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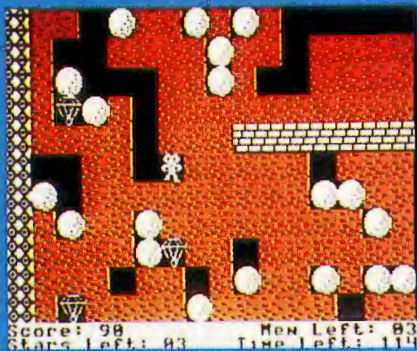
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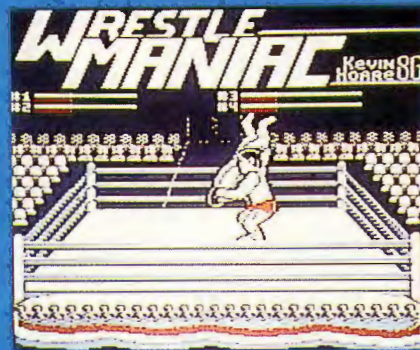
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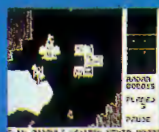
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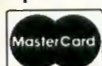
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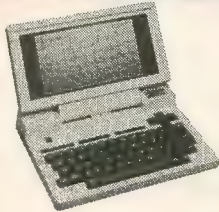
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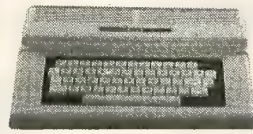
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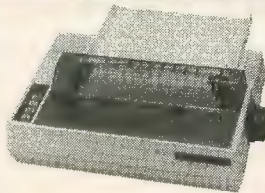
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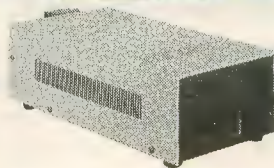
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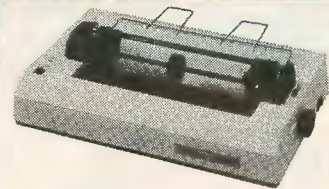
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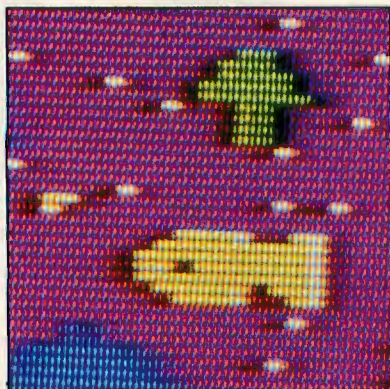
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NEXT MONTH: Ho, ho, ho! It's that merry time of year and there's no better way to get into the festive spirit than with our December Holiday Issue. We've packed our bag full of surprises and programs you're sure to enjoy during those long winter evenings. And don't forget to take a look at our special Holiday Shopping Guide; perfect for selecting just the right gift for that certain CoCo nut.

Light up your December with THE RAINBOW, the number one information source for the Color Computers 1, 2 and 3!

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November 1986

Vol. VI No. 4

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Friends for a Long Time to Come

Editor:

I received the September 1986 issue of THE RAINBOW and was excited to see the announcement of the new CoCo 3. I immediately ran down to the local Radio Shack Computer Center to see this new machine and they didn't even have them in yet! I am amazed at how quickly you got this information into your magazine. That shows true dedication to your readers.

I am also amazed at the new CoCo and the features offered at such a low price. I was getting frustrated with having a great computer with only 64K of memory, and envious of my friends who have computers with larger memories, but now I will be the envy of them. It looks like CoCo and the great people of RAINBOW magazine will be my friends for a long time to come.

*John Merrill
Provo, UT*

BACK TALK

Editor:

I am writing in reference to Richard White's article "Getting In Touch With Penpal" [August 1986, Page 194]. Richard mentioned his dilemma when using JDOS 40-command track formatted disks with *Penpal*. His first reference is that the FREE command only returned 73 granules versus 78. This is because *Penpal* is not compatible with JDOS 40-track FAT table formats. *Penpal* follows the standard FAT table format established in Disk Extended BASIC with extensions for 40-track.

This format is based on the file allocation table containing 78 contiguous bytes of information concerning the availability of storage granules. This table starts with the first byte of the sector in which the file allocation table is stored. JDOS starts its first allocation byte on the sixth byte, followed by 77 additional bytes.

The first five bytes in the JDOS file allocation table are identification bytes. This code tells the JDOS operating system that a format other than 35-track, single-sided disk is installed. Since the file allocation table under Disk BASIC is byte-to-granule position dependent, this causes total incompatibility with JDOS 40-track disks outside of the JDOS operating environment. When *Penpal* checks the FREE status of the disk, it sees the first five bytes (of JDOS code) as

used granules and the next 73 granules as the only FREE space available.

What *Penpal*, or any other Disk BASIC-based program, sees as data stored in granule 20 for example is seen by JDOS as data stored in granule 15. So a copy of a file saved under JDOS causes data from the wrong granule or granules to be moved to the new disk. You end up with garbage or missing data.

I recommend using only Disk BASIC compatible operating systems when using 40 tracks. A DOS like ADOS follows the FAT table format and just extends its range. The use of JDOS creates a need to stay with programs that are only JDOS compatible, or to operate with two operating systems and separate your disks by DOS type. It's too bad JDOS didn't put its ID Codes at the end of the file allocation table.

