: 92A - unless it is version 4. The ROM has a bug and the dealer should replace it for you.
- Banana: Behaves like a Radio Shack
- Prowriter: 8510

These type styles come on the CoCo Calligrapher program tape or disk:

**Old English**
- Reduced
- Reverse

**Gay Nineties**
- Reduced
- Reverse

**Cartoon**
- Reduced
- Reverse

**Old Style**
- Reduced
- Reverse

**Antique**
- Reduced
- Reverse

**Business**
- Reduced
- Reverse

**Broadway**
- Reduced
- Reverse

These additional type styles are also available — $19.95 each, or $49.95 for all on tape or disk.

**Tape 1**
- Old English-reduced
- Old English-reverse
- Cartoon-reduced
- Cartoon-reverse
- Gay Nineties-reduced
- Gay Nineties-reverse

**Tape 2**
- Broadway
- Broadway-reduced
- Broadway-reverse

**Tape 3**
- Business
- Business-reduced
- Business-reverse
- Business-reverse-reduced

**Old English Cartoon Gay Nineties**

**Tape**
- $24.95
- $29.95
- Both require 32K ECB

and Sugar Software Introduces . . .

**Color Disk Manager**

A disk utility which will handle virtually all of your disk related needs! **Color Disk Manager** will do selective initializations, verifies, backups and repairs.

- Handles multiple drives
- Make a backup of the directory
- Recover file command
- Repair or salvage crashed disks
- Gives allocation table map
- Displays file granule map
- Loads files 2 ways
- Kill file command
- Verifies tracks or entire disk
- Append sector command
- Transfers programs from tape to disk
- Rapid scan feature
- Dumps memory to screen
- Loads and executes rompacks saved on disk
- Move ROM to RAM command
- 64K compatible

Requires 32K - $34.95

**Color Tape Manager**

A utility which will handle most of your tape related needs!

- Appends ML to Basic programs
- Displays start, end, and execute addresses of ML programs
- Converts ML programs to Basic data statements
- Displays memory in hex, decimal or ASCII
- Change memory in decimal or hex
- Rapid memory-scan using arrow keys
- Allows input in hex or decimal
- Transfers control to other programs with a "go" command
- Moves blocks of memory from start through end address to new start address

Tape requires 16K ECB - $24.95
Disk requires 32K - $24.95
PreReader
32K ECB; Joystick Required
Tape - $19.95
Disk - $24.95
Level I - your child will work with colors, shapes, numbers, capital letters and small letters
Level II - your child will learn to associate individual letters and consonant blends with the sounds they make
Songs and happy faces for each correct answer!

Radio System Design Calculations

Helps design or evaluate:
- Land mobile radio systems
- Satellite TV
- Satellite data acquisition systems
- Aircraft radio systems
- Microwave systems
- Microwave/DBM conversions
- Frequency/Wave length conversions
- System received signal levels
- Gain of parabolic antenna
- Propagation Calculations

32K ECB $29.95 - Tape
$32.95 - Disk

... for the Programmer in the Family

AUTO RUN 64 - $24.95
AUTO RUN - $19.95
Tape

- Creates a ML loader which automatically starts up your Basic or ML program
- Title screen utility
- Provide an audio introduction
- Locates your program at the desired address

PIRATECTOR!
You write the Basic or ML program. Pira
tector™:
- Supplies protection scheme
- Includes Semigraf graphics editor
- Incrementing serial numbers
- Many user subroutines included
- Effective against popular piracy/ protection cracking programs

32K Disk $99.95

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Add $1.00 per tape for postage and handling. Ohioans add 5.5% sales tax. COD orders are welcome. CTs orders EMAIL to 70405, 1374. No refunds or exchanges.
850 PRINT#-2:N=44:GOSUB950:PRINT
#-2,CHR$(12)
860 PRINT#-2,TAB(27)"MONTH ENDING
8":"M$:PRINT#-2
870 PRINT#-2,TAB<27>"G":M$:PRINT#-2
880 N=46:GOSUB950
890 FOR N=47 TO 72:GOSUB940:NEXT
900 PRINT#-2:N=73:GOSUB950
910 PRINT#-2:N=74:GOSUB950
920 PRINT#-2,TAB(4)A$(75>TAB<37):PRINT#-2,<USINGX$;M<N>:PRINT#-2,
930 PRINT#-2,CHR$(12):GOTO960
940 PRINT#-2,TAB(5)A$<N>TAB(38):PRINT#-2,USINGX$;M<N>:PRINT#-2,CH
950 PRINT#-2,TAB(4)A$(N)TAB(38):PRINT#-2,USINGX$:M(N):PRINT#-2,
960 "to convert % back
970 FORM=1T075;MN>=M(N)/100:Y
980 OPEN"O",#1,"MIDMONTH."+Z$:FOR N=1T075:WRITE#1,MCN>:NEXT:CLOS
990 FORM=1T075
1000 WRITE#1,Y(N):NEXT:CLOSE#1
1010 CLS:PRINT@65,"ENTER BACKUP
1020 FORM=1T075
1030 WRITE#1,Y(N):NEXT:CLOSE#1:EN
1040 DATA "SOURCES OF INCOME
1050 DATA "WITHHOLDINGS & PAY
1060 DATA "RESIDENTIAL EXPEN
1070 DATA Major Improvements,Fur

ishing Purchases," TOTAL
" AUTOMOBILE EXPENSES:" "Husb
and's Car," "Insurance," Rep
airs & Maintenance," "Licenses
& Fines," "Gasoline," "Less Re
imbursements," " TOTAL
1080 DATA "Wife's Car," "Insu
rance," "Repairs & Maintenance
" " Licenses & Fines," "Gasolin
e," "Less Reimbursements," "
TOTAL" " TOTAL AUTOMOBILE
EXPENSES" 1090 DATA "OTHER EXPENSES:" 
Union Dues,Life Insurance,Health
s/Hospital Insurance,Medical/Dent
al,Pet Expenses,Meals Out,Food
Purchases," Appliances, Dishes, e
tc." Small Tools etc.,Work Relat
ed Expenses 1100 DATA Computer Expenses,Ste
reo/Video/Photo,Hobby Expenses,E
tertainment,Physical Fitness Ex
penses,Personal Grooming & Hygie
ne,Vacation,Clothing,Laundry & C
leaning,Gifts etc.,Flowers 1110 DATA Contributions,Magazin
es & Books,Bank/Finance charges,
Collectibles,Miscellaneous 1120 DATA "TOTAL" " TOTAL EXPENSES" " ***CHANGE IN SAV
INGS***", " ---SALES TAX PAID---
" 1130 OPEN"O",#1,"MIDMONTH."+Z$:FOR
N=1T075:WRITE#1,M(N):NEXT:CLOS
E#1 1140 PRINTTAB(10)"INSERT BACKUP
DISK AND PRESS":PRINT:PRINTTAB(1
5)" 'C' FOR COPY":PRINT:PRINTTAB
(15)"ENTER TO END" 1150 EXEC44539:IF INKEY$="C" THE
N 1130 ELSE END 1160 CLS:SS="SUMMARY OF ACTIVITY
to Date":PRINT:PRINT 1170 IF C=13 THEN C=0:EXEC44539:CLS:
PRINT 1180 IFN>72 THEN EXEC44539:S=0:
RETURN 1190 PRINT@261,"ENTER FIRST 3 LE
TTERS OF MONTH: ":LINEIN
PUTZ$:OPEN"I",#1,"MIDMONTH."+Z$:FI
OR N=1 TO 75:INPUT#1,M(N):NEXT:C
LOSE#1:M(7)=0:M(15)=0:M(28)=0:M(3
6)=0:M(43)=0:M(44)=0:M(72)=0:M(7
3)=0:M(74)=0:M(75)=0:RETURN

94 THE RAINBOW March 1985
PRINTMASTER
A full featured screen print program that will work with any printer capable of dot addressable graphics now available for the color computer. This value packed program should be on everyones 'must have' list. Just look at these powerful specifications:
- Automatic PRMODE recognition
- Menu driven or called from Basic
- Vertical and horizontal stretching (zoom!)
- Full or partial screen rotation
- 8 color recognition & separation
- Vertical & horizontal concatenation
- Inverse printing.
All of the above will work on the full screen or on any portion that you specify.

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ROMMASTER
Rommaster is a circuit board with a rotary switch and sockets for three EPROM's (24 or 28 pin) that can be individually selected. You can now have up to three versions of Basic and three versions of Extended Basic in your Coco at the same time.
If you wish you can burn your own EPROM's and have them available on power up at the flick of a switch. If you develop software for sale it is essential that your programs be tested on all versions and configurations of ROM's before you release them.

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Double sided prototype boards

|  | $9.95US | $12.95CDN |

Blank keyboard overlays

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- Search capability allows you to list or print all memos between two specified dates or only ones meeting key-word criteria.
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- Requires 32K in BASIC
TAPE DATE-O-BASE CALENDAR - $16.95 (max. 400 memos/tape file)
DISK DATE-O-BASE CALENDAR - $19.95 (over 4000 memos/disk...max. 300 memos/month)

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If you have spent hours trying to balance your Debits and Credits, DISK DOUBLE ENTRY is for you!
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- Up to 1400 average transactions on a diskette.
- Summary reports and four levels of subtotals available.
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Works in all PMODEs and lets you shift screen image anywhere on the printed page.
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- SPECIFY PRINTER TYPE...in Machine Language
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TAKING BASIC TRAINING

Further Venturing With Program Tables

You may just as well get last month's issue of THE RAINBOW and page to the "Taking Basic Training" article.

Everyone is encouraged to save all back issues of THE RAINBOW. All beginners are urged to buy all available back issues that may have been missed. Each issue is equivalent to a good-sized text book and contains a wealth of information. All RAINBOW issues should become a valued part of your CoCo reference library.

As the beginner progresses through BASIC, he will find many new vistas opening up. Articles that were incomprehensible many moons ago will now have new significance. After all, the object of "Taking BASIC" is to whet the newcomer's appetite to partake of more complex programs and progress further to dine on "gourmet fare."

In reference to Listing 1, in last month's article (which you were asked to put on cassette tape), in program lines 130, 140 and 150 you could insert SEE, and change GOTO 180 to GOTO 200.

In lines 160 and 170, insert SEES, and change the GOTO 190 to GOTO 200. Delete lines 180 and 190, and you will get the same result. It just proves there is more than one way to skin a cat.

In effect, this makes columns 1 and 2 in Table I a new Column 1 and eliminates Column 2.

You may also desire to add more words to any column to get an even more varied assortment of sentences to study. For instance, change Line 110 to \( x = \text{RND}(7) \) and add at the end of Line 120: 171, 172.

171 PRINT* 172 PRINT*
   HE SEES '1:GOTO200 SHE SEES '1:GOTO200

If you enjoy experimenting, add a verb such as "hear" above the horizontal line of Table 1 and "hears" below the horizontal line (remember, we are still discussing last month's lesson).

Use the original listing or the modified one and figure out how to integrate the two verbs into the program. There are many ways to do it and it makes a neat puzzle to solve.

Listing 1 is the altered version of last month's listing. You may choose to CLOAD your saved copy, key in Listing 1 or merely follow this month's continuation.

Refer to Table 1; make a rough working copy of it. It is assumed you have mastered the program developed last month and understand how to use the table.

Notice the dividing horizontal lines in columns 1, 3 and 7. This means that in this particular group of random sentences, the pronouns in columns 3 and 7 agree with the masculine nouns. Conversely, the third person feminine pronouns agree with the feminine nouns. Even though both the "boys" and "girls" can call the present or past tense in Column 2, the verbs in columns 4 and 8 must be in the same tense as those in Column 2.

If you attempt to create sentences from this table without the above restrictions, you are apt to get foolish sentences such as: "Joe thought she knows Greek but he didn't." To create acceptable sentences, we have to turn to string variables.

To temporarily bypass the CLOADed listing, add:

19 GOTO 400
400 CLS: FOR I=1 TO 6: PRINT: NEXT

Program Line 400 clears the screen and locates our first line of created text on the sixth screen line.

By Joseph Kolar
Rainbow Contributing Editor

Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)
The nouns in Column 1 and the pronouns in Column 3 will have to be turned into string variables.

Nor e that nouns have two spaces in front of the names for indentation purposes and one space after to allow for spacing between the noun and the next word. The two pronouns have only a space at the end for the same purpose.

The rule is that each word will allow for the spacing between it and the following word, before adding the closing quotation mark. Now, for the three sets of verbs:

```
410 BS= "JOE";CS= "GEORGE";DS="HE";
420 ES= "DIANA";FS= "OLIMPIA";GS= "SHE"
```

Run repeatedly, checking for mistakes. Since the noun can call either tense, lines 520 and 530 give us the two verbs (LS or MS). We allowed for the proper pronoun, ZS (lines 470-500). We set up ZZS to equal either NS or OS, and print the appropriate verb from Column 4 that agrees in tense with the verb in Column 2.

Note at this time that when a sentence begins with OLIMPIA, only five spaces remain at the right-hand margin. Obviously, the nouns in Column 5 will split into two text lines on the screen.

Set up the program line numbers for the Column 5 nouns by keying:

```
540 X=RND(4);ON X SOTO 550,560,570,580
```

We use PRINT@ to locate the next text word on the second text line at the left margin.

```
550 PRINT222,"RUMANIAN "+B$;560 PRINT222,"GREEK "+C$;570 PRINT222,"LATIN "+E$;
580 PRINT222,"FRENCH "+F$;
```

Run repeatedly and weed out any errors. Rewrite Line 590 to read:

```
590 PRINT@" BUT "+Z$;
```

The above line adds the only word in Column 6 and ZZS adds the correct pronoun from Column 7. (Recall that we told CoCo in lines 470-500 whether ZZS="he" or "she." )

```
600 GOTO 680
```

Run the program and check.

To get the correct tense we desire from Column 8, we tell CoCo:

```
600 IF ZS="H" THEN AAS=P$ ELSE 370
```

If ZZS is the present tense, then AAS would be the present tense, etc.

At this point, it is time to center both text lines. Run repeatedly to check the length of the first line of text. The longest line of text is "Olimpia thought she knew." (You could also count the characters and spaces between words, using Table 1, to find out the number of spaces remaining at the right side.) It is always better to visually inspect your handiwork.

The longest line of text leaves five blank spaces on the right. This indicates it is safe to add three spaces in front of all initial sentence words in Column 1.

Edit lines 410 and 420. Insert three additional spaces between the first quotation mark and the first character of the noun in BS, CS, ES and FS. Now, the first line of text will be pushed over toward the right; run this repeatedly. The first text line is fairly well-centered.

Looking at the second line, we note that rather than beginning at the left margin, it would look more attractive if we moved the line of text over two or three spaces; let's try three spaces.

```
610 IF ZZS=N$ then AAS=Q$ ELSE 370
```

Looking at the second line, we note that rather than beginning at the left margin, it would look more attractive if we moved the line of text over two or three spaces; let's try three spaces.

```
620 PRINT AA$;
```

You may not like this, so change 227 to 226 in lines 550-580 and run. Somehow, it looks better. You may still not like what you see, so try one space (225), and perhaps you prefer to begin at the left margin. You choose! Try them all and pick your preferred format.

To operate the program, we decide to press 'G' and to get out of the program, press 'H.' Key in:

```
630 AS=INKEYS: IF AS="G" THEN CLS:650 ELSE 400
```

To integrate last month's program, which we bypassed in order to develop this month's sentence, DEL 10 and delete from Line 370 ELSE 370 and add:

```
380 IF AS="H" THEN 400 ELSE 370
```

Note that 'H' will advance to the next group of sentences in Line 380 and in 640 will jump out of the program. Make a closing panel.

```
650 CLS(3);PRINT235," THE END ";660 GOTO680
```

We must change the instructions at Line 30 (see Listing 2).

Naturally, you could add other tables to make this a long, varied and interesting study session for the pupil.

I hope you enjoyed creating this program. Remember, there are other ways to make portions of this program. Needless to say, you can add modifications and improvements; make up a nice title page of your own design.
What to look for when buying application software . . .

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Elite•Comm turns your Color Computer into a powerful 300 baud terminal. With Elite•Comm you can access large main-frame computers, local computer bulletin boards, and national computer database services. Elite•Comm is fully compatible with Elite•Word and will work with ASCII files from other programs. If you want a terminal communications package that is smooth and easy to use, Elite•Comm is for you.

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- Edit records with full screen "type over" editor
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- Load Elite•Calc worksheets into random access data files
- Scan mode for quick data retrieval
- Locate any record by field content
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- Select specific groups of records by field content with full logic combination capability
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**CALC-LIST** is a separate, machine language, utility that works independently of Elite•Calc. It can read either tape or disk worksheet files, and will give you additional information that was previously "hidden" within your worksheet. With CALC-LIST, you can list on the screen (or print) the actual contents of your worksheet cells, including FORMULAS. You get all the valuable worksheet format data including assigned Column Widths, all cell Format specifications ($, C, F, G, etc.), Constant table assignments, and Printer format information (Set-up, Page Length, Line Width, etc.). Use your CALC-LIST printout as a hardcopy backup of your worksheet for review or archival purposes. You can even let your friends use the listing so they can type your worksheets.
Listing 3 creates the routines for the sentences created in Line 400, using GOSUBs instead of GOTOs. If you care to explore, alter the second sentence program you developed using Listing 3 as a guide, to use GOSUBs instead of GOTOs. It is always good to know alternate solutions and the only real way to learn them is to experiment on the old CoCo.

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Table X

Listing 1:
0 'LISTING1 MODIFIED FROM FEB. '8
5 'RAINBOW'
50 CLS(0): PRINT@128," TO STUDY
THE SENTENCES IN THIS PROGRAM, P
RESS THE <G> KEY. REPEAT THIS
PROCEDURE UNTIL YOU ARE FINISH
ED WITH THE TABLE."
60 PRINT: INPUT "PRESS
<ENTER>";OA
100 CLS
105 FOR I=1 TO 6:PRINT:NEXT
110 X=RND(7)
120 ON X GOTO130,140,150,160,170
,171,172
130 PRINT" I SEE ":GOTO200
140 PRINT" WE SEE ":GOTO200
0
150 PRINT" YOU SEE ":GOTO200
0
160 PRINT" JOE SEES ":GOTO200
0
170 PRINT" OLIMPIA SEES ":GOTO200
0
171 PRINT" HE SEES ":GOTO200
0
172 PRINT" SHE SEES ":GOTO200
0
200 X=RND(5):ON X GOTO210,220,23
,240,250
210 PRINT"HIM ":GOTO260
220 PRINT"HER ":GOTO260
230 PRINT"THEM ":GOTO260
240 PRINT"GEORGE ":GOTO260
250 PRINT"DIANA ":GOTO260
260 X=RND(2):ON X GOTO270,280
270 PRINT"OPENING ":GOTO290
280 PRINT"SHUTTING ":GOTO290
290 X=RND(2):ON X GOTO300,310
300 PRINT@225,"A ":GOTO320
310 PRINT@224," THE ":GOTO320
320 X=RND(4):ON X GOTO330,340,
,350,360
330 PRINT"DOOR. ":GOTO370
340 PRINT"WINDOW. ":GOTO370
350 PRINT"BOOK. ":GOTO370
360 PRINT"DICTIONARY.";GOTO370
370 A$=INKEY$: IF A$="G" THEN CL
S;GOTO100 ELSE370

Listing 2:
0 'LISTING2
5 CLS(0): PRINT@128," TO STUDY
THE SENTENCES IN EACH TABLE, PRE
SS <G>. WHEN YOU ARE READY TO G
O TO THE NEXT TABLE, PLEASE PRE
SS <H>. REPEAT THIS PROCEDURE
UNTIL YOU FINISH ALL THE TABLES
IN THE EXERCISE."
60 PRINT: INPUT "PRESS
<ENTER>";OA
100 CLS
105 FOR I=1 TO 6:PRINT:NEXT
110 X=RND(5)
120 ON X GOTO130,140,150,160,170
,171,172
130 PRINT" I ":GOTO200
140 PRINT" WE ":GOTO200
0
150 PRINT" YOU ":GOTO200
0
160 PRINT" JOE ":GOTO200
0
170 PRINT" OLIMPIA ":GOTO200
0
171 PRINT" HE ":GOTO200
0
172 PRINT" SHE ":GOTO200
0
200 X=RND(5):ON X GOTO210,220,23
,240,250
210 PRINT"HIM ":GOTO260
220 PRINT"HER ":GOTO260
230 PRINT"THEM ":GOTO260
240 PRINT"GEORGE ":GOTO260
250 PRINT"DIANA ":GOTO260
260 X=RND(2):ON X GOTO270,280
270 PRINT"OPENING ":GOTO290
280 PRINT"SHUTTING ":GOTO290
290 X=RND(2):ON X GOTO300,310
300 PRINT@225,"A ":GOTO320
310 PRINT@224," THE ":GOTO320
320 X=RND(4):ON X GOTO330,340,
,350,360
330 PRINT"DOOR. ":GOTO370
340 PRINT"WINDOW. ":GOTO370
350 PRINT"BOOK. ":GOTO370
360 PRINT"DICTIONARY.";GOTO370
370 A$=INKEY$: IF A$="G" THEN CL
S;GOTO100 ELSE370

THE RAINBOW March 1985
There is an old legend, handed down through generations of Canadian plains Indians, which tells a tragic tale of two lovers.

A young Indian brave, so the legend goes, was on his way to his wedding, a journey of many days. He was making his way down a beautiful river valley, interspersed with many lakes, when he heard his name called. The caller seemed to be his lover. But that couldn’t be. She was still days away. "Who calls?" he asked from his drifting canoe. "Who calls?" was his only answer — a lonely echo; nothing more.

Yet, he was so sure...

When, finally, he arrived at his beloved’s home, he was greeted with tears of sorrow and told the tale of his lover’s illness and untimely passing. And as she crossed from this world into the next, he was told, with her last breath she called his name.

She had died the very moment he had heard her call his name while he made his way toward her — down the Qu’Appelle Valley.

Qu’Appelle is French for "Who calls" and was the name given to the river and valley which pass through the plains of Saskatchewan in the heart of Canada.

Now, from the shore of Echo Lake in the beautiful Qu’Appelle Valley a call is going out again. This time it is to CCo users everywhere.

A new (and different) news magazine, made especially for your CCo and you, is about to be launched — from the shore of Echo Lake in the beautiful Qu’Appelle Valley, from the heart of Canada to you.

Watch for it!

Pieter van der Plogen,
Proprietor, Dragonfly Writings®.
RETURN
2200 X=RND(4): ON X GOTO2210,222
0,2230,2240
2210 PRINT@226,"RUMANIAN ":RETUR
RN
2220 PRINT@226,"GREEK ":RETURN
2230 PRINT@226,"LATIN ":RETURN
2240 PRINT@226,"FRENCH ":RETURN

Bonus Listing:

0 '<STARSONG>
10 'CC> 1984, J. KOLAR
30 PMODE2:PCLS:PMODE4
40 A=170:B=106:P=1.01
50 DIM B(2), D(2), F(2), H(2), J(2)
61 DRAW"BM14,0D4"
63 DRAW"BM38,4L4"
65 DRAW"BM54,4U4"
67 DRAW"BM70,4R4"
69 DRAW"BM90,0F2ND4R4E2D4NF2L4N"
62BEU2R2D2L2"
71 GETC10,0>-<1B,B>,B,G
73 GETC30,0>-<3B,B>,D,G
75 GET(50,0>-<5B,B>,F,G
77 GETC70,0)-(78,8>,H,G
79 GET<90,0)-(98,9>,J,G
80 PCLS:SCREEN1,1
105 FOR R=8121 TO 20STEP-10
110 FOR Z=2000 TO 1904 STEP-5:C=
Z/Z/2
120 C=C+P/2/180
200 X=INT(A-6+R*SIN(C-.625) YI
NT(B-6+R*COS(C-.625))
225 PUT(X-40,Y-10)-(X-32,Y-2),B,
D,E
230 PUT(X-40,Y-10)-(X-32,Y-2),D,
E,F
235 PUT(X-40,Y-10)-(X-32,Y-2),E,
F,G
240 PUT(X-40,Y-10)-(X-32,Y-2),F,
G,H
245 PUT(X-40,Y-10)-(X-32,Y-2),G,
H,I
250 PUT(X-40,Y-10)-(X-32,Y-2),H,
J,I
255 PUT(X-40,Y-10)-(X-32,Y-2),I,
J,K
260 GOTO 260

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Remarkable progress has been made with the Color Computer, and the software available is staggering. When I passed the phase of discovering what our marvelous machine could do, I began a successful quest for useful software for various and unique applications. Color Computer owners can be very selective, and with magazines such as THE RAINBOW, the choice is sometimes very simple.

I was presented a challenge by a close friend to develop a system he could use to help manage his rental property. My first thought was to set up one of the available spreadsheet programs, or perhaps even a database to fit this specific application. I proceeded in this direction, but soon learned that the application would be very limiting, and require constant modification of the "packaged" software. Therefore, I began to develop the following program system.

First, I made a list of what we wanted the program to accomplish:

(J.D. Ray is minister of music at the Cooper River Baptist Church in North Charleston, S.C. He enjoys water skiing and woodworking as hobbies. He has two children, Jeff and Jenny.)
1) A file program to have pertinent information available when needed, such as renter’s name, rental date, deposits, phone numbers and mortgage information.

2) A financial journal to record all financial transactions each month.

3) A financial summary of income and expenses on a monthly basis.

4) A financial summary of individual property transactions on a monthly basis.

5) A year-to-date summary on income and expenses.

6) Applicable on a 16K Disk System with printer options.

7) Sufficient screen prompts to prevent keeping paper notes and instructions.

We soon discovered that one program would be too cumbersome and too large for even a 32K system. I developed the system using four different programs to perform the various functions. A menu program coordinates the entire system.

Program Summary

RENTMENU sets up the basic foundation of the system and allows you to enter any special commands that will be needed for the other programs. Since graphics are not needed, a PCLCLEAR1 is added to take advantage of all available memory. This will be especially important to 16K users. You can also insert commands to alter your printer baud rate. Once the baud rate is set in the menu program, you do not have to set it again in the other four programs.

FILEMAIN is a file maintenance program and allows you to set up the programs for your own needs. This program needs to be run first so you can set up your accounts. Once established, you should not have to run this program except to change the accounts. The first menu will let you enter property codes (a three-digit number/letter combination), income accounts or expense accounts.

Property codes are codes that you assign to your various properties. The codes can be set up by location, acquisition or value. Expense accounts are those expense categories that you determine will be used. Use categories such as maintenance, advertisement, utilities, mortgage or loan payments, etc.

I advise you to set up at least two miscellaneous categories so you can expand later. You can change the account names at any time, and these will be reflected immediately in the program. However, the previous file summaries will not reflect this update. Be careful when adding accounts after the program has been in use for some time. Income accounts are similar to expense accounts and you should use such categories as rent income, refunds, deposits and miscellaneous.

RENT MANAGEMENT is a file program set up to keep records on the properties that you listed in the File Maintenance Program. Information requested will be such things as rental date, phone number, deposit paid, monthly rent, purchase date, purchase price, monthly mortgage, due date and lien holder. These can be changed at any time, but be sure to change the property code, renter’s name and address in the FILEMAIN program. Other items can be changed at any time. See Illustration 1.

Using the System

1) Type in the program carefully, or better yet, buy RAINBOW ON TAPE and save your fingers.

2) All programs must be on the same disk.

3) Type RUN ‘RENTMENU’

4) Select Menu option 4 to set up property codes, income and expense accounts.

5) Select Menu option 1 to enter property information.

Next month we will add the financial programs and discuss the use of Direct and Sequential disk files. Because these programs are set up to use disk files only, a cassette system will not work without radical system changes. While you are waiting for next month, you might want to brush up on using disk files by reading Bill Nolan’s series of articles found in the July-December 1984 issues of THE RAINBOW. This system will be available on disk for $10 plus a disk and return postage. This system has been set up for two drive systems and for some of the high resolution screens. If interested, contact me at 5065 France Avenue in North Charleston, SC 29406.
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LISTING 2:

2 '***RENTMANG***
4 '**PROPERTY INFORMATION**
6  'LISTING #2
8 CC=163:FOR XX=1 TO 6
10 CLS:PRINT@CC,"RENTAL PROPERTY INFORMATION"
12 CC=CC-32
14 FOR Z=1 TO 250:NEXTZ
16 NEXTXX
18 CLEAR1000:DIM MTH$(12)
20 FOR ZZ=1 TO 12:READ MTH$(ZZ):NEXTZZ
22 DATA JANUARY,FEBRUARY,MARCH,APRIL,MAY,JUNE,JULY,AUGUST,SEPTEMBER,OCTOBER,NOVEMBER,DECEMBER
24 K$="":L$="":M$="":N$="":O$="":P$="":Q$="":R$="":S$="":T$="":U$="":V$="":W$="":X$="":Y$="":Z$="";
26 X=0
28 OPEN"I",#1,"PROPERTY/ACC"
30 IF EOF(1)=-1 THEN CLOSE#1:GOTO 040
32 X=X+1
34 INPUT#1,COD$(X),ADR$(X),NAM$(X)
36 GOTO30
38 CLOSE#1
40 IF X=0 THEN CLS:PRINT:PRINT"YOU NEED TO INPUT PROPERTY INFORMATION FIRST!"
42 CLS:PRINT@98,"RENTAL PROPERTY INFORMATION"
44 PRINT@162,"1) INPUT DATA"
46 PRINT@194,"2) VIEW DATA"
48 PRINT@226,"3) PRINT DATA":PRINT@258,"4) END THIS JOB"
50 PRINT@322,"(1, 2, 3, OR 4)"
52 AN$=INKEY$:IF AN$=""THEN52
54 ON VAL(AN$) GOSUB 56,156,352,408
56 'SUBROUTINE TO INPUT DATA ON DISK
58 CLS:FOR JJ=1 TO 5:PRINT:NEXT:PRINT
60 PRINT; "ENTER TODAY'S DATE: (MM/DD/YY)"
62 INPUT";U$
64 GOSUB410
66 REC = LOF(1)
68 REC = REC+1
70 CLS:PRINT@3,"RENTAL PROPERTY INFORMATION"
72 P$=COD$(REC):PRINT"PROPERTY NO. CODE: ";P$
74 A$=ADR$(REC):PRINT"ADDRESS: ";A$
76 INPUT"CITY: ";C$
78 INPUT"STATE (XX): ";S$
80 INPUT"ZIP CODE (XXXXXX): ";Z$
82 N$=NAM$(REC):PRINT"RENTAL NAME: ";N$
84 INPUT"RENTAL DATE (MM/DD/YY): ";R$
86 INPUT"PHONE (XXX-XXX): ";H$
88 INPUT"DEPOSIT PAID: ";D$(REC)
90 INPUT"MONTHLY RENT: ";M$(REC)
92 INPUT"PURCHASE PRICE: ";PRI$(REC)
94 INPUT"MONTHLY MORT.: $ ";Q$(REC)
96 INPUT"PAYMENT DUE: (XX) ";PY$
98 INPUT"LIEN HOLDER: ";LN$
100 INPUT"PAYMENT DUE: (XX) ";PY$
102 LSET UDAT$=U$
104 LSET COD$=P$
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March 1985 THE RAINBOW 111
354 LDOSUB 10
355 CLS:PRINT@160,"DO YOU WANT TO PRINT ALL FILE OR JUST ONE PROPERTY LOCATION?":PRINT@224,"(ALL OR ONE)"
358 INPUT XX$
360 IF XX$="0" THEN PRINT:PRINT"WHAT IS THE PROPERTY NO. <XXX>?: ":INPUT MN$
362 FOR REC=1 TO LOF(l)
364 GET *1,REC
366 PRI<REC>=CVN(PRIC$)
368 M<REC>=CVN(MREN$)
370 D<REC>=CVN(DEP$)
372 Q<REC>=CVN(MORT$)
374 IF XX$="0" AND COD$ <> MN$ THEN 402
376 FOR X=1 TO 3:PRINT*-2:NEXT X
378 PRINT*-2,TABC26>;'Rental Property Information"
380 PRINT*-2,TAB(30);"PROPERTY NO: ";COD$
382 PRINT*-2,TAB(32);"DATE: ";UDAT$
384 PRINT*-2,PRINT*-2
386 PRINT*-2,"ADDRESS: ";ADR$;
388 PRINT*-2,TAB(32);"CITY: ";CITY$;
390 PRINT*-2,TAB(32);"STATE: ";STAT$;
392 PRINT*-2,"ZIP: ";ZIP$
394 PRINT*-2
396 PRINT*-2, "RENTAL DATE: ";RDAT$
398 PRINT*-2,"MONTHLY RENT: ";PRINT*-2,"DEPOSIT: ";PRINT*-2
400 PRINT*-2,"PURCHASE PRICE: ";PRINT*-2
402 NEXT REC
412 CLOSE#1
414 GOTO42
416 RUN"RENTMENU"
Where but at RAINBOWfest could you meet so many CoCo enthusiasts, see so many new products, and attend seminars that are of immediate assistance? It’s the next best thing to receiving the latest issue of THE RAINBOW in your mailbox.

Many of the people who write for THE RAINBOW — and those who are written about — are there to meet you and answer your questions, technical and otherwise. RAINBOWfest is CoCo’s very own show, and it’s a people-to-people event as well as a valuable learning experience.

To make it easier for you to attend, we schedule RAINBOWfest in three parts of the country. If you missed the fun in Irvine, Calif., why don’t you make plans now to be with us in Chicago, Ill., or New Brunswick, N.J.? Each show is unique, offering fun, new acquaintances, and great sharing experiences. For members of the family who don’t share your affinity for CoCo, you’ll be comfortable knowing that each RAINBOWfest is located in an area that will provide fun and enjoyment for all.

Our Chicago show is being held at the Hyatt Regency Schaumburg, adjacent to

— Chicago
May 17-19, 1985
Hyatt Regency Schaumburg
$65 per night, single or double
May 10, 1985

— New Brunswick, N.J.
October 18-20, 1985
Hyatt Regency
$65 per night, single or double
October 11, 1985
the Woodfield Mall, one of the largest indoor shopping centers in the world. The Hyatt Regency offers special rates for RAINBOWfest. The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday — the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. There will be no exhibition hours or seminars Saturday evening. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

A well-known speaker will again keynote the highly popular CoCo Community Breakfast. And you can set your own pace in the exhibit hall interspersed with a number of seminar sessions on all aspects of CoCo — from improving your BASIC skills to working with the OS-9 system.

But most of all, there will be exhibitors. Lots of them. All ready to demonstrate products of every kind. It's a time for unveiling brand new products. Many have special buys for RAINBOWfest. If you've been eyeing something in THE RAINBOW, you can try it out and take it home that very day.

Tickets may be obtained directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

Come to RAINBOWfest. Let's all celebrate the CoCo Community!

United Airlines and THE RAINBOW have joined together to offer a special discounted fare to those attending RAINBOWfest Chicago. Simply by calling United at the toll free number listed below and identifying our meeting, with account number 563-E, you will be eligible for a 20 percent discount on the Easy Saver Fare. The only requirement is a Saturday evening stay.

(800) 521-4041
Account Number 563-E

---

Show Schedule:
Friday evening — Exhibit hall open from 7 p.m. to 10 p.m.
Saturday — CoCo Community Breakfast at 8 a.m.
Exhibit Hall opens at 10 a.m. and closes at 6 p.m.
Sunday — Exhibit Hall open from 11 a.m. to 4 p.m.

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160 PRINT@394,"(1, 2, 3 OR 4)"
170 AT$=INKEY$:IF AT$="" THEN 170
180 ON VAL(AT$) GOSUB 190,730,12
60,1810
190 'PROPERTY CODES
200 CLS:PRINT@9, "PROPERTY CODES"
210 GOSUB 780
220 ON VAL(AT$) GOSUB 240,400,49
0,1240
230 GOTO210
240 'INPUT CODES
25121 CLS:PRINT"PREVIOUSLY ENTERED PROPERTIES WILL BE LOST"
260 PRINT"DO YOU WANT TO CONTINUE <Y/N)"
:INPUT AZ$
27121 IF AZ$="" THEN 780
280 X=IZ1:CLS:OPEN 11 01,#1, "PROPERTY/ACC"
290 CLS:PRINT@64,"PRESS < ENTER > WHEN FINISHED":PRINT
30121 X=X+1
31121 INPUT "PROPERTY CODE:" ; COD$(X)
320 IF COD$(X)="" THEN CLOSE#1:GOTO190
330 IF LEN(COD$(X))>3 THEN PRINT "TOO LONG!! REDO " :GOTO340
340 INPUT "ADDRESS:" ; ADR$(X)
350 IF LEN(ADR$(X))>20 THEN PRINT "TOO LONG!! REDO " :GOTO340
360 INPUT "RENTER:" ; NAM$(X)
370 IF LEN(NAM$(X))>20 THEN PRINT "TOO LONG!! REDO " :GOTO340
380 WRITE #1, COD$(X),ADR$(X),NAM$(X)
390 GOTO 31210
400 'VIEW ACCOUNTS
41121 X=f21:CLS:PRINT "PROPERTY CODES":PRINT
42121 OPEN"I", #1, "PROPERTY/ACC"
430 IF EOF(1)=-1 THEN CLOSE#1:EXEC 44539:GOTO190
440 X=X+1
450 INPUT#1,COD$(X),ADR$(X),NAM$(X)
460 PRINTCOD$(X);"";NAM$(X)
470 PRINT "";ADR$(X)
480 GOTO 430
490 'CHANGE ACCOUNTS
500 X=0:CLS:OPEN"I", #1, "PROPERTY/ACC"
510 OPEN"O", #2, "TEMP/ACC"
520 IF EOF(1)=-1 THEN 650
530 X=X+1
540 INPUT#1,COD$(X),ADR$(X),NAM$(X)
550 CLS:PRINT@64,COD$(X);"";NAM$(X)
560 PRINT "";ADR$(X)
570 GOTO 570
580 ON VAL(OS$) GOSUB 660,96121121,63
590 GOTO570
600 INPUT "NEW PROPERTY CODE:" ; COD$(X)
610 INPUT "NEW ADDRESS:" ; ADR$(X)
620 INPUT "NEW RENTER:" ; NAM$(X)
630 WRITE#2,COD$(X),ADR$(X),NAM$(X)
640 GOTO520
650 PRINT:"DO YOU WISH TO ADD A PROPERTY <Y/N)>";Q3$
660 IF Q3$="" THEN 690
670 X=X+1
680 GOTO 600
690 CLOSE#2,#1
700 KILL"PROPERTY/ACC"
710 RENAME"TEMP/ACC"TO"PROPERTY/ACC"
720 GOTO190
730 EXPENSE ACCOUNTS
740 CLS:PRINT@9,"EXPENSE ACCOUNT S"
750 GOSUB780
760 ON VAL(AT$) GOSUB 860,960,10

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THE RAINBOW
March 1985

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THE RAINBOW
March 1985
4121, 1240
770 GOTO 750
780 PRINT @107, "SELECTIONS:"
790 PRINT @162, "1) INPUT ACCOUNTS"
800 PRINT @194, "2) VIEW ACCOUNTS"
810 PRINT @226, "3) ADD/CHANGE ACCOUNTS"
820 PRINT @258, "4) RETURN TO MAIN MENU"
830 PRINT @394, "1, 2, 3 OR 4"
840 AT$=INKEY$: IF AT$="" THEN 840
850 RETURN
860 'INPUT ACCOUNTS
870 GOSUB 1750
880 CLS: X=1: OPEN 1, "EXPENSE/ACC"
890 CLS: PRINT "PRESS <ENTER> WHEN FINISHED": PRINT
900 X=X+1
910 INPUT "EXPENSE ACCOUNT: "; EX$(X)
920 IF LEN(EX$(X)) > 10 THEN PRINT "CATEGORY IS TOO LONG! -REDO!": GOTO 9090
930 IF EX$(X)="" THEN CLOSE#1: GOTO 0730
940 WRITE #1, EX$(X)
950 GOTO 990
960 'VIEW ACCOUNTS
970 X=0: CLS: PRINT "EXPENSE ACCOUNTS": PRINT
980 OPEN 1,="#1, "EXPENSE/ACC"
990 IF EOF(1)=-1 THEN CLOSE#1: EX EC44539: GOTO 0730
1000 X=X+1
1010 INPUT #1, EX$(X)
1020 PRINTX; "; EX$(X)
1030 GOTO 990
1040 'CHANGE ACCOUNTS
1050 CLS: X=0: OPEN 1,="#1, "EXPENSE/ACC"
1060 OPEN 0,="#2, "TEMP/ACC"
1070 IF EOF(1)=-1 THEN 1160
1080 X=X+1
1090 INPUT #1,EX$(X)
1100 CLS: PRINT@64, X; "; EX$(X)
1110 GOSUB 1580
1120 ON VAL(Q2$:) GOSUB 1130, 1070
1130 INPUT "NEW ACCOUNT: "; EX$(X)
1140 WRITE#2, EX$(X)
1150 GOTO 1070
1160 PRINT: INPUT "DO YOU WISH TO ADD AN ACCOUNT <Y/N>: ": Q3$:
1170 IF Q3$="N" THEN 1200
1180 X=X+1

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**THE RAINFOB**

March 1985
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THE “THIRD WAVE” has arrived with a new organization designed to support the growing number of people who work in their homes with personal computers. The newly formed Association of Electronic Cottagers will bring focus to this group. “We will provide actual business services to both computer entrepreneurs and telecommuters who work at home on a salary,” the group’s founders, husband-and-wife team Paul and Sarah Edwards, said in announcing the group’s formation.

Members of AEC can obtain marketing assistance, business consultation and other services. They can also access up to the minute news about local, state, national and international developments affecting their interests through a monthly newsletter, an online hotline, bulletin boards, electronic conferences and private databases available to AEC members through Compuserve Information Service. Aspiring cottagers can get help finding work at home and assistance in setting up a computer-based business.

Electronic cottage members are already mobilizing to protect their rights to work at home with a computer by opposing AFL/CIO efforts to ban telecommuting and by setting forth the Electronic Cottage Bill of Rights.

Those interested in AEC can write the Association for free information at 677 Canyon Crest Drive, Sierra Madre, CA 91024.

PUT YOUR COMPUTER TO WORK.

Making Money with Your Home Computer, written by Dana K. Cassell, has been published by Dodd, Mead & Co. A paperback retailing for $5.95, the book tells home computer owners what software to buy, how to get started, where to look for potential customers, what services to offer and how to build and maintain a profitable and satisfying computer service bureau business.

It can be ordered through Dodd, Mead & Co., Dept. CDH, 79 Madison Ave., New York, NY 10016, for $5.95 plus $1.50 postage; or order by phone using Visa or MasterCard: 1-800-251-4000.

‘C’ YOUR REFERENCE CARD. If you program in the C language, or are learning it, you can now get information you need from the first comprehensive C reference card. The card, entitled “C LANGUAGE,” is a two-sided two-color 8½ by 11-inch plastic card filled with four point type. It covers the full implementation of the language and auxiliary utilities, too.

Covered are: statement summary; basic data types; conversion of data types; operator definitions with precedences and associativity; escape characters; preprocessor statements; typedef; constants; scope of variables; arrays; pointers; functions; structures; unions; enumerated data types; printf; scanf; the UNIX (tm) cc command; the lint command; a summary of over 100 commonly used library functions; command line arguments; tools under UNIX; ASCII; and more.

The summary was written by Stephen Kochan, author of Programming in C (Hayden Book Company) and consultant to Bell Labs. Micro Chart #11 and other summaries are available with a money-back guarantee for $5.95 each (plus $1 postage) from Micro Logic, POB 174, Dept. P, Hackensack, NJ 07602; phone (201) 342-6518.

THOSE SUMMER DAYS. “How I Spent My Summer Vacation” essays will never be the same for youngsters attending the 1985 National Computer Camps. Camp locations are in Simsbury (Hartford), Connecticut; Atlanta, Georgia; St. Louis, Missouri; Pepper Pike (Cleveland), Ohio; and Garrison (Baltimore), Maryland. The camps are directed by Dr. Michael Zabinski, professor at Fairfield University. Dr. Zabinski serves as a consultant to school systems throughout the country.

Campers may sign up for one or more weeks during June, July and August. The coed campers, ages 9-18, will have small group instruction on TRS-80 and Apple computers. Dr. Zabinski will be assisted by experienced elementary and secondary school teachers.

The camp is for youngsters of all levels of experience including no experience whatsoever. In addition to computers, the campers will have access to recreational facilities including swimming and tennis.

For further information and a brochure contact Michael Zabinski, Ph.D., at (203) 795-9667, or write to National Computer Camps, Box 585, Orange, CT 06477.

INTERNATIONAL ELECTRONIC Technology has established the Center for Electronic Theft Prevention. This center will utilize a new advancement to the Kaish Circuit Lockout system, which will allow authorized service centers to re-program chips that are on Circuit Lockout via telephone links with the center without removal or replacement of the Lockout chip.

For details, contact Norman Kaish, president of International Electronic Technology Corporation, 1931 Mott Avenue, Far Rockaway, NY 11691; (718) 327-1119.

“...And these are my children — David and David: Version 2.0!”

120 THE RAINBOW March 1985
The Spectrum Adventure Generator (SAG) allows you to create silent and talking adventure games that are 100% machine language and very fast in execution. Up to 99 rooms, 255 objects, 70 command words and 255 conditional flags can be used. Get a head start in this month's Rainbow Adventure Contest NOW! 32K/64K DISK $39.95
Note - Talking version requires Spectrum Projects' Voice Pak, a Disk "Y" Cable or Multipak and 64K.

$100 REWARD for all SAG winning entries in the Third Annual Rainbow Adventure Contest!

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(see Sept '84 Rainbow Review)

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(see June '84 Rainbow Review)

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(see June '83 Rainbow Review)

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By James W. Wood

Racer is a high resolution game which involves dodging cars as you pass them. Your car runs faster than your computerized opponents. (Would you expect to be slower?)

The road animation is accomplished by storing three different sets of center line stripes on different graphics pages. As the pages are flipped, the two-lane highway appears to move toward the bottom of the screen. The race cars are drawn and stored as arrays. They can be quickly put onto the screen. Your racer is at the bottom of the screen. Use the left- and right-arrow keys to dodge the other cars as you fly by them.

As the game proceeds, it becomes more difficult. After a short while, the cars that appear at the top of the screen will jump from their original lanes into the other lane. The cars only show in five positions as they move from the top to the bottom of the screen. If one lane jump doesn’t cause you to rear-end them, the game will later cause the cars to possibly jump lanes in the second and third positions as they come down the screen.

There is room for improvement in Racer. (Isn’t that the best part?) One could add a better title page or add lines to allow more than one crash. The crash sequence could stand improvement; perhaps a high resolution crash could be stored on graphics Page six and shown at the moment of impact. Study the line description to decide which enhancement you will program, or enjoy the game “as is.”
CoCo I – $69.95
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Description
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Title screen
Description
Reserves memory for graphics arrays
Draws race cars for computer and player and stores them.
Draws three views of the road on three different pages.
Stores locations where race cars can be put.
Deals with flipping pages.
Sets computer's car at top of screen.
Sets computer's car into second position after certain number of miles.
Sets computer's car into third position after certain number of miles.
Puts computer's car onto screen.
Sets computer's car back to top of screen.
Resets keyboard memory.
Sets player's car's position according to arrow key pressed.
Puts player's car onto screen.
Shows Hi-Res screen which was just drawn.
Keeps track of mileage.
Determines if crash occurred.
Variable to flip to correct road screen.
Back to top of animation loop.
Random color flash, crash sequence.
Ending message.

The listing:

10 REM JAMES W. WOOD, 424 N. MISSOURI, ATWOOD, IL, 61913
20 PCLEAR5:CLSIZL
30 FORA=160 TO 180: SOUNDRND<l50)+5
40 DIM R (12), S (10), X (0, 4), M (0, 14)
50 PMODE0,1:PC1S
60 CR$="D10L2U4R2D16L2U4R2D6R6U6
R2D4L2U16R2D4L2U10L6BR2BD12U1R2D1"
70 DRAW"BM2,0S4"+CR$ 80 GET (0, 0)-(10, 24), X, G
90 PC1S
100 DRAW"BM4,0S6"+CR$ 110 DRAWBR2D2L6" 120 PAINT (6, 30), 1, 1
130 GET (0, 0)-(20, 48), M, G
140 PMODE0,1:PC1S
150 B=0:GOSUB210
160 PMODE0,2:PC1S
170 B=14:GOSUB210
180 PMODE0,3:PC1S
190 B=26:GOSUB210
200 GOT0250
210 LINE(100, 0)-(75, 191),PSET
220 LINE(150, 0)-(175, 191),PSET 230 FORA=1T0190STEP4 240 LINE(125, A+B)-(125, A+B+7),PC1T:NEXTA:RETURN
250 FORA=1T019:READR(A):NEXTA
260 DATA 106, 104, 100, 94, 88, 130, 135, 138, 140, 144
270 FORA=1T010:READS(A):NEXTA
280 DATA 10, 40, 70, 100, 140, 10, 40, 70, 100, 140
290 A=1:D=88
300 IFE=4THENELSE=4
310 PMODE0,E 320 PCOPY A TO E
330 IF G=0 THEN G=1:IF RND(2)=1 THEN H=1:GOT0360 ELSE H=6:GOT0360
340 IF J>50 AND G=1 THEN G=2:IF RND(2)=1 THEN H=2:GOT0360 ELSE H=7:GOT0360
350 IF J>100 AND G=2 THEN G=3:IF RND(2)=1 THEN H=3:GOT0360 ELSE H=8:GOT0360
360 PUT(R(H), S(H))- (R(H)+10, S(H)+24), X, PSET: H=H+1
370 IF H=6 OR H=11 THEN G=0
380 POKE343, 255: POKE344, 255
390 IF PEEK(343)=247 THEN D=88 ELSE IF PEEK(344)=247 THEN D=144
400 PUT(D, 140)-(D+20, 188), M, PSET
410 SCREEN1,1 420 J=J+1
430 IF H=5 AND D=88 OR H=10 AND D=144 THEN 460
440 A=A+1:IFA=4THENELSE=1
450 G0TO360
460 SCREEN0,0: FOR AA=1T020: CLSRRN
D(9)-1:PLAY"L25501"+CHR$(64+RND(7)) :NEXTA
470 CLS:PRINT@260,J/10:"MILES"
480 PRINT"PLAY AGAIN (Y/N)"
490 A$=INKEY$:IFA$="Y"THENCLS0:R
UN ELSE IF A$="N"THENEND ELSE 49

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Watching Your Cash Flow Rate of Return

By William S. Bonnell

In business, projects are attractive if they produce a rate of return on investment greater than a company's cost of capital. This produces a net inflow of cash into the company. If a company has unlimited funds, it invests in all projects having a rate of return greater than the company cost of capital. In reality, projects are rejected even though they have a favorable rates of return because funds are limited.

Capital budgeting ranks projects according to their financial attractiveness and selects the set which maximizes the present worth (PW) of the firm. One method of capital budgeting compares projects on the basis of present worth, considering those for investment which have a cash flow rate of return (CFRR) greater than some minimum required rate of return, the cost of capital.

The program described in this article determines the CFRR and PW of a project and allows sensitivity testing of the assumptions made in the calculations.

The required parameters for calculation of CFRR and PW for a project are:

1) Expenses by year
2) Savings by year
3) Capital investment by year
4) Tax rate percent
5) Investment tax credit percent
6) Type of depreciation
7) Depreciation life of capital
8) The required rate of return percent

Expenses are defined as the annual cost of operations. They are not depreciated. They represent the outflow of cash resulting from the alternative being investigated. Savings are the opposite of expenses and represent the inflow of cash from the alternative in question. Expenses can be netted out of savings or both can be entered separately. Examples of expenses are labor, overhead and raw materials. Savings result from prevented expenditures or reductions in labor, overhead and raw materials.

Capital expenditures are investments in building and equipment which are allowed by law to be recovered over time through depreciation.

The tax rate is the percentage of profits which the organization must pay to the government. Investment tax credit is a means the government uses to stimulate business investment in capital equipment. Generally in the year following the capital expenditure, the organization is not taxed for a percentage of the expenditure.

The required rate of return depends on the nature of the company involved.

(William Bonnell is an industrial engineer specializing in modeling of manufacturing and business computer systems. He has a master's degree in management science and 15 years experience with large organizations.)
If the company finances its operations by borrowing, the cost of capital is the borrowing rate. If projects have a rate of return greater than the borrowing rate, they will be profitable. Therefore, the required rate of return is the borrowing rate.

In companies financing their operations by common stock or a combination of stock and debt, the cost of capital is more difficult to determine. In these cases, the cost of capital may be a policy variable supplied by management as a benchmark for comparison of projects in general. It may be unrelated to the true cost of capital funds to the company.

The PW of a project is defined as the net cash flow (inflow-outflow) when all flows have been discounted to the present. The basis for this concept is a dollar invested for one year is worth more than a dollar at the end of the year. Similarly, a dollar received a year from now is not worth as much as a dollar now. The value now of a dollar received a year from now is:

\[ \frac{1}{(1+r)} \]

where \( r \) is the rate of return a dollar could earn if invested at the company's cost of capital. The value now of one dollar received two years from now is:

\[ \frac{1}{(1+r)^2} \]

(Note: ** is used as a symbol for exponentiation.)

And in general, the value of a dollar received \( N \) years from now is:

\[ \frac{1}{(1+r)^N} \]

If a company spends $1,000 on a piece of equipment which will save $400 each year for 5 years, what is the PW of this project, ignoring taxes and depreciation, if the company can earn 10% from other investments?

\[
\begin{align*}
-1000/(1+.1)^0 &+ 400/(1+.1)^1 + 400/(1+.1)^2 + 400/(1+.1)^3 + 400/(1+.1)^4 + 400/(1+.1)^5 \\
\end{align*}
\]

The present worth (PW) is $516.31. The straightforward answer might seem to be $1,000 since $1,000 went out and $2,000 came in, but this ignores the alternative uses of these funds.

Cash flow rate of return (CFRR) is defined as the rate, \( r \), which makes PW equal to zero in the following equation:

\[
PW = CF1 + CF2/(1+r)^2 + CF3/(1+r)^3 + \ldots + CFN/(1+r)^N - I
\]

where “CFN” is the net cash flow (in-out) at the beginning of year ‘N’ (or at the end of year N-1).

CFRR is analogous to lending a sum of money and receiving annual payments which eventually pay off the original deposit plus interest. The interest rate earned is like CFRR.

To be accurate and of use in business, tax and depreciation effects on taxes must be considered. Depreciation is a method for recovering the cost of capital assets over time. Government policy determines how quickly the investment can be recovered. Faster recovery is more beneficial to business because of the time-value of money.

Money recovered sooner is more valuable than money recovered later.

There are many methods of depreciation depending on the type and life of the asset. Using straight line depreciation, 20% of an asset's value can be recovered each year after the first, assuming a five-year tax life. It is recovered by subtracting depreciation from profits. This means a company can shield a portion of its profits from taxes by depreciating its assets. This is an incentive for investment in new assets.

An accelerated method of depreciation is Sum of the Year's Digits (SOYD). If an asset has a depreciation life of five years, the SOYD is 15 \((1+2+3+4+5)\). In the first year after the capital expenditure, this method would allow \( \frac{1}{15} \) or .0667 of the asset value to be deducted from profits before calculating taxes. In subsequent years, the remaining fraction of the asset value could shield profits from taxes. The sum of these depreciation factors is usually one.

Double-declining balance is another accelerated method of depreciation. In the first year after capital expenditure, the depreciation factor is two divided by the asset life. In subsequent years, the remaining fraction to be depreciated is multiplied by \( \frac{1}{2} \) (asset life). The remaining fraction is the previous remaining fraction less the current depreciation factor. Refer to Listing 1, lines 670-1100 for calculation of depreciation factors.

Once the depreciation factors have been determined, the after-tax cash flow is calculated for each year.

\[
\text{Cash Flow} = \text{Savings} - \text{Tax Rate} \times (\text{Tax Base}) - (\text{Expense + Capital}) + \text{Investment Tax Credit}
\]

\[
\text{Tax Base} = \text{Savings} - (\text{Expense + Depreciation})
\]

\[
\text{Investment Tax Credit} = \text{Tax Credit \%} \times \text{Capital Investment In The Previous Year}
\]

Refer to Listing 1, lines 1110 - 1250 for this calculation.

This annual net cash flow is then adjusted for the time-value of money at the company cost of capital. It is summed to get the net present worth of the project. The CFRR is calculated by finding rate of return, \( r \), which just makes cash inflows equal to cash outflows, causing PW to equal zero.

The Program

The program was written for the 16K Color Computer using disk or cassette. It should run on any computer using standard BASIC with very few modifications.

Data entry is prompted or menu driven. If flows become constant, the program allows one value to be entered for several years. There are four standard types of depreciation to choose from or factors may be entered manually.

After the data has been entered, the program calculates and displays the depreciation flows, the after-tax cash flow and the discounted after-tax cash flow using 15% as the discount rate. Present worth is calculated for various required rates of return. When PW changes sign from a positive to negative (passes through zero), that is the CFRR.

After the display of output is complete, data values can be changed and the problem rerun. This is a powerful tool for sensitivity analysis. Finally, data may be saved or read from disk or cassette. A report can be generated on a printer.

The algorithm to calculate CFRR is shown in Listing 1, lines 1510 to 1790. It is a binary search algorithm. If CFRR is in the range zero to 100 percent, the interval containing the CFRR is halved.
At that point, the program interpolates for a final value of CFRR. For example, if the PW at R=100% is less than zero and PW at R=0 is greater than zero, PW is calculated at R=50%. If PW at 50 percent is less than zero, PW is found at R=75%. If PW at R=75% is greater than zero then PW is found at R=62.5%, and so on until the difference between successive R’s is less than three percent. The program then interpolates the final CFRR.

To illustrate its use and verify your entry of the program, try the following example problem:

A company spends $10,000 on a new computer system. By spending this amount, labor savings of $4,000 are expected each subsequent year for 10 years. The company tax rate is 48% and an investment tax credit of 10% is available. It will cost $500 per year for supplies for the new computer and $400 per year for maintenance.

Computers can be depreciated with a five year life using double-declining balance switching to SOYD. What is the present worth of this investment if the company can earn 15% on alternative investments? What is the CFRR for this project?

**INPUT DATA**

<table>
<thead>
<tr>
<th>Start Year</th>
<th>Expense</th>
<th>Savings</th>
<th>Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>10000</td>
</tr>
<tr>
<td>2 - 11</td>
<td>900.00</td>
<td>4000.00</td>
<td>0</td>
</tr>
</tbody>
</table>

**Required Rate Of Return** = 15%
**Tax Rate** = 48%
**Investment Tax Credit** = 10%

Listing 2 shows my inputs and the computer responses to solve this problem. It was produced by echoing the screen output to the printer. A printer report is also generated.

At 15 percent, this project has a positive net present worth indicating a worthwhile investment. The CFRR of 22 percent is greater than can be earned on the average investment available to the company (15 percent).

If other investments are available, they should be compared on the basis of present worth. Comparing on the basis of CFRR can, in some cases, lead to the wrong conclusion. The CFRR should be a “go/no go” comparison with the required rate of return for the company.

### Project life = 11 years
### Depreciation life = 5 years
### Tax rate = 48 percent
### Investment tax credit = 10 percent

**List of Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Choice of option</td>
</tr>
<tr>
<td>AS</td>
<td>Answer to prompts</td>
</tr>
<tr>
<td>CA()</td>
<td>Capital expenditure array</td>
</tr>
<tr>
<td>CC</td>
<td>Capital input value</td>
</tr>
<tr>
<td>CF()</td>
<td>Net cash flow array</td>
</tr>
<tr>
<td>D</td>
<td>Device for I/O</td>
</tr>
<tr>
<td>DC</td>
<td>Discounted cash flow</td>
</tr>
<tr>
<td>DF()</td>
<td>Depreciation factors</td>
</tr>
<tr>
<td>DL</td>
<td>Depreciation life</td>
</tr>
<tr>
<td>DP()</td>
<td>Depreciation component of cash flow</td>
</tr>
<tr>
<td>DT</td>
<td>Depreciation type</td>
</tr>
<tr>
<td>E1</td>
<td>End year for editing changes</td>
</tr>
<tr>
<td>EE</td>
<td>Expense input</td>
</tr>
<tr>
<td>EX()</td>
<td>Expense array</td>
</tr>
<tr>
<td>FS</td>
<td>File name</td>
</tr>
<tr>
<td>FR</td>
<td>Double-declining balance fraction</td>
</tr>
<tr>
<td>I, I1, J, K</td>
<td>Various year counters</td>
</tr>
<tr>
<td>N</td>
<td>Net present value (NPV)</td>
</tr>
<tr>
<td>N6</td>
<td>NPV in CFRR interpolation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required</th>
<th>Present Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>-2307.51</td>
</tr>
<tr>
<td>30%</td>
<td>-1742.79</td>
</tr>
<tr>
<td>45%</td>
<td>-3846.28</td>
</tr>
<tr>
<td>60%</td>
<td>-5107.03</td>
</tr>
<tr>
<td>75%</td>
<td>-5940.91</td>
</tr>
<tr>
<td>90%</td>
<td>-6532.03</td>
</tr>
</tbody>
</table>

**CFRR = 22.18%**

Hopefully, the value of this program has been demonstrated for analyzing alternative business investments. The concept is more fully explained in any good financial textbook.

<table>
<thead>
<tr>
<th>Year</th>
<th>Expense</th>
<th>Savings</th>
<th>Capital</th>
<th>Dpr. Flow</th>
<th>Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$10,000</td>
<td>$0.00</td>
<td>-$10,000</td>
</tr>
<tr>
<td>2</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>2000.00</td>
<td>3,572.00</td>
</tr>
<tr>
<td>3</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>3200.00</td>
<td>3,148.00</td>
</tr>
<tr>
<td>4</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>2100.00</td>
<td>2,620.00</td>
</tr>
<tr>
<td>5</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>1500.00</td>
<td>2,332.00</td>
</tr>
<tr>
<td>6</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>900.00</td>
<td>2,044.00</td>
</tr>
<tr>
<td>7</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>300.00</td>
<td>1,756.00</td>
</tr>
<tr>
<td>8</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1,612.00</td>
</tr>
<tr>
<td>9</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1,612.00</td>
</tr>
<tr>
<td>10</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1,612.00</td>
</tr>
<tr>
<td>11</td>
<td>900.00</td>
<td>4000.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1,612.00</td>
</tr>
</tbody>
</table>

Old depreciation life
Old project life
Payback time
Discounted payback time
Project life
Present worth (PW)
PW array for various rates of return
Calculated CFRR
R3, R4, R5, R6
Used in binary search CFRR calculation
Remaining life in depreciation
Required rate of return (ROR)
ROs used to calculate PW()
Remaining value in depreciation
Start year for editing data
Savings array by year
Sum of cash flows in finding payback
Savings input value
Sum of years digits
Investment tax credit value
Tax rate
Value to change in editing data
Year when input flows become constant
10 CLS
20 PRINT" ********************
30 PRINT" * CFRR PROGRAM, W. BO
40 PRINT" * 3/24/1983 COPYRI
50 PRINT" ********************
60 ' 70 PRINT:PRINT
80 DIM EX(20),SA(20),CA(20),DF(2
90 INPUT "MENU ENTRY OR REGULAR
100 IF LEFT$(A$,1)="M" THEN 1810
110 GOSUB 130:GOSUB 190:GOSUB 36
0:GOSUB430:GOSUB500:GOTO 1110
120 ' 130 IF PL>0 THEN CLS:PRINT"OLD P
140 INPUT "PROJECT LIFE"="OP"YEARS"
150 IF PL>20 THEN CLS:PRINT:"OLD T
160 IF PL<1 THEN 130
170 RETURN
180 ' 190 IF OD>0 THEN CLS:PRINT"OLD D
200 INPUT "DEPRECIATION LIFE";DL
0:DL=DL
210 CLS
220 IF DL>20 THEN 190
230 IF DL<1 THEN 190
240 PRINT
250 PRINT "DEPRECIATION TYPES:
260 PRINT "1. SUM OF YEARS DIGIT S"
270 PRINT "2. DOUBLE DECLINING B
740 'DOUBLE DECLINING BALANCE
750 RV=1
760 FOR I=1 TO DL+.5
770 FR=2/DL
780 DF(I)=RV*FR
790 RV=RV-DF(I)
800 NEXT I
810 RETURN
820 'STRAIGHT LINE
830 RV=1
840 FOR I=1 TO DL
850 DF(I)=1/DL
860 RV=RV-DF(I)
870 NEXT I
880 DF(I)=RV
890 RETURN
900 'DDB TO SOYD 1/2 YR AVG CONV
910 DF(I)=1/DL
920 RV=1-DF(I)
930 DF(2)=2/DL*RV
940 RV=RV-DF(2)
950 RL=DL-.5
960 IF INT(RL)=RL THEN SY=RL*(RL+.5)/2;EN=1 ELSE SY=(RL+.5)*(RL+.5)/2
970 K=2
980 FOR I=RL TO 0 STEP -1
990 K=K+1
1000 DF(K)=I/SY*RV
1010 NEXT I
1020 RETURN
1030 'OWN FACTORS
1040 CLS:PRINT "ENTER"DL"FACTORS"
1050 FOR I=1 TO DL
1060 PRINT USING "##";I;
1070 INPUT DFC(I)
1080 NEXT I
1090 RETURN
1100 'GET DEPR. AND AFTER TAX FL
1110 'GET CFRR
1120 CLS
1130 PRINT:PRINT "START DEPRE C ATER TAX DISCOUNT"
1140 PRINT"OF YR. FLOW CASH FLO WAT 15%"
1150 FOR I=1 TO PL
1160 IF I>DL THEN I=I-INT(DL) ELSE I=I
1170 FOR K=I TO I
1180 DP(K)=DP(K)+CA(K-1)*DF(K-I)
1190 NEXT K
1200 CF(I)=SA(I)-TX*(SA(I)-(EX(I)+DP(I)))-(EX(I)+CA(I))+TC*CA(I-1)
1210 PRINT USING "##";I;
1220 PRINT USING "#######.##";DP(I);CF(I);(CF(I)/(1.15)^(I-1))
1230 NEXT I
1240 INPUT "HIT ENTER TO CONTINUE";A$
1250 CLS
1260 '
1270 'PRESENT WORTH
1280 PRINT
1290 PRINT "REQUIRED AFTER TAX"
1300 PRINT " RATE %. PRESENT WORTH"
1310 J=0
1320 FOR R=.15 TO .91 STEP .15
1330 J=J+1:RR(J)=R*100
1340 PW=0:SM=0
1350 FOR I=1 TO PL
1360 DC=CF(I)/(1+R)^(I-1)
1370 SM=SM+CF(I)
1380 PW=PW+DC
1390 IF PB=0 THEN IF PW>0 THEN P=PB=1:RR=R
1400 IF P9=0 THEN IF SM>0 THEN P=I
1410 NEXT I
1420 PRINT USING "##";PW
1430 PRINT USING "##.##";PF
1440 PW=PW
1450 IF P9=1 THEN GOTO 176
1460 IF RR=0 THEN RR=.15
1470 PRINT AT "RR*100%"
1480
1490 PRINT USING "##.##";PW
1500
1510 'GET CFRR
1520 R=0:R3=0:R5=0:R6=0:N6=0
1530 R4=1
1540 GOSUB 169
1550 IF N<=I THEN GOTO 176
1560 R=R4
1570 GOSUB 169
1580 IF N>=0 THEN R=100:GOTO 176
1590 R=R3+R4/2
1600 IF ABS(R6-R)<.03 THEN 1730
1610 R6=R:N6=N
1620 GOSUB 169
1630 IF N<0 THEN GOTO 1660
1640 IF N>0 THEN 1670
1650 IF N=0 THEN 1760
1660 R4=R:GOTO 1590
1670 R3=R:GOTO 1590
1680 PRINT@416,"wait ";N=0:FOR I=1 TO PL:N=N+CF(I)/(1+R)^(I-1):
March 1985 THE RAINBOW 135
NEXT I
1700 PRINT @420,STRNG$: (4,8);
1710 RETURN
1720 GOTO 1780
1730 N6=N
1740 GOSUB 1690
1750 R=(R-N*(R-R6)/(N-N6))*100
1760 R=INT((100*R+.5)/100
1770 PRINT 1780 PRINT@416, "CFRR="R"%"
1790 INPUT "HIT ENTER TO CONTINUE"
1800 PRINT@416, "CFRR="R"%"
1810 'CHANGE DATA ROUTINE
1820 CLS
1830 PRINT "entry/change menu"
1840 PRINT "PROJECT LIFE"
1850 PRINT "PRESENT VALUE"; PV;
1860 PRINT "PAYMENT"; PMT;
1870 PRINT "INTEREST PERIODS"; N;
1880 GOSUB 130; 2020; 2120
1890 PRINT "INVOY.TAX CREDIT"
1900 PRINT "SAVE DATA IN FILE"
1910 PRINT "READ DATA IN FILE"
1920 PRINT "RUN"
1930 PRINT "PRINT REPORT-(AFF"
1940 PRINT "STOP"
1950 INPUT "CHOOSE"; A;
1960 PRINT "ENTER START,END"
1970 FOR 1=1 TO PL
1980 PRINT USING "##"; !;
1990 PRINT USING "$$####.##"; EX(I);
2000 NEXT
2010 PRINT "ENTER START,END"
2020 PRINT USING "##"; !;
2030 FOR I=1 TO PL
2040 PRINT USING "##"; !;
2050 NEXT
2060 PRINT: PRINT "CONTINUE"
2070 FOR I=S1 TO E1
2080 PRINT USING "##"; !;
2090 NEXT
2100 PRINT "ENTER OUTPUT FILE NAME"
2110 'CLS:PRINT "YR EXPENSE"
2120 CLS:PRINT "YR SAVINGS"
2130 CLS:PRINT "YR CAPITAL"
2140 PRINT USING "##"; !;
2150 PRINT USING "$$####.##"; EX(I);
2160 NEXT
2170 FOR I=S1 TO E1
2180 PRINT USING "##"; !;
2190 PRINT USING "$$####.##"; EX(I);
2200 NEXT
2210 PRINT "ENTER OUTPUT FILE NAME"
2220 CLS:PRINT "YR EXPENSE"
2230 FOR I=1 TO PL
2240 PRINT USING "##"; !;
2250 NEXT
2260 PRINT:PRINT "CONTINUE"
2270 FOR I=S1 TO E1
2280 PRINT USING "##"; !;
2290 NEXT
2300 PRINT "ENTER OUTPUT FILE NAME"
2310 'CLS:PRINT "YR EXPENSE"
2320 PRINT USING "##"; !;
2330 PRINT USING "##"; !;
2340 OPEN "O", #D, F$
2350 PRINT #D, PL; DL; TX; TC; DT; OD;
2360 PRINT #D, EXIT(I); SA(I); CA(I);
2370 NEXT I
2380 CLOSE D
2400 RETURN
2410 'CLS:PRINT "YR EXPENSE"
2420 PRINT USING "##"; !;
2430 PRINT USING "##"; !;
2440 OPEN "I", #D, F$
2450 IF EOF(D)=-1 THEN GOTO 2500

One-Liner Contest Winner...

This program, adapted from an algorithm used on a Texas Instruments 57 programmable calculator, computes the interest per period for normal annuities.

The listing:

1 PRINT: INPUT "PRESENT VALUE"; PV;
2 INPUT "PAYMENT"; PMT;
3 PRINT "INTEREST PERIODS"; N;
4 INPUT "I"; I:
5 PRINT USING "INTEREST PERCENT"; (I-1)*100:
6 END OF PROGRAM

Bob vander Mark
Groningen, The Netherlands

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Simulations and its companion Rainbow Simulations Tape.)
2460 INPUT #D,PL,DL,TX,TC,DT,OD,OP
2470 FOR I=1 TO 20
2480 IF EOF(D)=-1 THEN I=20: GOTO 2500
2490 INPUT #D,EX(I),SA(I),CA(I)
2500 NEXT I
2510 CLOSE D
2520 RETURN
2530 'INITIALIZE THEN RERUN
2540 FOR I=1 TO 20
2550 DF(I)=0: CF(I)=0: DP(I)=0
2560 NEXT I
2570 PB=1: PP=1: RR=0
2580 GOSUB 320 'DEPREC
2590 GOTO 1120
2600 'PRINTER REPORT
2610 PRINT#-2, 'PRINT#-2, "INTER#-2, "PROGRAM.
2620 PRINT#-2, "3/24/87;
2630 PRINT#-2, "COPRIGHT 
2640 PRINT#-2, "PROJECT LIFE= "DP(I)=0
2650 PRINT#-2, "DEPRECIATION LIFE = "OD"YEARS"
2660 PRINT#-2, "TAX RATE="TX*100"
2670 PRINT#-2, "INVESTMENT CR
2680 PRINT#-2, "EX"; using "% EXPENSE"; "SAVINGS"; "CAPITAL"; "DPR. FLOW"; "CASH FLOW"
2690 FOR I=1 TO PL
2700 PRINT#-2, "PROJECT LIFE= "DP(I)=0
2710 PRINT#-2, "DEPRECIATION LIFE = "OD"YEARS"
2720 PRINT#-2, "TAX RATE="TX*100"
2730 PRINT#-2, "INVESTMENT CR
2740 PRINT#-2, "EX"; using "% EXPENSE"; "SAVINGS"; "CAPITAL"; "DPR. FLOW"; "CASH FLOW"
2750 FOR I=1 TO PL
2760 PRINT#-2, "PROJECT LIFE= "DP(I)=0
2770 PRINT#-2, "DEPRECIATION LIFE = "OD"YEARS"
2780 PRINT#-2, "TAX RATE="TX*100"
2790 PRINT#-2, "INVESTMENT CR
2800 PRINT#-2, "EX"; using "% EXPENSE"; "SAVINGS"; "CAPITAL"; "DPR. FLOW"; "CASH FLOW"
2810 FOR I=1 TO 6
2820 PRINT#-2, "PROJECT LIFE= "DP(I)=0
2830 PRINT#-2, "DEPRECIATION LIFE = "OD"YEARS"
2840 PRINT#-2, "TAX RATE="TX*100"
2850 PRINT#-2, "INVESTMENT CR
2860 PRINT#-2, "EX"; using "% EXPENSE"; "SAVINGS"; "CAPITAL"; "DPR. FLOW"; "CASH FLOW"
2870 RETURN

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READ / WRITE TO CASSETTE

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There are many types of "PERT" programs available on the market. Some of these are quite sophisticated (and expensive) and require a large mainframe in which to operate. The PERT version I have developed for the Color Computer is a simple one, yet it has sufficient "bells and whistles" to make it quite beneficial at work.

Following are the main features of the PERT program:

1) Calculates minimum time needed to complete project.
2) Calculates probability of completion by a target date.
3) Determines whether activities are critical or non-critical.
4) Calculates expected duration and standard deviation for each activity.
5) Determines early and late start and finish times.
6) Calculates slack time for each activity (if any).

In addition, several output reports are available:

1) Worksheet for developing a precedence table.
2) Complete activity schedule.
3) Activity schedule by responsibility.
4) Complete Gantt type schedule.
5) Gantt schedule by responsibility.

The activity and Gantt schedules both clearly indicate the "critical" activities so the user can concentrate on evaluating those activities, as well as monitoring progress, as the project advances through the various stages of completion.

The program is fully prompted for all input data, so these will not be covered in detail. The input and output routines send data to a disk. If you have a cassette system, you will have to change those routines so data is saved to cassettes instead of disks. Also, a printer is necessary for the various output reports.

Please note that a total of 100 activities is the maximum established by the program. This limitation can be changed by changing the DIM statements at the beginning of the program.

In order to properly enter all data, a precedence table (which activity comes before another activity) is necessary. After you enter all of the activities, you will be able to develop a worksheet for this purpose. After you have the worksheet completed, you can then run the program in its entirety.

Here are some hints for properly completing the worksheet:

A "node" can be viewed as a stage in the project. That is, at which stage an activity must commence and at which stage it must end. These nodes serve as the key for determining the rest of the calculations in the program, so care should be exercised in planning this aspect of the project.

The start node of each activity must appear as the end node of some other activity in the project. In other words, all activities must be linked with each other (exceptions are those activities

(Jorge Mir is a certified public accountant and controller of a Fortune 500 Corporation. He publishes most of his original work through THE RAINBOW.)
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4. GALAGON
5. QIKS
6. CUBIX
7. MS. GOBBLER
8. BUZZARD BAIT
9. DEVIOUS
10. BLOKHEAD

ARCADE QUALITY GAMES

Cassette Price

<table>
<thead>
<tr>
<th>Game</th>
<th>Cassette</th>
<th>Disk add $3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANCER (JOUST)</td>
<td>32K ML</td>
<td>24.95</td>
</tr>
<tr>
<td>LUNAR ROVER (MOON PATROL)</td>
<td>32K ML</td>
<td>24.95</td>
</tr>
<tr>
<td>GALAGON (GALAGA)</td>
<td>32K ML</td>
<td>24.95</td>
</tr>
<tr>
<td>MS. GOBBLER (MS. PAC MAN)</td>
<td>32K ML</td>
<td>24.95</td>
</tr>
<tr>
<td>PLANET INVASION (DEFENDER)</td>
<td>ML</td>
<td>24.95</td>
</tr>
<tr>
<td>WHIRLBYIRD RUN (SCRAMBLE)</td>
<td>ML</td>
<td>24.95</td>
</tr>
<tr>
<td>CUBIX (Q*BERT)</td>
<td>32K ML</td>
<td>24.95</td>
</tr>
<tr>
<td>GALAX ATTAX (GALAXIANS)</td>
<td>ML</td>
<td>24.95</td>
</tr>
<tr>
<td>COLOR PANIC (SPACE PANIC)</td>
<td>32K ML</td>
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<tr>
<td>COSMIC INVADERS (SPACE INVADERS)</td>
<td>ML</td>
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</tr>
<tr>
<td>PENGON (PENG)</td>
<td>32K ML</td>
<td>21.95</td>
</tr>
<tr>
<td>DEVIOUS (KEVIOUS)</td>
<td>32K ML</td>
<td>21.95</td>
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<tr>
<td>FROGGIE (FROGGER)</td>
<td>32K ML</td>
<td>24.95</td>
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<tr>
<td>QIKS (QIX)</td>
<td>32K ML</td>
<td>24.95</td>
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<tr>
<td>STORM ARROWS (TARG)</td>
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<tr>
<td>ANDROID ATTACK (BERZERK)</td>
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<td>DEFENSE (MISSILE COMMAND)</td>
<td>ML</td>
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<tr>
<td>GHOST GOBBLER (PAC MAN)</td>
<td>ML</td>
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<tr>
<td>SPACE RACE (OMEGA RACE)</td>
<td>ML</td>
<td>24.95</td>
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<tr>
<td>CRYSTAL CASTLES (ICE CASTLES)</td>
<td>32K ML</td>
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<tr>
<td>COLOR ZAP (SPACE ZAP)</td>
<td>ML</td>
<td>14.95</td>
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<td>SPACE SENTRY (STAR TREK)</td>
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<tr>
<td>STAR SPORES (FIGHT ALIEN INVADERS)</td>
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<td>21.95</td>
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<tr>
<td>BEAM RIDER (ORIGINAL STRATEGY GAME)</td>
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<td>24.95</td>
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<tr>
<td>SPACE WAR (INTERPLANETARY COMBAT)</td>
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<td>21.95</td>
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with a node of 'I', meaning they are to be performed first and no other activity precedes it).

More than one activity can have the same start or end nodes; just make sure the beginning node of an activity coincides with the ending node of the activity that must precede it. Here is a simple example (cooking a meal):

<table>
<thead>
<tr>
<th>Start Node</th>
<th>End Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy all ingredients</td>
<td>1</td>
</tr>
<tr>
<td>Marinate meat</td>
<td>2</td>
</tr>
<tr>
<td>Wash vegetables</td>
<td>2</td>
</tr>
</tbody>
</table>

Bake potatoes | 3 | 5 |
Broil meat | 3 | 6 |
Cook vegetables | 4 | 6 |
Serve meal | 6 | 7 |

In the example, you cannot broil the meat (start node 3) until the meat is marinated (end node 3). Also, this project may require two people since there are two activities starting at the same node (i.e., one marinating the meat and the other washing the vegetables).

If there is a start node which does not coincide with an ending node in one of the other activities, the program will stop execution and inform you of those activities for which starting nodes must be changed.

The best way to get used to the program is to run some simple examples, as the one noted. That way, you will get a good feel for all the prompts for inputting data and all of the output reports, as well as the various ways in which a program of this nature can be put to good use.

I often get involved in some complex projects at work and have used this program many times to help me keep control of such projects. Take my word for it, it really helps!

The listing:

```
10 GOTO 260
20 CLEAR 10000
30 DIM A$(100), R$(100), A(100,2), S(100), F(100), E(100,2), C(100)
40 DEFFNR(Z1)=INT((Z1*1000+.5))/1000
50 GOTO 1530
60 GOSUB1540:PRINT"HAVE ACTIVITIES ALREADY BEEN STORED ON DISK?"
70 I$:INKEY$:IF I$=""THEN70 ELSE IF I$<>"Y" THEN PT=0:GOTO150 ELSE PT=1
80 GOSUB1540:PRINT"PLACE DISK CONTAINING PREVIOUSLY STORED ACTIVITIES IN DRIVE 0 AND PRESS ANY KEY WHEN READY."
90 IF INKEY$=""THEN90 ELSE PRINT"LOADING DATA......"100 OPEN"I",#1,"PERT.ACT"110 INPUT#1,PT$
120 IF EOF(1) THEN 140
130 N=N+1:INPUT#1,A$(N),R$(N):B
140 GOTO1
150 CLOSE#1:GOTO250
160 GOSUB 1540:PRINT"TITLE OF THIS PROJECT:";LINE INPUT PT$
170 PRINT"DESCRIBE ACTIVITIES INCLUDED IN THIS PROJECT."
180 PRINT"TYPE 'END' WHEN DONE."
190 PRINTA-&H400,"ACTIVITY NO."
```

The best way to get used to the program is to run some simple examples, as the one noted. That way, you will get a good feel for all the prompts for inputting data and all of the output reports, as well as the various ways in which a program of this nature can be put to good use.

I often get involved in some complex projects at work and have used this program many times to help me keep control of such projects. Take my word for it, it really helps!
450 PRINT#-2," " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " &n
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SOFTWARE

BUSINESS APPLICATION

The system is a comprehensive double entry accounting system with complete audit trails, closing procedures, and full reporting. The chart of accounts is flexible and the system easy to use. Reports include the General Ledger Trial Balance, Bank Statement, and Transaction Register.

Your financial information is at your fingertips!

PAYROLL

This is the most comprehensive payroll you'll find on a microcomputer. Besides collecting key employee information, it allows entry of pay rates for standard hours, overtime, and salary. Hourly, salary, and commissioned employees may be paid weekly, bi-weekly, semi-monthly, and monthly. Two types of special monthly deductions are also accommodated. Year-to-date, quarterly, monthly and current totals are maintained. All federal reporting is done automatically and your state computations are also included.

ACCOUNTS PAYABLE

This system can give you the tools to plan your business' growth by controlling expenditures and forecasting cash requirements. It helps a small business manage and track its cash liabilities by collecting vendor invoice information and reporting the business' cash commitments and payment history. Along with standard payable reports it also includes a check writer and payment forecast reports.

ACCOUNTS RECEIVABLE

All businesses need to know who owes them money! This system provides reliable and timely information regarding the status of all customer accounts. You can view accounts instantly which accounts are past due, forecast how much money to expect to receive for cash flow planning, and keep on top of your customers' credit positions. Customer name, address, credit limit, invoice and payment information is recorded and reports of all information including customer statements are available upon your request.

NEW! PERSONAL FINANCE SYSTEM

The Personal Finance System makes it easy to organize, control and understand your personal finances. It's a complete personal budgeting program. It balances your checkbook. It includes all your account statements, all transactions recorded, all cash account history. It helps you see trends, spot problems and prevent financial surprises. You can easily view your account history at any time. The system is designed to work with your existing accounts and includes the necessary forms to help you record your financial transactions. You can view your current financial status at any time and see how your financial picture is changing. You can view your financial statements and track your expenses easily. The system includes all the forms you need to manage your financial affairs. The system includes a detailed report of your financial status and gives you a clear picture of your financial picture. It is designed to work with your existing accounts and includes the necessary forms to help you record your financial transactions. You can view your current financial status at any time and see how your financial picture is changing. You can view your financial statements and track your expenses easily. The system includes all the forms you need to manage your financial affairs.

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- Requires 32K a disk drive

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DATA BANK
for OS-9 and other 84K users

If you want a data base that does it YOUR way, then DATA BANK is the data management system for you! With DATA BANK, you are the boss. You define your own display screens, record formats, calculated fields, sort sequences, selection criteria, and report formats. Even with all its power, DATA Bank is very easy to use! It goes several steps beyond the average data base by adding features like calculated fields, three level sorts, easy interface with DynaCalc, and special file manipulation utilities.