In reference to Richard's lost 14 granules under Disk BASIC, it is that you have 19 used granules plus JDOS code of 5 granules for a new used granule total of 24 verses 19 actually. This total would be from the 68 only reported by Disk BASIC.

In closing, may I say I really enjoy your magazine and its informative articles.

*James Bodily
Clearfield, UT*

Editor:

I appreciate the time and effort that Mr. Bodily has gone to, to explain why *Penpal* cannot use 40-track disks formatted under JDOS. This problem should not be considered a problem with *Penpal*. Rather, it is a compatibility problem between Disk BASIC and JDOS.

Mr. Bodily's closing comment about his appreciation of RAINBOW and its informative articles could not have been made but for material submitted by informed readers like Mr. Bodily who spend time to share their knowledge with others.

*Richard White
Fairfield, OH*

Metronomic Proportions

Editor:

I'd like to contribute this routine to Michael Bridges of Nashville, Tenn. [August 1986, Page 8], and anyone else who is interested in using the CoCo as a metronome. If you don't find certain speeds

accurate enough, change the value of the variable 'T' in program Line 1 or merely enter a speed value greater than or less than the one you want. It will be more accurate if you type everything exactly as it is printed, including line numbers and spaces.

After you have typed it in, RUN. When the prompt appears, type a number for the speed you want in beats per minute and press ENTER. Your CoCo will immediately begin to act like a metronome. Make sure the volume is turned up on your TV or monitor. When you're finished, press BREAK.

```
0 CLS: CLEAR 200
1 T = 420
2 PLAY "05;L255;V31"
3 PRINT @ 225,,: INPUT "<enter>"
  METRONOME SPEED. ";S
4 B = INT(60/S * T)
5 PLAY "G": FOR X = 1 TO B: NEXT
  X: GOTO 5
```

*Don Lockwood
Washington, PA*

Pin-to-Pin Fix

Editor:

Alfred Johnson [July 1986, Page 8] wrote about the Cannon Typestar 7 that doubles as a typewriter. I own a Brother EP-44 dot-matrix printer that also doubles as a typewriter. It's portable, runs on AC or DC and has a 4K memory to use as a simple word processor.

The EP-44 has a built-in RS-232C interface. All you need to make the EP-44 work with CoCo is a 4-pin to 25-pin serial cable (Cat. No. 26-3014) from Radio Shack.

The following hookup works: CoCo Pin 2 to RS-232C Pin 20. CoCo Pin 3 to RS-232C Pin 1. CoCo Pin 4 to RS-232C Pin 3.

The EP-44 accepts ASCII code and is compatible with other computers, including Tandy models. Just set the Baud rate and word length, and you're ready to print. If anyone needs more information or has any questions, drop me a line.

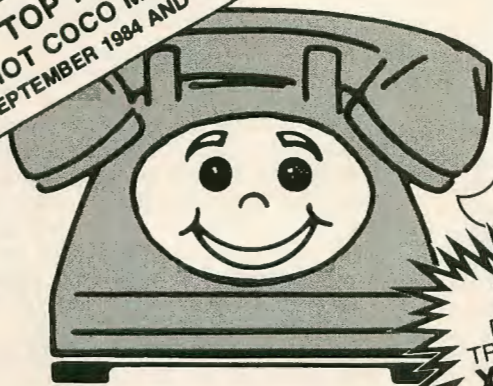
*Edward Lasota
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Quick 'n' Dirty

Editor:

In response to E.C. Blend, Jr. [September 1986, Page 6] and others who have asked how to get *Desk Mate* to print at 2400 Baud, here is a quick and dirty solution: Patch the

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SEPTEMBER 1984 AND MAY 1985



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Banta, *HOT CoCo*, 9/84

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Eilers, *RAINBOW*, 11/84

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device driver (printer) so that it ignores the Baud parameter in the descriptor and sends at 2400 Baud. This works for any application that uses the printer module.

Boot up with a disk that has *DeskMate*. If the disk does not have *Cobbler* and *Debug* in the execution directory, switch to one that does and execute `chx /do/cmds`, then load *Cobbler* and *Debug*. Switch back to the *DeskMate* disk and execute `chx /do/cmds` again. Patch the Printer module and execute *Cobbler* as shown below.

```
OS9:Debug
Interactive Debugger
DB: L PRINTER
    0000 B7
DB: . .+61
    0061 A6
DB: =86
    0062 AB
DB: =04
    0063 35
DB: =12
    0064 xx
DB: L PRINTER
    0000 B7
DB: . .+194
    0194 AE
DB: =9B
    0195 B2
DB: =25
    0196 CA.
DB: =35
    0197 xx
DB: Q
OS9:COBBLER /DO
```

The memory locations shown are offsets. The actual locations will be the offsets added to the base address where Printer is loaded.

Duane M. Perkins
Mount Gretna, PA

More Views on Pirating

Editor:

Mr. Vergona's letter [August 1986, Page 6] helps to emphasize that there are real people out there whose rights are being trampled on and their profits stolen by others who steal their software.

For those who think it is "no big deal" to copy software you haven't paid for, just what do you think is the difference between what you do and what a shoplifter does? Of course, the only difference between you and the shoplifter is that he will eventually be caught and punished, but you know you never will because it is impossible for anyone to enforce the copyright laws. You operate outside the sphere of law enforcement, so society gives you the romantic label of pirate instead of thief . . .

Robert Pels
Burlington, VT

Editor:

. . . I sympathize with his plight. Having spent over a year writing and rewriting a BASIC checkbook management program, I would hate to see the results of my labors passed around illegally if I were offering the program for sale.

I do not condone "trading" programs with other users — in the end this will only hurt

the recreational or home computer market, especially the CoCo community! . . .

Jim Peasley
Redwood City, CA

Editor:

Responsible members of the CoCo community would not have stolen Bill Vergona's work so there is no sense in appealing to those who did. I would suggest those who have a copy of Bill's work and did not spend any money to acquire such material, owe Bill Vergona for his efforts. Bill said the loss of revenue from this piracy has made advertising his product impossible. I don't currently need what Bill has worked so hard on for my own use, but there will come a time when I may very well want such a product or some new product Bill has brought to the marketplace. I want the option of choosing. . . .

David Nolton
Charlotte, NC

Editor:

. . . I agree totally with his point of view; however, I don't see how sales could have been cut "by over 50 percent." Any serious user needing such a powerful utility as *CBASIC* would purchase it. In my opinion, the pirated copies are being used by people who ordinarily wouldn't purchase it (another program to fool around with).

Allen Huffman
Pineland, TX

HINTS AND TIPS

Editor:

I've noticed several inquiries concerning sources of Ham radio programs. While thumbing through *QST*, the journal for the American Radio Relay League, I ran across this information: Amateur radio software is now available from *SPEC-COM*, the Amateur Radio Specialized Communication Journal. These programs are for the CoCo and are available on tape or disk. A catalog of these programs can be obtained by sending an SASE to *SPEC-COM*, P.O. Box H, Lowden, IA 52255.

Curt Myers, KJ4AA
Benton, KY

Going Bananas

Editor:

I have been using *DeskMate* and am very pleased with it. However, the program has a bug to be considered by users of these printers: Radio Shack LP-7, the Gorilla Banana and the Epson MX-80. For these printers, the Text processor part of *DeskMate*, at the first top line of the second and all later printed pages, prints that line at the left border, not at the normal margin. So that one line is positioned to the left, out of line with all other lines. Radio Shack knows about this and tells me they have no patch for the problem. Test the program with your printer before buying it.

The *DeskMate* terminal program is a beauty, far better than any other terminal programs I've tried. I use the *DeskMate* Terminal program in preference over all others.

I would like to hear from anyone who is

able to tell me how to increase the Ter buffer and the Terminal buffer.

Charles E. Brown, J.
Route 1, Box 59
White Stone, VA 22578-976

Starlord Hint

Editor:

Here is a hint for *Starlord* [August 1986 Page 58] to make it easier to find the line number of a data statement that has an error in it. This hint will only work if you receive an FC error in Line 30. You should have your lines numbered exactly the way they are printed in the magazine. After you receive the FC error in Line 30, type: `PRINT(((I-10240)/8)*10)+60`

The number you receive is the line number that contains the error. Simply list that number to display the line that contains the error. No line should contain a number greater than 255 since 255 is the largest number that can be poked into a single memory location. For those of you whose copy of the program simply locks up after a certain point, recheck your typing. Even if one number is incorrectly entered, the program could crash.

Raju Dash
Downers Grove, IL

REQUEST HOTLINE

Editor:

I would like to find any programs for printing address labels. I have a 16K CoCo 2 ECB with a cassette. Any programs and information would be greatly appreciated.

Karen Krumanocker
609 College Garden Drive
Kutztown, PA 19530

CoCo Cribbage

Editor:

In a recent issue of a competitive magazine I saw a program for a cribbage game for the Commodore and Atari. Does someone have a CoCo version that I might be able to type in and enjoy?

Bill Franken
1358 Sepulveda
San Bernardino, CA 92404

Electronics Programs

Editor:

I have been looking for a program for my electronics hobby. So far I haven't seen or heard of one for the Radio Shack 64K Color Computer. Do you know who sells them? Also, I was told that Radio Shack's 100 Disk Drives can be used with my machine, is this true?

J. DeBruin
236 Pinecove Road
Burlington, Ontario
Canada L7N 1W1

Choo Choo CoCo 2

Editor:

I would like to know how to run a train

set from the CoCo 2. Any help would be greatly appreciated.

Torin Segstro
216 Springdale Circle East
Airdrie, Alberta
Canada T0M 0B0

Attention Numismatists

Editor:

Anyone who has a coin saving program for the CoCo, please write to me.

Blake Cadmus
1106 Whitfield Blvd.
Reading, PA 19609

A Wave of the Wand

Editor:

I am interested in purchasing a text reader for my CoCo. I have hundreds of programs I don't have time to type in. If anyone knows of such a device and the appropriate software to use it for entering programs, please let me know.

Percy Veals
Rt. 1, Box 169
Gloster, MS 39638

DELPHI LINE

Editor:

How about a RAINBOW ON DISK? I know a lot of people would like it. Don't get rid of the tape, just have the disk as well.

Paul Fielding
(PAULFIELDING)

Your prayers have been answered.
Look on Page 159 of this issue.

School Daze

Editor:

The CoCo community is growing up! How will the CoCo do in the college scene? What if the "campus computer" is a Macintosh or an IBM? What if there is no "campus computer"? I am sure CoCo owners who will be taking the computer to college with them would be interested in knowing what they're up against. I asked a friend of mine who runs his own business, and unfortunately he had to say that if the campus computer is an IBM or whatever, you either have that computer, you buy it or you flunk out because of incompatibility. If you do your homework on a CoCo, you can't always transfer it to an Apple. People might want to consider what the current computer of a college is when deciding where to go.