STORING YOUR DATA - the way YOU want to see it!

Remember with Data Bank you determine how your information is stored and displayed. You can design up to 9 different screen formats for display, making data entry and retrieval simple. Each record can contain up to 512 characters in up to 35 fields, ample for nearly every application. Data types include alphanumeric (for strings of all kinds), mant (for real numbers), date, and "derived" (values calculated by your own defined formulas). These defined formulas can use values from other fields and entry screens. There isn't anything you can't store with these formats! The size of your data base is limited only by your disk space and you can maintain multiple data bases on the same disk. Expansion of record files is made very easy with sophisticated file manipulation utilities. You can also transfer data between files - all records or selected subsets which is handy for revising record layouts!

SORTS & SELECTIONS - organizing your data

To aid in sorting and selecting, you can define up to 9 different "access keys" each with up to 3 levels. These access keys are used for accessing a specific record, sorting an entire file, or selecting subsets of files. The generic search will find any occurrence of a given value in a key field throughout the data base. Using logical operators (less than, greater than, equal, or and), you can select any subset of your data base for printing. All or any selected subset of records can be sorted in order. You can organize your data in any way you can think of!

REPORTING - all the right stuff!

Printing your information in a format useful to you is the most important function of a data base system. Data Bank allows you to design customized reports to fit your individual needs and can save up to 9 defined formats for repeated use. You may include page headings with titles, automatic page numbers, column headings, totals for numeric fields, and more. Reports will print to the output path you specify and use any of your pre-defined access keys.

SPECIAL FEATURES

Data Bank offers even more with:
• Access to all OS-9 commands from the program
• Easy access to user programs
• Reads DynaCalc OS-9 files
• OS-9 not required

64K Disk $79.95

FLEXI-FILER™

This is the most comprehensive and flexible data management system available. It is easy to use and very powerful! (Requires 32K disk & RSDOS.)

Collect up to 35 fields per record, with up to 240 characters per record! You designate the name of each field, its position, and its format (alphanumeric, numeric, money, date or exponential). The size of your data base is unlimited - only your disk space will limit your files.

Organize your way. You determine how the information is displayed and stored by designing your own record formats for repeated use. You may include page headings with titles, automatic page numbers, column headings, totals for numeric fields, and more. Reports will print to the output path you specify and use any of your pre-defined access keys.

DON'T FORGET!

Personal Time Management System and Event Recorder with Memos

You won't forget Don't Forget! You'll actually enjoy getting organized with this personal time management system. The Wachowitch-like icons make entering your personal schedule simple and fun. But if you need instructions, there are help screens to assist you.

You'll never miss a birthday or important appointment again! With Don't Forget! you can record the entire year's occasions and daily appointments ahead. Each day has spaces for 4 Special Occasions, 2 Memos, and hourly notes for 6 am through 9 pm. The built-in "S" key lets you view your schedule for the day, week, or month at a glance. You can display or print any daily schedule - or a whole week at a time - so you'll never miss any important event. You can even print a blank monthly calendar page with big boxes to scribble notes in!

So use your CoCo's memory and Don't Forget! as your personal secretary. Designed for mouse, joystick, or keyboard entry. Don't Forget! requires 32K and one disk drive.

Disk $27.95

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MERGE ‘N MAIL

Merges at Mail is specially designed to do one job and do it very well - maintain merge, and print mail list information. Merges at Mail is perfect for clubs, Christmas card lists, newsletter writers, party givers, or anyone with a personal address list for relatives, doctors, insurance agents, emergency numbers...

A lot of information is stored. The eight preset fields include Last Name, First Name, Company Name, Address, City, State, Zip Code, and Phone Number. Twelve additional programmable fields allow you to store extra information according to your personal needs. Names are automatically sorted by last name when entered, and no special sort is needed. A zip-code sort is also available. Merge 'N Mail can store over 2500 records per file. Over 800 is possible on a single drive; the files may be on 4 drives.

Look-up is easy and fast. Logical selection allows you to search for records by any field with six different qualifiers. The binary search algorithm makes accessing very fast. The unique "soundex" search feature lets you look for a name without knowing how to spell it correctly - just type what it sounds like.

Printing is a snap! Label formats are easy to specify at print time or your own custom label formats may also be saved and loaded from disk. Labels and listings may be sorted by name or zip-code. The logical selection feature allows you to specify a subset of your mailing list by any field with six different qualifiers for printing. Printer baud rate, compression and uncompressed codes may be changed and saved to disk to tailor it to your personal printer.

The mail-merge feature is especially useful. You can create letters with your word processor and embed mailing list automatically! It can be used with any ASCII editor including Scribe, Teletype Script, and Super Color Writer II.

Mail 'N Merge is sophisticated yet easy to use. If you maintain a mailing list for any purpose this is a tool that can save you time! It requires 64K and one disk drive and sells for a very reasonable price.

64K disk $27.95

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Check is delayed for bank clearance
1050 PRINT "NON-";
1060 PRINT "CRITICAL EVENT")":PRIN
1070 PRINT USING U$ ; "EXPECTED DUR
1080 IF INT(S1)>0 THEN 1150
1090 PRINT USING U$ ; "START NO LATE
1100 PRINT USING U$ ; "MUST COMPLETE
1110 IF L>=F(A(I,2)) THEN 1130
1120 L=F(A(I,2))
1130 Y=Y+E(I,2)
1140 GOTO 1190
1150 PRINT USING U$ ; "EARLY START"
1160 PRINT USING U$ ; "LATE START"
1170 PRINT USING U$ ; "EARLY FINISH"
1180 PRINT USING U$ ; "LATE FINISH"
1190 PRINT@448,STRING$(32,140);:
1200 IF I$=CHR$(13) THEN 1530
1210 IF I$=CHR$(13) THEN 1530
1220 NEXT I
1230 GOSUB1540
1240 PRINT "THE CRITICAL PATH LEN
1250 P=SQR(V)
1260 PRINT "PLUS OR MINUS" ; PRINT
1270 PRINT "ENTER DESIRED COMPLET
1280 INPUT D
1290 IF D<=0 THEN 1530
1300 Y=(D-L)/P
1310 Z=Y
1320 Y=1/(1+.33267*ABS(Y))
1330 T=1-R*(.4361836*Y-.1201676*
1340 IF Z>=0 THEN
1350 T=1-T
1360 GOSUB1540
1370 PRINT
1380 PRINT USING "PROBABILITY OF
1390 PRINT USING "ITEMS NEED EDITING:"
1400 PRINT
1410 GOTO 1270
1420 CLS:END
1430 PRINT:PRINT "EDITING STARTI
1440 FOR I = 1 TO N
1450 IF S(A(I,1))>0 THEN 1490
1460 IF A(I,1)=1 THEN 1490
1470 IF XX=0 THEN GOSUB1540:PRIN
1480 PRINT "A$(I)
1490 NEXT I:XX=0
1500 PRINT@484,"PRESS ANY KEY TO CONT
1510 IF INKEY$="" THEN1200

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Simulates the problems faced by the
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146 THE RAINBOW March 1985
1620 PRINTTAB(T)"6 - PRINT GANTT CHART"
1630 PRINTTAB(T)"7 - END PROGRAM
1640 PRINT@448,STRING$(32,140);: PRINT TAB(9)"YOUR CHOICE?":SOUND D100,1
1650 I$=INKEY$:IF I$="""THEN1650
1660 I=VAL(I$):IF I<0 OR I>7 THEN SOUND100,1:GOTO1650
1670 ON I GOTO 1830,1890,2020,2100,2280,2460
1680 GOSUB1540;"DO YOU WANT TO PREPARE A WORK-SHEET AT THIS TIME?"
1690 I$=INKEY$:IF I$="""THEN1690
1700 IF I$<"Y"THEN CLS:END
1710 PRINT: INPUT" RESPONSIBILITY II;:K$:
1720 GOSUB 2650
1730 U$="% % % % ###" +STRING$(8,95)" " +STRING$(8,95)
1740 PRINT#-2,CHR$(30);" PROJECT: "PT$: PRINT#-2 II
1750 PRINT#-2,"STEPS RESPONS.
1760 PRINT#-2,"BEG END TIME FROM TO"
1770 FOR I = 1 TO N
1780 IF INSTR(R$(I),K$)=0 THEN 1810
1790 PRINT#-2,CHR$(13);CHR$(13);CHR$(28)
1800 PRINT#-2,CHR$<12>
1810 NEXT I:PRINT#-2,CHR$<12>
1820 GOTO 1530
1830 IF PT$="""THEN 60
1840 GOSUB1540
1850 PRINT: PRINT PT$: PRINT"DO YOU WANT TO ADD TO IT?"
1860 I$=INKEY$:IF I$="""THEN1860
1870 IF I$="Y" THEN GOSUB1540;GOTO T0170
1880 N=0:GOTO150
1890 GOSUB1540
1900 LINEINPUT"FILE NAME: ";F$
1910 IF F$="""THEN DIR:GOTO1900
1920 IF F$="""THEN 1530
1930 PRINT#-2;"PROJECT BEING LOADED:"
1940 OPEN"I",#1,F$
1950 X=0
1960 INPUT#1,PT$,Y=N+Y
1970 PRINT" ";PT$;
1980 IF EOF(1)THEN 2010 ELSE X=X +1
1990 INPUT#1,A$(X),R$(X),A(X,1),A(X,2),S(X),F(X),E(X,1),E(X,2),C(X)
2000 GOTO 1980
2010 CLOSE#1:GOTO1530
2020 GOSUB1540
2030 LINEINPUT"FILE NAME: ";F$
2040 OPEN"O",#1,F$
2050 WRITE#1, PT$,N
2060 FOR X=1 TO N
2070 WRITE#1,A$(X),R$(X),A(X,1),A(X,2),S(X),F(X),E(X,1),E(X,2),C(X)
2080 NEXT X
2090 CLOSE#1;GOTO1530
2100 GOSUB1540
2110 PRINT" DO YOU WANT TO CHANGE ANY OF THE DATA BEFORE EVALUATING THIS PROJECT?"
2120 I$=INKEY$:IF I$="""THEN 2120
2130 IF I$="N" THEN 940
2140 IF I$<"Y" THEN 2120
2150 PRINT#-2;"KEYWORD: ";K$
2160 U$="% % % % ###" FOR X=1 TO N
2170 IF INSTR(A$(X),K$)=0 THEN 250
2180 GOSUB1540

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For Details See Page 114
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Authors: We are seeking quality children's software for leisure or learning. Write for details. Top Royalties. TRS-80 Color Computer. TDP System 100.
2190 PRINT A$(X):PRINT
2200 PRINT USING U$; "START NODE"
2210 PRINT USING U$; "EXPECTED DURATION"; E(X,1):PRINT USING U$; "VARIANCE"; E(X,2)
2220 PRINT:PRINT "CORRECT RECORD?":PRINT @480," (PRESS <ENTER TO END)"
2230 I$=INKEY$:IF I$="" THEN2230
2240 IF I$="Y" THEN I=X:FLAG=1:GOSUB 550
2250 IF I$=CHR$(13) OR X=N THEN GOSUB 1540:PRINT:PRINT "CLEARING REGISTERS...":FOR X=1 TO N:FCX(0)=0:S<X>=0:10 NEXT X:PRINT "RECOMPUTING START/END TIMES...":GOTO 20810
2260 NEXT X
2270 FLAG=0:GOTO 1530
2280 GOSUB1540:PRINT:INPUT "RESPONSIBILITY"; K$
2290 TIME=0
2300 GOSUB 2650
2310 V=0:C=0:L=0
2320 PRINT#-2,CHR$(30); "PROJECT: "PT$:PRINT#-2
2330 PRINT#-2,CHR$(29); "----NODES---- EXP. START TIME- ---END TIME- SLACK"
2340 PRINT#-2," STEPS EXP. START END LATE EARLY RESPONSE"
2350 PRINT#-2," TOTAL EXPECTED TIME:"; TIME
2360 U$="%"; A$(I,1); PT$(A(I,1)+36)
2370 FOR I=1 TO N
2380 IF INSTR(R$(I),K$)=0 THEN 2430
2390 S1=F(A(I,2))-S(A(I,1))-E(I,1);IF INT(S1)<0 THEN C(I)=0 ELSE C(I)=S1
2400 IF C(I)=0 THEN CR$=CHR$(93)+" PAINTRICIAL" ELSE CR$=""
2410 PRINT#-2, USING U$;A$(I,1), R$(I); A(I,1), A(I,2), E(I,1), S(A(I,1)), F(A(I,2))-E(I,1), S(A(I,1))+E(I,1), S(A(I,1)), CR$(I), 1), F(A(I,2)), ABS(61), CR$(I)
2420 TIME=TIME+E(I,1)
2430 NEXT I
2440 PRINT#-2:PRINT#-2:PRINT#-2, "TOTAL EXPECTED TIME:"; TIME
2450 GOTO 1530
2460 GOSUB1540:PRINT "RESPONSIBILITY"; K$
2470 GOSUB 2650:PRINT#-2,CHR$(30); CHR$(31): PRINT#-2, TAB((40-LEN(P$(2)))/2):PT$(25)" (CRITICAL PATH SCHEDULE)
2490 PRINT#-2, "RESPONSIBILITY": IF K$="" THEN PRINT#-2, "ALL" ELSE PRINT#-2, K$
2500 PRINT#-2,CHR$(29);TAB(35)" 10 20 30
40 50 60
70 80 90
100"
2510 TT$="+---------+---------+--
-----+---------+---------+--+
------+---------+---------+---

TT$="+---------+---------+--
-----+---------+---------+--+
------+---------+---------+---

2520 FOR I=1 TO N
2530 IF INSTR(R$(I),K$)=0 THEN 2630
2540 IF LEFT$(A$(I,1))="" THEN2630
2550 PRINT#-2, "CRITICAL PATH SCHEDULE)"
2560 PRINT#-2, "RESPONSIBILITY:"
2570 FOR X=T1 TO T
2580 PRINT#-2, M$;
2590 NEXT X
2600 IF C(I)=0 THEN PRINT#-2:GOTO 02630
2610 FOR X=S(A(I,1))+E(I,1)+1 TO F(A(I,2))
2620 PRINT#-2, "":NEXT X:PRINT#-2
2630 NEXT I:PRINT#-2, TAB(35); TT$
2640 GOTO 1530
2650 IF PEEK(65314)=4 OR PEEK(65314)=6 THEN PRINT@480," DATA BEING PRINTED NOW ";RETURN
2660 PRINT@480," PRINTER IS NOT READY";SOUND 100,51FORX=1TO 500: NEXT:GOTO 1530
2670 RETURN
2680 PMODE0,1:PCEAL1:GOTO20
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Sketchpad is a graphics drawing program designed to provide the computer hobbyist with easy manipulation of the powerful graphics capabilities of the Coco. Advanced programmers can design graphics screens and characters for Basic and Ml programs and games. Sketchpad was used to create the graphics for "Eagle." Two joysticks control cursors that provide endpoints and boundaries for lines, boxes, circles, ellipses and painting. Point-to-point drawings may be plotted on the screen and then rotated, enlarged or shrunk, or inverted. Patterns may be programmed in to easily create dazzling illusions using lines, boxes, circles, ellipses and drawings. Sketchpad supports all Pmodes and color sets and gives false colors in Prodes 1 and 4. Text and graphics can be combined on high-resolution screens. All pictures and drawings can be saved to disk for future use. 32K, 2 joysticks required. Disk only - $29.95

MAYCODE
Disassembler For The TRS-80 "Color Computer" A 6502 assembler. It will read Object Code from memory and convert them to standard 6502 assembly language mnemonics which can be disassembled to the screen, printer, cassette, or disk. When output is to a tape or disk, the source code can then be loaded into EDASM for modification, changing the origin address 16K min., 32K recommended. Tape - $24.95  Disk or Amdek - $29.95

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T-bill Computation provides the investment rate which equates the coupon rate of other investments, as well as the number of days to maturity, profit, and the amount of your federal income tax on the T-bill. The interest on U.S. Treasury bills is not subject to state income tax.

If your state has an income tax, the amount of this savings is also shown. The profit on a 52-week T-bill differs from the investment rate, which is comparable to the coupon rate on an investment which pays interest semiannually.

The program requires the discount rate. It also requires either the cost of the T-bill or the exact number of days to maturity. If neither of these are available, use 91, 182, and 364 days to maturity, respectively, for 13-, 26- and 52-week bills, as these figures are likely to be accurate since they change only when the day of issue or maturity would fall on a holiday.

For information or applications to purchase U.S. Treasury bills call 202-287-4114, or write to the Bureau of the Public Debt, Washington, D.C. 20239-0001.

By Walter J. Tucker

The listing:

```
10 CLS:gosub320:print"THIS PROGRAM PROVIDES THE COUPON OR INVESTMENT RATE, PROFIT, DAYS TO MATURITY, AS WELL AS FEDERAL & STATE TAX:"145
70 ..........145
170 ..........156
300 ..........139
420 ..........230
END ..........192
```

AX IMPLICATION OF EACH T-BILL."
PRINT:PRINT:PRINT"DO YOU NEED INSTRUCTIONS? <Y/N>:"PRINT"PRESS <S> TO RECORD":PRINT:PRINT:
20 GOSUB520:IFW$="N"THEN100
30 IFW$="S"THEN450
40 CLS:PRINT"EACH WEEK THE U.S. TREASURY BORROWS BILLIONS OF DOLLARS BY AUCTIONING 13 & 26 WEEK T-BILLS, USUALLY ON MONDAYS, AND 52-WEEK T-BILLS EACH MONTH. MANY ARE PURCHASED AT AVERAGE..."
E COST.\n50 PRINT"RATES ARE PUBLISHED IN \nFINANCIAL PAGES OF MANY TUESDAY N \nEWSPAPERS, SOME INCLUDE COST.\n60 PRINT"RECENT AUCTION RESU \nLTS ARE ON TELEPHONE TAPE (202) \n-287-4100. FOR INFORMATION CALL \n(202)-287-4113 OR WRITE TO: THE \nBUREAU OF THE PUBLIC DEBT, WA \nSHINGTON, D.C. 20239-0001\n70 CLS:GOSUB320:PRINT"THIS PROG \nRAM REQUIRES DISCOUNT RATES. I \NF NEITHER THE COST NOR THE EXACT \nDAYS TO MATURITY ARE KNOWN, TH \nEN USE 91, 182, & 364 DAYS RESPE \NTIVELY FOR 13 & 26 WEEK AND \n1-YEAR T-BILLS AS THESE ARE MOST \nLIKELY TO BE ACCURATE.\n80 PRINT:PRINT:PRINT:GOSUB 53IZ1:GO \nSUB521Z1\n90 CLS:GOSUB510:GOSUB470:PRINT A \n100 CLS:GOSUB510:GOSUB470:PRINT @ \n324,"(C)1984 WALTER J. TUCKER":G \nPRINT@356,"B 211 CARRLEIGH PARKW \nAY ";PRINT@388,"SPRINGFIELD, V \nA. 22152 ";:GOSUB480\n110 CLS:GOSUB520:INPUT"DISCOUNT \nRATE IN %";A:PRINT IF A<70THEN1 \n120 INPUT"COST OR NUMBER OF DAYS \nTO MATURITY";G:IFG<367THE \nND=G\n130 IFG>366THENB=G\n140 IFG<367THEN=G\n150 C=10000-B:IFG>366THEN=\n365\n160 CLS:GOSUB320:PRINT"DISCOUNT \nRATE=";A:"%":PRINT:PRINT"COST=";G \n;INT(B*100+.5)/100:PRINT:PRINT"A \nMOUNT OF INTEREST=";INT(C*100+. \n5)/100:PRINT:Y=365:IFD>=363ANDD< \n170 IFD>=181ANDD<183\n180 IFD>=91ANDD<92\n190 GOTO350\n200 PRINT"1 YEAR ":D:"DAYS TO M \nATURITY":GOTO230\n210 PRINT"6 MONTHS ":D:"DAYS TO M \nATURITY":GOTO240\n220 PRINT"3 MONTHS":D:"DAYS TO M \nATURITY":GOTO240\n230 E=INT((1000000*(SQR((D/Y)^2)- \n(4*(D/(2*Y))-.25)*((B/100)-100)/ \n(B/100)))*(D/Y))/(2*(D/(2*Y))-.2 \n5))+.65)/1000\n240 E=10100000*(C+365)/(B*D)/1000\n250 PRINT"INVESTMENT RATE=

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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 everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners. Generally, we're much more interested in how your submission works and runs than how you developed it.

Those wishing remuneration should contribute to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should contribute.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.
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- CO-PROCESSOR MODE
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Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's Scoreboard column. All entries must be received 60 days prior to publication. Entries should be legible and must include your full name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

**Current Record Holder**

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<th>Company Name</th>
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<td>Saul Kirsch, Ra'anana, Israel</td>
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<td>Brian Jenner, Calgary, Alberta</td>
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**MADNESS & THE MINOTAUR (Radio Shack)**

- 220 | Ellen Ballinger, Uxbridge, Ontario

**MEGA-BUG (Radio Shack)**

- 13,805 | Ron Suijkoek, Bay City, MI
- 8,035 | Sheri Durr, Eau Claire, WI

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- 178,650 | Stephen Latham, Rich Square, NC
- 144,359 | Theodor Latham Jr., Rich Square, NC
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- 83,960 | Steven Allen, Sharpsburg, MD
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- 29,290 | Emmett Truxx, Canton, OH

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- 670,300 | Jeff Robeg, Winfield, KS

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- 151,000 | Danny Stinson, North Adams, MA
- 62,100 | Bud Seibel, Tumbled Ringer, British Columbia
- 105,200 | Martin W. Grimm, Elkhart, WV
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- 10,750 | Saul Kirsch, Ra'anana, Israel
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- 194,800 | Helene Gilbert, Rouyn-Noranda, Quebec
- 103,950 | Kevin Kordana, Port Credit, NY
- 100,000 | Laura Hotz, Herzliya, Israel

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- 1,375 | Ken Krejca, Chicago, IL
- 1,540 | Tom Rube, Atlanta, GA

**PYRAMID (Radio Shack)**

- 220,115 | Jeff Lilly, Bettendorf, IA
- 220,130 | Cornelius Caesar, Guelphrdsttr, West Germany
In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

MEMORANDUM FOR MADNESS

Scoreboard:
For all of you who have trouble with Madness and the Minotaur, here are a few hints.
To get out of the maze, find the small pit and jump over it, but if your physical condition is below 245, then you won't make it. To get past the hydra, find the rope and type in TIE HYDRA. Last but not least, to kill the Minotaur, you must have the sword, shield and power ring.

Charles Farris
Lebanon, IL

PASSING KARRAK'S PIT

Scoreboard:
I have to write to advise the true Adventurers out there. Yes, there is a way to get past the pit in game I of The Amazing Adventures of Karrak (THE RAINBOW, Feb. '84), and I don't mean by cheating (example: altering the listing). If you will notice, when you take inventory you have a sack. By using the back-arrow sign (a shifted up-arrow) you can inventory the sack. Alas, there is a pouch. GET POUCH and OPEN POUCH. 'GASP' a coin falls out. I must confess I beat my brains out for a few hours before my wife, who had no idea what was going on, suggested the proper answer.
Happy Adventuring!

Wayne T. Holiman
Mesquite, TX

TREKBOER (Mark Data)
161
| Warren Scalcan, Seattle, WA

TUT'S TOMB (Mark Data)
163,060
| Michael McCafferty, Oceanside, CA
158,000
| Chris Russo, Miami, FL
134,560
| Judy Smith, Shreveport, LA
106,460
| Eileen Kasee, Royal Oak, MI
104,460
| Gary Marshall, Layton, UT
72,140
| Anthony Ebert, Galveston, IN

UGH (Softtek International)
4,875
| Oren Bergman, Herzlia, B, Israel

VENTURER (Aardvark)
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WILDCATTING (Radio Shack)
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| John Kidd, Clarkboro, NJ
33,090
| Jack Ballinger, Uxbridge, Ontario
31,973
| Lisa Ballinger, Uxbridge, Ontario
26,860
| Mike Galasso, Richmond, KY

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| Alan Morris, Chicopee, MA
93,700
| Craig Kugler, Miami, FL

ZAXXON (Datsoft)
2,057,500
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1,510,000
| James Cuadrella, Brooklyn, NY
666,000
| Andy Green, Whitehall, PA
401,900
| Mike Hughey, King George, VA
370,400
| Chris Coyle, Selden, NY
134,800
| Sean Conner, Summit, NJ
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| Diego Gallina, Summit, NJ
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| Kevin Kordana, Poughkeepsie, NY
96,300
| Vernon Johnson, Parkville, MD
88,500
| Nanopik Tufford, Hudson, NH

— Debbie Hartley
DIZZINESS REMEDY

Scoreboard:
In Bedlam, if you get a lobotomy, simply type PLUGH and it will cure the dizziness. What are the exact words to use to kill the dog? It always changes. Write to me if you know at 301 Caravel Dr., 19701.

Stephen Slack
Bear, DE

SHAMEFULLY HIGH SCORE

Scoreboard:
An easy way to run up your score in Shamus as high as you like is to step back and forth repeatedly across the threshold between two rooms, firing continuously into the rooms. Can anyone explain how to use the keys to unlock the locks? And is there a green key? I can only find the red and the white keys. Write to me at P.O. Box 15564, 20003

John Tiffany
Washington, DC

FUEL SHORTAGE

Scoreboard:
I need help on Zaxxon. After I get over 100,000 I start running out of fuel really fast. Any help or hints would be greatly appreciated. Please send to 10 Ronnie Lane, 12601.

Kevin Kordana
Poughkeepsie, NY

PYRAMID PLEA

Scoreboard:
I am a proud owner of a TRS-80 Color Computer. The very first game I got was Pyramid. I have tried to figure out how to solve this game and it has nearly driven me crazy. In the Jan. '85 issue of THE RAINBOW ("Scoreboard Pointers" Page 178), I found many people had solved it. I would like for anyone to write me and give me the solution to it. My address is 5208 Ventura Dr., 27406. Your help will be greatly appreciated.

Brian Beasley
Greensboro, NC

DUNGEON-AID

Scoreboard:
I have the game Dungeons of Daggorath and have gotten to the fourth level. I can kill any creature there besides the galdrog. Can anyone help? Also, my heartbeat gets to about thirty beats a second. What creatures have hale or thews' flasks?
If you need help before the fourth level, the blob brings you a Vulcan ring on the first level. Type I FIRE. The Rime ring on second level is ICE. Stow these and use them for the wizard's image. On the first level turn around, move, turn right, move seven times, turn right, move, move and there is a hole in front of you! On the second level, face down the long corridor, move down it to the end, turn left, move three times, turn right and follow the doors. When you are in a left and right corridor, go right. Go as far as you can and you've found it!
On the third level, make sure you use a Solar Torch or the scorpion, and the wizard's image is hard to see. After the first time you attack the wizard's image, use a hale flask.
For more help, send a SASE and the information you need to 32 Daniel St., 02159.

David Heinemann
Newton, MA

ADVANCING ON DONKEY KING

Scoreboard:
Are you tired of playing Donkey King because you can never seem to get past the first level? Try this: CLDRDM the game, POKE 12889,2, now EXEC. This will let you start at the elevators level.
If you CLDRDM, POKE 12889,18 you can start at the rivets level. And if you CLDRDM, POKE 12889,18 you can start at the conveyor belt level.
Also if you CLDRDM, POKE 12914,x you can pick how many extra men you want to play with, x being any number from one to 255. Lastly, I'm looking for a CoCo pen pal with whom I can share ideas and knowledge. It might make these Wisconsin winters bearable. My address is 708 Michigan Ave., 53081.

Bill Bernic
Sheboygan, WI

Scoreboard:
I have just recently solved the new graphics Adventure Blackbeard's Island. I would like to offer other Adventurers help. I have made a clue sheet with all 86 moves required to solve the game, but with one slight difference. This clue sheet has all the clues encoded so you can get only the clues you want without accidentally seeing the answer and spoiling the game. The clue sheet comes with the decoder. Anyone interested should send $1 to 539 South Berthe Ave., 32404.

Mikel Rice
Panama City, FL
How To Figure Foreign Currency Exchange Rates

Over the past several years, my wife and I have had the good fortune to be able to travel to several foreign destinations for a combination of business and vacation. Being typical tourists, we have always been on the lookout for good bargains and also for items that are difficult to come by at home.

A big hindrance to our shopping has always been converting the local currency to the U.S. dollar. Even using a hand-held calculator has proven to be irksome for me and doesn't appeal to my wife (who keeps forgetting the formula).

In any event, the following simple little program came about when I returned from Italy (lira=1677:1) where I made up a handwritten table to aid in converting sales prices to understandable costs.

Using the conversion table, for example, I want to buy a beautiful pair of Italian shoes, but the price tag says 76,555 lira. Wow! Get out your trusty copy of the table and look up 76,555 lira, which falls between $40 and $50. Sometimes having just that information can be enough to permit you to consummate the purchase, but if not, subtracting 67,000 lira ($40) from the 76,000 leaves 9,000 or between $6 and $5, or about $46 total. Interpolating in this manner, you can calculate any asking price.

Foreign currency exchange rates are published in newspaper business sections or by local banks. Before embarking on a trip, just enter the name of the currency and its rate of exchange to one U.S. dollar for each country to be visited. Hit the ENTER key and Voila!

The program requires Extended BASIC because of the use of the PRINT USING functions, but shouldn't be difficult to alter to Color BASIC. For those readers who live outside the U.S., simply change the program to refer to your own currency wherever "U.S. dollars" occurs (lines 30, 40, 140, 210, 215). The program logic is merely a multiplication exercise using FOR/NEXT loops to print out the table. More time was spent in trying to do a reasonable job of error trapping than with the BASIC program. One last thing, if you modify Line 3 of the program to add the month of this issue and the page number, you will always be able to find the source of the program.

### Conversion Table of Lira to U.S. Dollars at the Rate of 1677 to 1

<table>
<thead>
<tr>
<th>U.S. Dollars</th>
<th>Lira</th>
<th>U.S. Dollars</th>
<th>Lira</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1677</td>
<td>2</td>
<td>3354</td>
</tr>
<tr>
<td>3</td>
<td>5031</td>
<td>4</td>
<td>6708</td>
</tr>
<tr>
<td>5</td>
<td>8385</td>
<td>6</td>
<td>10062</td>
</tr>
<tr>
<td>7</td>
<td>11739</td>
<td>8</td>
<td>13416</td>
</tr>
<tr>
<td>9</td>
<td>15093</td>
<td>10</td>
<td>16770</td>
</tr>
<tr>
<td>11</td>
<td>18447</td>
<td>12</td>
<td>20124</td>
</tr>
<tr>
<td>13</td>
<td>21801</td>
<td>14</td>
<td>23478</td>
</tr>
<tr>
<td>15</td>
<td>25155</td>
<td>16</td>
<td>26832</td>
</tr>
<tr>
<td>17</td>
<td>28509</td>
<td>18</td>
<td>30186</td>
</tr>
<tr>
<td>19</td>
<td>31863</td>
<td>20</td>
<td>33540</td>
</tr>
<tr>
<td>30</td>
<td>50310</td>
<td>40</td>
<td>67080</td>
</tr>
<tr>
<td>50</td>
<td>83850</td>
<td>60</td>
<td>100620</td>
</tr>
<tr>
<td>70</td>
<td>117390</td>
<td>80</td>
<td>134160</td>
</tr>
<tr>
<td>90</td>
<td>150930</td>
<td>100</td>
<td>167700</td>
</tr>
</tbody>
</table>

(Gordon B. Lewin is a materials manager at U.S. Divers Company, affiliated with Jacques Cousteau. He would like to someday write a book combining the subjects of his three hobbies: world travel, photography and computers.)
The listing:

1 '**********CONVERT**********
2 '****1984, BY GORDON LEWIN****
3 '****MARCH 1985 RAINBOW******

* 10 CLS(3)
20 PRINT@142,"MDNEY"; PRINT@204,
11 CONVERSION 11 ; PRINT@270, 11 TABLE 11 ;
30 PRINT@448,"U.S. DOLLARS IN FD
REIGN CURRENCY"; GOSUB 390
4121 CLS: PRINT@1,"THIS PROGRAM WIL
L PRINT OUT A TABLE OF U.S. DO
LLARS EXPRESSED AS
A FOREIGN CUR
RENCY. ALL YOU NEED TO DO IS AN
SWER A FEW VERY SIMPLE QUESTIONS
."; GOSUB 390
50 PRINT@456,"ARE YOU READY?"
60 I$=INKEY$: IF I$="Y" THEN 70 ELSE 60
65 FOR X=1 TO 500: NEXT X
7121 CLS<3>: PRINT@32," WHAT FOREIGN
N CURRENCY NEEDS TO BE CONSIDER
ED FOR CONVERSION? ": PRINT STR
ING$(34,175); INPUT FC$
75 IF FC$="Y" THEN 70 ELSE FC=V
AL<FM$)
80 Z=127: Q$=STRING$(32,175)
90 IF LEN<FC$)<23 THEN 135: PRINT
@ 360,"USE AN ABBREVIATION!! ":FOR
RX=1 TO 150: NEXT X
1121121 Z=Z+16
11121 PRINT@352,STRING$(32,Z>
120 FOR C=1 TO 150: NEXT C
13121 IF Z=255 THEN 140 ELSE 90
135 PRINT@352, Q$: PRINT@352, FC$;
140 PRINT@352, "HOW MANY " FC$; PR
INT@384, "ARE THERE IN ONE U.S. D
OLLAR?"; INPUT FM$
150 IF FM$="Y" THEN 140 ELSE FC=V
AL(FM$)
160 IF FC>0 THEN 170 ELSE CLS<3
): GOTO140
170 IF FC=0 THEN PRINT@352, STRIN
G$(128,175) ELSE 175: GOTO 140
175 CLS(3)
180 PRINT@258, "IS THE PRINTER RE
ADY ? ? ? ";
185 I$=INKEY$: IF I$="Y" THEN 190 ELSE
190 CLS<3): PRINT@262, "PRINTING.. ";
210 PRINT#-2: PRINT#-2, "CONVERSI
ON TABLE OF " FC$ " TO U.S. DOLLARS
AT THE RATE OF " FC" TO 1": PRINT
#-2: PRINT#-2
215 PRINT#-2: TAB(4)" U.S. DOLLARS
"FC$; PRINT#-2, TAB(44)" U
.S. DOLLARS " FC$; PRINT#-2
225 FT=FC
230 FOR T=1 TO 20
250 PRINT#-2, USING
***
FT; FT=FT+FC: NEXT T
270 FOR T=30 TO 110 STEP 10:FT=F
290 IF T>100 THEN 310 ELSE 250
310 PRINT #-2: PRINT#-2: PRINT#-2
330 PRINT@270, "DONE PRINTING "%;
350 PRINTR@222, "ANOTHER CURRENCY
TABLE? (Y/N) ";
370 I$=INKEY$: IF I$="Y" THEN 370
ELSE IF I$="N" THEN 70 ELSE CLS<
3>: PRINT@270, "END ";
380 GOTO 380
390 FOR X=1 TO 1500: NEXT X: RETURN

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by C.E. Laidlaw

What programs are on this disk? Which disk is my WIDGET program? WHERE'S-IT will answer these questions for you and maintain disk directory index files with up to 972 programs in each. Completely user-friendly, just run WHERE'S-IT and follow the prompts to:
Create index files holding up to 972 programs
Load or save existing index files
Add, delete or update index files for specific disk
Sort index files alphabetically with a machine language sort
List index files to screen
Print index out with at least 162 programs to the page

Disk only: $19.95
(32K Extended Color BASIC)

We are also a dealer for the following companies:
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Computerware
Spectrum Projects
Mark Data, Amdek, Epson
Pel Creations, Tom Mix
PBH Computer, Inc.
Spectral Associates
Cognitec, Elite Software
Prickly Pear, Botek
Cobra Software
and many more fine companies

T.A.G.
THE ADVENTURE GENERATOR

Cassette: $34.95
Disk/Amdisk: $39.95

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by Terry A. Steen

Control your submarine in its efforts to destroy the enemy fleet. You must launch your sub to surface missiles while avoiding the depth charges. Five different types, hi-res graphics and spectacular sounds. Also a talking version included at no extra charge for those who have an SC01 based voice pack. Four screens and progressive difficulty make this all machine language program a real bargain.

Cassette: $19.95
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FEATURES
Creates stand-alone programs
Up to 100 rooms, 60 objects, 30 command words, and 9 conditional flags
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Includes sample ADVENTURE
Works with all models of the CoCo except MC-10
Requires 32K Extended Color BASIC

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Calling All CoCo Nuts

By Paul Poulosky

his 16K ECB graphics display explains exactly why there are so many CoCo widows. I was inspired to write CoConuts on the first anniversary of having my CoCo. CoConuts is a program designed to be expanded upon. We challenge ambitious programmers to make another screen or two. Good luck!

(Paul Poulosky, a junior in high school, has been a CoCo owner for a year. His hobbies are playing fantasy games, reading science fiction/fantasy books and computer programming.)

The listing:

0 "COPYRIGHT (C) BY PAUL POULOSKY
10 PMODE4,1
20 SCREEN1,2
30 PCLS
40 DRAW"BM00,168;R96;L65;L96;D65"
50 DRAW"BM00,133;R96"
60 DRAW"C1;BM165,128;L7;U4;R7;D4"
70 DRAW"BM176,128;L6;R6;U4;L6;R6;U4;L6;R6;U4;L6;R6;U4;L6"
80 DRAW"BM00,128;R6;L6;U4;R6;L6;U4;R6;L6;U4;R6;L6;U4;R6"
90 DRAW"C1;BM85,138;D30;R86;U30;L86"
100 PAINT(84,138),1,1
110 DRAW"C0;BM00,133;R96"
120 DRAW"C1;BM100,165;R56;U3;L56;D3"
130 PAINT(101,164),1,1

The Rainbow March 1985
One-Liner Contest Winner . . .

Echo plays musical notes that you specify. Just type in a note letter and an octave number and press ENTER. You can put more than one combination on a line.

The listing:

760 DRAW"BM130,30;R6;D6;U6;L6;U6" 770 DRAW"BM139,30;D6;E3;F3;U6" 780 CIRCLE(115,66),50,,4,5,99 790 CIRCLE(115,56),50,,4,5,99 800 CIRCLE(115,71),50,,4,5,99 810 CIRCLE(115,66),50,,4,5,99 820 CIRCLE(115,61),50,,4,5,99 830 PAINT(67,71),1,1 835 PAINT(67,61),1,1 840 FORX=1TO2000:NEXT 900 FORX=6:GOTO164 910 LINE(X,18)-(X,76),PRESET 920 NEXT 930 GOTO 400 1000 GOTO 1000

Joshua Jackson
South Salem, NY

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Simulations and its companion Rainbow Simulations Tape.)
SUPER BACK-UP UTILITY*  

WITH S.B.U. FROM COMPUTIZE - YOU'LL NEVER NEED ANOTHER BACK-UP UTILITY FOR YOUR COCO!!!  
SUPER BACK-UP UTILITY WILL PERFORM ALL  
OF THE FOLLOWING FUNCTIONS:  
1. TAPE TO TAPE (Regardless of most protection schemes!)  
2. TAPE TO DISK (Move Cassette programs to Disk!)  
3. AUTO RELOCATE (For those Cassette programs that conflict WITH Disk operating systems)  
4. DISK TO TAPE (Place Disk programs onto Cassette)  
5. DISK TO DISK (Our powerful Split-N-Image Program. *Regardless of protection schemes!)  
* MENU DRIVEN!  
* REQUIRES 32K EXTENDED COCO  
* REQUIRES 1 OR 2 DRIVES (For Disk Functions)  
* ALL MACHINE LANGUAGE!!!  

COMPARISON WITH OTHER INDIVIDUAL PROGRAMS  
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T.T.U. - TRIPLE TRANSFER UTILITY (C)  
M.I. For Cassette & Disk Program Transfer  
Transfer contents of disk to tape - Transfer contents of tape to disk - "Select" or "All" Option  
Will automatically relocate those cassette programs that conflict with the disk operating system -  
Will display machine language program address - Copies ASCII Basic, Machine & Language Programs - All contained in 1 menu driven program!!  

REQUIRES 32K CC EXT.  
Cassette $19.95 Disk $24.95  

SPIT-N-IMAGE (C)  
M.I. Disk Back-Up Utility  
There is no need to suffer the heartbreak of crashed disks any longer. Split-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions.  
Will also initialize and back-up in one pass. Data processing experts always insist on having a back-up - it's good practice - Don't wait!  

REQUIRES 32K CC AND 1 OR MORE DRIVES  
DISKETTE $34.95  

MASTER KEY  © 1984  
ONLY  
$99.95  

Have you ever lost a program and didn't have a back-up? Sooner or later it happens to everyone. The best policy is to HAVE A BACKUP OF EVERYTHING. Thus comes the problem - many programs are copy-protected and won't back-up well. So how do you protect your investment?  

The MASTER KEY was developed just for this problem. Just as a master key unlocks all doors in a building, this MASTER KEY will unlock ML programs that load into your COCO's memory. And it is as easy as flipping a switch! Once you have control, you can copy your programs, protected or not, to tape or disk.  

The MASTER KEY offers:  
Complete Disassembler  
Display/Change memory in Hex or ASCII  
View memory in all Graphic Modes  
Versatile printer routine for all printers  
Non-Paradroided set of assembly language symbols  
Non-Paradroided set of disk system memory - Enables the Full 64K of RAM in your 64K Color Computer. Provides up a additional 16K of RAM. Permits you to change, modify or copy the BASIC, EXTENDED BASIC, ROW/PACK, OR DISK PACK.  

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Disk Only $19.95  

64K-IT©  
Enables the Full 64K of RAM in your 64K Color Computer. Provides up to an additional 16K of RAM. Permits you to change, modify or copy the BASIC, EXTENDED BASIC, ROW/PACK, OR DISK PACK.  

REQUIRES 64K COCO  
TAPE $11.99  

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Tape-Dir is a basic program used for displaying and/or printing information about cassette files  
In addition to listing file name, Tape-Dir will list and/or print the following information  
1 Type of file - Machine Language. Data. Basic  
2 Format - Binary or ASCII  
3 M.I. Start, End. and Execute addresses  
4 For Basic & Data Files - will show number of bytes used! Useful for sorting out your tape and files by those that will run on your 16K/32K machine!  