I was thumbing through my latest issue of THE RAINBOW and noticed your advertisement for PCM magazine. Could there be any way for readers to use a bar code pen to wave in programs out of RAINBOW? You could add a special part to THE RAINBOW with the codes on it. This would be a fast way to enter programs and might even be cheaper than having to download them from Delphi. I'm sure this would raise the price, but it would be worth it.

Ted Matthews
(SIERRA)
Frazer, PA

INFORMATION PLEASE

Editor:

I am a licensed Ham radio amateur, W2SAD, looking for a program for the CoCo that will function as a Bulletin Board on packet radio. These programs are called Packet Bulletin Board System (PBBS) and are used with a Packet controller (TNC 2) developed by Tucson Amateur Packet Radio in Tucson, Ariz., on allocated amateur radio frequencies. There are PBBSs that have been written for the IBM and Xerox computers, but I can't find any for the CoCo. Anyone with information on how to obtain a PBBS program for the CoCo please write me.

Harry Warren
19 New York Avenue
Lavallette, NJ 08735

Multi-Pak Fix

Editor:

I understand there is a fix required on the old Multi-Pak before it will work on the CoCo 3. Will I be able to use my 512K chips to upgrade my 128K CoCo 3?

Leonard H. Reed, Sr.
190 Cleaveland Road #1
Pleasant Hill, CA 94523

The "fix" for the Multi-Pak is, at this time, only expected to be available through Radio Shack service centers. It involves a chip replacement. The new CoCo 3 uses a satellite board (special circuit board) for 512K upgrades. The board comes with 16 256K by 1-bit dynamic RAM chips.

CoCo Max Questions

Editor:

I own a CoCo 2 ECB and am going to buy a printer for CoCo Max. I have seen an Olivetti PR-2300 ink-jet printer in the DAK catalog. If I have a serial to parallel converter, can I use this printer with CoCoMax II?

Cliff Geier
Rt. 1, Box 245
Fairview, WV 26570

To our knowledge, this printer is not supported by CoCoMax II. We suggest you contact Color-ware.

Hayes Compatibles

Editor:

I am looking for information on DAK or other Hayes-compatible 1200 Baud modems.

Chad Stuckey
254 S. Ringold
Boone, IA 50036

Pokin' Along

Editor:

I have bought the last few editions of RAINBOW and found some very helpful POKEs and EXECs. I would like to know if anyone knows of other helpful POKEs and EXECs. Any reply would greatly be appreciated.

Warren Hudym
Box 174
Wapella, Saskatchewan
Canada S0G 4Z0

Microcom Software sells 500 Pokes, Peeks and Execs. See their ad on Page 17.

CoCo Cat Art



Rochelle Sherman
Levittown, NY

BOUQUETS AND BRICKBATS

Editor:

I would like to tell your readers about the excellent service of two of your advertisers. The first is The Software House of Redford, Michigan. I saw their advertisement on Page 162 of the August 1986 issue. I decided to order eight of their color ribbons for the SG-10 printer. I mailed my order with a check and within one week I received the eight ribbons plus two extra ribbons. Mr. Dallas Cox wrote on my invoice that they had recently added purple ribbons to their color assortment and he was including two of these ribbons at no extra charge. I would like to thank Mr. Cox for his friendly, fast service, and would like to encourage others to deal with The Software House. By the way, the ribbons are great!

Second, I would like to congratulate Dayton Associates. The first time I called to order their SG-10 printer package, I was greeted by an answering machine. I left my name and number, and the next day Dayton Associates returned my call. I ordered the printer C.O.D. and in four days it was on my doorstep. I was pleased with the packaging, and the manual was easy to understand. Not only would I like to thank Dayton Associates for their prompt, courteous service, but thank Star Micronics for making such a fine printer as the SG-10. I can only imagine the quality of their new NX-10.

Brian Biggs
Grove City, OH

Fast Service Praised

Editor:

I would like to make a few comments about some of your advertisers. I have purchased about \$1,000 worth of equipment from Computer Plus in the last five years and have been more than satisfied. They give fast service and good prices. But can you top this? I ordered Graphicom by phone from Moreton Bay Software about noon one day

and found it laying at my front door early the next morning. There was also a note from the telephone sales girl saying she hoped I would enjoy the program and she gave me a few extra pointers on its use.

Floyd Keirnan
Orange, CA

Rainbow BBS?

Editor:

I get unbelievably great support from your advertisers. With both hard- and software problems they have all come through with quick, courteous fixes or replacements. This type of response sometimes gives me a better feeling about a supplier than if all had been perfect. It says a lot about the quality of RAINBOW.

I would like to see RAINBOW start its own BBS, so people like me who don't have access to Delphi or CompuServe could get access to you via modem. I have literally called from Maine to California (Florida, too) trying to get a copy of *MTERM*. So I wouldn't mind the long distance calls once in a while to your BBS.

Art McDaniel
Ferndale, CA

User Hostile

Editor:

I agree heartily with the comments published in your magazine regarding the user hostility of *VIP Writer*. In fact, I find the entire *VIP Library* to be user hostile.

What is even worse, though, is the attitude of the publishers of the *VIP Library*. I have written to Softlaw three times over the past year or so asking for help in using the math package contained in *VIP Database*. Thus far, I've not been shown the courtesy of a reply of any kind whatsoever by Softlaw. That, to me, is the ultimate in "user hostility."