REQUIRES 16K EXTENDED COCO, CASSETTE PLAYER. (PRINTER OPTIONAL)  
CASSETTE $11.99  

OS-9 "CONVERT"  
This high quality M.I. Utility will CONVERT Standard OS-9 Formatted Files (51/8") to Radio Shack OS-9 to run on your COCO. Will also convert 40 track to 35 track if you require.  

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A Unique Interrupt-Based Program Tracer  
From Spectro Systems  
Fastape gives you cassette 1/O at 3000 baud-Twice Normal Speed. It uses the high-speed (POKE 65495,0) mode, and makes it convenient to stay in this mode throughout. Features automatic adjustment of cassette and printer parameters when speed mode is changed. Control-key functions for many Basic commands and for changing speed modes. Compatable with all tape file types. Can be used with Teletower-64 and many other utilities  

"I strongly recommend this fine utility" Rainbow, 7/83  
"A treat for those without disk systems" Hot Coco, 10/83  

REQUIRES 16K COCO  
CASSETTE $21.95  

THE PEEPER  
A Unique Interrupt-Based Program Tracer  
From Spectro Systems  
Imaging being able to monitor the operation of a machine-language program while it is running. To display any portion of memory in any of Coco's 26 documented display modes, and to move through memory using the arrow keys. To slow down the action to a crawl, or freeze it at will. Instantly switch between watching the output of your program and watching the memory contents. Memory examiners watch the display and/or printer for the contents of the 5059's registers and stack, showing changes as they happen. In the slowest speed mode, Peeper provides continuous single-stepping. Faster modes give a counter trace. Or, halt the action and single-step by repeatedly pressing the space bar. Peeper supports breakpoints, memory examiners, and more. Think how much easier it would be to modify someone else's M.I. Software if you could determine what routines were being executed at any given point!  

For fun, and this requires no ML experience), use Peeper with arcade games, viewing the details of the animation effects in slow motion. See how the game looks and plays in other graphics modes. Or watch what is happening on "hidden screens" you never see. (Makes a superb demonstration)  

REQUIRES 16K COCO  
CASSETTE (COPYABLE TO DISK) WITH ASSEMBLER LISTING  

ONLY $24.95
The first of a two-part series

So, You Want To Sell Your Software . . .

By Susan P. Davis

Many people write a piece of software for the Color Computer which they think other people could use and enjoy. There are three ways to go: donating the software to the public domain by sending it to CompuServe or other bulletin boards, submitting it for publication in THE RAINBOW or another magazine, or trying to sell the program.

People who decide to sell a piece of software that they have written then need to decide whether they want to sell it themselves or if they want to submit it to an existing software house. There are many pros and cons related to each choice. The final decision is truly an individual one, often based on the amount of time and money the author has to invest in his/her program and not on the quality of the software.

Let's examine the advantages and pitfalls of trying to sell the software yourself. Next month, we will discuss having a software house market your program.

The first decision that you have to make is the form that your business will take. If you are setting up the business all alone, you can either have a sole proprietorship or form a corporation. Either way, you may have as many employees as you wish. If you plan to start the business with another person, you can have a joint venture, a partnership or a corporation. If you have had a business before, you know the pros and cons of each of these business forms. If not, you will want to consult your attorney, Small Business Association and/or accountant before making your decision.

Now, let's get a business name. Choose a name that tells something about you or your business. After you decide on a good name, you will have to register this name with the state in which you reside. You will have to pay a fee for this. The state will look into its database of registered company names to make sure that you have not used a name already in use or a name that is very close to one already in use. You should not start using your business name until your state has given you the go-ahead.

After the state OKs your new business name, it will tell you about even more fees which you must pay. The state, county and local fees that you will have to pay vary, and you must find out about them. Ignorance here is no excuse and you will probably have penalties to pay if you do not pay all your fees at this time. You will need a vendor's license for each state in which you will be selling your software. This license is renewed annually. This vendor's license obligates you to collect and send in at various intervals the sales tax levied by your state.

You will need to establish a business relationship with a bank. You will need a business checking account and perhaps business credit cards. The "rules" for this account will probably be different from those of your personal account, and you will probably incur more charges. Do you need a loan to get started in your business or to expand? Your business banker will be able to help you here. If you want to offer your customers charge privileges, you will need to apply to be a Visa/Mastercard merchant. The bank will take a certain percentage of each charge card sale; the newer you are, the higher your percentage. You will probably find this well worth it, as phone customers can easily order after they have all the information they need about your program.

You and the bank will need to decide how much money you can afford to lose if things do not go well at first. If you do not achieve these financial goals, you
will need to do a serious reevaluation.

Finally, you are ready to start! Where will you conduct your business — from your home or from a separate office or store? If you will be leasing a store or office, you will need money for rent and utilities before the first sale is even made. Most people start their Color Computer businesses from home. Even THE RAINBOW started off in Lonnie Falk’s house, eventually taking over every inch of habitable space. (Now I hear they have had to expand the Prospect, Ky., city limits to accommodate all the growth.) If you will be running your business from home, do you have a separate place to do the business? The IRS has tightened up on the “office in the home” rule, and you must have a place where you conduct your business and don’t do anything else. You will need to decide if you will get an 800 number and how you want to handle your long distance calls.

Next, survey your equipment. Do you have enough computers, tape recorders, disk drives (according to Gary, my husband, no one ever has enough disk drives) and controllers and tape duplicators to fill orders? If you don’t, will you buy the machines or will you have your duplication professionally done?

You will need to find bulk suppliers of tapes and diskettes, mailing envelopes and office supplies. Many of these places advertise. You can probably get good recommendations from other software houses and local businesses.

There is a lot of artwork to consider in the software publishing business. You will need to develop a logo to use on your business cards, letterhead and magazine advertising. Documentation booklets need to be designed. You will need to decide what kind of packaging you want to use and who will do it for you. All of these things will have to be printed. You can attempt to do this all yourself or you can hire someone else to do it for you. The people who purchase software have become more sophisticated, and ads that were acceptable two years ago are no longer seen.

Your ads need to attract their attention so that they can read about your product.

Now is the time to set up an advertising budget. This will help you and/or your advertising director or agency make the best decisions. Will you advertise only in magazines like RAINBOW, which are Color Computer specific or will you also consider magazines which deal with other computers? A call or letter to the advertising manager will get you a copy of the latest rate card. The ad rates, sizes of the ads, discount terms and conditions, mechanical requirements, issuance and closing dates will all be spelled out for you.

You will also have to consider attending trade shows. There are Color Computer specific shows such as the RAINBOWfest and there are business software shows, educational software shows, etc., for all home computers.

You will need to develop a catalog, a flyer or both. Will you do mass mailings and how will you develop your mailing list? You might investigate the advantages of purchasing a bulk mailing permit or renting a post office box. You will need to develop policies about COD orders, extending credit and your collection procedures. Obviously, there are many factors which will influence your decision. Once you have considered the above questions, and others that may occur to you, it’s time to start. You are ready to go! Good luck!
Now ... from the makers of THE RAINBOW comes the new, expanded

Just because we at PCM call ourselves The Magazine for Professional Computing Management, you shouldn't get the idea that we're no fun.

We cover five of the most exciting computers on the market, as well as the most productive — the highly popular Model 100; a brand new portable, the Tandy 200; and Tandy's new MS-DOS computers, the Tandy 2000, Tandy 1200 and Tandy 1000.

We learned from THE RAINBOW that readers want programs to type in, so, each month we bring you an assortment of them, including games, utilities, business applications and graphics. Also, PCM is the only computer publication anywhere in the world (that we know of) that brings you programs in bar code, ready to scan into memory with the sweep of a wand!

Add to this our regular tutorials on MS-DOS and dBASE, and monthly columns on telecommunicating, hardware and machine language, as well as BASIC programming tips and product reviews, and we think you'll find we're one of the most informative and fun magazines on the market today.

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Stock Index will make CoCo a useful investment tool so you can have your own . . .

Barometer On
The Stock Market

By Patrick H. Lowrie, Jr.

You can gauge your own performance in the stock market with Stock Index. It works equally well for measuring the performance of mutual funds, bonds or anything where the price fluctuates with time.

Measuring your performance is easy if you just buy some shares and hold them. The price of the stock times the number of shares you hold tells you whether you've made money or lost it.

But, when you buy a few shares of this stock today, a few more shares in another stock in a couple of weeks or months, then sell some shares after another month or so, how can you tell? With some stocks increasing while others are decreasing, determining the net performance can be a chore.

Stock Index will take the work out of it. It doesn't care whether you're buying or selling, or whether you're reinvesting the dividends or taking them in cash. It will faithfully show you not only how you are doing, but it can show how well you would be doing if you had invested differently, or how any group of stocks, bonds, funds, etc., are doing.

It's very important to note here that you don't have to actually buy stock to use this program. On the contrary, this program provides an ideal tool by which you can experiment with hypothetical purchases and sales to evaluate an investment method before you spend any money!

Running the Program

Once the program is loaded, run it.

To pass the title, press any key. If you answer 'N' to the query about the printer, the program disables the PRINT commands so you can't inadvertently request a PRINT (which would cause the program to lock up without a printer attached).

Amount Invested

After you have entered the date, the program will prompt "total investment?". Enter the total net amount you have actually (or hypothetically) spent in purchases of shares as of that date. (If you don't know this number, or if you want to just compare stocks, for instance, against a baseline date, see "Determination of Baseline" below.)

If you want to know precisely how your investments are doing, this number should include broker's fees, cost of wiring the money or cost of the certified check, and any other costs immediately associated with the purchase. If your purchase was for less than $1,000, it's more important to include these costs, as they are a larger percentage of the total investment than for larger investments. They are real, however, so to ignore them is to make the picture look (somewhat) rosier than it really is.

If you have sold shares, reduce the total amount invested by the amount of cash you received from the sale (and be sure to reduce the NO. SHARES by the number sold).

Dividends Taken in Cash

Next, the program will prompt "Total dividends taken in cash?". As any dividends you have taken in cash are part of the return on your investment, entering this value will allow the program to more accurately compute your performance. (Any dividends that you have reinvested will increase the number of shares of the stock in March 1985 THE RAINBOW 171

(Patrick Lowrie, president of Lowrie Information Systems, Inc., holds a bachelor's degree with special honors in electrical engineering. He has been writing programs professionally and for fun since 1960.)
This identifier may be or funds, a list of names and their abbreviations is handy. Press after entering the name.

Your broker (if you have one) can tell you this price, or you can get it to two decimal places. This corresponds to how the prices are listed today in most newspapers, though they are usually quoted in fractions over the air.

The entries will now be relisted on the screen followed by the words CORRECTIONS? (Y/N), if you have made a mistake during the entry of the stocks, new is the time you can fix it. In response to your pressing 'Y', the program will prompt ENTER NO. OF LINE TO BE CHANGED. This number must be followed by ENTER.

You can also add stocks by selecting a number higher than those listed. (If you enter a number greater than 12, the program will announce “improper entry,” and request “Correction?” again.) That is, if three stocks are listed, you can add another stock by selecting a number larger than '3'. The program will always list the next entry with the next successive number, so, if at the end of a three row entry, you entered a '5', the program would enter a '4' because that is the next number in the series.

You can also delete a stock by pressing ENTER without any entry in the "Stock" column of the row to be deleted. Following each correction the program will relist all entries followed by CORRECTIONS? (Y/N). You will stay in the correcting mode until you respond to the "Corrections?" prompt with 'N'.

If you answered 'Y' to the "printer connected?" prompt, you will see at the bottom of the screen PRINTOUT (Y/N)? A 'Y' response to this prompt will result in a dump of the entire table to the printer. Since the printer is not limited by screen size, the complete (up to 12) entries are printed on one table.

Additional Entries

If you answered 'N' to the "printer connected?" prompt, or if you answer 'N' to the "printout?" prompt or at the completion of the printout, the prompt MORE STOCKS? will appear at the bottom of the screen with the (Y/N) flashing.

If you respond with 'Y', the program returns to the stock entry table, but it first enters the AGG 1 row to this new table as entry #1. This includes the total aggregate entries of the first table as the first entry of this new table. As a consequence, the results of these new entries will include the results of the previous entries as well.

By answering 'Y' to the "more stocks" prompt, you can build your total analysis to include as many entries as you choose. Each time a new AGG is calculated, the AGG identifier will increase by one (the first will be AGG.
1, the second will be AGG 2 and so on).
Answering 'N' to the "more stocks" prompt will return you to the "entry date" prompt for entry of a new and independent set of data.

**Determination of Baseline**
You may select any analysis as your baseline by entering 'O' in answer to the "total investment" prompt. Doing this will cause the "Total Value" amount in the results table to be the baseline from which subsequent analyses can be based. It becomes 100 percent no matter what value it has. This is a convenient way to determine the performance of a block of stocks, funds, etc., for a period of time following a specific date. Once the baseline value is established, it becomes the value used as the "Total Investment" for future analyses.

**Final Note**
If you want to go back into the program without losing the data, press BREAK to exit the program, then key in GOTO 300 and enter. The program will then display the last list of data entered with CORRECTIONS? (Y/N) at the bottom of the screen, and you are back in the "corrections" phase.

Author's Comment
An enhanced version of Stock Index is one item on the menu of investment programs for the serious investor that is soon to be published. These programs are intended to make the CoCo a truly useful investment tool. For additional information about these programs, and for information about a pre-publication offer, write to the following address:
Lowrie Information Services, Inc., 17 Lowrie Circle, P.O. Box 0728, Hialeah, FL 33011, phone (305) 557-6651.

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C. 1984. ALL RIGHTS RESERVED

120 FS=INKEY$: IF FS="" THEN 120
130 DIM X(13): DIM Y(13): DIM Z(13)
140 CLS: PRINT@195, "PRINTER CONNECTED? (Y/N)"
150 Q$=INKEY$: IF Q$="Y" OR Q$="N" THEN 150 ELSE Q$="Y" THEN PP = 1 ELSE PP = 0
180 FOR X = 1 TO 13: S$(X) = "": NS(X) = 0: P(X) = 0: NEXT X: CLS: PRINT "****STOCK INDEX CALCULATOR****"
190 LINE INPUT "ENTRY DATE MO/DA/YR" ; M$: PRINT USING "TOTAL INVESTMENT ON % " ; M$: INPUT TD, INPUT "TOTAL DIVIDENDS TAKEN IN CASH" ; DC
210 DV = TD / 11: T1 = 0: G = 1: AG = 0: V = 1: ZI = CLS: PRINT@6,'STOCK INDEX NO. PRICE/': PRINT@46,'SHARES SHAIRE"
220 IF AG > 1 THEN PRINT@64, USING "I.###.### ###.##" ; A$, M$, PZ
230 FOR X = CI TO 12: K(X) = 34 + 32 * (X - G + V): L(X) = 44 + 32 * (X - G + V): M(X) = 53 + 32 * (X - G + V): PRINT@ (32 + 32 * (X - G + V)), USING "###.###.### " ; X$: PRINT@K(X), "": INPUTS$(X) : IF S$(X) = "" THEN 260 ELSE PRINT@L(X), "": INPUT NS$(X) : PRINT@M(X), "": INPUT P$(X)
240 IF HP = 1 AND Z = 6 THEN G = X + 1: Z = 0: INPUT "PRESS <ENTER> TO CONTINUE" ; H: CLS: GOTO 380
250 NEXT X
260 PRINT@448, "CORRECTIONS? (Y/N)"
270 Q$ = INKEY$: IF Q$="Y" THEN 270 ELSE 540
280 PRINT "ENTER NO. OF LINE TO BE CHANGED" ; INPUTS IFZ > 12 THEN PRINT@384, "IMPROPER ENTRY" ; PRINT@41
&", "": FORT = 1 TO 350: NEXT X: GOTO 300 ELSE IF Z > T1 THEN Z = T1 + 1: IF Z > 1 THEN Z = Z - 1 ELSE T1 = T1 + 1
290 GO SUB 510: PRINT@ (34 + 32 * Z), "": INPUTS$(Z): IF S$(Z) = "" THEN 310 ELSE PRINT@ (44 + 32 * Z), "": INPUT NS$(Z): PRINT@ (54 + 32 * Z), "": INPUT P$(Z)
300 GO SUB 510: GOTO 320
310 FOR X = Z TO T1: S$(X) = S$(X + 1): N S$(X) = NS(X + 1): P(X) = P(X + 1): NEXT X: T1 = T1 - 1: GO SUB 510: GOTO 320
320 TV = 0
330 FOR Y = 1 TO T1: TP$(Y) = NS$(Y) * P$(Y): TV = TV + TP$(Y): NEXT Y
340 TV = TV + DC: IF TD = 0 THEN IX = 100 ELSE IX = TV/DV
350 CLS: HP = 0: G = 1: Z = 0: MS = 0: FORT = 1 TO T1: MS = MS + NS$(X): NEXT X
360 PRINT#-HP, "STOCK NO. PRICE VALUE": PRINT#-HP, "STK NO. PRICE": PRINT#-HP, "SHARES SHAIRE"
370 IF NS$(G) = 0 AND P$(G) = 0 THEN 44
400 FOR X = G TO T1
410 PRINT#-HP, USING "###.###.###.###" ; A$, M$, PZ
420 IF TD = 0 THEN PRINT#-HP, USING "BASELINE IS #######." ; TV-DC
430 PRINT#-HP, USING "INDEX= #######." ; IX
440 IF HP = 1 THEN PRINT "****PRINT OUT (Y/N)???" ELSE PRINT "MORE STOCKS? (Y/N)"
450 IF HP = 1 THEN PRINT "****PRINT OUT (Y/N)???" ELSE PRINT "MORE STOCKS? (Y/N)"
460 PRINT#-HP, USING "INDEX= #######." ; IX
470 IF HP = 1 THEN PRINT "****PRINT OUT (Y/N)???" ELSE PRINT "MORE STOCKS? (Y/N)"
480 IF HP = 1 THEN PRINT "****PRINT OUT (Y/N)???" ELSE PRINT "MORE STOCKS? (Y/N)"
490 IF HP = 1 THEN PRINT "****PRINT OUT (Y/N)???" ELSE PRINT "MORE STOCKS? (Y/N)"
500 IF DS$(G) = 0 AND P$(G) = 0 THEN 44
510 FOR X = G TO T1
520 PRINT#-HP, USING "###.###.###.###" ; A$, M$, PZ
530 PRINT#-HP, USING "BASELINE IS #######." ; TV-DC
540 PRINT#-HP, USING "INDEX= #######." ; IX
550 IF HP = 1 THEN PRINT "****PRINT OUT (Y/N)???" ELSE PRINT "MORE STOCKS? (Y/N)"
560 IF HP = 1 THEN PRINT "****PRINT OUT (Y/N)???" ELSE PRINT "MORE STOCKS? (Y/N)"
570 IF DS$(G) = 0 AND P$(G) = 0 THEN 44
580 IF DS$(G) = 0 AND P$(G) = 0 THEN 44
590 IF DS$(G) = 0 AND P$(G) = 0 THEN 44
600 IF DS$(G) = 0 AND P$(G) = 0 THEN 44
Computing Interest Payments

A lesson on how to formulate math solutions

The most difficult type of math example for many students is often the verbal problem. These are problems that tell a short story and ask a question, and the student must decide how the information given can lead to a solution. Many times, the solutions are not obvious; these solutions become obvious only after much explanation and practice.

It is not usually the math of these examples that thwarts students. The difficulty is in deciding how to solve the problem. The information must be internally processed in a meaningful manner. The child reaches the point where the solution becomes some arithmetical function of the pieces of given information.

There is a unique formula that accompanies each of these types of examples. When the formula is familiar, it is a matter of plugging the numbers in the right places and performing the arithmetic. This is sometimes easier said than done when the child reaches the high school level. It is wise to build a solid foundation early on to make the road ahead a little less painful.

Verbal problems come in an almost endless variety. Among them are distance, mixture, coinage, age, perimeter and interest problems. Each has its own distinctive method of obtaining the solution. Distance problems, for example, use variations of the formula Rate times Time equals Distance.

This article deals with interest examples: One borrows a certain amount of money at a fixed rate of interest for a given amount of time. The problem is to compute the amount of interest that will be charged. The method for computing the amount of interest owed, therefore, is based on the principal, the rate and the duration of time the money is borrowed.
was chosen here which you can adjust any way you wish. Line 110 determines the number of years of the loan, and Line 120 determines the rate.

The remainder of the program asks for an answer and compares it to the real answer. Right or wrong is indicated and the correct answer is displayed if an incorrect answer is given. If incorrect, the formula is also given as a gentle reminder.

A report card is given after 10 examples. The student may either end the program at this time or do another round. We hope this program helps clarify an important, yet often confusing, concept for your children.

```basic
10 REM "COMPUTING THE INTEREST - VERBAL PROBLEMS"
20 REM "STEVE BLYN, COMPUTER ISLAND, NY, 1985"
30 CT=0:CR=0:V=RND(-TIMER):REM "CT=THE COUNTER AND CR=THE # OF CORRECT EXAMPLES"
40 CLS5:PRINT@7,"INTEREST EXAMPLES";
50 PRINT@128,A3$=" BORROWED $";A3:PRINT" AT ";B3;"% A YEAR FOR "M" YEAR";
140 IF M>1 THEN PRINT"S" ELSE PRINT ""
150 PRINT@256,"WHAT IS THE TOTAL AMOUNT OF INTEREST PAID? $ ":";LINE INPUT J$
160 PRINTSTRING$(64,207);
170 J=VAL(J$): 'PLAYER'S GUESS
180 H=A3*B3*M*.1: 'CORRECT ANSWER
190 IF STR$(J)=STR$(H) THEN PRINT" CORRECT!":CR=CR+1:SOUND 240,3:GOTO230
200 IF STR$(J)<STR$(H) THEN PRINT" THE ANSWER IS "::PRINT"ING":####.###":H;PRINT" BECAUSE"
210 PRINT" A3: ":"X"B3*:M*:01;"X":M
220 SOUNDF5:PRINT@66,P$;
230 PRINT@485,"press enter to go on";
240 A$=INKEY$;
250 IF A$=CHR$(13) THEN GOTO 41
260 GOTO 240
270 CLS4:GOSUB 250T030STEP10;SOUND DT:1:NEXTT:PRINT@61,"report card";
280 PRINT@134,"YOUR GRADE IS";CHR$(10)"%":
290 PRINT@134,"PRESS 'G' TO GO ON OR 'E' TO END"
300 B$=INKEY$;
310 IF B$="G" THEN RUN ELSE IF B$="E" THEN END ELSE 300
```

---

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- **ADVENTURE GAMES:** Sea Quest and Shenanigans from **MARK DATA**
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- **SCAVENGER HUNT** 16K

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**Price List**

- **STOCKBROKER** and **CRIBBAGE** 32K: $14.95 each
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**THE RAINBOW** March 1985
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Give yourself peace of mind while on vacation by programming the HOME COMMANDER to control lamps, radios, TVs and more. Or make life easy on yourself by turning on the coffee pot before you wake up. You can do this and more with the HOME COMMANDER.

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The HOME COMMANDER uses your home's existing electrical wiring to control virtually anything. Appliances are controlled via small control modules (sold separately). The LAMP DIMMER MODULE allows you to turn a lamp on or off and control 16 brightness levels. The APPLIANCE MODULE is used to control appliances up to 400 watts such as a TV, radio, stereo system, fan or motor.

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Included is a program to allow you to control up to 256 devices and specify the time and date they are to be activated. That's right, the software has its own built-in accurate clock.

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Now your computer will always know the correct time and date. This amazing precision time module is calibrated to the National Bureau of Standards (WWV) atomic clock and you should never have to change it. Use the PRECISION TIME MODULE to add the time element to your games or use on BBS. If you like, purchase separately our BBS.

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Why pay $100 to $200 for a multi-pak. With the Y-CABLE, you can connect your disk system to your computer along with either our STEREO PAK music synthesizer, our VOICE, SUPER VOICE speech synthesizers, or our PRECISION TIME MODULE. All connectors gold plated.

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Interested in building your own project? Our oversized board gives plenty of room for construction while the sturdy aluminum case with black satin finish assures protection and a professional appearance.

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**MUSICA 2**

$29.95

Tape or Disk

- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
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- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- When in stereo mode, music is played through our STEREO PAK (purchased separately).
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.

**THERE’S MORE**

- 4 Voices produced simultaneously
- Input notes from keyboard or joystick
- Play music from your own BASIC program
- Block copy music for easy music development
- 100% machine language so it is lightning fast
- Vibrato effect easily produced
- With STEREO PAK, voices may be switched between left and right speakers as music plays
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It’s a must for the audiophile!
- Durations include: whole, half, quarter, eighth, sixteenth, thirty second, sixty-fourth, and triplet.
- 30 page manual describes all.

“Musica 2 is GREAT!”
Stephen Wilson

“It's the best four part harmony composer on the market and the most used program in my files.”
R.C. Wrights

“Of all the music programs, and I've had them all, there is no comparison in flexibility, simplicity of operation and in the warm vibrant tones that it produces. I went out and spent $700.00 on stereo equipment just so I could more thoroughly enjoy Musica 2 and the Stereo Pak!”
Howard Lentz
TCI Industries

Output music to your printer (Gemini 10X, Epson, R.S. printers, Okidata).

“There’s more…”

RICH PARRY

‘I THOUGHT ONLY AN APPLE SOUNDED THAT GOOD’

That's what I was told after I gave a seminar and demonstration of MUSICA 2 and the STEREO PAK at the Chicago Rainbowfest. I smiled and thanked the young man for the “supposed” compliment, but upon reflection, I became angered by the apparent belief that the CoCo is inferior in this regard. Nothing could be further from the truth.

To help fight this false belief, we've decided to lower the price of MUSICA 2 to help spread the word. We will also keep the STEREO PAK price at $39.95 and give you a complete refund if you are not 100% satisfied with the STEREO PAK.

Download music from our BBS or Compuserve.
NEW! STEREO PAK™  $39.95
Plug this gem into your computer, connect to your home stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY. Disk owners may use the STEREO PAK with the R.S. Multi-Pak or our Y-CABLE ($28.95).

NEW! MUSIC LIBRARY™ — 3 VOLUMES
You get over 100 four voice songs with a combined playing time of 3 hours. That's right, 3 hours of music. You won't believe your CoCo could sound so good. To fit over 100 songs required both sides of 5 C-20 tapes and the disk version uses 5 full disks (that's a half box of disks).

A JUKE BOX selection program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music.

These songs were developed using the best music program available for the CoCo; MUSICA 2. The tunes may be used as source files for MUSICA 2 and changed by the user. When coupled with the STEREO PAK the songs are reproduced in stereo with unsurpassed realism.

SPEECH SYSTEMS DATAPEN
The DATA PEN is a lightpen, but unlike other light pens, it is far more sophisticated.
- Insensitive to ambient light.
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We believe that no COCO speech synthesizer gives you the power and flexibility of the SUPER VOICE. Nevertheless, some have decided to go with the Radio Shack SPEECH & SOUND PAK. For those we've decided to open our TALKING LIBRARY by offering the SPEECH & SOUND TRANSLATOR. Just load this program and our entire library is open to you.

But that's not all, this program adds features. You get increased intelligibility, the power of an exception table to specify specific pronunciations, $12.81 is spoken in dollars and cents, 1,234,567 is spoken in millions, thousands, and hundreds, and much more. $24.95

TERMTALK All the features of an intelligent telecommunications program plus what appears on the TV is spoken.

- Upload and Download programs
- Control Xmit Protocols
- Full or Split Screen
- Normal or Reverse Video
- It talks

Please specify version (VOICE or RS SPEECH & SOUND PAK)

Tepe $39.95
Disk $49.95

TALKING BINGO BINGO was never like this. The VOICE or SUPER VOICE makes all the calls while you sit back and play. Comes with 20 playing cards and 200 markers. High Resolution graphic screen, 3 timing level, ball count and pause control. $24.95

ESTHER the talking psychoanalyst. An excellent example of artificial intelligence. She may not solve all your problems, but her insight will amaze you. Just like the original Eliza. $24.95

SCORE E-Z A yahtzee type game. Up to six can play. $24.95

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EDUCATION

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PRE-SCHOOL

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TALKING SUBTRACTION A program specifically designed to help the student learn subtraction. $29.95

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PELLA-TRON Student builds a dictionary of words to be quizzed on. Perfect for Spelling B. $24.95

SPELLING TESTER A graphic spelling game. The student is shown objects to be spelled. $9.95

POETRY CREATOR The VOICE speech unit is used to speak poetry that is created. $9.85

GRADES 2 - 6

SHORT STORY MAKER A program to create and speak stories created by the child. $9.95

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Is our advanced technology serving as a catalyst for illiteracy?

Reading vs. Computers

By Michael Plog, Ph.D.
Rainbow Contributing Editor

Is there a problem with literacy in this country? I have read that at least 23 million adults are functionally illiterate, and that number is reportedly growing each year. I do not know how “functionally” is being defined, but for the sake of argument, we can accept the figure, or at least the idea that a lot of people cannot read.

It has also been reported that book reading for people under 21 years of age has declined 13 percent in the last five years. So, even if people can read, they choose not to.

National studies have addressed the problem of students not being able to read in school, and even teachers who cannot read. It does seem that this country should have the highest literacy rate in the world, and we should ideally have a literacy rate over 99 percent.

Recently, I overheard someone talking about students’ low level of reading, and reasoning that technology is the cause of lack of ability to read. With computers, arcade games and video performances, the argument goes, students do not take the time nor have the desire to read. The lure of the television screen, with its computer generated graphics, is too much competition for books or magazines.

I disagree with this position. There has always been competition with books, including such things as fishing, cloud watching, tree climbing or just plain “hanging around.” If we as a nation do not read, the fault lies not in our electronic gadgets, but in ourselves. (My apologies to Shakespeare.)

Current technology may impose many ills upon society, but a lack of reading is not one of them. We may lose our privacy, our dignity and even our definition of “good” taste, but technology will not cause us to lose our ability to read.

Now the microcomputer is but one component of current technology. It, however, is more often accused of causing a lack of reading than some of the other technologies, such as video recorders. It is my contention that current technology (including the microcomputer) will help eliminate illiteracy. It is gratifying to know that others, in positions of prestige and power, share this view.

Last year, Congress requested a study on the future of books, given the electronic methods of access to information. The Library of Congress recently released a report responding to the request.

It is true that technological expansion has “deprived the printed word of its traditional monopoly on access to knowledge, information, and the masterpieces of civilization,” according to the study. Losing the monopoly, however, does not mean people have less access to knowledge.

The report goes on to explain that new technologies expand access to the world of books. For example, many classical pieces of literature are currently being reformatted to movie or television productions. These “translations” draw more people to libraries and bookstores to read the original works.

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)
In a more direct sense, the conversion of books and newspapers to microfilm increases the availability of sources of information; sources that are being used by the American public. Computers, naturally, are used to compile and store more comprehensive reference works, and greater detail of information, than ever before.

The report claims that far from being a threat to the printed word, new information technologies promise to aid in the spread of knowledge and the war on illiteracy. In fact, the "culture of the book" benefits from the development of computers, television and even radio.

So, back to the original thought for a moment. On first glance, it may indeed appear that students are not reading as much as in the past, because they have entertainment in their home microcomputers. That position is a simple response to a problem, and does not even stand up against "common sense" arguments.

In order to operate a computer, even a relatively inexpensive, but high powered machine like the Color Computer, a person has to read directions. Also, computers tend to be in affluent homes more than in poor homes, and students from affluent backgrounds usually tend to read better than their peers of lesser economic means.

And, anyone who has had a computer more than three weeks knows that the machine does not reduce paperwork, simply processes paper more quickly. Producers of all that paper have to be able to read it.

It may be true that students today do not read as well as in past generations. However, it may not be true, for several reasons. The most simple explanation for the lack of truth of this assertion is in the numbers and types of students taking tests now, compared with students taking tests 20 years ago.

It used to be that only college-bound students were administered the nationwide testing for college admission. Then, the trend changed to testing almost all students — which could be done easily because of computers. By adding the lower academic students to the group taking tests, the scores have to decline. If scores of less academic students are included in national results, the average (mean) must decrease. In fact, I understand some principals have improved their school scores dramatically by only having selected students take the tests.

In some respects, it makes no difference whether students today can read as well as their counterparts of past years. It is simply unforgivable for any student in America today to not be able to read. The solution to increased literacy is not in abandoning technology, but in using technology to open more doors for students as well as adults. In essence, just what the study from the Library of Congress found is starting to happen. Educators have a responsibility to use all available means to provide reading skills to students.

I am pleasantly surprised at the availability of computer software for education, including programs for reading. A few days ago, a person I work with asked me about educational software for the Color Computer. He has a CoCo, mostly for his daughter's use, but had not purchased many educational programs.

We started going through THE RAINBOW, looking for educational software. In the first 30 pages, we found advertisements from eight companies for educational software. He quit making notes at that point, realizing the abundance of available software. This can be contrasted with just a few years ago, when almost all advertisements were for games.

So, the lack of software is no excuse for not using the computer to help students read. Neither is the argument that computers are detrimental to reading. We must use the computer and other means at hand to improve reading aptitude of students.

I realize that you read, and can probably read well. After all, THE RAINBOW is a print media, and you are reading this article if you got this far. Also, any parents reading this probably have children who can read well — they have access to computers, don't they? Your responsibility, however, does not end with your family. Universal education, as the theory works in the United States, is the job of all citizens.

For anyone interested, a copy of the report from the Library of Congress can be obtained by mailing $2.50 to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Ask for the publication, "Books in Our Future," stock number 052-05978-7. If anyone wishes to write to me to share opinions, my address is 829 Evergreen, Chatham, IL 62629.
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CoCo Cooler II, a handy gadget to prevent unwanted heat buildup inside your Color Computer to keep things cool and running smoothly. Specify 'D', 'E' or CoCo 2. Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421 or P.O. Box 9866, San Jose, CA 95157-0866, $49.95 plus $3 S/H

16K DOS Adapter, an adapter for using 2764, 27128 and 27256 EPROMs in place of your existing ROMs. Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421 or P.O. Box 9866, San Jose, CA 95157-0866, $19.95 plus $3 S/H

The Seal of Certification program is open to all manufacturers of products for the TRS-80 Color Computer, the TDP-100, or the Dragon-32, regardless of whether they advertise in THE RAINBOW. By awarding a Seal, the magazine certifies the program does exist, but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Monica Dorth

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March 1985 THE RAINBOW 189
CALORIE COUNTER

Editor:
In looking over my review of Draco Software's Calorie Counter in the January RAINBOW, Page 220, I find it is possible even to surprise myself.

First, let me say that Calorie Counter is the easiest to use and most complete program of its type I have yet come across. As such I can without hesitation recommend it to the casual dieter or anyone interested in keeping track of calorie intake.

Having said that, I would like to amend my introductory line, "... just what the doctor ordered." A diet is something most of us take for granted, and, if of normal health and sound body, we can afford to. However, in cases of other than "normal" health (pregnancy, any illness, attempts to lose more then a few pounds) an unsupervised diet can lead to serious problems. In these, or any situation where there is any question, no computer program can take the place of a trained health care professional.

If the above is kept in mind, I believe that any user of Draco Software's Calorie Counter will find it both easy and satisfying to use and a reasonable value for the money.

Nevin J. Templin
Willingboro, NJ

HANDS ON

Editor:
As an owner of the Hands On package reviewed by Mark Williams in the November 1984 issue of THE RAINBOW, Page 206, I agree that it is a fine package. I think that Mr. Williams did a very good job on this review. There is one thing about my Hands On package that differs from the copy that Mr. Williams reviewed. I am able to make unrestricted backup copies for my own use using Disk BASIC's BACKUP command. (I used no backup utility.) There are no instructions in the Hands On documentation for making a backup, but I tried it and all programs on the Blackboard activity disk and the Color It activity disk work flawlessly.

I agree with Mr. Williams that the inability to do backups for programs for children is a distinct liability, even when free replacements are available. I have two young sons and use only my backup disk while keeping the originals in a safe place. I bought my Hands On package from Tandy Home Education in September, 1984. It is in the same packaging as in a Radio Shack store. The version on the "registration for modification notices" is 01.00.00. I presume that Mr. Williams has a different number on his copy.

I hope that my comments will be useful to Mr. Williams and your readers. I commend him on a fine review.

Gail Allinson
Brookfield, IL

BAKERSFIELD KENO

Editor:
I received Michael Nowicki's review the other day concerning my program called Bakersfield KENO. I have to admit that I was a little more than just thrilled at his comments considering that [this] is the first commercial program I've attempted.

I just wanted to clear up one little point. The game picks 20 winning numbers "just like Vegas, Reno, Tahoe" and not 15 as stated in the review.
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So what's so new in our second generation? We had a lot of requests for the use of the less expensive 26 pin Eeproms. Our 2nd generation controller allows the useage of either (two 24 pin ROMS), or (one 24pin ROM and one 28 pin ROM).

The second feature we added was a technical one and is not apparent to the average user. Western Digital was good enough for manufacture for us a far advanced drive controller chip called the WD1773FDC. This chip integrates the data separation method within itself allowing the cleanest data transfer to date.

Reduce your I/O errors with the Hard Drive Specialist Floppy Drive Controller for the Color Computer (Gold Edge Card Connectors, Advanced Design, and the absence of potentiometers make this the best board available to date)

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Radio Shack ROM ........................................ $ 20.

NEW ROM
HDS has licensed the ROM from Radio Shack to be able to offer alternative operating systems pre-brown ready for installation. The first of what we hope to be a wide range of options is ADOS. ADOS is a product of SpectroSystems of Miami Florida and is fully supported by the author. The HDS version of ADOS supports 2 drives, 40 track, 5.25 inch drives only, either Single Sided or Double Sided. The ADOS package comes complete with original documentation and diskette from SpectroSystems and can be installed in our Drive Controller Board at purchase time for no additional charge.

ADOS/HDS 24 pin ROM ...................... $ 50.
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(usable in the HDS 2nd generation board only)

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The Fantastic Keytronics Keyboard is now being manufactured only for Hard Drive Specialist. It is the only keyboard for the Color Computer known on the market that does not use membrane switches. The KB500 uses a capacitance foam switch. This type of switch will never give keyboard bounce and last much longer than all other types. The KB500 is also the only keyboard that will fit all versions of the color computer weather it is A, B, C, D, E, F, ET, TOP-100, COCO IA, or COCO IB.

One keyboard fits all with out risk of getting the wrong version, and there is no need to do any modifications to your case. Additional features include a higher spring force on the break and clear key to reduce the possibility of a disastrous key-stroke, sculptured keys, low profile, "gaps" on home row keys. The "PF" function key comes with documentation and a sample program. The Keytronics-HDS keyboard list price was $69 when it was offered through Keytronics. Our price on it is only $59, plus $3 for shipping.

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Comparable RS-232 Packs: Tandy Deluxe Program Pak And PBJ 2SP-Pak

One of the things that makes the Color Computer so desirable is that you do not have to buy extra plug-in boards in order to make it drive a printer or a modem. The reason for this is circuitry that comes with every CoCo allowing it to talk to the outside world through what is known as an RS-232 port. So why would anyone want to buy such a thing as a plug-in card when the RS-232 port is already built into the computer?

First, the CoCo has only one built-in port. If you need to use both a printer and a modem, you have to either plug and unplug each of them time and again, or buy a hardware device that switches between them. Even with such a switcher, you still are unable to use both at once. And some find the need to switch annoying. So, one reason to buy a hardware RS-232 device is to provide a second port for your computer.

More reasons relate to the nature of the CoCo's built-in port. That port is what we call a "software RS-232." That is, in order to send and receive information through that port, the CoCo must create and analyze the RS-232 signal using cumbersome software that is somewhat inaccurate and, worse yet, eats up a great deal of the central processor's time. If all you need to do is drive a printer or use a smart terminal program at no greater than 300 Baud, this is not a great problem. But if you want to do both at once, or if you want a smart terminal program that functions with true full duplex at 1200 Baud, a hardware UART is required. Due to the limitations of the built-in software UART, it is impossible to write a smart terminal program that functions correctly at 1200 Baud with the CoCo's built-in port (Colorcom/E, sold by Spectrum Projects, comes closest to doing this).

For those of you using OS-9, there is even more reason to consider buying a hardware RS-232 port. Because the software RS-232 is so time-consuming, if you try to use the power of OS-9 to print out material as a background task while running another program (in effect spoiling the printer via OS-9), the other program(s) will run badly, often unusably slowly. But with a hardware RS-232 port, the process of outputting data takes 10 to 100 times less time, and printer spooling can be accomplished very effectively. A hardware RS-232 port is also a must if you plan on having a second user hooked in through a terminal under OS-9.

Of course, you must either be able to write or buy software to use these pieces of hardware. OS-9 users may know by now that the new release of OS-9 from Tandy will now support both the Tandy Deluxe RS-232 Program Pak and one port of the PBJ product (the PBJ 2SP Dual RS-232 Pak) as both are addressed to the same place. PBJ has available a series of patches for OS-9 for both of its ports. Disk BASIC users will be happy to learn that Tandy and others will soon be coming out with disk-based smart terminal programs that can use the hardware RS-232 port. CompuServe's VIDTEX will soon be released in an updated version that makes use of such special hardware. And I am currently beta testing a smart terminal program that uses this hardware. Thus, by the time you read this, even Disk BASIC users should be able to buy software that uses this hardware.

Similarities of the Two Products

Both the Tandy and the PBJ product are similar in size, shape and cost. Both products must be used with an expansion port device if you want to use them with a disk drive. Both have a hardware RS-232 port addressed at $FF68 that uses the same 6551 ACIA chip to create the port. Both have the address of the port fully decoded, meaning that the port will work regardless of which slot you put them in your expansion device and regardless of which slot you select. Both products have the capability of placing a ROM or EPROM on board the device, though in both cases the EPROM on the device is addressed using the *CTS line, meaning that in order to use any software in the EPROM you must select the slot the device is plugged into. Both products work as advertised. Both are designed to provide the required positive and negative RS-232 voltages using as input only the 5-volt line. That is, both will work when plugged directly into a CoCo 2. Full technical information, including schematic diagrams, is available for both from their respective suppliers. Both Tandy and PBJ are to be commended for this policy.
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  - Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
  - Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

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Differences Between the Devices

Unlike the PBJ product which comes only with traces provided for soldering in an EPROM socket, the Tandy product comes with a terminal program on a 24-pin, 8K by 8-socketed ROM inside the device. This might seem to be a tremendous advantage, until you realize that the program supplied cannot use the disk drive. This is a serious limitation, because of its lack of support for disk systems and its overall poor structure and quality, I would advise potential buyers to ignore the supplied software in the ROM in the Tandy Pak, and look at that pack as solely a hardware port without software.

When one does that, the Tandy product doesn’t look bad at all. The RS-232 port it provides connects to the rest of the world using an industry standard DB 25 connector, not the CoCo 4-pin DIN connector. The PBJ unit uses the “CoCo standard” 4-pin DIN connectors. In addition to the signal ground, transmitted data, received data, and carrier detect (DTR) line available with the CoCo’s built in, or with the PBJ’s port, the Tandy product also provides CD (Pin 8), CTS (Pin 5), DSR (Pin 6) and TD 8 (Pin 2). Thus, it represents a fuller implementation of the RS-232 protocol. If you wish to program an application that will use those other lines, your only choice in hardware packs is the Tandy product.

On the other hand, you can use your existing modem cables with the PBJ unit. And I know of no currently existing or proposed CoCo software that uses the extra lines provided by the Tandy Pak.

The Tandy unit provides about plus and minus 10 volts on its RS-732 lines. The PBJ unit provides about plus and minus 4.7 volts. Both figures are within specifications for the industry standard for the RS-232 protocol. But because the Tandy unit puts out somewhat more voltage than the PBJ unit, it may be preferable for those few applications where you want to run 50 or more feet of RS-232 cable. I must add that I know of few users who need more than 10 feet of cable.

Assuming one does not use the ROM supplied with the Tandy unit, one has a 24-pin socket to play with. The PBJ unit is designed to support a 28-pin socket that you solder in. If you are a hardware hacker, this means that you can put up to a 16K by 8 (27128) EPROM in the PBJ unit, whereas the ceiling on EPROM size with the Tandy unit as supplied is an 8K by 8 (68764) EPROM. You really should call PBJ if you plan to use the traces provided for the socket. There are a few details of how to wire it that you should be aware of, depending on which EPROM you want to use.

Since many Radio Shack Computer Center employees know little about the Deluxe RS-232 Program Pak, it's rather hard to get good information on how to use it. PBJ, in my experience, is readily available to aid its customers with prompt and knowledgeable advice. The folks at PBJ are always up to date on what software — both third party and from Tandy — works with their products.

Hackers will be delighted to learn that PBJ makes the 2SP available as a bare board with documentation. The price of this is $19. But be warned: While the circuit is not very complicated, and all needed information is present, this is no Heathkit! You need some experience in electronics if you want to tackle the bare board. I built two of them, so I know! If you do decide to get the bare board, be sure to call or write PBJ for the latest revision of corrections to be made to the board. If you plan to wire up the EPROM socket, this is especially important. Purchasers of the assembled and tested unit need not worry about this, as all my reports indicate the units ordered have arrived in excellent working condition.

I’ve saved the biggest difference for nearly last. While the Tandy Pak provides only one hardware RS-232 port, the PBJ unit gives you two for almost the same price (only $10 more)! One port is addressed to the same place as Tandy’s ($FF68), and should run with all software designed to work with the Tandy unit. The second port is addressed just above it starting at $FF6C. To use the second port as a printer port, you’ll have to alter the wiring of the busy line from your serial printer, as PBJ uses the “CD” pin of the port as its busy detect, whereas the CoCo proper uses the “receive data line,” instead. If you are using the PBJ C-C Bus expansion port device as well, PBJ tells you how to “strap the interrupt lines” to use its device under interrupt control. This option (not available to Tandy Multipak users) is useful for those using a multi-user OS-9 system on the CoCo, but for little else. Using this option requires significant hardware and software experience. PBJ also sells driver modules for the 2SP to be used with OS-9.

Recommendations

It’s not an easy choice between these two excellent units. If you are sure you’ll only want one hardware port forever, then the Tandy Deluxe RS-232 Pak is a good choice. It costs $10 less than the PBJ product and is available at Radio Shack. But, if you are running OS-9, or if you’re a hardware and/or software hacker, you may do well to get the PBJ product, because of the extra flexibility offered by having two, rather than one port.

(PBJ, Inc., P.O. Box 813, N. Bergen, NJ 07047, PBJ 2SP-Pak, $89.95; Radio Shack stores nationwide, Tandy Deluxe Program Pak, $80)

— Marty Goodman

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March 1985 THE RAINBOW 195
24-Pin/28-Pin Adapter Answers EPROM-blems

We will now call together the monthly meeting of the Hardware Hacker's Society. First, we will have old business.

"Has anyone found a good source of 68764 EPROMS? All I can find for a reasonable price are 2764s."

"How about a way to speed up my 6 ms disk drives?"

"I sure like Spectrum DOS, but I can't run some machine language games."

"How about new business?"
The chairman of the society, Bob Rosen, addresses the meeting.

"I have the answer to all of these problems — 24-Pin/28-Pin EPROM Adapter from Spectrum Projects."

Meeting adjourned so we can all go home and try the new product.

The 24-Pin/28-Pin EPROM Adapter is not fancy. All it consists of is two sockets connected by a 3-inch piece of ribbon cable. One male socket plugs into the existing ROM socket in your disk controller, or your BASIC socket if you wish. The other end of the cable has a 28-pin socket that is adaptable to a 2764 (8K x 8), 27128 (16K x 8), or 27256 (32K x 8) EPROM. Address lines A13 and A14 are separated from the rest of the cable such that if an EPROM greater than 8K is used you can bank select the portion of the EPROM you wish to use.

What's the most practical use for this device other than being able to use the less expensive 2764 EPROM? Well, Bob sent us a 27128 EPROM already mounted on the board that not only has Disk BASIC, but Spectrum DOS as well. They are selectable by a small switch on the side of our disk controller. Another use that comes to mind is to switch between BASIC 1.1 and 1.2. If you have access to 27256 EPROMs you could select between four different DOSs.

The adapter kit comes with adequate instructions. For a 2764 EPROM, no additional wiring is necessary. The 27128 and 27256 EPROMs require a small switch (two for the 27256) to allow bank selection of the memory you wish to use.

What if I want Disk BASIC and Spectrum DOS on a 27128 EPROM? With a proof of purchase of a Disk BASIC ROM, and Spectrum DOS, Spectrum Projects (in San Jose only) will burn Disk BASIC and Spectrum DOS on an EPROM for an extra $39.95. Contact Spectrum Projects for specific details. As shipped, you will have to supply your own EPROMs.

If you've ever tried to make an adapter socket to convert your CoCo for 2764s, I think you will like this gadget. In my opinion, it will save you time and money. No more burnt fingers, or melted sockets, trying to make your own.

(Spectrum Projects, Inc., P.O. Box 9866, San Jose, CA 95157-0866 or P.O. Box 21272 Woodhaven, NY 11421, $19.95 plus $3 S/H)

— Dan Downard

Inspect Your Programs With BASIC Searcher

BASIC Searcher is a machine language utility that searches through the lines of your BASIC program for any selected string of characters. The program can easily find variables or key words and phrases. It allows you to find your way through large programs looking for key elements.

BASIC Searcher operates from protected high memory and is called by a simple EXEC command. The program searches for the string of characters which you assign to the BASIC variable $F$. You specify the line to start the search by assigning the line number to variable $L$. Finally, you can specify output to your printer by setting $SP=1$, or direct the output to the screen with the default $SP=0$. The program is supplied on tape for a 16K Color Computer. Simple instructions show you how to load the position-independent program for your particular memory size. The program is easily backed up to disk or tape. A two-page description of the program's operation accompanies the tape.

Typically, you search a BASIC program by typing in the simple commands $SP=2$ $F$ = **STRING** : $L=0$ (and optionally $SP=1$ or 0) followed by EXEC. The program then scans the BASIC text for the first occurrence of the "string" characters. The program presents you with the BASIC line containing the string. You then have the choice of pressing 'N' for the next occurrence, pressing 'R' for the rest of the occurrences, or 'X' to exit the command.

BASIC Searcher has several uses beyond simply finding a single word or phrase. The program can be used to list all DATA statements in a program by using DATA as a search string and pressing 'R'. Another simple application is to list all REM statements in a program as a means of documentation.

The program does its job precisely as specified. It doesn't miss any combinations of characters; I was unable to find any technical flaws.

If you compose programs using a typical word processor or screen editor, these search features may already be available to you. But, for many beginning programmers, this search feature may be the answer to an unruly LIST command supplied with your built-in BASIC editor.

(Colored Computer Utilities Unlimited, 3907 Bethel Rd., Boothwyn, PA 19061, 16/32K, tape or disk $19.95 plus $2 S/H)

— Stuart Hawkinson

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One of the more obvious ways to use this program would be to make an insert listing all the programs you have on a particular cassette along with the counter numbers. I find the index provided with RAINBOW ON TAPE is easy to get misplaced, etc., so the first thing I did with Cassette Box Insert Maker was to make an insert for my September RAINBOW ON TAPE. The result is very impressive. Below I have included an illustration of what a finished printout looks like.

Cassette Box Insert Maker is published by CoCo Freeware Clearinghouse, so to get a copy just forward a blank tape or formatted diskette along with a self-addressed, postage-paid return mailer to CoCo Freeware and request program number 801A (the documentation program). Disk users should also request program number 801B, Extended BASIC users, 801C, and Color BASIC users, 801D. There is no purchase price, but after receiving and using the program, you can send a contribution.

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**TALKHEAD** And Real Talker
Reveal New Dimension
In Voice Synthesis

By Kenneth D. Peters

Not only can your CoCo have a voice, but a realistic, masculine face to go along with it! Colorware has an animated “Talking Head” program that uses high speed, Hi-Res graphics to create a realistic audio-visual simulation. **TALKHEAD** requires a 64K CoCo and the Colorware Real Talker voice pak, but the combination may be hard to beat!

I used both the cassette and disk versions of **TALKHEAD** and found no difference other than speed of loading. Disk users simply insert the disk and run **TALKHEAD** (a BASIC loader program); cassette users CLEAR and RUN, which takes four minutes longer. The rest is automatic. Three machine language modules are loaded and executed, apparently containing an English text-to-phoneme code translator, the graphics for the head, the movement of eyes, mouth and jaw, and the Colorware logo. Colorware has its own unique audio-visual logo presentation that can’t be missed! When the logo is finished, the **TALKHEAD** face appears and says “Talkhead ready.”

At this point, “Talkhead” is ready for anything you care to do next. You can experiment with typing various words and phrases for Talkhead to say, write a program and come back to Talkhead, or load programs from tape or disk that already utilize Talkhead’s ability. A demo program is provided on both disk and cassette versions called Daisy. Remember the song “Daisy, Daisy, give me your answer true…”? Well, I must have been half crazy for running the demo so many times! RUN **Daisy** gives a fairly good rendition of the song done by none other than Talkhead himself — I was impressed by both the audio and the visual achievement of **TALKHEAD**. It’s a simple song, and it’s not perfect, but I’ve heard worse singers. The Talkhead face seems so life-like I caught myself following the movement of his eyes and mouth just as I would if listening to another person. The three-dimensional quality graphics of the head combined with the appropriate movement of the eyes, mouth and jaws during synthesized speech is quite realistic and well-done.

**Daisy** demonstrates what can be done with **TALKHEAD**. But more importantly, a look at the program also shows how easy programming Talkhead can be in BASIC. Two new commands are available: SAY and PITCH.

**SAY** is very similar to the PRINT command. Assuming **TALKHEAD** is loaded and ready, you can simply type: SAY ‚’HELLO, I AM MR. TALKHEAD’’ (and press ENTER). The screen immediately changes to Hi-Res graphics, filled with the life-like three-dimensional face of Talkhead, and he begins talking. When he’s through talking, the graphics screen disappears and you are returned to the text screen. Talkhead always appears on the screen automatically whenever he has something to SAY.

Talkhead speaks words or phrases, in the immediate mode or within a program. Either way, four rules must be followed:

1) SAY must be the only command on a program line. No other commands, functions, or statements are allowed on the same line.

2) You cannot use string manipulation, for example **SAY** (A$+BS), within a **SAY** statement.

3) The length of the expression following the **SAY** command is limited to 232 phonemes or approximately 35 words.

4) Numeric variables must be converted to string variables first if you want to **SAY** the numeric variable.

All the rules are simple to follow and pose no problems, especially if you are beginning to write a program from scratch.

A little extra work may be required, however, to convert one of your existing programs for use with **TALKHEAD**. Putting **TALKHEAD** to a more practical use, I modified a spelling program I had written using the Real Talker with the old text-to-speech translator software, in which U=USR(A$) had to be used everytime you wanted the value of A$ spoken. **TALKHEAD** uses the new “enhanced” software for the Real Talker, which simply uses **SAY** A$ whenever you want to have the value of A$ spoken. (This

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software has been available since about May 1984.) So, if you have been using the new, improved software for Real Talker, you should find TALKHEAD can be used immediately without any modification of your programs. I, on the other hand, had to substitute the new syntax (SAY AS) for the old syntax (U=USR(AS)). Being in the habit of writing programs with multiple command lines, I soon found there was more to do than simple substitution. After making the necessary substitutions, each multiple command program line with SAY had to be broken away from the sequence and placed on a separate line by itself. It took a little more work, but the end result was worth it.

My son, aged 7, had used the old spelling program (using the voice synthesizer without TALKHEAD) extensively in first grade last year. He thought it was really neat to “see someone” on TV giving him his spelling words! My older daughter, aged 10, agreed. Even my preschooler wanted Talkhead to do her spelling words, (she doesn’t have any!). But she is satisfied with just being able to type in letters and words she knows to see Talkhead speak. She is in speech therapy, so I hope to use TALKHEAD and the Real Talker to help her.

I spent a lot of time talking about SAY and the use of one command line, but it’s an area of interest that must be considered more by those people who purchased Real Talkers prior to May 1, 1984, and consequently might demand modifications to their existing programs in order to incorporate TALKHEAD.

The second rule states you cannot manipulate strings within a SAY command, for example: SAY AS+&S. You can issue the command SAY AS for any value of the string AS just as well as SAY **THIS IS THE VALUE OF AS**. Manipulations have to be done prior to wanting to say the final result: CS=AS+&S then SAY CS.

A single SAY line is limited to about 35 words or 232 phonemes. When you think about it, that is anywhere from four to six lines of text on a standard CoCo screen. If that’s not enough, you can use multiple SAY lines (many program lines with one SAY command) or READ in the string variable within a loop.

SAY requires a string format, thus either a string variable or the text within quotes is required. Therefore, if you want to SAY a numeric variable (for example the value of X), you must first convert the numeric variable to a string variable using the STR$ function in BASIC.

I mentioned earlier that there were two new commands to use TALKHEAD in BASIC. The other command is PITCH. TALKHEAD was programmed to “simulate” singing “Daisy” by the use of the PITCH command. PITCH, which can be abbreviated PL on a command line, varies the pitch of the phonemes, words or phrases following the PITCH command. The value of PITCH remains in effect until a new value is issued. If none is issued the default value is 1. Pitch levels available are 0, 1, 2 and 3, with zero being the lowest and three being the highest.

Intrigued by the demo song, I just had to try my hand at composing. Well, actually I didn’t compose it, but I programmed Talkhead to sing it for me. Ten to 15 minutes of programming had Talkhead singing “Mary Had a Little Lamb.”

TALKHEAD is really the “enhanced” Real Talker’s machine language text-to-speech translator combined with the digitized Hi-Res graphics of the head, so up to now anything other than graphics that has been said about TALKHEAD also has described the “enhanced” updated Real Talker software. A few additional comments about Real Talker are necessary here to point out other improvements and additions to it since my original review of it appeared in the July ’84 RAINBOW.

Perhaps the most noticeable difference is the increased ease of use for the BASIC programmer. There are no DEFUSR or USR statements to worry about. In making the Real Talker extremely user-friendly, only one thing is left for you to remember: You must LOAD and EXEC the Real Talker’s translator utility software first before you load another program or start programming! The utility automatically takes care of the rest, relocating itself and providing three new commands for you to use in BASIC: SAY, PITCH and CONVERT. The first two commands have already been discussed. CONVERT creates a stand-alone, talking BASIC program that no longer requires use of the machine language translator program. In other words, plug the voice pack in, load your CONVERTed BASIC program and it talks! All program lines with SAY literals (e.g., SAY **Hello**) in your program will be converted to stand-alone talking lines.

Among other improvements is the Phoneme Editor now has an improved and expanded Help screen, and the translator now recognizes and understands (pronounces) dollars and cents whenever a $ is encountered. Finally, ASCITALK has been added to the Real Talker support software. This program will recite any ASCII file, from a word processor or a terminal program, line by line!

I can’t think of anything I don’t like or would add to the programs, nor have I found any faults with the documentation. Documentation for both TALKHEAD and the enhanced Real Talker seems to be quite thorough. I checked every sentence and tried every example. Both documentation booklets were extremely well-written with easy-to-understand explanations and examples. These programs were a pleasure to use in BASIC.

The cassette version of both programs can be transferred to disk should you upgrade to disk. Documentation gives complete and clear instructions on transferring to disk. I actually did the transfers and ran TALKHEAD and Real Talker from that copy; it was no problem. Everything performed as it had from the cassette version. For disk users, this software will not run on JDOS. I had to switch to Disk BASIC.

If you have Colorware’s Real Talker and a 64K machine, don’t deprive yourself of the exceptional graphics and realism of TALKHEAD. If you have the old version of Real Talker, you might consider updating, with its added features and increased ease of use. I have all four speech units for the CoCo and definitely feel Real Talker has become the simplest to use in a BASIC program — just SAY **Whatever**. It’s a fast, easy and convenient way to make your program talk!

If you’re looking for a practical reason to buy TALKHEAD and Real Talker, my kids have all used the program and feel they would rather have Talkhead give them their spelling words and math problems than just having to look at a screen without the face! We’re all in agreement in this household that TALKHEAD is a good addition to the voice and makes a great head for the Real Talker voice pak.

(Colorware, 78-03A Jamaica Ave., Woodhaven, NY 11421, 64K ECB, tape or disk $29.95; Real Talker 16K ROM pack and tape $59.95; $69.95 for CoCo 2 version)
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Music Library 200 And 300
Make Beautiful Tunes

Question: Does the availability of new hardware generate software, or does the availability of software generate hardware sales?

Speech Systems is not taking a chance when it comes to supporting their music-generating programs for the Color Computer. They have released two additional sets of musical libraries to support their Musica 2 system.

Recent reviews in THE RAINBOW have covered Musica 2, the music composing program, and Music Library 100, the first release of musical compositions which were generated using the Color Computer. The release of Music Library 200 and 300 tremendously increases the amount of pre-recorded music which can be played on the CoCo, or modified if one has the Musica 2 program.

First, I will briefly review Musica 2 which was used to generate Music Library 200 and 300.

It allows you to create musical compositions with up to four-part harmony (four voices played at one time). The results are quite unlike anything you’ve ever heard using the SOUND and PLAY commands. The sound of the songs is quite electric, similar to the tones created by a Moog synthesizer, but also reminiscent of a harpsicord or a Wurlitzer band organ without the cymbals.

The Color Computer and Musica 2 create the music by generating a stream of numbers that the CoCo converts to voltages through the sound port (six-bit digital-to-analog converter). By varying the numbers and then the voltages at the appropriate rate, a tone is produced through the TV speaker. Pitch is varied by skipping a certain number of values. This method of varying pitch makes it possible to produce more than one note at a time.

Musical notes are displayed on the standard treble and bass staffs as you create or edit them. Music Library 200 and 300 does not contain the Musica 2 program. You cannot create or edit music with these programs, only play the selections contained on them.

Music Library 200 contains:

Volume 11 — More music from the '40s, '50s, '60s and '70s (39 minutes, 21 selections)
Volume 12 — More music from the '70s (43 minutes, 21 selections)
Volume 13 — More music from the '60s and '70s (43 minutes, 21 selections)
Volume 14 — More music from the '40s, '50s, '60s and '70s (34 minutes, 21 selections)
Volume 15 — The Beatles (37 minutes, 21 selections) (my personal favorite)

Music Library 300 consists of:

Volume 16 — Variety (39 minutes, 21 selections)
Volume 17 — Nostalgia (42 minutes, 22 selections)
Volume 18 — Richard Rodgers Song Book (39 minutes, 19 selections)
Volume 19 — More music from the movies (40 minutes, 23 selections)
Volume 20 — Music from the '60s, '70s and '80s (42 minutes, 15 selections)

Each of these musical libraries is available on either disk or tape. The disk version is more desirable as it displays a menu of the available titles and allows you to play any selection at random, or program a series of your own selections — like a jukebox — except you don’t need any quarters.

The quality of the compositions range from OK to fantastic. Clark Rulaford, who composed (or transferred) these songs using Musica 2, obviously took extra time on a few to maximize the results using the capabilities of Musica 2. “Lady Madonna” and “Penny Lane,” from the Beatles disk, are outstanding examples of the capabilities of Musica 2, but “Norwegian Wood,” also on the Beatles disk, drags.

To maximize the tonal quality of the songs, it will be necessary to add either an external speaker to your TV or purchase the Speech Systems Stereo Pak accessory which redirects the output through your stereo. The small TV speakers just don’t have the tonal range to do justice to the capabilities of the Musica 2 system.

A word of warning: If you purchase any of the Music Library programs, you had better start a fund to set aside enough to purchase the Musica 2 program, because after you’ve heard what music can be created with your CoCo, you will want to start creating your own.

(Speech Systems, 38W255 Deerpark Road, Batavia, Ill. 60510, 32K disk $39.95 each, tape $34.95 each.)

— Bruce Rothermel

RAM 16

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Plug 16K memory into your CoCo cartridge slot. Absolutely no internal modifications are required. RAM-16 has low power drain because like your CoCo, RAM-16 contains reliable dynamic RAM memory.

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RAM-16 comes with a complete Users Manual containing a circuit diagram and applications information. Price $129.95 (U.S.) plus $5.00 (U.S.) Shipping and handling. (Ontario residents must include 7% prov sales tax.)

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Color Computer is a trade mark of the Tandy Corporation
Screen+ Adds Variety To Your Text Screen

Screen+ is a machine language utility with several features. The color of the text screen as well as the characters on the screen may be changed to interesting, non-standard color combinations. The program does this while operating in a background mode with BASIC programs. The screen changes can be toggled from the keyboard or within the program. Keyboard operation is achieved using the down-arrow key as a control key, while operation from within a program is best controlled by printing the appropriate Chr$ as described in the instructions. Although the instructions say the keyboard commands can be used whenever INKEY or INPUT statements are active, I experienced erratic results when I tried this method. Better results are obtained when keyboard control is used before running the program.

The program also contains an auto-number routine for use in writing BASIC programs, a line list routine that will list a program to the screen line by line and an auto-repeat key function on all keys.

I found the screen commands to be of limited value. Each time any of the commands were called, the screen was cleared to the new command format. If a CLS is then used, the screen returns to the usual CoCo color. This makes it difficult to use this routine to enhance existing software as the screen usually ends up with some of each color present. This can make for some strange effects. When writing new programs, the screen effects available are more easily used and can give your software distinctive text presentation.

The other features of this program work well and make it easier to write your own programs. The auto-number routine can be set for any start number and any line increment. I find this feature helps my concentration when I am working on my latest “masterpiece” in code. The line list feature allows controlled scrolling through the listing to find just where that “lost” subroutine has gone. The key repeat feature is a mixed blessing; it’s there whether you want it or not. I think it would be more helpful if this feature could be toggled on or off.

The instructions are supplied as a clearly printed two-page booklet photo-reduced to fit on one 8½ x 11-inch sheet. Loading instructions are explained and the necessary command lines for 16K and 32K computers are typed as they would appear on the screen. Instructions for use of the program features follows. The program is not copy protected, so backups are not a problem. The high quality cassette contains multiple copies, while the label contains the distributor’s address and telephone number.

At the asking price of $16.95, I think this is a useful program for anyone who does not want to invest in a more complete BASIC helper program, and as a bonus you get some unusual text screens to make your work stand out from the crowd.

(Dataman International, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8H1Y9. 16K or 32K, any BASIC, cassette $16.95, disk $20.95, U.S.; cassette $19.95, disk $23.95, CND.)

— Charles Bream
Software Review

Arithmetic Tutor Is
A Good Practice Tool
For Problem-Solving

Sometimes I view computer programs somewhat analogous to television programs. A great many of them (mostly games) are for entertainment only. These are the sitcoms, variety shows and soap operas of computerland. Applications (word processing, etc.) are similar to TV news programs. Finally, educational programs for computers can be compared to educational programs on television: some are great and some are very boring.

With this in mind, I looked at an educational offering from Computer Island called Arithmetic Tutor. This package is primarily made for a classroom environment and allows practice in multiplication, long division, factor operations and the hierarchy of operations. Significant, the program provides feedback not only in a “number right” report, but also provides a diagnostic listing on various aspects of the operations needed to complete a problem. The teacher (or parent) can then help the child overcome his specific computation problems by checking out what problems continue to crop up on the report.

From a programming standpoint, Arithmetic Tutor is thoughtfully made. The student is lead step-by-step through the problem-solving process, and is prompted at every operation to tell what the next computation will be. I do have a criticism with Arithmetic Tutor in this area as the program seems to be more interested in computational skills than in process. That is, the program leads the student through the process basically asking, for example, “OK, now it is time to multiply; what is 8 times 7?” instead of “do I multiply or carry a number next?”

On the positive side, as with most good educational programs made for computers, the BREAK and CLEAR keys are disabled to prevent students from destroying records of other students’ work that hasn’t been saved to disk. Arithmetic Tutor also features a Help command to give the students aid if they run into a problem area. The program will automatically “help” students if they press ENTER without giving an answer. All this is recorded in the report area so the teacher can check what areas the student needs the most help in later.

Although each session will hold information on a class of only 15 to 17, the program will extend to hold more students if disk space is available. A password must be provided to reveal diagnostic information as well as to start a new session. One potential problem is no provision is made if students have the same name. One student may wipe out another’s file if both are named “Ted,” for example. The documentation suggests using a different name for one of the “Teds.” My experience with children is that they are very proud of their names and they don’t care to change it for anyone (including a computer).

The most important test of any educational program is how well it works with its intended student. Here, I must get back to the television analogy. The best educational programs hold the student’s attention while they continue to involve the viewer in some educational process. Here is where Arithmetic Tutor has a major problem. After the initial interest in the program because of the computer gimmick, I found children quickly discover the program is mostly drill and practice with little reward and they lose interest. My daughter also complained that it was too hard to do the computations on the keyboard and video screen, and she soon resorted to paper, wondering why she was doing such problems on a computer, anyway.

The answer, of course, is the diagnostic areas provided for the teacher. The teachers, when using this program, will have to be ready with some answers to these questions if they attempt to use the program in class.

A few questions are not answered in the documentation provided with the program. The author does not attempt to affiliate a grade level with the program. I suppose this is not important as far as the arithmetic portion (a teacher can use it when needed), but it is important for giving a teacher a clue as to the level of the written material (such as instructions to the student). The program is not protected, but there is no indication whether the teacher may make multiple copies if there is more than one computer in the classroom.

Educational software is so sorely needed for the Color Computer it is really hard to be critical when one is produced. I would much prefer my daughter to be using Arithmetic Tutor on the computer than playing another round of some Pac Man-type game. I fear, however, that as students have gotten bored with the “talking head” approach to television and television moved to much better programs, so it is with “practice” programs such as Arithmetic Tutor. Buy it as an alternative to games for your students or kids, but let’s hope for a little more pizzazz in education programs for the future.

(Computer Island, 227 Hampton Green, Staten Island, NY 10312, 32K disk $49.95)

— Brian James

One-Liner Contest Winner...

You might call this one-liner a “one-worder.” It asks you for a single word, a delay value and a screen location, then flashes the word you gave at the desired location, alternating between normal and inverse text.

The listing:

```
0 INPUT "INPUT POSITION, DELAY, 
ORD": P, D, W$: CLS: L = LEN (W$): FOR X = 1
TOL: L$ = MID$(W$, X, 1): N$ = CHR$(ASC (L$) + 32): F$ = F$ + N$: NEXT: FOR X = 1 TO 20
```

Kelly Weston
Kansas City, MO

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Simulations and its companion Rainbow Simulations Tape.)
Color Stat Strategy Baseball is an Excellent Statistical Game

Color Stat Strategy Baseball is produced by Pinto Products. The program is on disk and requires a 32 Disk Extended BASIC system. The disk includes three programs which are listed as: CS, DF and LD.

CS is the actual baseball program. When you run it, you will be prompted to input the visiting team, then the home team. After each team is selected, the program automatically loads their statistics from the disk. Next, you will be required to select your batting order, then your pitchers. Now on with the show!

The screen will clear and the batting orders are shown as follows: 1-9 visitors, A-I home, then you input which batter is up and he will appear on the screen along with his statistics.

You have eight options from which to choose, 1) hit; 2) change; 3) sacrifice; 4) hit and run; 5) intentional walk; 6) steal; 7) squeeze play; and 8) infield, in/hold runner. The computer will check the batter stats against the pitcher stats and the results will be shown on the screen. The computer takes care of the plays and the outs. The Simulation continues for the rest of the game.

DF is a data file program which is used to create new teams and their statistics, which could be past, present or ones you make up.

To establish a new data file, first you input the team name, then choose (b)atter or (p)itcher, change or input. You are then prompted with (Name AB, H, 2B, 3B, HR, SO, SR, RR), for example: Morgan 404, 93, 20, 1, 16, 54, 89, C, 16 then ENTER.

For pitchers, you are prompted for the following: IP, H, SO, BB, ER, HR, Won, Loss. After each player change or addition, you will be prompted (another pitcher Y/N), (another batter Y/N). If no, then the screen will clear and you will be asked to make a selection as follows: R-restart, N-restart and create new file, Q-quit, L-to run list data program.

LD is a list data program for reviewing or changing an existing data file, or printing out teams and stats.

Color Stat Strategy Baseball is a well-written program with very good documentation, but as a baseball buff, I see this more as an excellent statistical program than as a baseball game. It seems to be hard for an amateur baseballer to follow because: 1) no scoreboard; 2) the program does not tell who is on base; 3) if the inning changes, the same team can bat and 4) all scores and base runners are to be kept on a separate sheet. I feel if these points are corrected and inserted, this would be a more enthralling baseball game.

(Pinto Products, 718 Fiji Circle, Santa Ana, CA 92704, disk $27.95 plus $2.50 S/H)

— By Terry Brown
B-XREF Is A Good Utility For Any BASIC09 Programmer

Anyone who does much programming knows about cross-reference programs. They are utilities that take programs and create such niceties as a variable dictionary consisting of the location and type of variables, listings of those lines pointed to by other lines by GOTOS and GOSUBS, and other useful references. These programs are hard to come by, however, since they are complicated to write and demanded only by the more experienced of programmers.

Since BASIC09 is relatively new, many companies have not put much time or money into the development of such "risky" programs. Fortunately, for those of us who program in BASIC09, one company has. It is Interactive Micro Systems and their program is called B-XREF. This is an excellent program that can be used by anyone, from first-time users to old hands at programming.

The operation of the program is extremely simple; simple enough, in fact, to warrant a one-page instruction sheet. On the fact-filled page there is a program description, installation procedure, general instructions, restrictions and a list of error messages.

Installation refers to placing the program where it can be used. This is simply to copy the program from the master disk onto your working disk. Nothing can be simpler than that. To invoke the program is only a few keystrokes more difficult than the installation. The command line that makes B-XREF go to work is: bxref [-f] [-w] [-i] in-file1 [in-file2 ... ] [>

out-file] with the items in the square brackets being optional.

All of the options preceded with a dash are called switches. These allow for a customized output with as little extra work by the user as possible. The switches are as follows:

-f allows form feeds to be suppressed for use with printers which do not accept form feeds.
-w creates a narrow report, as opposed to a wide one, which is especially useful for on-screen outputs.
-i will prevent the listing of the source procedure; otherwise the procedure is printed out before the cross-referencing information.

Another feature of B-XREF is that more than one procedure can be cross-referenced at a time; simply add the procedure name to the command line. In addition to multiple procedure names, the command line may have any valid output path. This allows for the output of the cross-reference to go to a file on disk, to the screen or to the printer.

B-XREF has only two obvious limitations, as is stated in the documentation: The utility should be used only on unpacked, error-free procedures. If, however, it is fed a procedure with a misspelled keyword, for example, there is a good chance B-XREF will help you find the mistake.

The second restriction is there may be no more than 500 total references. This includes the use of a variable name, procedure name or line number. There is a note that if the latter restriction is a problem, simply contact Interactive Micro Systems for help.

Any utility would not be complete without error messages. These are few in number (four) and cover problems in opening files, lack of available memory, or a full reference table. The messages are self-explanatory, but the documentation goes even further in explaining their meanings.

The output of the utility is clearly laid out. At the top of the page is the source listing of your procedure, unless prohibited by the -l switch. After that, the program starts listing all variables and procedure calls in alphabetical order. On the left-hand side of a line is the name of the variable, and on the right side is the type of variable: integer, string[20], procedure name, etc. On the next line appears the line in which the reference occurs. The source program lines need not be numbered, as in Disk BASIC, so when B-XREF lists the source code it includes line numbers of its own.

In general, I think B-XREF is a well-done utility which will be useful to any programmer who uses BASIC09. Perhaps it would be helpful to have the program cross reference numbers as well as variables, but since BASIC09 does not require them, this is a trivial omission. If only there were more utilities such as this for other languages for the CoCo!

(Interactive Micro Systems, P.O. Box 21007, Columbus, OH 43221, disk $19.95, plus $2 S/H)

— Jim Sewell
Shiver Your Timbers
With The Sailor Man

The 64K arcade games have finally arrived for the Color Computer and if the development of The Sailor Man by Tom Mix Software is any indication of things to come, our patience will have been well rewarded.

As the title suggests, the hero of this four-screen, action-packed thriller bears a strong resemblance to the knobby-kneed, swollen-wristed Popeye, whose zany exploits have long fascinated generations of Americans who love to pull for the good guys in white hats.

And true to form for Tom Mix, the CoCo version of this popular arcade game includes all of the features that have made it a hit, plus a few extras.

Loading is highlighted by a high resolution version of the Tom Mix logo, which is followed by a message asking the user to be a part of the software pirating solution by not making unauthorized copies of the program for friends. When the disk stops whirring, you are required to type in a common password supplied to all purchasers of the program. The procedure is a little confusing at first, but with a little practice, it comes easy.

After high scores from previous games are loaded (in the disk version), there's a color test to ensure that you are not making unauthorized copies of the program for friends. The procedure is a little confusing at first, but with a little practice, it comes easy.

On the first screen you dash madly about on four floors of play, negotiating eight different stairways while attempting to catch enough of Elsie's kisses (red hearts that float from the top of the screen) to fill in the 20 squares on the Sailor Man's house. As on all of the screens, you are vigorously pursued by none other than Bigfatbadguy who has his own ideas about who ought to be getting Elsie's favors. You're in danger of being eliminated until you can swallow a can of spinach, which will give you incredible power over your enemy. There's a punching bag at the top of the screen which, if your timing is exquisite, can send a bucket down onto Bigfatbadguy's head — a feat that will bring smiles to any onlookers.

The principle is the same on the second screen except that you are expected to catch musical notes. Oh, yes, there is the Olduglyseawoman who appears at higher difficulty levels to hurl empty bottles at you. You must punch them to avoid being bounced into the water. The objective is to catch enough notes to play Elsie a love song, which advances you to the third screen where you must collect enough letters (thrown by Elsie's cries for H-E-L-P) to build a ladder to the crow's nest where Elsie is trapped.

One of the real delights of the game is watching Bigfatbadguy sail through the air, bouncing off the left and right sides of the screen and then hearing the highly audible splash when he hits the water.

Adding interest are the various musical interludes between screens. You'll recognize and appreciate a fast-moving version of the Popeye theme song. However, if you tire of the music, press the 'M' key to toggle the music on and off.

By pressing the CLEAR key, you may select the number of players, the level of difficulty (from 1 to 9), the number of attempts, and the screen on which you wish to begin. Starting with any more men than three will prevent you from entering your name on the high-score table.

After a while you forget the novelty of playing a 64K game because the difference really isn't that noticeable, which actually says a lot about the quality of the games already on the market for the Color Computer. However, any feature you ever wanted in an arcade game is included in The Sailor Man.

(Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49505, tape $29.95, disk $34.95.)

— Charles Springer
Preschool Pak
Reinforces Letter And Number Recognition

Preschool Pak is a pair of programs designed for (who else?) preschoolers. Alphatalk promotes upper- and lowercase letter recognition. Countem drills in counting and number recognition. These programs are designed to utilize the Voice Pak by Spectrum Projects, but don’t feel left out if you don’t own one. Alphatalk and Countem work well without the voice.

In the program Alphatalk, the child matches letters on the screen with keys on the computer. When run, Alphatalk graphically displays on the screen a letter of the alphabet. It randomly chooses an upper- or lowercase letter. If you have the Voice Pak, the program will say the letter and wait for a response. If, after five seconds, no key has been pressed, the letter will be spoken again. If the wrong key is pressed, the letter will be spoken again and the program waits for the correct key. When the right key is pressed, a clown face appears, a snappy tune plays and the voice tells them they are correct. The next letter then appears.

The colors and graphics are nice in this program; even those kids who were old enough to know their alphabet forwards and backwards had fun with Alphatalk. My one criticism, though, is with the graphics. Alphatalk is all done in low resolution graphics. This makes the letters hard to read sometimes, particularly for those children who are not very familiar with lowercase letters.

Countem is a Hi-Res graphics program. When run, up to 10 interesting objects appear on the screen. They may be cars, birds, lamps, TVs or robots. The child counts the number of objects and presses the appropriate key. As in Alphatalk, Countem does not punish a wrong answer with noises or flashing displays, but simply waits for the correct response. When the right key is pressed, the screen changes to a pair of robot-like creatures who shoot a laser back and forth. There is a musical tune and a spoken reward. The next group of objects then appears on the screen. This program reinforces number recognition as well as counting skills.

Both of these programs are simple enough for preschoolers to play and enjoy without much adult intervention. Children as young as 3 and as old as 6 had fun with Countem. Alphatalk was enjoyed by all who were ready to learn both upper- and lowercase letters.

( )

Grand Prix Rivals Arcade Version Of Auto Race Games

You expect the unexpected when you strap yourself into the Formula 1 in Intracolor’s Grand Prix, but there’s no way you could ever prepare for the hairpin turns.

You’re zooming along, knowing the turns are ahead, but suddenly the track becomes a maze of stripes and your senses fail you. Your only option is to hit the brakes, let up on the throttle and hope for the best!

Among the recent auto race arcade games introduced for CoCo, Grand Prix is one of the more challenging. The graphics are excellent, although not comparable to MichTron’s Speed Racer, in which the background competes strongly for your attention.

The dashboard is well designed, with gauges displaying the best time, the track number, lap number, miles per hour, gear and elapsed time. The steady hum of the Formula I adds a lot of realism to the program. You have the feeling that you’re in for some serious competition.

When you’re ready to begin, press the CLEAR key to select the desired track (there are five from which to choose). You may choose from either the keyboard or the joystick mode. If using joystick, just use the firebutton to shift gears. To accelerate, move the stick forward; to brake, pull the stick back. In the keyboard mode, the SHIFT key is used to shift gears. The up- and down-arrow keys are for acceleration and braking, the left- and right-arrow keys for steering.

The object is to score the lowest elapsed time for five laps in any one of the five different tracks. If you crash three times on one track, the game is over. When five laps are completed (a lot of practice runs will be required), your time is compared with the previous best time and you advance to the next track.

Grand Prix is another of those programs rivaling the quality of those many of us have longed for after visiting the neighborhood video arcade. It just goes to show that CoCo is capable of just about anything!

(Intracolor, P. O. Box 1035, East Lansing, MI 48823, tape $34.95, disk $34.95.)

— Charles Springer

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LIZPAC: An Extensive Statistical Analysis Package

By Frank J. Esser

A variety of statistical packages have existed for mainframe computers for quite some time. They are an invaluable aid to scientists and engineers, and give these people the ability to put observed data into some meaningful form and, quite often, display the results in graphical form. These packages offer a number of different routines or programs, and depending upon what the individual desires, dictate which of the routines he would use. Sometimes more than one routine will be found useful, and at other times, the data output from one may be fed into another to produce still another set of data. Whatever the desire of the user, the bottom line is that he has at his disposal a set of routines to help analyze data sets and reach a conclusion without the need for long and lengthy manual calculations. To anyone who has gone through such manual calculations, you know what a problem it can be.

What has all this got to do with LIZPAC and the Color Computer? Well, a statistical analysis package has come to the world of the Color Computer. Those of you interested in frequency distribution, regression analysis and so on, this is what LIZPAC is all about. I am not a whiz at statistics and cannot begin to determine if everything is present that would be desired. However, I can attest there is an awful lot offered by this package that should more than delight the heart of the user.

The programs come on eight 5¼-inch diskettes — that is correct — there are eight diskettes full of programs and editors. The documentation is contained in a standard three-ring binder and consists of around 140 pages of instructions, and approximately 35 pages of printer listings of individual program runs. The last section contains the instructions for SHOWPACK 1.0 which will help create, label and edit Hi-Res graphics screen displays.

LIZPAC consists of 88 statistical and file management programs. LIZPAC programs are loaded by a single keystroke from the control program. Minimum requirements for LIZPAC are 32K of memory, Extended BASIC, a printer and at least a single disk drive. According to the documentation, LIZPAC can be used by individuals who have only a superficial knowledge of the use of computers.

The excellent use of menus and screen prompts are enough so the user need not worry about data files, etc. Many of the programs ask if data files are to be constructed during the running of this program. The user is then prompted how to enter the data.

The documentation also states LIZPAC does not assume the user has an extensive knowledge of statistics. However, the user must be sufficiently familiar with the statistical process and terminology as to be able to provide appropriate responses to LIZPAC queries and prompts; if you don’t know anything about statistics, this package is not for you. LIZPAC is written entirely in BASIC, and can be listed and modified should the user feel the urge to do so.

LIZPAC is broken down into five packages. The following is a brief description of each of those packages.

Package A — Core Package

Data File Administration — Has a complete editor for editing data files, utilities to perform sorting, merging, deleting from and adding to data files.

Descriptive Statistics — Consists of one-way frequency distribution, random sampling, theoretical frequency distribution, histogram and frequency polygon.

Comparison of Means — Comparison by t-test, Scheffe’s test and Tukey’s test; examination of means for polynomial trends; partitioned ANOVA tables and standard ANOVA tables.

Regression Analysis — Mass production of Pearson’s “r’s.” Special packages for polynomial regression and exponential regression analysis.

Transformation of Variables — Performs variable transformation by incorporating user-written BASIC statements.

Showpack — Disk graphics package for editing and labeling LIZPAC graphs saved to diskette.

Datapack — Converts ASCII files to LIZPAC files or converts LIZPAC files to ASCII files.