E.W. Rees
Yaupon Beach, NC

Don't Forget Us

Editor:

With all the excitement over the new CoCo 3 please don't forget there are still those of us struggling along with the old gray machine who would like to learn more of the secrets of its use.

H.W. Regester, Jr.
Corsicana, TX

See Jim Reed's "Building July's RAINBOW" July 1986, Page 16.

No Silly Advice

Editor:

I am writing because I am afraid that a very helpful tip that was passed on may have not been taken seriously by some of your readers.

I have a 64K CoCo with cassette and I have been plagued for some time with I/O errors, especially with machine language programs. Some programs, including my screen dump, have proved impossible to

load. When I read the suggestion offered by Rick Bullon [June 1986, Page 163], I chuckled. Turn your recorder upside down! Stupid! Unscientific! No good solution is free.

Well Rick, after tucking my tongue in my cheek, bearing in mind that this silly lark was costing me nothing, I tried it. Rick, I now have just three words for you — it works, thanks!

Paul Fullerton
Gardiner, ME

Too Technical!

Editor:

Thanks to your magazine, the Color Computer is one of the best consumer products on the market. The articles elaborating on the existing programming structure provide extreme flexibility.

Why are all of the OS-9 articles reading like a lab report? Did someone forget that OS-9 comes with all the technical specifications and minus the information required to get the individual pieces of your system operating (so you can experiment)? The Guide to OS-9 could be a good manual. The missing operators manual is quite normal when you let engineers do the paperwork. All of the high-tech goodies-bag without the proper organization has promoted the impression that OS-9 is just a digitized Edsel. Just getting the printed word to the buyers of these products should go a long way to eliminating the unending articles on computer-market apathy.

Michael L. Millard
Douglas City, CA

A Color Black and White TV

Editor:

The "Loose Strings" cartoon by Tron [September 1986, Page 166] isn't nearly as funny as you think! There is a program available for the TS1000 (Russell Electronics) which does produce color graphics on

a black and white TV by a pulse-modulator technique. Put one of your programmers to work on that for the CoCo!

B.R. Pogue
Lake Havasu City, AZ

A 'Prize Winning' Idea

Editor:

I was thinking about an annual RAINBOW magazine cover contest, where subscribers could make a cover picture using *Graphicom*, *CoCo Max* or any program to make a cover for your magazine. Their prize is having it printed on the cover of the RAINBOW! So what do you think?

Jeff Kilsdonk
Milwaukee, WI

Nice idea, Jeff. In the meantime, try your artistic talents on "Envelope of the Month" or "CoCo Gallery."

PEN PAL

Editor:

I'm Brazilian and a RAINBOW reader. I have a 64K ECB CoCo and I'd like to correspond with other CoCo owners around the world.

Eduardo Akira Watanabe
R. Major Fraga, 4-155
Bauru - SP - Brazil 17100

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

Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

ARTS AND LETTERS



Envelope of the Month

Dan Wang
Oshkosh, WI

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- Un-DISK is provided on cassette.
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- Un-DISK is CHEAPER than a DISK DRIVE!
- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

EXTRA . . . EXTRA . . . EXTRA . . . EXTRA . . . Additional Power For \$14.95

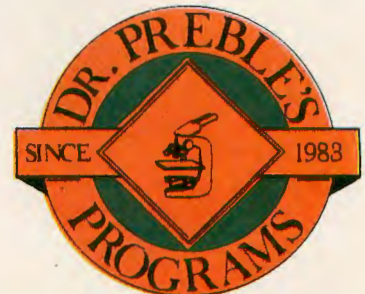
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Tandy's Got "IT"

I must confess that I am in some bit of trouble here. Despite the fact that I am a stickler for deadlines being met, it seems I am about to miss mine for this column. If there is a blank space rather than these words, you'll know I didn't make it (and probably got keel-hauled in the process).

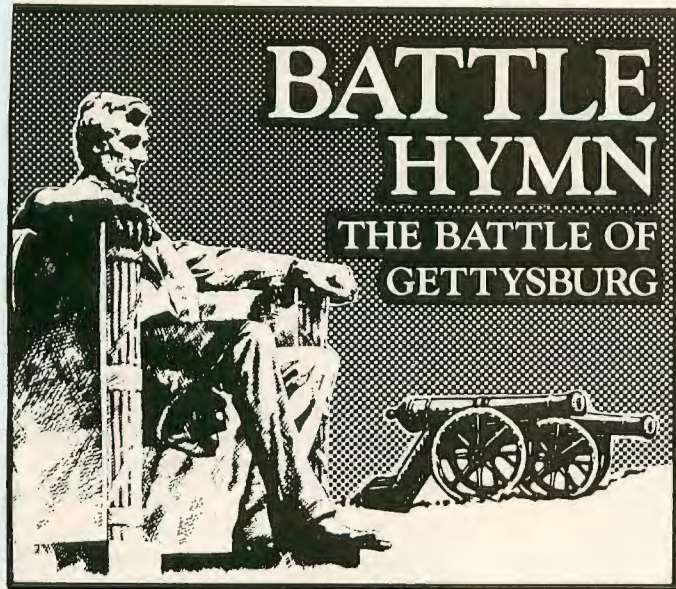
There is a good reason, though. The person to blame is a Maine resident by the name of Stephen King.

King (*Salem's Lot*, *Carrie*, *Cujo*, etc.) has had the audacity to release his latest novel, *It*, right at deadline time. I have been haunting (pun intended) the bookstores for its appearance. Now that *It* has arrived, I've had my nose deep in its 1,100-plus pages for nights and nights.

It is one of those books that is best to read by the strong light of a sunny day; but nighttime is about the only time I have had to read it (night is also when I usually write this column). King has not only written a good story in *It*, but he has crafted the story so that it is just pure pleasure simply reading it. I'm savoring the book but, like all good scary books, it also gives me some unsettling moments.

Since I have not yet finished *It*, I think the "It" of the title is that dark, undefinable something that hangs out in basements, attics, pipes, under porches and in dark hallways. Everyone has confronted It at some time or another. It is the one thing you fear most. It might be a vampire, wolfman and/or mummy, but usually It is without definition — other than It. Unfortunately, with an active mind, and reading the book at night, It has been hovering close to the house.

So, last night, the dog had to go out about 2 a.m. After a dozen or so plaintive whines, I put *It* down and took him. He charged down the stairs onto a wooden floor in the dark and his claws made this absolutely terrifying scratching noise in the darkness. Just for a moment there, I wondered whether It was down there, too. Let's be charitable and say I hastened to turn on the light.



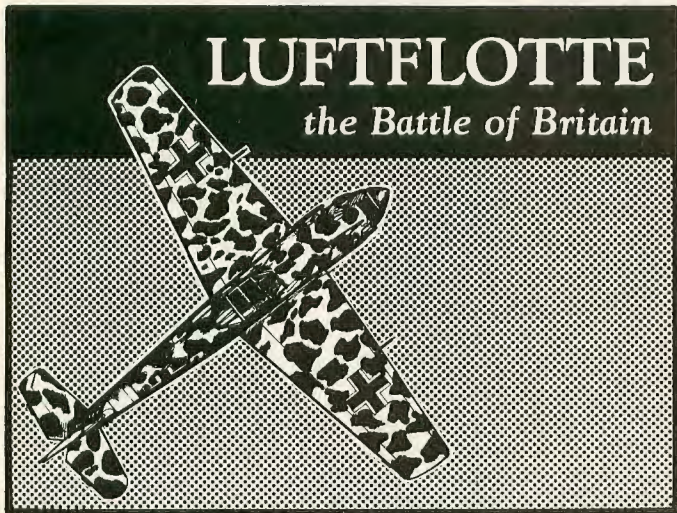
64K Disk or Tape BATTLE HYMN — The Battle of Gettysburg

Player controls Lee's army of 11 divisions (39 individual) brigades including 3 cavalry (Stuart) and 3 artillery (Alexander) and must capture 5 victory objectives to win decisively. It's all here, from Culp's Hill to Little Round Top, from Pickett's charge to Hood's heroic victory at Devil's Den.

Play starts on the second day of the battle with Johnson, Early and Rodes facing an unreinforced Union line running from Culp's Hill down to Cemetery Hill and east. Player has early size advantage but must act quickly as Union reinforcements are seen arriving; and must form the line and charge up hill over a great distance. Where is Stuart?

Brigades must be turned to march or fire, Union troops must reload after firing. Player may limber or unlimber cannon; must watch his fatigue factors and prevent troops from routing. The object is to force the flank and pin the enemy in a cross fire. Easier said than done. Very historic, with an Ark Royal touch.

Hi res graphics; machine language. Game save. Play takes 3-5 hours. **\$29.00**



64K LUFTFLOTTE — The Battle of Britain

Player takes the German side and tries to succeed where Goering and the entire Luftwaffe failed: destroy Britain's will to fight from the air.

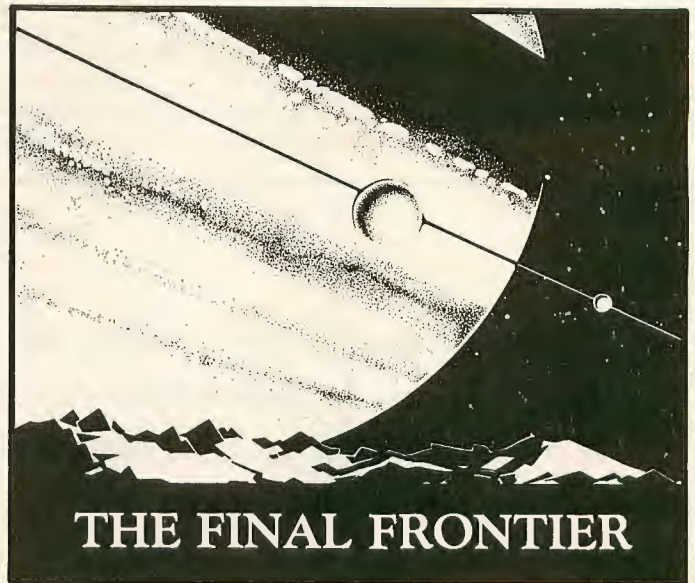
A mammoth game, Luftflotte has it all. Twenty-four British cities producing one of six war materials: petroleum, armaments, aircraft, shipping, morale, electronics; 26 air bases, 18 low radar sites, 17 high radar sites all forming a complex web of inter-communication and defense. Can you break the web?

Player controls 3 Luftflottes of over 2000 individual planes including Stuka, Junkers, Dornier and Heinkel bombers; Me110 and Me109 fighters. Player may launch bomb runs, recon missions, strafing sorties or transfers: up to five flights per Luftflotte.