Package B — Factor Analysis

Programs in this package provide for preparation of the raw data file and the correlation matrix, extraction of the principal components and estimating the principal factors by iteration. The rotation methods available are Quartimax, Varimax, Orthomax and the Direct Oblimin method.

Package C — Discriminant Analysis and Canonical Correlation

Performs a complete discriminant analysis and canonical correlation analysis, Geisser classification, and includes a program for one-way analysis of covariance with multiple covariants and multiple variables.

Package D — Cross-tabulation and Related Programs

Analysis of Cross Classifications — Program will perform a two-way analysis or will print a multidimensional table as a series of two-way tables.

Non-Parametric Statistics — Includes such tests and procedures as: Wilcoxon signed rank test; Hodges Lehmann estimate of the median; the Friedman two-layout and many more.
Package E — Time Series Analysis and Forecasting

Includes such forecasting techniques as ANOVA for trend and seasonal effects, plus much more.

Also included with LIZPAC are three utility programs which make using the analysis programs all that much easier. The utilities are EDITOR, DATAPACK and SHOWPACK. The editor will allow you to edit any of the data files created by the various programs. It is run from the main entry menu from which all the LIZPAC programs are run. When the editor is first started, it comes up in the ready state. Pressing the 'B' key will enable all the function keys used by this processor. All the commands are executed under the EDITOR via single keystrokes. The following is a list of the commands available and the control keys.

SHOWPACK is a program which will help create, label and edit Hi-Res graphics displays. Aids are provided for plotting data from tables, drawing with the joysticks, and creating pie charts and bar graphs. Graphs can be plotted using data tables stored on disk. It is loaded and run in the standard manner.

The LIZPAC package is quite impressive. The authors have gone through quite a bit of work to ensure the programs run as they should and have added some very nice utilities. The EDITOR is not a Telewriter-64, but is functional and does the job very nicely. SHOWPACK is another good example of the type of utilities that were added; it will let you plot your data on the screen in the Hi-Res mode. You can then label the charts, graphs, etc., however you want. The entire screen display can be saved and, if so desired, can become a part of a slide presentation. The programs themselves are quite concise, and from the very simple tests I ran, straightforward to use. Every attempt has been made by the authors to make the programs usable by someone other than a computer expert. One nice feature of each data run is the ability to add to the output listing, the date of the run and the person performing the run. That appears on each printed output even if it goes to the disk.

I am not a statistician nor do I perform the type of data analysis in my everyday job that these programs provide, but I do know that LIZPAC is not for everyone. For those who need to perform data analysis of any kind, be it social studies, agricultural studies, scientific studies or any type of data manipulation, I think this is the set of programs for you. The only hard part is getting the data on the disk for processing. A utility called DATAPACK will take a LIZPAC file and convert it to an ASCII file or an ASCII file to a LIZPAC file. So if you have a terminal program and your data is on some other machine, you can dial into that machine, access the file, and LIZPAC will do the rest.

I like LIZPAC. It is well-done and the documentation, though not for the beginner, is also well-done. There are eight disks full of programs and sample data files. Again, this package is not for someone who does not have at least a good general background in statistics or data manipulating. It assumes a knowledge of certain skills is already present.

(Prickley-Pear Software, 86 Cherokee Shores, Northport, AL 35476, $200 plus $5 S/H)
Be A Battleship Mate
In Talking Shiphunt

If you're looking for a version of "Electronic Battleship" for the CoCo, your search is over. **Talking Shiphunt** is a strategic game requiring 32K Extended BASIC, one joystick and one player. For the best effect, Spectrum Project's **Voice Pak** with Del Software's **Translate** program should be used in conjunction with the program. *Shiphunt* can be played without voice, but it's much more interesting when CoCo talks to you.

A short instruction sheet is included which tells you how to load in the programs. *Shiphunt* is supplied on cassette, but can be easily saved to disk or another tape for a spare copy. Before loading, make sure the CoCo is off, then insert the **Voice Pak** cartridge. Next, `LOAD "SHIPHUNT` and run it. You are then asked "Do you want me to talk?"

If yes, put the **Translate** program into the cassette player and press 'Y' to load and execute. (**Translate** is the machine language text-to-speech program.) Before the game begins, instructions can be read and/or heard.

Game play is similar to the pegboard game "Battle-Ship." One big difference between the two is that the player does all the guessing in *Shiphunt* as to where the computer hides the ships. The player doesn't have ships of his own to deploy for CoCo to find. My attention span would have been longer if this capability was included.

At the start, a 9 x 12-inch Hi-Res graphics grid is drawn on the left of your screen with 71 shots available. I prefer to use the keyboard to place the cursor in the spot I wish to fire upon. However, response time between the keystroke until the cursor moves from block to block is slow and can be aggravating. The right joystick must be plugged in so the cursor doesn't drift across the screen. It can also be used for movement, but the keyboard provides better control.

The object is to sink all five of the computer's ships before your shots are gone. Five hits are needed to sink the battleship, four for the cruiser, three for the submarine, two for the destroyer, and one for the frigate. If you miss, a green bar appears in the block you last shot. Hits are displayed as yellow bars. Indicators at the right of the screen list how many ships, and which ones, have been hit or sunk, and how many shots are left.

Throughout the game, you can hear the captain giving orders to his crew: "You scrub the deck," "Load the cannon," and "Get ready to fire," are a few. The captain will also talk to you, saying things like "Please, can we talk this over?" Sometimes it's hard to understand what is spoken, but if you turn the volume up and listen closely, the sentences make sense. Anytime during the game, hitting 'T' will turn the speech off. This will speed up execution of the program, but it's not as entertaining without speech.

There is no big finale at the end. When someone wins, a text display of the grid is flashed on the screen for a few seconds, which shows where the remaining ships (if any) are and what your score is.

**Talking Shiphunt** is a good game for the younger children and inexperienced game players who don't want a lot of action. If you plan to purchase it, make sure you first have the **Voice Pak** with Del Software's **Translate** program.

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**One-Liner Contest Winner . . .**

This program draws a tight spiral, paints in the gaps, changes screen modes and does it again. It's great for seeing how the **PRINT** command works.

The listing:

```
10 B=0: A=1: PMODE4, 1: PCLS: FORR=1T
02: SCREEN1, B: FOR1=1T091STEP4: CIR
CLE(128, 96), I, A: NEXT: COLORB:LINE
(35, 96) - (221, 96), PSET: CIRCLE(128
, 96), 93, A: PAINT(128, 99), A, A: A=0:
B=1: NEXTR: RUN
```

Kevin Oberberger
Sparks, NV

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Simulations and its companion Rainbow Simulations Tape.)
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Anyone who has ever visited one of our gambling meccas has probably played keno. You can't help not playing it because it’s everywhere; in the restaurants, lounges, the casino game areas, even in washrooms.

My favorite casino has a great $3 steak and eggs breakfast in its dining hall. In the middle of the tables with the salt and pepper shakers are keno trays filled with forms and pencils. The roving game steward is only too happy to pick up your game ticket and bet at your table. That $3 breakfast usually winds up costing a lot more after losing a number of keno games.

Bakersfield KENO comes on cassette and requires 32K Extended BASIC and is not copy-protected. After you run the program, your eyes are treated to Hi-Res graphics display of numbered Ping-Pong balls bouncing around a glass jar, just like in the casinos. An attractive keno board fills the screen that serves as both the game ticket and the game board.

The program prompts you for the starting bankroll that cannot exceed $1,000. The maximum bet allowable is $9,999 or less, depending on how much you have left. The program keeps track of your bankroll, bets and payoffs.

Next, you pick how many numbers will be played with a choice of from one to 15. You can use the left-arrow key to go back and change a number before starting the actual game — a nice feature. The computer then selects 15 numbers at random and more times than not, they are not the numbers you picked (just like in the casinos)! I played over 100 games and only won once, which made me wonder if the game is rigged. This theory was quickly blown to shreds, however, when a friend of mine who does very well in casino keno won a lot more than I did using this program.

When you run out of money or come very close to winning, any one of a number of humorous phrases is displayed, such as “CLOSE BUT NO CIGAR.”

Bakersfield KENO can be considered to be both a home version of the game and a serious simulation of the real thing, except for one detail. Only one game card can be played per game. I would have liked to have been able to play several cards at once or play along with friends. I could find no bugs in the program, and great care has been taken to reject incorrect user response.

The documentation consists of one typewritten page that is mainly a payoff chart with simple instructions to run the program. Even if you have never played keno before, the documentation is sufficient to get you going and understand all the features and options.

Bakersfield KENO is fun to play and is sure to please those who can’t afford to drive to Reno every time the keno bug bites. Even though I kept on losing my bets, it was hard to stop playing (just like in the casinos)! Nothing else is required to use this fine program except the feeling that “Lady Luck” might be on your side today.

(Seibyte Software, P.O. Box 6464, Bakersfield, CA 93386, tape $22.84)

— J. Michael Nowicki

One-Liner Contest Winner...

If you write machine language programs and have a printer, try this one-liner. It generates a chart on the printer of text screen memory locations in hexadecimal. (If you plan to make a batch of these charts in order to mark them up, you might consider doing it on a copier to save wear and tear on the printer.)

The listing:

1 CLS:PRINT" HEX SCREEN LOCATION"$:PRINT "READY PRINTER (PRESS ENTER)"$:PRINT "READY"$:K$:CLS:PRIN T" WORKING...":PRINT#:2,CHR$(27) ;CHR$(20):C=0:FORX=1024TO1535:C=C+1:PRINT#-2,"";HEX$(X):;IFC=32 THENPRINT#-2:PRINT#:2:C=0:NEXTSENE NEXT

Fred Furtado
Springfield, VA

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Simulations and its companion Rainbow Simulations Tape.)
**TEXT** Teaches Valuable Lesson In Word Processing

What could possibly be interesting about a program called **TEXT**? Is it something you read with or write with? It must be boring with a name like that.

That's what I thought. I was wrong! You're not going to be razzled and dazzled with lights and colors, but your child will receive a valuable lesson in a pre-word processing activity.

**TEXT** allows children to type, edit and format words and sentences on the video display. The letters are large and appropriately sized for young children. Each line holds 13 characters and each screen, seven lines. The program can hold up to three screens of information in memory. The cursor has four-way non-destructive control; text is not destroyed when the cursor is moved. Paging is controlled by placing the cursor in the bottom or top corner and pressing the right- or left-arrow key. When paging to the next screen, a brief waiting period is encountered while paging takes place. This wait would be inconsequential for small children.

What would a word processing program be without some filing and retrieving capabilities? **TEXT** has these, also. Pressing the SHIFT and left-arrow keys at the same time invokes the utility menu. From this menu, saving and retrieving from disk or tape is possible. Printing the file is also an option on the utility menu. All printable keyboard characters are programmed into the **TEXT** program.

**TEXT** would be a valuable tool for schools and parents who desire an introduction to word processing for children. All the terms and conditions of a sophisticated word processing program can be introduced and demonstrated. Used properly, a child would benefit greatly from this program.

There are a few problems with the program that need to be addressed. The following enhancement suggestions would add to an already fine program. The program is written in **BASIC** and the **BREAK** key is not disabled. This is an absolute must for programs that are to be used by small children. No recovery procedures are built into the program. Another feature that would be nice is auto key repeat. This would provide an even more realistic word processing experience. One last enhancement would be improved documentation. If a program is to be used with young children, ideas and projects should be offered for the parent or teacher. **TEXT** documentation is one copied sheet with instructions.

In summary, **TEXT** is well-constructed and bug-free. It's a lesson for learning that should not be missed!

(Reach Software, P.O. Box 7366, Johnston, RI 02919, $24.95)

— Rick Cobello
DATA LIST Is A Good General Purpose Database

DATA LIST is a database program written by Arlin Karger and distributed by Computer Associates, Inc. It is a cassette database written for the 32K ECB Color Computer that suits its purpose well. Among the things a computer does extremely well, given the proper software tools, is file, sort and format data. DATA LIST does all this and more.

Among the database types is the File-Management System, which lets you create, save and retrieve records made up of fields into a file. Mailing lists are usually a specialized version of this type of database, and DATA LIST is a general purpose database of this kind. The chief limitation of this type database is that you cannot merge information in one file with information in another file. You have to know what to put in the file, and prepare it from the beginning. The File-Management System works very well for most purposes, and especially well with cassette-based systems.

DATA LIST is clean and well-prepared. My one complaint is that the load procedure is a bit cumbersome. You must LOAD ENTER, RUN ENTER and RUN ENTER. Looking at the code, I felt one of the RUN ENTER steps could have been eliminated, but considering all else, that's being picky.

There are three copies of DATA LIST on the cassette, all of excellent quality. Each loaded cleanly on the first and subsequent passes. The manual is a clear and concise six pages, along with seven pages of descriptive tutorial. The tutorial takes the user through the creation of an address file — an expected and practical application.

Although the program is sold as being for a 32K ECB CoCo, I deliberately created a large file of 400 records, with 500 characters per record without problem in a 64K CoCo. It should be noted if you do manage to bomb the program, entering GOTO 1 will get you back in business with your data intact.

The function selections, all menu driven, are as follows:
- A) Add record — permits the input of data, following prompts, within the specified fields.
- B) Delete record — permits complete deletion of a record.
- C) Edit record — may be used to “Edit” any record.
- D) Sort — permits the alphabetical sorting of any column within the file.
- E) Load file — loads previously created files for printing, editing, search, etc.
- F) Save file — saves all records for future use, including all field data.
- G) List a record — list by selection, scroll up or down including wrap-around.
- H) Print reports — takes a little practice, but if it is in your file you can print it — alone or the whole thing.
- I) Print labels — obviously for use with mailing lists, but not so limited for the creative mind.
- J) Select printer — I like this feature a lot. Unless you “select” (turn on) your printer, data goes to the screen. The program is configured for the Epson MX/RX or Gemini-10. Option 0 will select the printer with no specialized commands for the Gemini or Epson.
- K) Set fields — this is where all records begin. You can use this option only if ‘E’ or ‘K’ have not been previously used.
- L) Analyze a record — this scrolls a record by fields. It is great for determining the location of a particular field within a record.
- M) End — ends the program.

If you have a cassette-based Color Computer, and can profit from the use of a good general purpose database (or just want to find out what databases are all about), I recommend DATA LIST.

(Computer Associates, Inc., P.O. Box 683, West Fargo, ND 58078, cassette $24.95)

— Gary Smith

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BBS Log Book Can Help You Get Organized

With the ever increasing popularity of long distance Bulletin Board Systems (BBSs), it becomes more and more difficult to keep track of which systems are available and what is required to access each of them. The BBS Log Book is designed to help solve many of these problems.

The book, which is 75 pages long, has a cardboard cover and is bound with plastic binding. Four pages of card board divider in the middle of the book contain room for 26 services such as CompuServe or The Source, and packet switching networks such as Telenet and Tymnet. Each service has columns for name, telephone number, customer service number, account number, password, network ID, control codes and optimum Baud rate.

Finally, the last section, called the “Telephone Log,” is 25 pages long and is designed to help you organize your phone bill. Columns are provided for the date of the call, area code, telephone number, phone company name, destination, time on/off and total cost.

In actual use I found a couple of problems with the BBS Log Book. First and foremost, I found it hard to train myself to make entries into the book every time I called a board. Without consistent use, the BBS Log Book is practically worthless. Secondly, I found the provided spaces much too small for practical applications. In most cases, I simply used two or even three lines to take notes on the boards’ activities. Finally, there is no place to store your passwords to frequently-called systems. The author states that the “password” column “allows you to change your password with each call if you wish.” However, when you call a particular board, you are going to have to search backwards through your log until you find your most recent password — hardly an efficient process if you call many boards.

Who would benefit from this book? I would only recommend it to people who are serious and frequent bulletin board users, and thus would benefit from the added organization. However, at $5.95 per copy, almost anyone can afford to buy BBS Log Book to see if it suits his or her personal needs.

(Atmospheres, 1207 Eighth Ave., Brooklyn, NY 11215, $5.95)

— Robert French

---

The KEY-264K is here!!

DO YOU HAVE A 64K SYSTEM (OR 32K WITH 64K MEMORY CHIPS) ?? ARE YOU BEING TOLD YOU CAN ONLY USE 32K FROM BASIC ??

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The KEY-264K divides the 64K ram memory into two 32K banks or sides, each of which can be utilized independently by the BASIC interpreter, with the ability to switch instantly from one side to the other. IT'S LIKE HAVING TWO COMPUTERS IN ONE!! Have your BASIC program on one side and keep your variables on the other side, or have your main program on one side and your subroutines on the other side, or have your program on one side and use the other side for 4 additional Hi-Res pages, or any combination you like. The possibilities are endless because the KEY-264K allows full communication between sides plus the ability to switch back and forth at will, all from within BASIC. You could also have different programs in each side and switch back and forth between them using simple keystrokes, even while the programs are running!! Or run them both at the same time in the FOREGROUND/BACKGROUND MULTI-TASKING mode. Don't buy that printer buffer yet! With the KEY-264K you can be printing in the background side while utilizing your computer normally in the foreground side AT THE SAME TIME!!!

Debugging a program? Use either a BASIC command or simple keystrokes to instantly duplicate your program, in it's present status, on the opposite side. Switch to the opposite side later and pick up exactly where you were before!!

For DISK users, the KEY-264K allows you to alternate between DISK and EXTENDED BASIC on the same side with simple keystrokes. No need to pull your controller or power down. You can be in EXTENDED BASIC on one side and in DISK BASIC on the other side and still switch back and forth and have full communications between the two sides.

The KEY-264K works on the 64K COCO or 64K COCO-2 and on older 32K systems with "E", "F", or even modified "D" boards and requires EXTENDED or DISK BASIC with GOOD 64K MEMORY CHIPS!

ORDER YOUR KEY-264K TODAY by sending check or money order for $39.95 (cassette) or $44.95 (disk) plus $2.00 postage U.S.A. ($5.00 outside U.S.A.) Mass. residents add 5% sales tax.

KEY COLOR SOFTWARE
P. O. BOX 360
HARVARD, MA. 01451

March 1985 THE RAINBOW 219
Hardware Review

Take A Break
With Pause Control Switch

For a CoCo hardware review, this is quite brief, because there is really not much to tell, which is probably appropriate for a “Pause Control.”

Pause Control Switch consists of about $2 worth of parts and a one-page instruction sheet. You really do not need more. The parts include an SPST toggle switch, two mini-clips and about nine inches of paired leads connecting the switch to the clips. It is all assembled, and the quality of the soldering and dressing was quite good on the set I reviewed.

You will have to open your CoCo to install Pause Control Switch, and you are properly warned about how this affects your warranty. Once the case is opened, all you do is mount the switch through the cover (you could string it through the back if you didn’t want to punch a hole in your computer), and clip the two leads to two well-exposed and safe leads on the ROM-Pak Interface. Thanks to the clips, no soldering is required.

What you have done is tied, in a way, to switch on a “halt” signal to the MC6809E microprocessor any time you want the computer to stop dead in its tracks. Halt forces all the VDG address lines into a high impedance state (engineers call it high-z). The computer is essentially stopped, waiting for direct memory access to drive it. Of course, none will, so the only effect as far as you are concerned is that the computer is stopped — literally frozen at the end of its last clock cycle! By the way, this hard stop will, in no way, harm your CoCo.

What does this do for you? You could pause in the middle of an action game, catch your breath, and resume like nothing had ever happened. This seemed important enough for one video game maker to use a similar halt as their prime advertisement. You could halt directory listings from disks. (Now, that had to make a few of you pause!) See how well it was named?

Computer security? Sure. With the switch on, applying power will get you a screen of graphics and nothing else. Pause Control does nothing if you are inputting with a cassette. Also, you can’t pause the analog signal in; otherwise, you can pause the computer in the middle of just about anything!

(The Data’Phile, 207 Melrose Drive, North Syracuse, NY 13212, $14.95)

— Gary Smith

WANTED!

Young men and women seeking adventure, excitement and thrill-a-minute action. No experience necessary—just you and your Color Computer. See below:

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Shrinx Is An Exceptional Graphics Programming Tool

Shrinx is a utility program that supplements the Graphicom program. Graphicom is a very powerful and popular high resolution graphics program for the CoCo. (For information on Graphicom see THE RAINBOW, April 1984.) Shrinx requires a 32K CoCo and one disk drive. Use of up to four drives is supported by Shrinx.

A small, well laid out operators manual accompanies the Shrinx disk. Using the Shrinx manual, the program was up and running quickly. I found one small problem in the boot portion of the manual; it states: “Put the disk that came with this manual into drive 0. Type Shrinx and push the ENTER key. Drive 0 will start and you will be greeted with the Shrinx menu.” This did not work using the standard Disk BASIC. I had to type: RUN ‘‘SHRINX’’ then press ENTER.

Following is a list of Shrinx commands:

? = Disk Directory — Typing a ‘?’ will list all the binary files on the disk drive currently being used.

M = Menu — Pressing ‘M’ causes the Shrinx menu to appear.

L = Load — Typing ‘L’ allows you to load binary picture files from a Radio Shack formatted disk.

W = Write — Pushing ‘W’ permits you to write a picture to a Radio Shack formatted disk.

D = Drive — Typing ‘D’ allows you to change the drive that is currently being accessed by the Load, Write and Disk Directory commands.

E = Enlarge — The Enlarge function divides the screen into four quadrants. After typing ‘E’ you are asked which quadrant to enlarge. The quadrant selected is redrawn to cover the entire screen.

S = Shrink — Pressing ‘S’ scales the original picture into four quarter-frame pictures by deleting horizontal and vertical lines. Each quarter-frame picture is unique because different lines are removed from each frame.

V = Variable Shrink — You can scale a picture to a desired size using the Variable Shrink function.

T = Transfer — The Transfer function allows you to save a picture to a Graphicom picture disk.

G = Get — Using the Get command permits you to load a picture from a Graphicom picture disk.

The Shrinx command structure allows you to easily transfer pictures from Radio Shack formatted disks to Graphicom picture disks and vice versa. I found the Shrinx program very user friendly. When used in conjunction with Graphicom, Shrinx can be an exceptional tool for the programmer, artist and/or novice.

(GRAFX, P.O. Box 254, West Mifflin, PA 15122-0254, Disk $29.95 plus $2 S/H)

— Gabriel Weaver
**T/S EDIT And TRSCOPY**

Make Editing Effortless

If you have not used a full-screen editing program, you do not know how easy you could have had it. Radio Shack has released T/S EDIT, a program that makes editing programs a lot easier than using the EDIT command. The first thing you notice when you open the package is that there are two disks. Radio Shack supplies a Disk BASIC version and an OS-9 version in the same package. Besides the two diskettes in the package, a well-written instruction manual is also included. The Disk BASIC version of T/S EDIT requires a minimum system of 32K RAM and one disk drive; the OS-9 version requires the OS-9 Operating System, 64K RAM and one disk drive. A notice in the manual states that T/S EDIT will run only on the Color Computer; it will not work on an auxiliary terminal.

One other thing, all OS-9 users with the 01.00.00 version will have to make a patch before using T/S EDIT. The manual very clearly directs you through the patch, even if you have just started with OS-9 and are not really familiar with the system.

The manual walks you through an example. At first it was hard to get accustomed to the command functions, but with a little practice, it became easier. I did have trouble using some of the cursor movement commands, and a call to the local Radio Shack did not provide much help since they had not received a copy of T/S EDIT yet. A call to Texas proved to be only a little better; there are a few "bugs" in the disk I received to review. I had trouble using the lowercase command functions, but I was assured these would be corrected in the marketed version.

Some features included in T/S EDIT are full-screen editing, true lowercase letters, side scrolling, variable character display size, global editing and multiple file merging. A Hi-Res screen is employed in both versions of T/S EDIT. You have 10 different display modes to choose from. These vary from 32 x 16 to 80 x 32. You also have the option of 32 columns being Hi-Res and/or virtual 80 columns with horizontal scrolling. This means you get a 32-column, Hi-Res window with text entered into an 80-column line.

T/S EDIT has a "search and replace" routine that makes you wonder how you got along without it. It makes it very easy to edit a program, i.e., change the output to go to the printer instead of the screen. With just one line, you can replace all PRINTS to PRINTS-2s.

One other command I found very useful was the "Yanking" command. With this, you can move parts of a program from one location to another without deleting the original text. This is good to use when you use the same type of loop in your programming. Auto key repeat is used in the Disk BASIC version, but unfortunately it is not available in the OS-9 version.

If you do not have a full-screen editing program, you should consider Radio Shack's version before you decide on one. It is a good version with an excellent instruction manual. The manual's last three pages are a glossary of the T/S EDIT commands, and after you initially go through the manual, the last three pages should be all you will need. The program together with its documentation is written to be used by even the inexperienced programmer.

Also included in my reviewing package was another program called TRSCOPY. TRSCOPY is used to transfer Disk BASIC text files to OS-9 files and vice versa. It also requires the OS-9 Operating System, 64K RAM and one disk drive. It has a very small manual, at least by Radio Shack's standards, but it is definitely all you will need. The transfer is both fast and painless. You may transfer both text files and programs saved as ASCII files from one operating system to the other, however, TRSCOPY moves the files without modification; control and other special characters are copied, but not translated. If you copy a BASIC09 program from OS-9 to Disk BASIC, it will appear as an ASCII file on the disk. You will have to edit it with a full-screen editor or a word processor to, at least, remove the PROCEDURE line at the top of the program.

Again, if you do not already own a full-screen editor or a TRSCOPY-type program, these programs deserve your attention. Radio Shack did a good job developing T/S EDIT and TRSCOPY and more support seems to be around the corner. If you do a lot of debugging, but are not sure you need these programs, then a stop at your local Radio Shack for a demonstration may be in order.

*(Radio Shack stores worldwide. T/S EDIT, disk $34.95; TRSCOPY, disk $24.95)*

— Dale Shell
Omega File: Good Management System With A Price To Match

By Robert Foiles

*Omega File* is a single disk-based file management system which does not require 64K and allows the user to handle files with records in one file as large as 4,080 characters. Just so we are all talking about the same thing, a record is a group of data arranged in data fields or lines, and a file is a collection of these records.

This program is designed to permit the user to create individualized records with up to 16 data fields and each field may be constructed to hold from one to 255 characters. Since this is a single disk system, the number of records that can be handled by the program is dependent upon the size and number of fields selected for each record. For example, if the user wishes to create a file with records which each use the maximum 16 fields and each field at the maximum of 255 characters long, then this file would be limited to only 37 records. But, a file with records limited to 10 fields of 20 characters each would allow for about 780 records. The actual file size (e.g., number of records in the file) is limited by the storage space available on the disk in use.

The program allows for sorting of records and a “sort file” is created. Thus, if the user plans to store close to the maximum number of records on a single disk, some planning is needed to leave room on the disk for the sort file. The user might store several small files, with sort files for each, on the same disk with a little planning. However, should it happen that the user didn’t do the homework, the program will flash the “Disk storage is getting low!” message on the screen before more data can be entered.

The hardest part of creating a file is the thought that needs to be put into deciding what the records should hold. To get to the task of structuring records for a file, select the Create option from the File Maker Menu. As noted, each record may have up to 16 data fields and each of those fields is to be labeled (up to 10 characters long). The user also sets the length of the data field (up to 255 maximum). In effect, this creates a template for each record to be in the file.

After the form is designed, it is just a matter of typing in the proper information for each record to construct the file. The program author has provided several good examples to follow in setting up the record format and also has provided several worksheets in the back of the manual to facilitate formatting a file.

When the user completes the designing of the record format or wishes to abort the efforts by hitting the ‘@’ key, the program returns to the main menu. From the main menu, the user now has the choice of “using” a file and, once the title is entered, the File Maintenance Menu appears. To speed up operations of the program, the program author has used the INKEY$: mode, which jumps the program to the next line or option when the designated number of characters is reached or ENTER is hit. After the first
eight characters of a filename are entered, the program goes right to the Field Maintenance or working menu. Also, while entering the data into the data fields of the records, when the designated number of characters is reached for that field, the program jumps to the next data field. This is fast, but it can cause problems for an inattentive user. However, the user may go into the Change option and correct the error.

At least one problem the user does not have to worry about is the saving to disk of the data. The program takes care of saving to disk as is needed. (But be careful: Upon ending the session, when the program asks if you want to “Save file,” answer ‘Y’ or the program will kill all the records in the file!)

Another speed up method in the program allows the user to repeat an entry in succeeding records by hitting the ‘@’ key while in the data field. The data field will automatically be filled with the information located in the same data field of the preceding record. Repetitive entries are a snap.

The Maintenance Menu now provides the option of either adding records to the file, changing information in individual records, viewing records in sequential order, or calling up a single record by its record number. If desired, deleting any record is possible; however, the record is not actually removed from the file, rather the first line of data is replaced by an ‘@’ and the rest of the data fields are blanked. It appears that once a record is created and then “deleted,” it still takes up space in the file and this space cannot be used again. Thus, the user should think about using the Change option to save storage space on the disk.

The Sort option can be used on any one data field within a record, and the line or data field selected will be used as the key for an ascending order “sort file.” Only one sort file per file is accepted by the program. If the user changes the sort field, the program will overwrite the old sort file. As noted earlier, if a file is getting close to the maximum number of records the disk can store, there may not be room for a sort file and a DF Error will occur causing the program to hang up. However, several short files with sort files can be on the same disk, depending on storage requirements of each file. The size of the sort file is directly related to the number of records in the file being sorted as the program lists the order of the records by their record number in this sort file.

The last option in the Maintenance Menu is the Print routine. All printing functions are set to the CoCo default 600 Baud. However, the user has the option of printing to an 80- or 132-column printer.

The output to the printer allows for many configurations. The user may select to have the material printed with or without a heading, with or without record numbers, all or only some of the data fields, everything printed one line under the other, or each data field following horizontally. The program also provides for a printing of only those records that match the first 25 character string in a selected data field. The user may also decide margins, both top and bottom, and the number of lines between each record. The order in which the data fields are printed out is up to the user. The records may be printed out from the file as they were entered or printed out from the sorted file. Once a print format is set, all the variables are stored by the program. If the user wishes to change any of the optional ways of printing out the file, the program provides that option, too!

The program’s biggest drawback is the type used to print the manual: It is a very condensed type (print size one might expect on a legal form!). The material is presented in a logical order and includes samples to follow to get a user started. It would have been helpful if the program author had included information on how to figure the amount of disk storage required by the record size and number of records. It would be even nicer if the program would read the disk and then, based on the record size designed, display on the screen the approximate number of records which might be stored on that disk.

The program makes use of sound to assist the user in the print option, but the use of a beep when the INKEY$ mode jumps to the next line would be very helpful. If the user were copying data from a list and not watching the screen all the time, the sound would be an alert of the line jump. Also, the use of sound with the “Disk storage is getting low!” message would be helpful or better yet, at least keep the message on screen until the user hits ENTER again. Should the maximum disk storage space be reached and the user does not see the message, the DF Error may occur and the program crashes. As noted earlier, if the size of the record is small, the maximum storage space may never be a problem. One option some other systems have, which would be a nice enhancement, is the “Reverse at Comma” option.

A manual printed in a more user-friendly type size and a few more “beeps” at the right time would be the only improvements needed to make this excellent program even better.

(Steve Johnson, 875 South Main, Logan, UT 84321, disk $14.95 plus $2.50 S/H)
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CoCo Cooler II To Help CoCo Breathe Easier

This is one addition your computer will surely welcome, especially if it gets a little hot under the collar at times. The CoCo Cooler II is a device for removing the hot air that can accumulate under the cover of your CoCo 2 due to the heat producing circuitry inside. The Cooler is actually a fan that blows air away from the computer, as opposed to into it. This prevents dust from being blown into the sensitive insides of your machine. The fan is approximately a 1¼-inch tall unit with a 1½-inch square base. It can be fastened to your computer with the double-sided tape on the bottom of the base or by use of the four holes in the corners for a more secure attachment than the tape. The instructions suggest that you place the fan over the power supply, which is a big source of heat buildup.

When I received the Cooler, I noticed that the label attached to it marked the direction the air should flow, but after plugging it into an AC outlet, it was obvious the fan was blowing in reverse. I made a quick call to the local distributor for Spectrum Projects and he in turn called Bob Rosen. It seems that the manufacturer of the units wired some of them incorrectly. This will not hurt the Cooler and is as simple to solve as reversing the two wires that lead to the fan. This is an easy task since a foot or so of the connection is left as two separately insulated wires instead of the two-wires-in-one-insulation type of cord most often used. In general I would have to say that if you have a heat problem with your computer, the CoCo Cooler II is an excellent product that will greatly help, if not totally solve, a heat buildup. By the way, the Cooler II will also help remove heat from overheating disk drives.

(Spectrum Projects, Inc., Box 2172, Woodhaven, NY 11421, or P.O. Box 9866, San Jose, CA 95157-0866, $49.95 plus $3 S/H)

— Jim Sewell

One-Liner Contest Winner . . .

This program draws boxes of various sizes in one corner, then another and another and another. It then moves the four square cones over the screen using the PCOPY command.

The listing:

```
0 PCLEARB:PMODE4,1:SCREEN1:PCLS1:FORA=0T03:DRAW"BM128",96COA=A:";FORZ=ST6BSSTEP2:N=7/6+1:PLAY"L255V5IN=N:";DRAW"R=Z;D=Z;L=Z;U=Z;B"H3";NEXTZ,A;FORC=0T020;FOR=0T01:SCREEN1:PMODE4,5-4*S:SOUNDPMNERTD(255),1:FORY=1T04:PCOPY Y+S*4TOY-4(*<Y<4)+1-4*S:NEXTY,S,C;RUN
```

Jacques Pannetier
Saint-Laurent, Quebec

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

Create Graphics Masterpieces With Rembrandt

By Bruce Rothermel

I really like my Color Computer. However, I sometimes look at the capabilities of the newer mega-buck computers with more than a little jealousy. For example, the Macintosh computer has graphics capabilities that make me a little green with envy. Admittedly, the Mac's graphics are monochrome, but they sure are nice.

Well, I'm pleased to report that a program has been released which gives advanced graphics capabilities to the CoCo. Appropriately called Rembrandt, this program allows the Color Computer to:

- Draw lines, circles and ellipses
- Fill in areas (paint) in 16 patterns.
- Repeat a pattern from one part of the screen to others (Stamp).
- Enlarge a portion of the screen and edit that area.
- Put text on the graphics screen.
- Save and load pictures.

Rembrandt's graphics utilize the highest resolution PMODE 4 screens with "artifacts" to produce more than the two colors Radio Shack says you can have in this mode. A small BASIC program is included to ensure that the Hi-Res graphics colors are correct.

There are three operation modes in Rembrandt. These are the full-screen line-drawing mode, the menu/select mode, and the close-up enlarge/edit mode.

The full-screen line-drawing mode is used to create the general foundation or framework of the picture. The menu modes allow you to select a particular function or parameter by presenting a list of options. The main menu mode has several options, all other submenus are selected from the main menu.

The enlarge/edit mode allows you to "blowup" a portion of the screen for detailed close-up editing. It is used to put the finishing touches on a picture you have created, or to patch errors that would be too tedious to correct in the full-screen mode.

Almost all functions can be controlled by the right joystick. The only time the keyboard needs to be used is to enter text or enter the name of a picture to be saved. In operation, after the program is loaded, you are greeted with the main menu. At this point you have 12 options:

- White, Black, Red, Blue, Paint, Circle, Screen Modes, Stamp Function, Enlarge/Edit, I/O Functions, Initialize, or Return.

The first four choices change the current color. The current color is shown with a dot next to it. Drawing lines is done while in the full-screen mode. The right joystick controls the position of the cursor which is surrounded by a box in the screen. Lines are drawn by tapping the joystick button where you want the line to start and then moving and tapping the cursor where you want the line to terminate.

Circles are drawn by tapping the joystick at the center point of the circle. As you hold the button, a circle with an increasing diameter appears. Tapping the button a second time freezes the circle. Moving the joystick left or right, up or down, while the circle is being drawn turns it into an ellipse.

Paint allows you to fill-in any specified area with up
to 16 colors and patterns. A nice feature with *Rembrandt* is that you have the option to erase your last command by pressing the CLEAR button.

The last graphics option available from the main menu is the Stamp function. This option allows you to select any 32 x 32 portion of the screen and use it as a stamp to duplicate whatever is in that box anywhere else on the screen. Options allow you to place this stamp on top of or under anything on the screen.

Initialize wipes whatever picture is in memory by painting the current screen in the current color. With many of the options, submenus give you additional options to customize your creation.

Text can be added to your drawing by pressing 'X' on the keyboard. A red graphics cursor then appears. By pressing the arrow keys, graphics can be placed anywhere on the screen. True lowercase with real descenders is possible by pressing SHIFT and 0; this acts as a toggle between caps and lowercase and all capitals.

The mode which makes *Rembrandt* very usable for fine, detailed drawing is the enlarge/edit mode. In this mode, you can select any portion of the screen so it can be enlarged 12 times for detailed examination and editing. Each of the 49,152 pixels (dots) which compose the screen can be individually colored to add detail or correct errors. You always have a reference as to what this enlargement will look like in the actual size version, because beneath the blowup the area being worked on appears in normal size.

The detail that can be obtained in this mode is quite impressive, although filling in the screen one pixel at a time is quite time-consuming, but with the tools offered, very impressive graphics can be created.

The only shortcomings I found were a complete lack of any reference in the tape version regarding how your completed masterpiece can be printed. What good is spending hours creating the ultimate Color Computer graphics if it can only be displayed on a screen? It's quite difficult carrying your CoCo and TV around to show your creation.

The other objection I had is the reaction of the cursor when it is being controlled by the joystick. The block surrounding the cursor moves in the direction of the cursor, but not at the same speed. As you move the cursor, for example, to the upper-left corner of the box, the box drifts in that direction, but at a different speed. This results in a lot of wiggling and overshooting your target on the screen. It takes a little getting used to. It would be nice to have the option of moving the cursor with the arrow keys as well as the joystick.

If you have a 64K Extended BASIC disk system, an advanced version of *Rembrandt* is available. The main advantage of the disk system is the ability to rapidly save and access pictures. Completed graphics are stored on the disk and a small file management program is included to simplify storing and recalling your masterpieces.

The good news is that the disk version, being a later release, includes brief instructions on how to use a screen print program and a dot matrix printer to make a hard copy of your creation. The bad news is that the instructions don't work. Completed pictures have to be loaded into the computer using the BASIC command LOAD*filename REM*", rather than the LOAD*filenameREM* instructions given in the manual.

The screen print shown is a greatly reduced reproduction created by one of the demo drawings supplied with the program. While it does not show the brilliant colors obtainable with *Rembrandt*, it gives you an idea of the fine detail available when using the program.

If you are "into" computer graphics, *Rembrandt* seems to maximize the capabilities of the Color Computer. With it, you are able to create graphics and pictures that are otherwise impossible according to Radio Shack documentation. Suddenly that Macintosh doesn't look as good anymore!

*One-Liner Contest Winner...*

This program, called *Cylinder*, draws some very nice random pictures of cylinders made up of diagonal lines. If the screen doesn't clear the first time, press BREAK and run the program again.

The listing:

```
1 IF R=0 THEN PCLS: R=64: GOTO 0 ELSE PSEP
O6E3+INT (R(ND(0)+.5): SCREEN1, INT(R(ND(0)+.5): COLOR INT(R(ND(8)+.5),1
: FOR Z=36 TO 0 STEP -4: C=Z+.14: C=C+.3.14/180: X=INT (68+R*COS(C)): Y=INT(66+R*SIN(C)): LINE (X, Y)-(X+120, Y+60), PSET: NEXT: IF R<33 THEN R=64: GOTO 0 ELSE R=16: GOTO 1
```

*Rolla Price*
*Sulphur Springs, MO*

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)
Keep A Computer Calendar With Don’t Forget

Don’t Forget is a disk-based program from Computerware that allows you to construct and maintain an appointment calendar. To start using it, you perform the following steps:

1) Turn on your Color Computer, monitor and printer.
2) Put the program disk in Drive 0.
3) Put a blank formatted disk in Drive 1.
4) Run "**REMEMBER**".
5) The program will ask you (on an excellent Hi-Res screen) to say which drive has which disk. It will then ask you whether you are going to use keyboard arrows or joystick.
6) You will then be given a menu. Choose "Build a new calendar year."
7) Choose the month and year where you want to begin; the program will draw a picture of that month on the screen — one of its talents.
8) Move the cursor to a date and enter. You will be given a "page" with icons (little pictures — the latest rage) at the top, room to enter two lines in a section called "Special Occasions," lines with hour headings to enter appointments, and a section labeled "Memo."
9) Say, on a particular day, you have a dentist appointment at 3:00. Move the cursor to the keyboard icon, ENTER (to show that you are going to type in something), move the cursor to the "3:00" line, type in "dentist" and enter. Is this day Joe’s birthday? Move the cursor to Special Occasion and type "Joe’s birthday." Now move the cursor to the Memo section and type "pick up cake at bakery for party" and enter.
10) Is that all for this day right now? Move the cursor to the disk icon and enter. Drive 1 will come on and save the data. Move to another day, or another month, and continue for as long as time and patience permit. For example, go through the year and put in all birthdays, anniversaries and holidays. Put in the dates of conferences, vacations, etc. Just remember to save each day’s entries to the disk before you leave that "page" or your entries will be lost.

To use the appointment calendar, repeat the steps above, except in step 3 you will put your calendar disk in Drive 1. You can now call any month and date, add other entries and look at what is already entered.

Suppose you want to know what is on the schedule for today. This is the sequence: Turn on your computer, load the program disk and calendar disk, run the program, tell it the program is in Drive 0, that you are using joysticks, that you want February 1985 and that you want to see the 11th. Do you want to have a hard copy? Move the cursor to the printer icon and enter. It will print out just what is on the screen. You can also print out a week’s calendar — 7 days from the day you are in.

Another option is to print out a blank calendar for the selected month to use as a scratchpad for appointments to be entered on your calendar disk at a convenient time.

Suppose you changed your dentist appointment to 4:00. You can move the cursor to the 3:00 line and enter, now move the cursor to the scissors icon and enter, and then move the cursor to the 4:00 line and enter. Or, you could move the cursor from the scissors to the trash can icon and enter. It is now deleted. Did you change your appointment to Thursday? Move the cursor from the scissors to the clipboard and enter. It is now saved. Move the cursor to disk and save the revised day. Go back to the February calendar page and select Thursday. Move the cursor to the clipboard, enter, move it to the time of your appointment and enter. Go to the disk icon to save this day.

Does that seem like a complicated way to maintain an appointment calendar for the year? Well, what is the alternative? You will have to go to any stationery store and buy a book which has preprinted calendar pages.