Player watches as his flights head for London or Bath or Glasgow or lorad site 'j' or... It's up to you. There are 85 individual targets in the game.

Hi res screen shows aerial combat, bombing and strafing missions and supplies brief information. Watch targets and planes explode! Semigraphic strategic map of England and targets. For conclusive information, view the intelligence screen to see everything. Unless, of course, you prefer playing EXPERT in which case you'll be flying blind as the real Germans did not so long ago.

Playing time: 3-6 hours. Game save. Machine language. **\$29.00**



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

While opening the door I decided to think about something other than It (after all, I had to turn off the light and go back up the stairs and the only thing

I realized that it was also the middle of the night at both Atari and Commodore headquarters, and it dawned on me that maybe some of those people, too,

in a tall glass tower in Fort Worth Texas. This is certainly not to imply that John Roach looks like the vampire Ron Stegall the wolfman or Barry Thompson the mummy. But, remember, It is really the one undefinable thing you fear the most. And, if I happened to be sitting up in the middle of the night thinking about what to do with my Amiga or ST computer line in view of the release of the new CoCo 3, I think it would certainly cross my mind that my It might, indeed, be coming to "get" me from somewhere like Tandy Center, Fort Worth, Texas, USA.

I think if I was responsible for the success or failure of Atari or Amiga, I'd be more scared of that than of some scratching, scraping screeching sound that *might* be a dog's claws on a wooden floor in the dark — or might not.

As Steven King, a good New Englander, would probably say, "ayuh."

"This is certainly not to imply that John Roach looks like the vampire, Ron Stegall the wolfman or Barry Thompson the mummy."

my dog guards with any competency whatsoever is his dinner bowl). And, naturally, since I was feeling guilty about it anyway, I thought about this column.

were awake and worried about their own It.

And then, flights of fancy being what they are, I decided that It for Commodore and Atari people might be lurking

— Lonnie Falk

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RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character “goes under” what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have “key boxes” to show you the *minimum* system a program needs. But, do read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the 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 that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the “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 Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a “check sum” system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and *SAVE* it for later use, then type in the command *RUN* and press *ENTER*. Once the program has run, type *NEW* and press *ENTER* to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+17B
20 CLEAR 25,X-1
30 X=256*PEEK(35)+17B
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y:W
60 POKE Z,Y:NEXT
70 IF W=7985 THEN B0 ELSE PRINT
  "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