Why would anyone want to use a computerized calendar? Well, if the first thing you do each day is to turn on your CoCo, it is not too hard to run this program first. And don’t forget that if your CoCo is a business and office machine, more than one person can use Don’t Forget — each with his or her own calendar disk. There is also the convenience of setting up the second and succeeding years. Don’t Forget will copy all the special occasion items onto your new disk for you.

Which system will serve you best? There is an old computer maxim that if a 3 x 5 card will do the job, use it; it is quicker and easier. Is this the case here? As one who must live by an appointment book, I am addicted to one that shows a week on facing pages with a column for each day with hours and half-hours shown, plus room for memos. Each January when I get a new one, I have to go through and put in all the birthdays, anniversaries, etc. The phone rings all day long, and I am constantly checking, entering and altering entries.

Is there anything the program cannot do as well as the book? One thing I do frequently is check back and see when I met with Mr. Jones. With Don’t Forget, after loading, etc., I can search the calendar by key word and it will give me the calendar pages on which Mr. Jones’ name appears. My only other problem was that I could not figure how to show an appointment for 10:30 or 3:15 — all Don’t Forget’s lines show even hours and I could not overwrite them.

Computerware is a large and dependable software vendor and this program's quality is up to their standard. It performs flawlessly and its Hi-Res screen is state-of-the-art. As with most of their offerings, documentation is rather thin, with just enough instructions to get you going. Some little problems we had to work out with some trial and error.

(Computerware, P.O. Box 668, 4403 Manchester Ave., Encinitas, CA 92024, disk $24.95 plus $2 S/H)
Corrections

“Christmas Card File And Labeler” (December 1984, Page 42): James Ball tells us there is a problem with Line 1740. The last statement reads:

IF A<LB THEN2080

This should be changed to:

IF A<LB THEN 1790

In addition, the program as presented in the December issue sets aside a five-character space for a ZIP code as used in the United States. Users in some other countries (or who are sending cards to other countries) may need space for a longer postal code. For example, Canada Post uses a code made up of six letters and numerals with a space, so a seven-character space is required. The suggested fix borrows the needed characters from the state/province field, which is adjacent to the postal code field. (This field will now accept only three characters, so the two-character state and province codes set by the Postal Service and by Canada Post will have to be used.)

Make these changes within the following lines:

940 MIDS$(A$(R) ,60,3)=ST$ ... MID$(A$(R) ,64,7) =ZIP$

2560 IF LEN(ST$)>3 THEN ... PRINT’’LIMIT TO 3 CHARACTERS.’’

2570 (Add two more spaces between the second pair of quotes for a total of seven.)

2580 IF LEN(ZIP$)<6 THEN ... PRINT’’ENTRY ERROR’’

2870 IF LEN(ST$)<3 THEN ...

2940 ST$=MIDS$(A$(R) ,60,3)

2960 ZIP$=MID$(A$(R) ,63, 7)

These changes should be sufficient for a seven-character postal code. Further expansion is possible using an analogous procedure. If you’ve entered data under the original version and then make these changes, your original information will be incorrectly displayed. The easiest way to rectify this is to edit each record accordingly.

“A Simple Text Processor” (January 1985, Page 103): Ashok Basargekar tells us that several of the ROM calls are not compatible with Radio Shack’s Disk BASIC 1.1 ROM. (This ROM is found in the disk controller, and the problem has no connection whatsoever with the ROMs in the computer itself.) These changed ROM addresses (which appeared on Page 160 of the March 1984 issue) should serve as a guide to modifying the program:

<table>
<thead>
<tr>
<th>1.0 ROM</th>
<th>1.1 ROM</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>C468</td>
<td>C48D</td>
<td>Open file</td>
</tr>
<tr>
<td>C6C5</td>
<td>C6F5</td>
<td>Kill file</td>
</tr>
<tr>
<td>C8A4</td>
<td>C952</td>
<td>Process filename</td>
</tr>
<tr>
<td>CA3B</td>
<td>CAE9</td>
<td>Close all files</td>
</tr>
<tr>
<td>CA53</td>
<td>CB01</td>
<td>Close file</td>
</tr>
<tr>
<td>CBD2</td>
<td>CCB2</td>
<td>Directory</td>
</tr>
<tr>
<td>CEA2</td>
<td>CF7E</td>
<td>SAVEM</td>
</tr>
<tr>
<td>CF07</td>
<td>CFE3</td>
<td>LOADM</td>
</tr>
</tbody>
</table>

Note that these changes apply only if you have the new Disk BASIC ROM; the modified program will not work with the old ROM.

Also, if your computer has Color BASIC 1.2 or 1.3 (EXEC 41175 to find out), the calls to the keyboard routine at $A1C1 should be changed to $A1CB. This change should not affect operation on computers having the old 1.1 Color BASIC ROM.

For those who get the RAINBOW ON TAPE, make the following POKEs after CL0 ANDing the text processor:

POKE &HEB3, &H27
POKE &HF86, &HSC
POKE &HFB7, &HBD : POKE &HF88, &HDD
POKE &HFB9, &H27 : POKE &HF8A, &H23
CSAVEM or SAVEM ‘‘TEXTPRO’’, &HEDD, &H16CD, &HEDD

For those who have assembled the source listing, make the following corrections to the source listing and reassemble the program:

Line 00920: CMPY <$ 27 Top of RAM reached?
Add Line 02745: INC
Delete Line 02770: (INC instruction is moved up two instructions.)

“The Art of Joystick Painting” (October 1984, Page 97): Brian Preble tells us that a couple of problems have arisen with the program Sketch. First, the SN Error you often get when running the program is caused by the notorious P CLEAR bug in the old Extended BASIC ROM. Just enter RUN again to start the program. (If you have the new Extended BASIC 1.1 ROM, you should not have this problem.) Secondly, the garbage that appears when the program is first run is normal. Since Sketch was designed to work with pictures created by other programs, it doesn’t clear the graphics screens when you start it. If this bothers you, just type PC LS before running it.

CoCo Cat

I’ve learned that whenever I need to go outside...

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The author contends that people — especially children — are likely to stay with a program longer if joysticks are used for input. Test his theory on this joystick menu and see if you agree.

Joystick-to-itiveness

By T.C. Taulli

This tutorial shows you the advantages of incorporating joysticks in all your programs. I have also provided a program to give you a taste of the joystick menu.

Here are seven advantages:
1) People find inputting with joysticks easier because all the options are in front of the person. There's no way a person will get a syntax error.
2) Inputting a number is less error prone. People don't have to keep reaching up on the keyboard when typing.
3) It's easier for kids and adults. Most kids don't like learning the different commands keyboard input programs have. And adults don't have two hours to spend studying what the game will do if you press a certain key.
4) Joysticks will make your program more entertaining, enjoyable and user-friendly. This will help people improve what they're doing instead of being bogged down by the tiring process of keyboard input.
5) It's easier for people who can't type. And, since the average kid can't type, more kids will buy joystick controlled games. When you add up all the adults and kids that want your joystick controlled program, you will have a big market for your program.
6) If you have played a multiple-player game, you know how hard it is to keep maneuvering when it's your turn at the keyboard. With joysticks, people can play multiple-player programs faster. Even sharing a joystick would be more practical than using the keyboard.
7) Joysticks are just plain fun.

If you're convinced joysticks will make your game a "cut above the rest," then type in the program below or buy RAINBOW ON TAPE (if you haven't already).

The program listing below is a joystick controlled menu that can be used to choose parameters for Adventure games. If you use a joystick menu in your Adventure, it would come after all the data has been read and after the title screen. You can do what you want, and feel free to use any of my ideas in this short program.

(T.C. Taulli is the author of the game Do or Die, and is a member of Color America Users Group.)

If you don't know how to use the skill level routine, then read on. In order to pick a skill level, put the cursor by the skill level you want and press the joystick button. The skill level will be switched into inverse video. This is so you know which skill level you selected and you won't keep choosing a skill level you've already selected.

The joystick menu is good for any program. It will make Simulations easier and cleaner. It will also make Adventures better. But, you might ask yourself, "Why do I need joysticks in my Adventure? Adventures are played by inputting commands from the keyboard." Well, it will still give you an edge over standard Adventure games and the Third Annual Rainbow Adventure Contest is being launched this month!

The listing:
1 S=1:TU=50:CLS3
2 PP=1:60SUB7000
3 CLS: PRINT@12,"OPTIONS: "; GOTO 80
40 'THIS IS WHERE THE SECOND MENU IS PRINTED
50 FOR X=1 TO 250: NEXT: PRINT@225, "LOAD IN SAVED GAME";
52 PRINT@289, "CHANGE MENU ONE";
53 PRINT@321, "START THE ADVENTURE";
56 PRINT@492, "TURNS: "; TU
61 PRINT@525, "PICK TURNS"; GOTO 246
70 'THIS IS WHERE THE FIRST MENU IS PRINTED
80 FOR X=1 TO 250: NEXT: PRINT@65, "SKILL LEVEL ONE";
81 PRINT@97, "SKILL LEVEL TWO";
82 PRINT@129, "SKILL LEVEL THREE";
83 PRINT@161, "GO TO MENU TWO";
84 IF PP=1 THEN PRINT@65, "skill level one";
85 IF PP=2 THEN PRINT@97, "skill level two";
86 IF PP=3 THEN PRINT@129, "skill level three";
200 FOR X=1 TO 250: NEXT: THIS IS WHERE YOU PICK FROM MENU ONE
202 IF O>1 THEN END=11
203 SET(1,0,5)
232 B=PEEK(65280)
234 IF B=25485 THEN END=238
236 SET(0,0,3)
237 GOTO 201
238 SET(0,0,3): IF O=4 THEN 400
239 O=6 THEN 400
240 IFO=6 THEN 500
241 IFO=7 THEN 500
242 IFO=8 THEN 600
243 IFO=9 THEN 600
244 IFO=10 THEN 700: IFO=11 THEN 700
245 GOTO 50
246 FOR X=1 TO 250: NEXT 'THIS IS WHERE YOU PICK FROM MENU TWO
247 Z=JOYSTICK(0): R=JOYSTICK(1)
248 IF R<14 THEN END=14
249 IF R>21 THEN END=21
250 SET(0,Y,5)
251 B=PEEK(65280)
252 IF B=25485 THEN END=300
254 SET(0,Y,3)
256 GOTO 247
300 SET(0,Y,3): IF Y=14 THEN 900
301 IFO=15 THEN 900
302 IFO=16 THEN 950
303 IFO=17 THEN 950
304 IFO=18 THEN 1000
305 IF Y=19 THEN 1000
306 IF Y=20 THEN 909
307 IFO=21 THEN 909
400 PP=1: GOTO 80
500 PP=2: GOTO 80
600 PP=3: GOTO 80
700 GOTO 245
900 FOR X=1 TO 250: NEXT: GOTO 1900
950 'THIS IS THE TURN ROUTINE
951 PRINT@384, "POSITION STICK FULLY UP TO INCREASE TURNS OR FULLY DOWN TO DECREASE YOUR TURNS";
953 PRINT@491, CHR$(143+80); 
954 PRINT@498, TU;
955 JJ=JOYSTICK(0): JY=JOYSTICK(1)
960 IF JY=0 THEN TU=TU+1
961 IF JY=63 THEN TU=TU-1
962 IF TU>11 THEN TU=11
963 IF TU<40 THEN TU=40
964 FOR X=1 TO 50: NEXT
965 B=PEEK(65280)
966 IF B=25485 THEN 300
967 GOTO 954
968 PRINT@491, CHR$(143+32);: GOTO 50
1000 GOTO 80
1001 GOTO 1000
1900 CLS
2000 PRINT:"THIS IS WHERE YOU WOULD HAVE A SUBROUTINE THAT LOADS IN A SAVED GAME" 
2001 PRINT:"PRESS JOYSTICK TO GO BACK TO THE BEGINNING"
2002 B=PEEK(65280)
2003 IF B=25485 THEN 126 THEN 1
2004 GOTO 2002
7000 FOR X=1 TO 250: NEXT: PRINT@0, "+* * THE JOYSTICK * *"
7001 PLAY"05L34DEDEDEDDEDED EDEDED": PRINT@75, "TUTORIAL";
7002 PRINT@134, "****BY TC TAULLI ****";
7003 PRINT@192, "PRESS THE RIGHT JOYSTICK BUTTON TO SEE THE JOYSTICK MENU PROGRAM";
7004 PRINT@458, "**(C) 1984**";
7005 B=PEEK(65280)
7006 IF B=25485 THEN 126 THEN 1
7007 GOTO 2002
7008 GOTO 7000
9099 FOR X=1 TO 250: NEXT: PRINT"THIS IS WHERE THE ADVENTURE WOULD START"
1000 CLS: PRINT"THIS IS WHERE THE ADVENTURE WOULD START"
1001 PRINT:"PRESS JOYSTICK TO GO BACK TO THE BEGINNING"
1002 B=PEEK(65280)
1003 IF B=25485 THEN 126 THEN 1
1004 GOTO 1000
This extremely powerful, compact program adds 30 new commands to any version of RS COCO BASIC. The commands are more versatile and operate up to 60 times faster than Extended Basic.

You write your own Basic graphic programs that operate so fast they appear to be written in machine language. For even greater speed you can compile the final program (compiler not supplied). Works with TEXTMASTER and PRINTMASTER.

A total of 24 sizes of text are possible in line lengths of 32, 36, 42, 51, 64, & 85 chrs./line. Text can be echoed to a printer using the printers character set, or you can use PRINTMASTER to print exactly what you see on the screen.

This unprotected program comes in a vinyl binder with full documentation, a demo program and character design program.
How To Read Rainbow

Please note that all the BASIC program listings you will find in THE RAINBOW are formatted for a 32-character screen—so they will show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character “goes under” what. If the characters match—and your line endings come out the same—you have a pretty good way of knowing that your typing is accurate.

We also have “key boxes” to show you the minimum system a program needs. But, do read the text before you start typing.

Finally, the little cassette symbol on listings indicates that program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

What’s A CoCo

CoCo is an affectionate name which was first given to the TRS-80 Color Computer by its many fans, users and owners. As such, it is almost a generic term for three computers, all of which are very much alike.

When we use the term CoCo, we refer to the TRS-80 Color Computer, the TDP System-100 Computer and the Dragon-32 Computer. It is easier than using the three “given” names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and TRS-80 Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus

The small boxes that you see accompanying programs in THE RAINBOW are the “Check system,” which is designed to help you type in programs accurately. Rainbow Check PLUS will count the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use the Rainbow Check PLUS, type in the program and CSERVE it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW ENTER to remove it from the area where the program you’re typing in will go.

Now, whenever you press the down arrow key, your CoCo will give you the checksum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure that you typed in the correct BASIC program code.

Use the following program if you wish to hand assemble machine language programs:

```basic
10 CLEAR 200, &H3F00: L= &H3F00
20 PRINT **ADDRESS**:HEX$(L) ;
30 INPUT **BYTE**: : B$;
40 POK 0, VAL (**H** + B$)
50 I= I+1: BDTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00.

Using Machine Language

Machine Language programs are one of the features of THE RAINBOW. There are a number of ways to “get” these programs into memory so that you can operate them.

The easiest way is by using an Editor-Assembler, a program you can purchase from a number of sources.

An editor-assembler allows you to enter mnemonics into your CoCo and then have the editor-assembler assemble them into specific instructions that are understood by the 6809 chip that controls your computer.

When you use an editor-assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW listing into CoCo.

Another method of getting an assembly language listing into CoCo is called “hand assembly.” As the name implies, you do the assembly by hand. This can sometimes cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand assemble some programs.

Use the following program if you wish to hand assemble machine language listings:

```basic
10 CLEAR 200, &H3F00: L= &H3F00
20 PRINT **ADDRESS**:HEX$(L) ;
30 INPUT **BYTE**: : B$;
40 POK 0, VAL (**H** + B$)
50 I= I+1: BDTO 20
```

The Rainbow Seal

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product which carries the Seal has been physically seen by us and that it does, indeed, exist.

Manufacturers of products—hardware, software and firmware—are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal. This lets you know that we have seen the product and that it does, indeed, exist.

The Seal, however, is not a “guarantee of satisfaction.” The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to any commercial product, regardless of whether the firm advertises or not.

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All programs require a minimum of 32K and 1 disk drive but will take advantage of 64K and multiple drives. Each package features a hi-res 51 x 24 black on green screen. 16K versions available without hi-res screen. Specify 16K or 32K versions when ordering. Future integrated packages will include: Inventory Control, Sales Analysis, Accounts Payable.

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6809 Arithmetic — The Way It All Adds Up

By R. Bartly Betts
Rainbow Contributing Editor
With Programs By Chris Bone

So far this column has dealt with reading and writing, but very little arithmetic. If your education is to be well rounded, it is time to take a look at assembly language calculations.

Chris and I have very different opinions in the area of arithmetic. He thinks life begins and ends with figures, calculations, algebra, trigonometry and the like. I think such things are closely related to the black plague and there should be an inoculation against them.

But duty calls and, whether for good or bad, arithmetic is essential in assembly language.

The Honor Roll

But wait, let’s postpone the dreadful for a moment. Even more important than calculations is the need to recognize those who have answered the first challenge put forth by this column. If you still remember, the job was to create text on your display screen, then change all letter A’s to asterisks. We had a number of good replies, and planned to announce the winner of the challenge sooner, but two factors caused postponements. First, the replies kept trickling in for quite awhile, and second, neither Chris nor I could decide who was a clear winner. Many of you did very well.

Both problems are now solved. First, no new programs have come in this month, (I am writing this in December) and second, we have created an honor roll of the best programs (at least I think the list is complete). If you submitted a program that worked well, and do not see your name, either the post office or I must have lost it, and the guilty party might be me.

I am still trying to get my computer work space arranged since moving to Texas. So far I have had it in four different places, and I have enough “junk” to fill a room (four computers, two printers, monitors, drives, books and books and books, power bar, tools, an oscilloscope, and pieces and bits). As I think my equipment has finally found a permanent home, I now have to work on my filing system.

But now, the winners are, in no particular order:

William A. Smith — USS THORN (DD 988) FDP Miami, Fla.
H. B. “Zack” Zachry — Midwest City, Okla.
Kevin Deneen — (Sorry, Kevin, I lost your address)
Al Clarke — Seattle, Wash.
Robert E. Cutter — Los Angeles, Calif.
Shawn Jack — Ooreville, III.
John R. Spencer — Lancaster, Penn.
George A. Rost — Lawndale, N.C.

Congratulations and thank you for your submissions.

Addition

With the fun part over, it’s time to get back to arithmetic. As you know, your editor/assembler has several math-oriented operation codes. And, despite my reluctance to admit it, additions and subtractions are the foundation of assembly language programming.

Either an 8- or 16-bit operation is 6809 addition that adds the contents of a register to a specified number or memory location. The operation can use either accumulator ‘A’ or ‘B’, in 8-bit functions, or both ‘A’ and ‘B’ (register ‘D’), in 16-bit functions. The following example demonstrates the ADD operation:

(R. Bartly Betts is currently a technical writer for Tandy Corp. and is a former news reporter and magazine editor. As the father of 10 children, computers are his escape from reality.

Chris Bone is a college computer science major and has been programming for more than three years. He averages between six and nine hours a day on the CoCo.)
I chose memory location $400 and $402 to store the values of 50 and 150 so you can see what is going on. Hex 400 is the beginning of the text screen, and anything stored there appears at the top left-hand corner of your video screen. Memory location $402 is two columns to the right on the top row of your screen. Of course, the program moves too fast to see anything but the result, which is the storage of 50 and 150 at the top of the screen. The value of 50 is represented by a reverse number 2 and 150 is represented by a graphic symbol.

Use the AO (absolute origin) switch to assemble the program to memory. Then, to test the program, type 'Z' to enter ZBUG. Press CLEAR so the screen won't scroll, then type GSTART to run the program. You can verify the display screen results by typing 'R' to examine the registers. Remember the register values are in Hex.

The Direct Approach
As well as using the ADD op code in extended addressing, you can also use it in direct addressing, such as this program:

```
00100 ORG $7000
00110 LDA $50 *PUT 50 IN A
00120 STA $400 *STORE A AT $400
00130 LDA $100 *PUT 100 IN A
00140 ADDA $400 *ADD
00150 STA $402 *STORE THE RESULT AT $402
00150 END SWI
00160 END
```

In this case, one is added directly to the value already stored in accumulator 'B'. Lines 120 and 140 are only included so you can see the results of the operations.

Adding More Bits
While 8-bit additions can be accomplished in either the 'A' or 'B' register, 16-bit additions require both 'A' and 'B', or the 'D' register. To see how 16-bit additions work, try this program:

```
00100 ORG $7000
00110 LDA $332B *LOAD 100 IN A
00120 STA $400 *STORE A AT $400
00130 LDA $343D *LOAD 55 IN B
00140 ADDA $400 *ADD
00150 STA $402 *STORE THE RESULT AT $402
00150 END SWI
00160 END
```

In this case, one is added directly to the value already stored in accumulator 'B'. Lines 120 and 140 are only included so you can see the results of the operations.

A Bit of Subtracting
I am pleased to announce that subtraction works exactly like addition, except! The "except" is a fairly major one, however, and introduces an important concept in computer number handling.

But, before we get into the complicated, let’s look at some of the things that are easy. The following program accomplishes a simple subtraction, using a memory location and the 'A' accumulator.

```
00100 ORG $7000
00110 LDA $100 *LOAD 100 IN A
00120 STA $400 *STORE A AT $400
00130 LDA $200 *LOAD 200 IN A
00140 SUBA $400 *SUB THE VALUE AT $400 FROM THE VALUE IN A
00150 STA $402 *STORE THE RESULT AT $402
00160 LDB $255 *LOAD 255 IN B
00170 SUBB $402 *SUBTRACT 55 FROM THE VALUE IN B
00180 STA $404 *STORE THE RESULT AT $404
00190 SWI
00200 END
```

This program first loads accumulator 'A' with the value of 100. The value is then stored in memory location $400. Next 'A' is loaded with the value of 200, then the value at memory location $400 is subtracted from 'A' to give a result of 100. This is stored at memory location $402.

Next, 'B' is loaded with a value of 255. Then the value of 55 is subtracted directly from 'B', leaving a value of 200, which is subsequently stored in memory location $404.

So far everything appears to operate the same as in addition. But what if the number subtracted from a register is larger than the value in the register? How does your computer handle negative values? So far we have been working with “absolute values,” but as my accountant well knows, computers have to be able to handle negative amounts.

Two’s Complement
The secret to handling negative numbers lies in a procedure called “two’s complement.” In the two’s complement format, the most significant bit (the leftmost bit) of a binary value is set aside as a “sign bit.” That is, if the MSB is zero, then the number is positive and, if the MSB is one, the number is negative.

To calculate a negative value using two’s complement, first subtract the numbers using normal methods, then change all of the binary ones to zeros and all the zeros to ones and add one. This is purely a mechanical process that gives the proper result. Before showing exactly how the mechanical calculations work, however, let’s delve into a bit of theory.
CINC PAC — Battle of Midway 32K
Ark Royal's masterpiece game of naval strategy of perhaps the most important battle in the history of the United States Navy. Hi Res graphics, 75% machine language allows player to control as many as 41 separate units on the screen at one time. Command Task Forces 16 & 17 as they play cat and mouse with the Japanese fleet. Maneuver the Hornet, Yorktown and Enterprise into the best position. Set courses and launch search and attack aircraft then hope for the best. Find the enemy fleet, then pick the targets: Akagi, Soryu, Kaga, Yamato and others in this historically accurate game. Relive history, Admiral, and it won't be any easier this time around. Anchors Aweigh.

Game save. Requires disk version to operate on disk. Cassette $27.95.

COMPANY COMMANDER

COMPANY COMMANDER 32K
Game module 1 — House to House. Ark Royal's squad level WWII infantry combat game. They said it couldn't be done — a SQUAD LEVEL wargame on a computer — but we've done it. The Line of Sight problem is licked — and the machine language routines really speed things up. Game Module #1 comes with House to House map and 10+ scenarios involving infantry combat in Aachen, Caen, Arnheim, Stalingrad and other famous WWII city battlegrounds. Combat units include rifle squads, mortar teams, machine gun crews, engineers, and more (depending on the scenario chosen), leaders, vehicles and other weaponry of WWII. Unique design allows incorporation of future expansion modules.

Choose campaign play and put yourself on the battlefield, Corporal Smith or Jones; collect points toward promotion. Order up smoke from the mortar squad, HE for those dug in units. Take the objective and you might make Major someday. Just don't step on a land mine.

Comes with House to House game map, more than 10 scenarios, on 2 cassettes, or all on 1 disk...$29.95. (Disk included.)

BATTLE OF THE BULGE 32K
Ark Royal's 1 or 2 player game by the author of Battle For Tunis, Bulge recreates operation Wacht Am Rhein, Hitler's last desperate gamble of WWII. In none of our games is the fog of war so apparent than in BULGE. You know the Germans have attacked in the Ardennes, but little else. What is their strength? Their objective? Who do you send to repair the huge gap in the American lines? What bridges do you blow? Can you protect the fuel depots? Where are all those Tigers coming from? When will the weather clear?

Historically accurate, and a real challenge whether it be against the computer or a friend. (Just don't humiliate him too badly.) A game you've been waiting for. Cassette $25.95.

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When you reserve the MSB of a binary number as a sign bit you have actually reduced the value that number is capable of storing by half. To see this, look at the 8-bit binary number 11111111. This number in decimal is 255, 128+64+32+16+8+4+2+1. When you reserve the first bit as sign bit you have the binary number 11111111, or 127 in decimal.

In fact, some computers represent numbers in this way. On the Radio Shack Model 3, numbers above 32,768 are represented as negative numbers. The highest memory location is -1, rather than 65536. There isn't room to show you how such a number is formatted but, using a maximum value of 19 rather than 65536, the following chart shows how you can count to 19 with such a method:

```
 0 1 2 3 4 5 6 7 8 9 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1
```

With this method, -9 now represents 11, -5 represents 15, and -1 represents 19.

To show you how two's complement can accomplish the job of subtracting, let's subtract the binary number 10 from 5. In decimal, it looks like this:

```
5
-10
-----
-5
```

In 6809 binary, when the two numbers are subtracted, the result is:

```
0101 5 decimal
1010 -10 decimal
1011 3 decimal, with a sign bit of 1
```

So far, aside from the number being negative, things don't look too good. But, let's do a two's complement operation on the result to complete the operation:

```
0100 Swap 0's for 1's and 1's for 0's
+1 Add 1
```

That looks better and, even more impressive, it is correct. For simplicity in this example, only 4-bit numbers were used. The process is exactly the same for larger, 8-bit or 16-bit numbers, however.

By now you probably wonder how your 6809 knows whether you are operating in two's complement mode or in absolute numbers. The answer to the question is that it doesn't, but you do (at least you should). Just to be on the safe side, the 6809 always acts as though two's complement is being used and outputs the necessary information. If you don't need two's complement, you can ignore the signs that the processor sends out. If you need two's complement, you can make use of the signs.
To see what happens with such an operation, type ir.
and assemble the following example:

```
00100 ORG $7000
00110 START LDA 11100
00120 STA $EO0
00130 LDA 1150
00140 SUBA $E00
00150 ENU SWI
00160 END
```

Use ZBUG to run the program as you did on the earlier examples. When you have run the program, type 'R' to examine the registers.

Remember several months ago when I told you that you could ignore the Condition Code register for awhile? Well, now you need to know that the flags for negative operations are kept in the Condition Code register. The best way to see this is to execute the program again, but this time single step through it.

To single step, first assemble the program in memory without errors. Then go to ZBUG and type START,. The comma tells ZBUG you want to single step the program beginning at START. Enter a comma every time you wish to implement a new step.

After each step you can look at the registers by entering 'R'. Examine the registers after lines 00110 and 00140 (remember, the last line displayed in the single step mode is the next one to be executed). At Line 00100 you get a register display similar to the following:

```
#Z
#R
A = 64 B = 00 DP = 00 CC = 81 = EC
X = 0000 Y = 0000 U = 0000 S = 0000
PC = 700A
```

You need to pay special attention to the condition code flags. At this stage flags 'E' and 'C' are set (CC 81 EC), but neither of these flags are of concern to us now. Next, step through Line 00140 and examine the registers again. The display should now look like this:

```
#Z
#R
A = CE B = 00 DP = 00 CC = 89 = ENC
Bytemaster Column
Article Number 7
X = 0000 Y = 0000 U = 0000 S = 0000
PC = 700A
```

A new condition flag is now set, the 'N' flag. If a subtract operation results in a negative value, the 'N' flag is set. If a subtract operation results in a zero, the 'Z' flag is set. If the result is positive, neither 'N' nor 'Z' is set. A flag is considered set if it equals one and is considered reset if it equals zero.

The subtract operation is now complete, but you can see that register 'A' does not hold the correct answer. Subtracting 100 from 50 should not give a result of $CE or 206 decimal. Now two's complement can save the day. To get the right answer, add two more lines to your program:

```
00142 COMA
00144 ADDA #1 *COMPLEMENT A
```

In the subtract operation, knowing that the CC 'N' flag is set lets you know the resulting value must be complemented and increased by one to get the right answer. Executing the program after the addition of these lines produces the right answer (50 decimal or 32 Hex) in the 'A' register.

Next month we will complete the look at addition and subtraction operations, and delve into comparison operations, multiplication and division. For now, experiment with addition and subtraction as far as we have gone and feel free to strike out on your own. The things you discover for yourself will be remembered much longer than those things you read about in a book.

Although we are not yet far enough along, Chris and I are working on some more neat programs to give you practical examples of what you are learning.

You can contact either Chris or me by writing or calling: 2251 Lipscomb, Fort Worth, TX 76110; Phone (817) 924-3725.

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KISSable OS-9/Dale Puckett
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## Specifications

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<th>Specification</th>
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<tr>
<td>Data Interface Output</td>
<td>RS-232C compatible</td>
</tr>
<tr>
<td>Inputs</td>
<td>MARK (OFF) 4.0V min (typical)</td>
</tr>
<tr>
<td></td>
<td>SPACE (ON) 4.0V min (typical)</td>
</tr>
<tr>
<td>Data Format</td>
<td>MARK (OFF) 0 to -25V</td>
</tr>
<tr>
<td></td>
<td>SPACE (ON) 2.5 to +25V</td>
</tr>
<tr>
<td>DCE Interlace</td>
<td>Serial, binary, asynchronous</td>
</tr>
<tr>
<td></td>
<td>Manual dial, manual answer, automatic answer/origin mode select</td>
</tr>
<tr>
<td></td>
<td>0 to 200 bps, full duplex or half duplex</td>
</tr>
<tr>
<td>Data Rate</td>
<td>Phase coherent, frequency shift-keyed (FSK)</td>
</tr>
</tbody>
</table>

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A Cure For The Baud Bug

By Dan Downard
Rainbow Technical Editor

This letter is prompted by a question in your December column concerning running a printer at 9600 Baud under OS-9. I purchased OS-9 several months ago and found the bug in question right away. I notified Randy Software Support and supplied them with the correction, but apparently they have not made it available to users yet (probably because their printers do not run above 2400 Baud!). I am sure many of your readers would appreciate the following information. You are free to use it as you see fit, however, I would ask if you publish it to please mention where you got it (like many of us, I enjoy seeing my name in print occasionally).

For those who are interested in the technical aspects, the problem results from errors in the Baud rate delay table in the OS-9 device driver module PRINTER (one more example of the disadvantages of a "bit-hanging" serial port). The delay counts for 4800 Baud and 9600 Baud are just a bit too large, causing the software to elongate the bit time to the serial port.

This occasionally causes the printer (specifically its serial interface) to lose bit synchronization and see two zero or one bits in a row when OS-9 only intended to send one. This smearing of extra bits is what fouls up the transmission of the characters enough to cause the garbage on the printer at rates above 2400 Baud. The original counts and my corrected counts are as follows:

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>Original</th>
<th>Corrected</th>
</tr>
</thead>
<tbody>
<tr>
<td>4800</td>
<td>$0016</td>
<td>$0014</td>
</tr>
<tr>
<td>9600</td>
<td>$0006</td>
<td>$0006</td>
</tr>
</tbody>
</table>

I have tried the 4800 Baud setting without difficulty, and I have been driving my Gemini 10-X at 9600 Baud under OS-9 for several months now with no problems whatsoever. I have used XMODE and COBBLER to alter my boot file so the default Baud rate for P is 9600, allowing me to alternate between OS-9 and Radio Shack Disk BASIC without changing any settings (I have a system initialization program that, among other things, sets the Baud rate to 9600, also).

Fixing the problem is very simple. The following list of commands contains a step-by-step scenario for changing the constants and creating a new bootfile. Of course, make sure you apply the fix to a copy of your OS-9 disk. After booting from the corrected disk, TMODE and XMODE settings of 4800 or 9600 Baud for device P should function properly.

One important note of caution: Be careful that any software that modified itself or other OS-9 modules dynamically is not active when you execute the COBBLER command. If it is, it can result in a non-bootable disk! One package I have that does this is the Hi-Res screen in O-PACK from Frank Hogg Labs. If you have it, make sure Hi-Res is not in the system while you apply this fix. Afterward, you can start Hi-Res again.

Thanks for the tips, Christopher. I guess I caused a little confusion by not distinguishing between input and output when discussing timing. You can indeed use this patch to correct the printer Baud rate, but it is not applicable for remote input, such as from the RS-232 port.

CREATE BUFFERS WITH OS-9

I own a Color Computer and a disk drive. I am interested if there is a way, with software, to give the CoCo a keyboard buffer like IBM computers have? You have a great magazine, keep it up.

Victor Capton
Troy, MI

A keyboard buffer is available for your
CoCo using OS-9, Victor. Color BASIC uses a method of keyboard input called polling where the keyboard is scanned at intervals for a key depression. To enable a keyboard buffer, the hardware, and software, inside your CoCo would have to be changed.

Buffers usually are based on what is called interrupt-driven software. When a key is depressed using this scheme, an interrupt vectored subroutine inputs the character into a buffer. This takes a small amount of time. Since, in Color BASIC, software timing is used for all I/O, it is impractical to use interrupts. The other alternative is hardware devices such as ACIA's, which would raise the price of the computer.

CLANG, CLANG, CLANG GOES THE DISK DRIVE

- Why is there so much grinding and assorted noises on my disk drive (Radio Shack's CoCo 2 drive)? Why, occasionally, do I get the directory quickly with no noise and most often with all that clanging? Is there a remedy for this — a nice short poke to silence it or make it sound like it's not breaking up?

- Why, sometimes, do I get that I/O Error when I load a program that loaded OK five minutes ago, then loads OK five minutes later? I'm so scared of crashed disks and lost programs, that I make at least three backups of every program I save.

By the way, my drive is not broken in any way, and I've experienced this on other drives, too (all the same!).

Barry Hornstein
E. Rockaway, NY

The clattering you are hearing in your disk drives, Barry, is the head inside the drive seeking the proper track.

This also accounts for the fact that you don't hear any noise when asking for a directory. I would bet you just asked for a directory with the previous command. Since all of the information required for the DIR command is on Track 17, the heads do not have to move.

The majority of I/O Errors I've encountered on disk systems are caused by dirty contacts between the controller and the CoCo, and speed variations of different disk drives. Since you indicate the program previously loaded, I would suspect dirty contacts. Try cleaning them with a pencil eraser.

I'd like to know where you are buying disks. You must be getting a good price if you can afford to keep three backups of all your programs. Good Luck.

DOWNLOAD DIRECTIONS

- Is there a manual or a book somewhere that explains the steps to do a download from the Color SIG in CompuServe?

  Michael Smith
  Colorado Springs, CO

Michael, the next time you're on the Color SIG, try reading the XA0 database. The last time I was on, it gave a complete description of the various CompuServe download protocols.

If you would like a manual of Special Interest Group (SIG) instructions, ask for a copy of CS-507 from CompuServe. This will not solve your problem, but contains the commands necessary to access the databases.

COCO/M100 WORK TOGETHER

- I would like to thank you for all your great articles found in THE RAINBOW, and your sister publication, FCM for the M100 owners.

  I have a problem and I need your help. I own a TRS-80 Color Computer 2, 16K ECB and a TRS-80 Model 100; I am considering expanding my CoCo to 64K and adding a disk drive. I would like to know if I can use the disk storage of the CoCo with my M100. I would like to be able to store text files from my 100 on the disk of the CoCo and not use the cassette storage for the 100. Is this possible? If so, how?

  Frank Hatchett
  Bowling Green, KY

The immediate solution that comes to mind, Frank, is using your Model 100 as a remote terminal for your CoCo. This would require running OS-9 on your CoCo. Files could be stored on your CoCo disk with no problem. The drawback of the setup is speed, since all communications would be at 300 baud.

Another solution is to use a terminal package on your CoCo and download files as necessary with your Model 100.

UNDOCUMENTED COMMAND

- I am the owner of a 64K CoCo with Disk BASIC 1.0. When I enter COPY 'programname.bas' the screen prompts me to enter a destination diskette. Is this an undocumented single drive copy command or an error in Disk BASIC source code?

  Charles Bateman
  Independence, MO

Yes, Charles, the single drive COPY command is not documented in the Radio Shack manuals. To use it, just type COPY 'filename/exec' and follow the prompts.

MIXED UP ABOUT MODEMS

- I have a 32K CoCo, but I do not have a modem and I am not into electronics — especially computer electronics. I am confused about modems.

  I do not understand why a modem cannot "talk" to any other modem, and thus why a computer equipped with a modem cannot "talk" to any other modem-equipped computer via telephone lines. It is my understanding that a modem converts the electrical signals/information from the computer to which it is attached into signals that can be transported/handled by a telephone receiver line. Or conversely, that a modem converts signals received from a telephone line into those that its computer can use.

If all of the signals handled by telephone lines are the same and the conversions are carried out before or after the signals reach the telephone line, where is the incompatibility?

By the way, with respect to Mark Azar's scrambling problem, using INKEYS instead of INPUT prompts on the bottom line of the screen allows a user to make loss of wrong responses without the display scrolling up.

Thanks for the tip on the use of INKEYS, Paulette. The question is hard to answer in a short column, but I will try to give you the basics.

There are several different types of communications protocols available on the telephone lines. The most common is the Bell 103, which defines the frequency of the tones for answer and originate, and the baud rate, which, by the way, is 300 baud. This designation just happens to correspond to the data set made by AT&T for this type of protocol. If you buy a Modem I from Radio Shack it follows this standard.

Then, there are 1200 Baud modems. I am aware of two different methods of transmission, tones and phase shift. The most common type of 1200 Baud protocol is the phase shift method, or the Bell 212 standard.

The only thing a modem does is convert the digital information from your computer to tones, so information can be transmitted on normal voice lines.

The incompatibility is introduced both by the protocol of the modem you are using and the information you are exchanging. In most cases it is ASCII text, which presents no particular problems, but some computers (and terminals) use different control codes than others. Then there are buffer control codes such as XON/XOFF handshaking.

It's a wonder any communication is accomplished at all with all of the different variables involved. Don't get discouraged, though; you can talk to almost any other computer you want with your CoCo, given the proper software. Most advanced terminal programs explain the above features as well as make them user-definable. So, if you know what type of computer you want to talk to, it shouldn't be too much of a problem.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity.

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Building A Program A Piece At A Time

This month we are going to talk about a feature in DEFT Pascal which provides you with the ability to develop and compile an individual program in several smaller pieces, rather than as a single, large unit. While this separate compilation feature is not part of standard PASCAL, most PASCAL compilers (including PASCAL09, UCSD PASCAL and Microsoft PASCAL for the IBM PC) incorporate a form of it.

There are a number of advantages to developing a program in this manner:
1) You can develop a set of utility routines as a program "piece," and then incorporate that piece into many different programs.
2) You can take a large program with perhaps many sub-systems and make each sub-system a program "piece." This allows you to develop and test each sub-system individually before trying to put the whole thing together.
3) You can let more than one person work on an individual program at the same time by having each one develop his own "piece" of the program.
4) You can use more than one programming language in a single program by having each "piece" written in a different language. With the DEFT Pascal Workbench, the languages available are PASCAL and 6809 assembler.

Modules
The term module is used to describe one of these program pieces regardless of which programming language is used to develop it. At the same time, DEFT Pascal has a keyword, MODULE, which denotes a particular type of PASCAL module. In DEFT Pascal there are two types of modules:

1) A PROGRAM is a module that contains subroutines, variables and the main sequence of instructions to be executed by the overall program.
2) A MODULE is a module that contains subroutines and variables.

A complete program can be made up of one or more modules, but one of these (and no more than one) must be a PROGRAM module. As you can see, every program we have written so far has been developed as a single PROGRAM module.

We already know what the syntax of a PROGRAM module is. The syntax of a MODULE is almost the same:

MODULE <identifier>;
<constant declarations>
?type declarations>
(variable declarations)
(Procedure and Function declarations>
END.

The only differences between a MODULE and PROGRAM are that the MODULE does not have any parameters, nor does it have the BEGIN <executable statements> at the bottom like a PROGRAM does.

PUBLIC and EXTERNAL
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and other MODULEs. The only problem is how the PROGRAM and other MODULEs reference these variables, procedures and functions. This linkage is accomplished via the attributes PUBLIC and EXTERNAL:

1) The PUBLIC attribute identifies those variables, procedures and functions which are defined within the current module (either PROGRAM or MODULE), and which are to be made available to other modules. These variables, procedures and functions then become publicly known.

2) The EXTERNAL attribute identifies those publicly known variables, procedures and functions which are defined in other (external) modules, but which are going to be used in this module.

An Example Module
As an example, let's suppose we have a set of routines that prompt for and validate various types of data input from the keyboard. This is how we might construct the MODULE that contains these routines:

One-Liner Contest Winner...

This one-liner converts a decimal number to any base from two through 36. As with hexadecimal, the letters starting with 'A' indicate digits higher than nine, but now the entire range from 'A' to 'Z' is used (hence the limit of 36).

The listing:

```
1 IF B>1 AND B<37 AND B INT (B) THEN M = INT (N/B) 
  S = M - R * B; R = CHR$ ((-48*(B<10)-55*(S>=9)) + R) 
  N = M; IF N=0 THEN R=TR; RUNELSE1 ELSE INPUT "NUMBER" 
  ; B: IF N<0 OR N<>INT(N) THEN B=0: RUN
  X=X-2*X<60>: X=X+2*X<3>: Y=Y-2*Y<60>: Y=Y+2*Y<3> 
  X=X-2:*X<10>: Y=-Y+2:*Y<10> 
  X=X+2:*X<25>: Y=-Y+2:*Y<25> 
  PSET(X,Y): NEXT I,J

Donald R. Boyce, Jr.
South Amboy, NJ
```

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

One-Liner Contest Winner...

This one-liner lets you draw a train of dots on the screen. Plug in a joystick (in the right jack) and try it!

The listing:

```
0 POKE65495,0:PCLEARB:PMODE4,1:PCLS:PMODE4,5:PCLS:X=198:Y=96:FOR J=1TO9999:FOR I=1TO8:PMODE0:1;SCREEN1,1:A=JOYSTK<0>:B=JOYSTK<1> 
  X=X-2*(A<60>: X=X+2*(A<3>: Y=Y-2*(B<60>: Y=Y+2*(B<3> 
  X=X-2*(X<10>: Y=-Y+2*(Y<10> 
  X=X+2*(X<25>: Y=-Y+2*(Y<25> 
  PSET(X,Y): NEXT I,J

Paul Wagorn
Carp, Ontario
```

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WRITE FOR OUR CATALOG
In this example, we have a number of private and public variables, procedures and functions. The variables 'R', 'I' and 'C' are all private variables in that they are known only within the module KeyboardData. The variable ThisDate, on the other hand, is a public variable because the VAR statement which declares it has a PUBLIC attribute following it. This means that ThisDate can be accessed by other modules while 'R', 'I' and 'C' cannot.

By the same token, the procedure DisplayError is a private procedure while the functions GetPercent and GetYesNo, as well as the procedure GetDate, are all publicly known. These last three all have the PUBLIC attribute following the FUNCTION or PROCEDURE statement.

**Reasons for Choosing PUBLIC**

The above declarations have been made for a particular purpose. In this case, the variables 'R', 'I' and 'C' are local work variables for use by all the routines in KeyboardData. There is no reason to allow other modules to access these variables and, by keeping them private, we can ensure that other modules do not inadvertently modify them.

ThisDate, on the other hand, is public because it contains the result of the procedure GetDate. Routines in other modules would invoke GetDate in order to prompt for and validate a date. On return, the resulting date can be accessed from ThisDate.

The routines GetPercent, GetYesNo and GetDate are all publicly known because they represent the purpose of the module to prompt for and validate various types of data from the keyboard. Therefore, these routines will be directly invoked from other modules in order to perform a particular function. The procedure DisplayError has not been publicly declared because it is merely a local utility routine for use exclusively within the module.

**The EXTERNAL Part**

The next thing to do is access this module from your main program. For example:

```pascal
PROGRAM MyProgram (Input, Output);

TYPE Date = RECORD
  Month, Day, Year : Integer;
END;

VAR EXTERNAL
  ThisDate : Date;
VAR ... (* local variables *)

FUNCTION GetPercent (Prompt : String) : Real;
EXTERNAL;

FUNCTION GetYesNo (Prompt : String) : Boolean;
EXTERNAL;

PROCEDURE GetDate (Prompt : String);
EXTERNAL;
... (* local procedures and functions *)

BEGIN
... IF GetPercent ('STARTING PERCENT') > .5 THEN BEGIN
  GetDate ('STARTING DATE');
  IF ThisDate.Year > 1960 THEN ...
END.
```

In this program, we had to declare the type Date in order to properly declare the external variable ThisDate. Like the PUBLIC attribute, external variables are declared in a VAR statement that contains the keyword EXTERNAL immediately after the keyword VAR.

The routines GetPercent, GetYesNo and GetDate are declared EXTERNAL. Notice that after the declarations of these routines, there is only the word EXTERNAL; there is no body to these routines.

Down in the executable portion of the program, the external variable and routines are used exactly as though they were local to this module.

"... all the variables, procedures and functions declared with an interface block are automatically declared as external."

**Linking the Modules Together**

All of these external identifiers represent things which are not present in the program module MyProgram, but which are present in other modules which will be linked together with MyProgram by DEFTLinker. Because they are not locally present, the compiler cannot completely generate the required instructions when any of them are referenced by executable statements.

What the compiler does is generate a note to the linker that this module is referencing an item that is present in some other module. Later, when the linker reads in all the modules that are to be linked together, it can determine what PUBLIC identifiers are present and what their addresses are. Then, when the linker encounters one of these notes from the compiler, it can determine what the proper address should be and inserts it at that point in the code to complete the instruction.

**INTERFACE Blocks**

As you can see, there are a number of lines of code the main program must have in order to allow it to access the module KeyboardData. These lines essentially declare the public interface to the module KeyboardData. DEFTPascal contains a second mechanism called an INTERFACE block for specifying the interface to a module. For example, using the INTERFACE block in MyProgram would look like this:
**Example Program**

This month’s example program actually consists of two separate listings. The first is an expanded version of our KeyboardData module. It contains the three public routines and variables that we have been using as an example.

The second is a listing of the program `Interest` which computes the total value of an investment. You supply beginning and ending dates, the interest rate, whether it is compounded quarterly (as opposed to yearly) and the initial investment amount. `Interest` uses the routines in KeyboardData in order to prompt for and validate the information that is entered. It also contains a local subroutine, `CountDays`, that gives an absolute day number to a given date.

You will notice that we used an INTERFACE block to link `Interest` to KeyboardData. The main program then not only used the variable, function and procedure identifiers, but also the type `Date` which was declared in the interface.

If you have any questions about the separate compilation facilities in `DEFT Pascal`, you can call (301)253-1300 during normal business hours for help.

Next month, we will learn about linking `DEFT Pascal` with 6809 assembly language.

If you have a disk system, these commands are needed prior to loading the program:

```
PCLEAR 1
FILES 0,0
CLEAR 16,4999
```

---

**Listing 1**

```
INTERFACE KeyboardData;

TYPE Date = RECORD
  Month, Day, Year : Integer;
END;

VAR ThisDate : Date;

FUNCTION GetPercent (Prompt : String) : Real;
FUNCTION GetYesNo (Prompt : String) : Boolean;
PROCEDURE GetDate (Prompt : String);

END;

PROGRAM MyProgram (Input, Output);

VAR ...
  (* local variables *)
...
  (* local procedures and functions *)

BEGIN
...
  IF GetPercent ('STARTING PERCENT') > .5 THEN BEGIN
    GetDate ('STARTING DATE');
    IF ThisDate.Year > 1960 THEN ...
  END.

END.
```

Using this method, there is no declaration of any of the public identifiers (or the required TYPE definition) from the module KeyboardData in the program `MyProgram`. Instead, the entire interface appears to be `predefined`. Notice in the INTERFACE block that there is no use of the keyword EXTERNAL, nor do any of the procedures or functions have bodies. That is because all the variables, procedures and functions declared with an interface block are automatically declared as external.

An INTERFACE block is usually put in a separate source file from any other source file that might need it. A %C compiler directive is then used to include the declarations at the beginning of the file. The standard PASCAL library is declared in exactly this way by always doing an implicit %C on the file `PASCALIB/EXT` at the beginning of any PASCAL program.
THE RAINBOW

Listing 2

00 0192 (* *****************************************************
00 0192 0 This Routine Prompts for date values
00 0192 0 *****************************************************
00 0192 0 PROCEASURE GetDate (Prompt : String);
00 0192 10 0192 PUBLIC;
10 0192 BEGIN
11 0196 NeedMessage := False;
11 019C WITH ThisDate DO
11 019C REPEAT
11 019C DisplayError;
11 01A5 WRITE (Prompt, ' (MM,DD,YYYY)
11 01B2 READLN (Input, Month, Day, Year);
11 01B9 WRITE (Prompt, ' Error;
11 01C2 EXIT;
11 01C9 var IsLeapYear, IsLeapMonth : BOOLEAN;
11 01CC IF Month IN (1,3,5,7,8,10,12) OR
11 01CD (Month = 2) AND (Year MOD 4 = 0)) THEN
11 01D5 EXIT;
11 01D8 END;
00 01E0 (* *****************************************************
00 01E0 0 This is the interface module for KEYBOARDDATA
00 01E0 0 which contains a set of routines that
00 01E0 0 provide the ability to input and validate
00 01E0 0 various types of data from the keyboard
00 01E0 0 *****************************************************
00 01E0 0 INTERFACE KeyboardData;
00 01E0 0 TYPE Date - RECORD
00 01E0 0 Month, Day, Year : Integer;
00 01E0 0 END;
00 01E0 00 0000 00 0000 00 0000 00 0000
00 01E0 00 0000 00 0000 00 0000 00 0000
00 01E0 00 0000 00 0000 00 0000 00 0000
00 01E0 00 0000 00 0000 00 0000 00 0000

The STYLOGRAPH III WORD PROCESSING SYSTEM is packed with many features! . . .

- Stylo comes with a 51 x 24 Hi-res screen driver called GO-51, which is compact and efficient (doesn't waste memory space).
- Totally compatible with the PBJ 80 column board called WORDPAK.
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- Prices have been lowered making Stylograph and WordPak the best buy in town.

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XTERM

XTERM is a full featured OS-9 communications program that takes full advantage of the power of OS-9. It works with the normal text screen, XSCREEN, or the Wordpak 80 column board.

XTERM is menu oriented for ease of use, it is simple to use even for the novice OS-9 user. And yet, XTERM is powerful enough for the expert OS-9 user.

Some of the features of XTERM include:
- Full upload and download support with remote buffer operation;
- Supports XON/XOFF protocol;
- 110/300/600/1200 baud, 5/6/7/8 bits, even/odd/no parity, full or half duplex;
- Able to execute an OS-9 shell command from within XTERM.

XTERM works with a Color Computer using the standard serial interface, but also will work with a hardware serial port. Also, if you are using a hardware parallel printer port, you can print data to the printer as it is received.

XTERM $59.95

XWORD

XWORD is a powerful word processing system for the Color Computer using OS-9. XWORD is feature packed with only a few features mentioned here.

Some of the editing features of XWORD include:
- True character oriented full screen editor;
- Works with the normal text screen, XSCREEN, O-PAK, or WORDPAK 80 column card;
- Full block commands with blocks displayed in inverse characters (except with normal text screen) for easy block manipulation;
- Full find and replace commands with wildcard character;
- Able to execute an OS-9 shell command in the middle of editing.

Some of the formatting features of XWORD include:
- Proportional spacing supported;
- Perfectly aligned hanging indents and columns, even when using proportional characters;
- Full printer control with control of character size, emphasized, italics, overstrike, underlining (with or without spaces), super and sub-scripts; up to 10 header/footers; page numbering in decimal or Roman numerals;
- Margins and headers can be set differently for even and odd pages;
- Automatically reads printer initialization file to define XWORD for your printer (many included, and easy to write or modify your own).

XWORD $79.95

XSCREEN

XSCREEN creates a high resolution screen for the Color Computer using OS-9. This high resolution screen gives you 24 lines of text with 51, 64, or 85 characters per line. Characters can be either white on a black background or vice versa. Easy menu operation.

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An Overview Of Programs, Corrections And More

Back in the old year, we were looking forward to 1985. Yet, the beginning of a new year, like many of life’s milestones, often brings us reminders of our human frailties — not to mention much unfinished business.

This year, the reminder about some of the unfinished business came a week or two ago from Dr. Bud Pass, a well-known programmer, writer and owner of Computer Systems Consultants, Inc. in Conyers, Ga. He had sent us the latest version of his CMODEM for Color Computer OS-9. He enclosed a short note with the disk to express his concern that we had never mentioned any of his products in “KISSable OS-9.”

Dr. Pass sent me a lot of information and copies of his programs earlier in the year. We had intended to pass along an overview of his products for months, but, as with most good intentions, rapidly approaching deadlines, weeks of temporary additional duty and other problems got in the way, and we never had the chance to prepare that overview.

We’ll do that first this month. We’ll also try to give you a quick overview of a few of the products available from JBM in King of Prussia, Penn.

CMODEM for CoCo OS-9

CMODEM is a communications program for Color Computer OS-9 that lets you receive or transmit files from or to another computer. It lets you use the Ward Christiansen XMODEM file transfer protocol found on CompuServe, Telenet, Newsnet and many CP/M bulletin board systems. The XMODEM protocol places no restrictions on the contents of the files you transmit. Because of this, you can receive pure ASCII text files, binary program files or command files that contain special control characters.

When used in the XMODEM mode, CMODEM receives or sends your data in blocks. A special checksum verification routine lets the receiving computer know that it received all the data in a block accurately. If there was static on the telephone line and a block is not transmitted accurately, CMODEM tells the other computer that it did not receive the block properly and asks it to send the block again. This process is repeated until the block is received accurately.

CMODEM works well at 1200 Baud.

By Dale L. Puckett
Rainbow Contributing Editor

We also have some more feedback on Radio Shack OS-9 Version 1.01.00 and more good news about the OS-9 Users Group Software Library. And finally, to help encourage you to jump in and get your feet wet with BASIC09, we’ll present two more short procedures written by a beginner.

...to help encourage you to jump in and get your feet wet with BASIC09, we’ll present two more short procedures written by a beginner.”

(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He is the author of The Official BASIC09 Tour Guide, published by Microware and has just completed The Official Rainbow Guide to OS-9. He serves on the InfoWorld Software Review Board and is a chief warrant officer in the U.S. Coast Guard.)
A COCO BREAKTHROUGH

Finally! The program that will make OS-9 your favorite CoCo operating system! OS-9 Solution is a program designed to create a "USER FRIENDLY" environment within OS-9. You will forget that you are using one of the most sophisticated and advanced operating systems ever written. This program makes OS-9 easy for everyone from novices to experts! Completely menu driven with prompts at all times. Built in "Help Screens" for run-time help. You may never see the OS-9 command prompt again!

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- Saves a lot of time and disk space - Up to 20K in your CMS directory!
- No more typing in complex, long pathnames!
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- Set all XMODE parameters at the touch of keys.
- Uses separate source and destination directories for "single key" copies.
- Organizing directories is made extremely simple!
- All files are contained in a directory "window". Use the ↑ and ↓ keys for access and command execution.

COMMAND SUMMARY

- A - Alphabetize filenames
- B - Backup disk
- C - Copy file
- D - Delete file or directory
- E - Examine file
- F - Format disk
- G - Goto parent directory
- H - Help screen
- I - Information on a file
- J - Jumble around filenames
- K - Compare files
- L - Load in a file
- M - Make directory
- N - New directory (Read It)
- O - Output file
- P - Put together files
- Q - Quit OS9 Solution
- R - Rename filename
- S - Set destination directory
- T - Set file attributes
- U - Use another disk
- V - Verify file
- W - Work multiple files
- X - Xmode parameters
- Y - Display free sectors
- Z - Execute shell command

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OS-9 is a trademark of Microware and Motorola
on the Color Computer and faster on systems that use an ACIA instead of the bit banger RS-232 port on the rear panel of the CoCo. The standard OS-9 version uses the standard OS-9 path descriptor named /T1, and is compatible with both OS-9 Level I and Level II systems. The Color Computer version contains its own drivers and uses the PIA printer/modem port. CMODEM is written in Dyna C and you can purchase the source code. This makes it a very educational as well as useful package.

The program is menu-driven and very easy to use. In fact, you can even run it without looking at the manual. CMODEM's prompts give you all the information you need. You simply pick a letter — or sometimes a number in the submenus. Once you know the program, you can run CMODEM in the expert mode which shortens the prompts. You can modify most of the program's parameters from the menu.

Here are your choices from the main menu:

T: Terminal mode
?: Toggle Expert mode
G: Gather text in memory buffer
V: View text in memory buffer
A: Dump an ASCII file
K: Kill text in memory buffer
E: Toggle Echo mode
M: Modify program parameters
B: Set Baud rate
D: Set delay factor
S: Send a file using XMODEM protocol
R: Receive a file using XMODEM protocol
X: Transfer a binary file using XMODEM protocol
Y: Receive a binary file using

The program is menu-driven and very easy to use. In fact, you can even run it without looking at the manual. CMODEM's prompts give you all the information you need. You simply pick a letter — or sometimes a number in the submenus. Once you know the program, you can run CMODEM in the expert mode which shortens the prompts.

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B: Set Baud rate
D: Set delay factor
S: Send a file using XMODEM protocol
R: Receive a file using XMODEM protocol
X: Transfer a binary file using XMODEM protocol
Y: Receive a binary file using

XMODEM protocol
Q: Quit
O: Gives you OS-9 prompt (to run a DIR for example) (CLEAR BREAK returns you to CMODEM)
H: Hang up phone
F: Flush data collection buffer to file
C: Close text collection file
L: Generate linefeed locally following carriage return

You can return to the selection menu above at any time by holding down the CLEAR key and typing the '@' character.

"OS-9 communications programs that can deal with the bit banger PIA port on the Color Computer have been a long time coming. This latest version of CMODEM seems to have conquered all the problems."

Make sure you wire your cable correctly if you plan to use CMODEM with the Color Computer. CMODEM requires the non-standard wiring below:

- pins 1 and 2 received data
- pin 3 ground
- pin 4 transmitted data

When you connect pin 1 and pin 2 together, you generate an interrupt each time you send a character to the port. CMODEM's drivers need this interrupt to function properly.

OS-9 Communications programs that can deal with the bit banger PIA port on the Color Computer have been a long time coming. Every programmer who has tried has run into problems. This latest version of CMODEM seems to have conquered all the problems. It worked well and it was fun to use.

Other products written by Dr. Pass include Super Sleuth, a disassembler that runs on OS-9, FLEX and UNIFLEX; cross assemblers that run under OS-9 and generate code for the 6800, 6801, 6805, 6502, 8080, 8048, 8045 and Z-80 microprocessors; a program that helps translate 6502 assembler code into 6809 code; and a program that translates position dependent 6800 or 6809 code into position independent code. Many of these programs, especially Super Sleuth, have been around for several years and are widely acclaimed.

Now, about JBM

John B. Martin and his programmers have been active in the OS-9 community for several years. After they ran a lot of advertisements for their OS-9 products for the Color Computer early this year, my curiosity got the best of me and I gave them a call. I wound up with so many programs that I was overwhelmed.

In our continuing attempt to clean the slate and start the new year fresh, here's an overview of the JBM Group's OS-9 product line.

LOOKUP and SLOOKUP are JBM's answer to the missing metacharacters and wild cards in the OS-9 shell. On MS-DOS and CP/M computers you can type *.'DIR *.BAS' to see a listing of only those programs that have a "BAS" extension. You can do the same thing with many of the UNIX utilities. You can't do it with OS-9's DIR command.
Get the most out of BASIC09

The OFFICIAL BASIC09 TOUR GUIDE is skilfully written in a friendly and easy-to-read style. Just perfect for those new to computers and to BASIC09. It's also a valuable reference book for programmers, engineers, students and hobbyists, providing an in-depth look at BASIC09 plus an overview of the OS-9 operating system. Comprehensive reference sections on BASIC09 and OS-9 commands are also included.

The book "maps" your route through the Mercedes of Basics . . . BASIC09 and puts you in the driver's seat in no time. Fasten your seatbelt, sit back and enjoy the ride to perfecting your programming skills.

MICROWARE . . .

The OFFICIAL BASIC09 TOUR GUIDE comes from the people who wrote BASIC09. As the leader in 6809 system software, we at MICROWARE care about our users and want to help you get the most from our products.

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Specialists in system software for 68-family microprocessors since 1977.

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To solve the problem, JBM wrote "LOOKUP" and "SLOOKUP" in BASIC09. When you buy the program you receive l-code that runs under RUNB. The wild card character, an asterisk, can appear anywhere. "LOOKUP" also lets you search subdirectories for missing files. "SLOOKUP" is identical to "LOOKUP", except its output appears in sorted form. This makes it a very handy tool for organizing your disks. Also, since "LOOKUP" sends its output to OS-9’s standard output path, you can easily redirect it to your printer for a hard copy or to a file for future reference.

"When you purchase the new version of OS-9, you must again install any custom drivers you had added to your original version of OS-9. Follow the directions from the software manufacturer that you followed when you installed them the first time."

And finally, the "LOOKUP/ SLOOKUP" package also includes a wild card delete procedure. This procedure prints the name of any file that matches your request and then deletes it.

JBM’s "EXAMOD/ CHGREV" utilities are two more BASIC09 l-code modules that you install in your working execution directory — usually /D0/ CMDS.

You use "EXAMOD" to examine a disk file and determine what type of modules it contains. It reports the module’s language, type, size, data storage requirements, revision number, edition and the offset from the beginning of the module to its execution address. Like the "LOOKUP" package above, "EXAMOD"’s output can be redirected to any device or file on your computer.

"CHGREV" gives you a shorthand method of changing the version number of BASIC09 l-code or 6809 object code modules in a file. It automatically updates the header parity and CRC of the module after it makes the change for you.

The "LdMac" package from JBM is a group of 6809 object code modules that can be called from BASIC09 to perform a number of tasks that are often required in business programs. Some of these tasks can already be performed from BASIC09 by running the SHELL command. Others could be written directly in BASIC09. However, both of these methods add overhead; either in the form of additional jobs running concurrently on your computer or in extra memory and slower speed.

If you plan to use the routines a lot you can even load them into memory with a command in your STARTUP file. They total less than 4K bytes of memory. To save space, we’ll define the individual routines that come with LdMac in table form.

<table>
<thead>
<tr>
<th>Routine</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>BFill</td>
<td>Fill a string with spaces</td>
</tr>
<tr>
<td>Caps</td>
<td>Capitalize all lowercase letters in a string</td>
</tr>
<tr>
<td>CFill</td>
<td>Fill a string with the character you specify</td>
</tr>
<tr>
<td>Cmpar</td>
<td>Compare corresponding fields in similar structures</td>
</tr>
<tr>
<td>ComCRC</td>
<td>Compute the cyclic redundancy value of a module</td>
</tr>
<tr>
<td>FilMgr</td>
<td>Return files’ size or position in file</td>
</tr>
<tr>
<td>GAtt</td>
<td>Return the attributes of a file</td>
</tr>
<tr>
<td>GetID</td>
<td>Return a process number and its User’s Number</td>
</tr>
<tr>
<td>GMod</td>
<td>Return names of modules linked to BASIC09 module</td>
</tr>
<tr>
<td>GPri</td>
<td>Report the priority of a process</td>
</tr>
<tr>
<td>HiC</td>
<td>Convert OS-9 strings to BASIC09 strings</td>
</tr>
<tr>
<td>InBytes</td>
<td>Accept unformatted data from a terminal</td>
</tr>
<tr>
<td>Lop</td>
<td>Remove leading spaces from a string</td>
</tr>
<tr>
<td>Psit</td>
<td>Position a source string in a target string</td>
</tr>
<tr>
<td>SetUID</td>
<td>Change a program’s user identification number</td>
</tr>
<tr>
<td>Sleeper</td>
<td>Suspend a BASIC9 process temporarily</td>
</tr>
<tr>
<td>SPri</td>
<td>Set the priority of a process</td>
</tr>
<tr>
<td>Squeez</td>
<td>Remove all spaces from a string</td>
</tr>
<tr>
<td>Tcrtl</td>
<td>Set characteristics of a terminal</td>
</tr>
<tr>
<td>Tnmbr</td>
<td>Report the name of a user’s terminal</td>
</tr>
</tbody>
</table>

The "ADLIB" package gives you a way to copy data structures, comments and subroutines from a library file to a source code file. This makes it easier to use the same routines over and over, and eliminates the time wasted when you continue to recode the same routines each time you need them.

"ISAM" is a package of BASIC09 programs that let you create and use Indexed Sequential Files. It contains three programs and one procedure to let you create, update, review or reorganize your files.

Another JBM package named "XRF" will let you use ISAM files that require more than one key. For example, when you are searching through a file containing a list of your employees, you may want to locate an employee’s record by name, by payroll number or even by the date he came to work for you. The "XRF" package helps you create the multi-key index you need to do this type of job.

And finally, JBM sells a string arithmetic system that lets you add, subtract, multiply, divide or compare very large numbers accurately. When we say large, we mean 18 digits. It is well-suited for financial applications where accuracy is a must.

In recent months JBM has released three new packages. We haven’t seen them, but they look like they could prove useful in a typical office. They are "MESSAGE", a multi-terminal mail system for OS-9 Level II systems; "CAL", a personal appointment diary; and "GENUS", a stand-alone sort program.

Comments about Version 1.01.00

The local Radio Shack in Springfield, Va., finally received their second shipment of Color Computer OS-9 Version 1.01.00 a few days before Christmas. By the time I received my copy, the comments were starting to arrive.

Hawkins of Ladysmith, Wis., reporting that the new version of OS-9 would not work with the Disk Fix utility package sold by Computerware. Since at one time or another I have used both Computerware’s new CCDISK module and D. P. Johnson’s SDISK package, I was concerned.

Yet, since I knew both packages simply contained replacement modules for the original Radio Shack CCDSK module, I couldn’t imagine why they wouldn’t work. But, rest easy friends. Both packages do work with the new Radio Shack Version 1.01.00. I tried them myself. Then, later I confirmed that other people were using both packages with the new version of OS-9. Bill Brady left a message in one of the databases on CompuServe’s OS-9 SIG. Here is a summary of his notes.

"O-PAK works the same with the
new CCIO. The new version also works fine with SDISK and double-sided, double-density disks. It works fine with the PBJ PC-PAK, which contains a clock chip and parallel printer port," Brady said.

"The new t2 driver works, but I suggest you set your NULLs=4 to allow X-On and X-Off to work properly. HiTerm and other BASIC09 programs execute the same. I've noticed the type-ahead loses far fewer characters now. That alone makes it for me," he said.

After receiving Hawkins' letter, I also spoke with Brian Lantz, a free-lance programmer in Tampa, Fla., who authored Computerware's new DATA BANK database manager program. He reported that he also has been using both SDISK and Computerware's CCDISK with Version 1.01.00. This makes me think that a reminder is necessary.

Remember! When you purchase the new version of OS-9, you must again install any custom drivers you had added to your original version of OS-9. Follow the directions from the software manufacturer that you followed when you installed them the first time.

I suspect Hawkins booted up OS-9 with his new Version 1.01.00 disk, and then tried to read a double-sided, 40-track disk he had initialized after installing Computerware's CCDISK into Version 1.00.00. Since the CCDISK module in the new version of OS-9 is basically the same as the CCDISK module in the old version, it still cannot read double-sided disks. Thus, Hawkins found a problem. Again! After you bring your new version of OS-9 to life, don't forget to reinstall any custom modules you have been using.

Along those lines, here's a trick you can use with D. P. Johnson's SDISK. If you only own single-sided disk drives and only use SDISK to read or write a standard OS-9 disk every once in awhile, you do not need to permanently install SDISK in your OS9Boot file — just load the two modules, SDISK and SDI, when you need them. Once they are loaded into memory, you can use them by naming the standard disk device by name. For example:

```plaintext
OS9: dir /S01 or
OS9: list /S01/NDRK/ a_standard_OS9_file
```

After you have used SDISK and SDI, be sure to UNLINK them in order to free the memory they use. On the other hand, if you own double-sided drives, you will find it worth your while to go to the trouble of making a new system disk that contains SDISK and the related standard OS-9 device descriptors.

### Possible Errors in Documentation Changes

While we are on the subject of Version 1.01.00, I should mention that a scan of the new pages 99-102 of the OS-9 Technical Information Manual that come with the new disk contain several probable errors. Here are the problems I noticed:

Under "SS. READY": Under the exit conditions, if the carry bit in the 6809's CC register is clear on exit from the routine, then the 6809 B-register should contain a zero. If, on the other hand, the carry bit is set, this indicates there has been an error — and if that error happens to be that the device is not ready, then that B-register should contain $F6, or in mnemonics, E$NOTRDY. It looks like several lines were dropped in editing.

Following "SS.POS": The description for SS.EOF — the test for an end of file condition has been deleted. Don't throw out the pages from your original manual. This description does appear there.

Under "SS.Joy": On Entry, the 6809's B-register should contain $13, not $12 as printed. If you used $12, you would be asking OS-9 for the SS.DSTAT call just above. That's how these things work. The B-register always contains the function code of the function you want to perform. I may not have caught everything. If I missed one let me know, and I'll try to pass it on in the next available column.

And, in case you are wondering about all the excitement created by the new ACIAPAC device driver and /T2 device written to work with the RS-232 cartridge, here's the scoop: "It allows true RS-232 usage on the Color Computer, using a 6551 ACLA instead of the PIA 'bit banger' required if you use the 'RS-232' port on the rear panel. The 'bit banger' requires each bit to be forced through the PIA by software, limiting you to 300 or 600 Baud reliably. The RS-232 hardware pack takes the load off the software, and handles the data as true serial 1/0, allowing reliable speeds up to 19,200 Baud!"

If you have a pioneering spirit — and most OS-9 users do — here's another interesting tidbit from the OS-9 SIG. It seems Dennis Bathory Kitzs of RAINBOWfest infamy is designing a "very inexpensive, down-'n'-dirty" 68000 computer. He wants to know what you want to see in hardware and software. His Compuserve user number is 70136,1257 if you want to leave him a note. By the way, the comments and demands on that "thread" are unreal!

---

**Listing 1:**

```plaintext
PROCEDURE dump
REM Program to dump a file to either screen or to the printer.
REM In the screen mode, it will display the data
REM 8 across. In the printer mode, it will display
REM 16 across.
REM
REM REM Version 1.3
REM October 14, 1984.
REM
REM REM Written by: A. Hoogeuraad
REM 4316 Ditzler
REM Kansas City, Missouri 64133
REM
REM REM
REM DIM done:BOOLEAN
REM DIM pathlist, file:STRING
REM DIM answer: STRING[1]
REM DIM amsgword(16), path, wordbyte:BYTE
REM DIM output, word(13), i, max, device, asciiCount, hexdump, hexcount: INTEGER
REM
REM done=FALSE

LOOP

PRINT CHR$(12)
INPUT "<1> Printer <0> Screen", output
PRINT
```

March 1985 THE RAINBOW 261
It saddens me to report that Richard Dundon, the editor of MOTD, the OS-9 Users Group newsletter, passed away after suffering a stroke on December 8, 1984. Although I had only met Dick in person on one occasion, I talked to him on the phone several times and considered him a good friend. He did an excellent job for the Users Group in the short time that he served.

Fortunately, for the Users Group, Dick’s close friend Tim Grovac has volunteered to take over the editor’s job — at least until the new officers are elected. If you have news, a program or anything you would like to share with other OS-9 users, please mail it to Tim. Here’s his address:

MOTD Publishing
25825 104th Ave. SE
Suite 344
Kent, WA 98031

Also, Tim is looking for an author to take over his BASIC09 column in MOTD as he moves on to publish the whole thing. If you are interested, he asks that you send your credentials and a sample of some of your writing to the address above. Give him a hand.

More than 750 OS-9 Users Group members receive MOTD bi-monthly.

More Software Exchange Disks Available
Dave Kaleita, Software Exchange committee chairman, reports that disk numbers zero through nine, numbers 11 through 14 and number 21 have been completed and are available for your order. Additionally, disk number zero — the one you received free when you joined — and disk number three, a number of word processing utilities, have been improved and carry version numbers of 0.01 and 3.01, respectively.

In the December issue, we gave you the contents of disks zero through 13. Here’s the breakdown on disk numbers 14 through 25:

14 — File maintenance utilities
15 — Communications programs
16 — Hardware customizations (drivers and descriptors for non-standard hardware)
17 — BASIC09 programmers toolkit
18 — System utilities
19 — Languages/programming environments (including XLISP)
The programs for these disks have already been selected and forwarded to other committee members who are assembling the master disks. They should be available by the second quarter.

In December, we gave you a detailed breakdown of the contents of disks zero through five. I just received an alphabetical list of all programs in the Users Group library and their disk assignments. I am organizing it by disk number now and hope to publish it in the April issue.

And, finally, Dr. James Petty, Dr. Robert E. Ringrose and Joseph J. Dubuc — all OS-9 users in the Oklahoma City area — are doing a fantastic job of keeping the group up to date on developments.

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job with the User Group’s membership committee. They have just completed a new database that contains the name and address of each member. Things are looking up for the group.

Here are two BASIC09 utility programs that should help you get your feet wet with BASIC09. They were contributed by Adrianus C. Hoogenraad of Kansas City, Mo. Remember, if you have a short routine you would like to share with other “KISSable OS-9” readers, send it to us at THE RAINBOW. We’ll try to get it in as soon as possible.

**DUMP**

Adrianus wrote this program before he realized the OS-9 DUMP utility had an “-L” option. You can use it to dump a file to the printer or the screen.

When you start it, **DUMP** asks if you want to dump to the printer or screen. Next, it asks for a pathlist. Here, you enter the pathlist to the directory that contains the file. It will give you a directory of that pathlist and ask you if you want another pathlist.

If you have the right directory, you’ll be asked for the name of the file you would like to dump. If you asked for the printer earlier, **DUMP** will dump out 16 addresses per line. It dumps eight addresses per line on your screen. Both modes display the ASCII values of characters at the end of each line. When the program is finished, it asks you if you want to dump another file.

**Del_file**

**Del_file** was just a “fool-around” program designed by Hoogenraad. It gives you another way to delete files from your disks.

This program runs much like **DUMP**. First, it asks for a pathlist, then displays a directory. It then asks you for the name of the file you would like to delete; after you type the name, it deletes the file and asks if you want to delete another.

These two programs were my first experience with BASIC09. I wanted to write a program with no line numbers, GOTO statements or GOSUB statements. Again, I wrote **DUMP** because I didn’t know the “-L” option was available. If I had known that, I probably wouldn’t have written the program, but it was a very good learning experience, anyway.

That’s all for March. Have a good month and we’ll see what we can cook up for April.
ever have something like this happen? Delete the wrong file, thinking you had a readable backup that only produces an I/O Error?

In Extended Color BASIC this has happened to me many times, as it may have to you. Fortunately, a long time ago I figured out how to painfully recover the file(s). If this has happened to you more than once, you may have also.

But what about under OS-9? If you are like most OS-9 users (not just CoCo OS-9 users), you are totally lost when it comes to recovering a deleted file. What’s that? You say only a dummy has that happen! Only a beginner!

I can disprove that by using an incident that happened to a friend of mine as an example. This friend is a computer professional from way back. Almost two decades ago he was involved in the development of one of the finest educational languages developed to date. He helped design one of the largest computer installations I have ever seen. What this man doesn’t know about computers doesn’t need to be known! Surely something like this could not happen to a knowledgeable, computer professional like this, right?

He was in the process of cleaning up his hard disk when someone distracted him. Instead of typing in the entire line, he typed:

DELDIR ENTER

Murphy’s law took its turn again as he looked at the terminal to see:
Deleting directory file
List directory, delete directory, or quit?
(l/d/q) —

(Brian Lantz is a software engineer and consultant. He is the author of OS-9 Textools, OS-9 Databank™, Unicharger and other software currently on the market)
Not knowing his previous mistake of an incomplete pathlist, he, of course, typed in a 'D' and entered. So, OS-9 proceeded to delete all the files in his current directory. This directory had the only copies of the source for a new version of a complete new language for OS-9. Before the mistake was noticed, over 16 files were deleted! I promptly received a desperate telephone call to help him out. The happy ending is that we were able to restore 16 out of 16 files, completely!

How to Save Deleted Files

Now for the "how-to" part. How can you save those valuable files if they happen to be deleted by mistake or accident?

First, the ideal tool needed: the PATCH utility command. This is available in the Disk Fix & Utilities package from Computerware. Other utilities can produce the same results, but I recommend using PATCH for the least work and fastest recovery time. I will explain how to restore files using PATCH, but even if you don't have PATCH, the principles are the same.

Now for a little knowledge of how things are organized on the OS-9 disk. OS-9 doesn't refer to a disk by track number and sector number like most operating systems (i.e., FLEX). OS-9 uses a Logical Sector Number (LSN). The first sector of the disk is LSN 0, followed by LSN 1, etc. This is the way OS-9 can access different types of drives in the same way. No matter how many tracks and sectors it has, LSN 43 is the 44th actual sector of the disk.

The OS-9 directory is a little different from Color Disk Basic, also. Each directory entry is 32 bytes long. The first 29 bytes are the filename. The last character of the filename has the Most Significant Bit Set. The other three bytes are the pointer to the File Descriptor sector of the file.

A File Descriptor is a one-sector information center for the file; each file has one, including directories. Several things are stored in the File Descriptor sector, including the file's attributes, the file owner's user number, the modification date and creation date, the file size, and the segment list. The segment list is a table of five-byte entries that tell where the file's sectors are actually located, and how many sectors are in each segment.

End of Basic Training

Now, with the basics out of the way, let's go through the restoration process. The first thing that needs to be done is to enter the PATCH utility. Let's assume for our discussion that the deleted file was named NEEDED, and was located on drive /DO. We would enter the PATCH utility by typing:

```
PATCH /DO0
```

This opens the entire disk located in drive /DO for patching. The next thing we see is the copyright notice, and the prompt, which looks like this:

```
OmegaSoft Patch utility version 2.20
Copyright 1983 by Certified Software Corporation
```

The first thing we want to do is locate the root directory for /DO. This information is located in LSN 0, along with several other useful tidbits. To do this, we use the 'D' option of PATCH. This will display in Hex and decimal the bytes requested. If only one number is given on the command line, then 256 bytes are displayed, starting with the byte requested. To display LSN 0, type:

```
-> D 0000
```

The result is Example 1. This is from one of my disks, and is actual output from PATCH. The root directory's File Descriptor sector is located in the eighth, ninth and tenth bytes of LSN 0, which, in this case, is 00 00 03. You will find that, with rare exceptions, the root directory's File Descriptor sector will always be this, but it is wise to check anyway.

In order to find a file, we must look at the File Descriptor, so let's tell PATCH what we want:

```
-> D 00000300
```

Note that we needed two additional zeros at the end. This is because LSNs refer to the number of sectors, not bytes. This PATCH command could have been given as:

```
-> D 0300
```

The result is Example 2. This is a typical File Descriptor sector. (I will not
take the space to describe all of what's here, just what concerns this article.) Notice bytes 9 through SOC. These bytes, 00 00 01 20 in this example, are the file size in bytes, not sectors. If we were looking at the File Descriptor of a deleted file, these would all be zeros.

The other important bytes start at offset $00. This is where the segment list table starts. Each segment list entry consists of five bytes. The first three bytes are the Logical Sector Number of the first sector of a block. The remaining two bytes are the length of the block in sectors. The entry following the last valid one must be all zeros. In this case, the LSN is 00 00 04 (or simply 4) and the length of the file in sectors is 00 02. Notice that $0120 bytes become two sectors for the segment list.

**Examine Directory**

Now it's time to examine a directory. We know that the first segment starts with LSN 4, so we type:

```- > D 0400```

and now we have Example 3. This is a typical directory listing. In it we find the remains of the *NEEDED.FILE*. As you can see, when a file is deleted in OS-9, the first byte of the filename is changed to a zero. This is the same as with Color Disk BASIC. The rest of the directory entry is left unchanged. This is what helps us to recover the file.

Notice the last three bytes of the entry for *NEEDED.FILE* at offset $04DD-$04DF. These bytes are the LSN of the old file's File Descriptor sector. Unless sector. Mark down where the File Descriptor is located, since you will need to come back here later on. This part of the segment list is left intact.

When a file is deleted, the first LSN is left in the segment list, but its block size is erased. This, in itself, is not so bad. The trouble is that any other segment list that may have been there originally is erased, also. This is not a problem if the file was in one segment, but if it was fragmented, then you are now on a scavenger hunt to find your

"We have fooled OS-9 into believing the file still exists, but the disk's sector map still believes the sectors deleted are available for use. This means the first time a file is created or edited, it could overwrite our recovered file..."

you have created or edited files since *NEEDED.FILE* was deleted, the data from the file is almost a cinch to find ("almost" will be explained below). Rather than take all the "fun" out of recovering your first file, I'll just describe most of the rest. The next step is to read the file's File Descriptor
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Example 3

M 5D09

If the sector happens to LSN 59, the appropriate address. Now the address of the byte, along with its current value, is displayed. To change it, enter in the new value. When you are done with the last of the four bytes, enter a / (slash) on the next line, and you will return to the normal PATCH prompt. If the length of the fictitious file was 30348, the display will look something like this:

Example 3

M 5D09

But, don't go away mad! Now, all you need to do is COPY this file onto another disk. OS-9 can do that now. It thinks the file exists. After copying it onto another disk, you need to remove the file back to the way you found it, so as not to confuse the operating system.

This may sound like a lot of trouble well, it is! But so is losing valuable data or programs. Not all files will be worth the trouble, but for the ones that are, this method works exceptionally well. If nothing else, you now have a better understanding of file organization under the OS-9 operating system.
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---

**SPECIFICATIONS:** XEX's SCREEN has user definable fonts, many of which are supplied. 24x51 is the default screen size, but this can be changed to suit the user. Default line length is 80, but this can also be changed. XEX's KEYBOARD has user definable keys, supports extra key combinations, auto key repeat, line editing, and command keys. XEX DISK DRIVERS supports all drives, 20 or 80 track, single and double sided and density. Also supports double density so that 40 track drives can be used with 80 track drives. Individual booting rates for drives are definable. MODULAR CONSTRUCTION allows easy modification and changes to XEX. It is easy to add or modify the drivers for things like modem and other hardware, because most of the source is included. SOURCE IS INCLUDED for the screen drivers, keyboard drivers, disk drivers, printer drivers, expansion card code, other system code, and many of the utilities, making modifications simple. It is easy to create your own custom version of XEX. Other major packages include ED, a powerful screen-oriented line editor, ASM, a complete macro assembler CTRM is Native Sharp Disk BASIC modified to work with XEX RTF, allows copying text files from RS BASIC to XEX. XEX supports 3rd party hardware and other software. XEX supports 128K upgrades. Support for the telephone and other software is available.

---

**COMPARISON CHART BETWEEN XEX AND OS9**

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>XEX</th>
<th>OS9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi-Res screen (24x51 default)</td>
<td>YES</td>
<td>NO (0-For $34.95)</td>
</tr>
<tr>
<td>Supports all disk drives</td>
<td>YES</td>
<td>NO (SDisk w/extra $33.95)</td>
</tr>
<tr>
<td>User definable keyboard</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>User friendly, easy to use</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Some system source included</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Powerful screen like editor</td>
<td>YES</td>
<td>NO (Simple free editor)</td>
</tr>
<tr>
<td>Conditional Macro Assembler</td>
<td>YES</td>
<td>NO (No Macro capability)</td>
</tr>
<tr>
<td>RS BASIC compatible with DBASIC</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Supports 128K upgrades</td>
<td>YES</td>
<td>NO (Yes if you have DOS)</td>
</tr>
<tr>
<td>One disk boot</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Telephone support</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Supports 3rd party hardware</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>
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MM-COCO-2 Memory Minder for double side drives ...................... $99

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