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 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 the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW's 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:

```
10 CLEAR 200,&H3F00:I=&H3FB0
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7FB0.

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 that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

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.

We will appreciate knowing of instances of violation of Seal use.

A Look at Copyrights and Your Right to Copies

This is our telecommunications issue and a prime topical thread in any form of telecommunications revolves around the use and abuse of copyrights. Perhaps my brief treatment here will stimulate individual reading and group discussion, both in club meetings and on bulletin boards and national information services.

A prime source of confusion is that many people familiar with the old copyright law preach it as gospel despite the fact a new law has been in force for years. Prior to 1978, under the old law, for something to be protected it had to be published with a copyright notice and registered with the U.S. Copyright Office in Washington, D.C.

Under present law, it's extremely easy to get a limited copyright. If you put a notice of copyright (where it can be easily seen) on every copy of the work that reaches the public, this alone — without further action — will afford protection for a period of five years. To get more permanent protection, you must register your work with the copyright office within five years after the work is made public. (The U.S. has reciprocal copyright relations with many countries — including Russia, so, I hope we copyright defense stuff!)

Copyrights used to be granted for 28 years and could be extended for another 28 years. That was under the old law. Now, a copyright lasts for your lifetime and 50 years after your death. In the case of companies, not individuals, holding copyrights, the copyright is for 75 years from the year in which it was first published, or 100 years from the date it was created — whichever is shorter.

Now, *copyright ownership* and ownership of the *material object* in which the copyright work is embodied are entirely separate things. That is, an artist, for example, could copyright a painting and then, if he chooses, convey that copyright to someone else, a publisher, for instance. But, he could keep the painting, since transfer of the material object does not in itself convey any rights under the copyright. By the same token, in going to a store and purchasing a copy of a book — or a piece of software — you do not acquire the copyright to it. You could pass that individual copy of the book around until the pages fell out, but you do not have the right to reproduce it merely because you bought a copy. Similarly, the law forbids you to reproduce copyright computer programs.

While, often, all rights are sold in one transaction, there are several separate rights protected by copyright laws and *each can be sold individually* without affecting ownership of the other rights. You might, for example, retain book and/or movie rights while selling only first North American serial (magazine) rights, and retaining other serial rights.

So, all you need do to copyright something is put the proper notice on all the copies that go to the public; registration is not necessary. But if you want to do something about copyright infringement, that is another matter! A copyright owner who has not registered his claim can, of course, sue someone who has infringed on his claim, but he *cannot enforce his claim until he has registered his work* — either before filing a suit or during the trial. It must be registered before a judgment can be rendered.

Unfortunately, there is a widespread notion that the original author retains some sort of rights to public domain material, such as a computer program he or she wrote. While there may be some moral obligation to the author, in copyright law, a creative work is in the public domain if it is not covered by a copyright or if its copyright has expired. Once in the public domain (that is, distributed to the public without copyright protection), it is fair game and cannot simply be "jerked back out" of public domain, nor can it be copyrighted by anyone else. When the copyright expires or the material is placed in the public domain, the copyright owner loses all rights to the work and it may be freely copied or reproduced by the general public.

Now, concerning so-called "collective" copyrights, a compilation of non-original material can be copyrighted. Nonetheless, any copyright material remains the property of the copyright *owner* and public domain stuff is still public domain.

So, a copyright is your exclusive right to control the distribution, copying, sale or publication of any form of communication that can be recorded in any tangible medium. It is a valuable piece of property, without which publications such as THE RAINBOW would not be possible. And, while we retain RAINBOW's copyright, you can purchase the right to receive 12 copies with a one-year subscription; I hope you'll choose to exercise that right.

— Jim Reed

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Use your spring-centered joystick to feel the effects of this game on your "man"



Treasure Quest: The Golden Adventure

By Eric Tucker

You've made it to the second room. All is quiet, and right across from you is a gold bar! As you look around the room, you count a total of five bars of gold. You check the walls, but see nothing. Looking at the floor, there's nothing but gold. You step across the floor, and fall into a pit.

Treasure Quest is an arcade Adventure game that requires a 16K Extended Color BASIC CoCo with one joystick. It uses the speedup POKE (POKE 65495, 0). If your machine can't handle it, edit lines 160 and 1130 to delete it.

The title screen has two parts. The first uses CoCo's eight colors and CHR\$ blocks to write the title. The second is the graphics screen which shows you entering the castle.

The castle has three rooms: the Vacuum Room, the Magic Pit Room and

the Wind Tunnel. In all three rooms your man is the blue square.

In the Vacuum Room, there is a large bar of gold on the other side of the room. You must cross the room, get the gold and return to the blue door. On either side of the room are two large ducts. Avoid both of them, or you'll get pulled in by the suction from the duct. If you get close to the gold, you may be repelled by an invisible force field. It comes and goes at random, so keep trying. Once you get the gold, you must go back across the room to the blue door to get out.

The second room is the Magic Pit Room. There are five bars of gold situated throughout the room. Surrounding them are large, square, disappearing pits. You must avoid getting caught when one appears or down you go! After picking up all the gold, a small blue key may appear on the screen. Pick up this key and you are awarded 100 points and an extra man. However, you must then go back and go through the room again.

The third room, the Wind Tunnel, is the easiest of the three. To your right is a large fan and three gold keys. To the left is a blue spiked wall. You must fight

against the fan to get the three keys. During your struggle, the spiked wall moves slowly but surely toward you. Once you reach all three keys, you are congratulated, then sent back to the Vacuum Room.

To begin, you are given three men. The only way to gain an extra one is to get the small blue key in the Magic Pit Room. All treasures except the blue key are worth 250 points. You automatically get five points each time you move. In the Vacuum Room, you must pass between the ducts to get the points. After passing all three boards, you are given another 100 points.

At the end of the game, your score and the high score are displayed. A spring-centered joystick should be used to best feel the effects of the first and third rooms. I hope to see some of your scores on the Scoreboard.

If your man doesn't look like a square, press BREAK and run the program again.

(Questions about this program may be directed to the author at 2950 Park Avenue #114, Bronx, NY 10451, 212-665-1821. Please enclose an SASE when writing.) □

Eric Tucker lives in the Bronx and is a 17-year-old student at Baruch College. He is studying for a bachelor's degree in computer science. He owns both an MC-10 and a CoCo, but programs exclusively on the CoCo.

140	.....121	760	.....120
230	.....72	900	.....17
360	.....89	1010	.....104
470	.....209	1130	.....67
580	.....147	END	.....181
640	.....171		

The listing: TREASURE

```

20 CLEAR200: DIM MAN(9,11)
30 PCLS: DRAW"C3": LINE(100,92)-(100,96), PSET, BF: GET(98,88)-(108,98), MAN, G: SC=0
40 CLS0: C=0
60 FORT=1TO8: PRINT@34, STRING$(3,143+(C*16));: PRINT@67, CHR$(143+(C*16));: PRINT@99, CHR$(143+(C*16));: PRINT@131, CHR$(143+(C*16));
70 B$=CHR$(143+(C*16)): B2$=CHR$(140+(C*16)): B3$=CHR$(131+(C*16)): G$=CHR$(128)
80 PRINT@70, B$+B$+G$+B$+CHR$(140+(C*16))+B$+G$+B2$+B2$+B$+G$+B$+B2$+B2$+G$+B$+G$+B$+G$+B$+B$+G$+B$+B2$+B$;
90 PRINT@102, B$+G$+G$+B$+B3$+B$+G$+B$+B2$+B$+G$+B2$+B2$+B$+G$+B$+G$+B$+G$+G$+B$+B3$+B$;
100 PRINT@134, B$+G$+G$+B$+B3$+B3$+G$+B$+B3$+B$+G$+B3$+B3$+B$+G$+B$+B$+B$+G$+B$+G$+G$+B$+B3$+B3$;
110 PRINT@200, B$+B$+B$+B$;: PRINT@218, B$;
120 PRINT@232, B$+G$+G$+B$+G$+B$+G$+B$+G$+B$+B2$+B$+G$+B$+B2$+B2$+G$+B2$+B$+B2$;
130 PRINT@264, B$+G$+CHR$(137+(C*16))+B$+G$+B$+G$+B$+G$+B$+B3$+B$+G$+B2$+B2$+B$+G$+G$+B$;
140 PRINT@296, B$+B$+B$+B$+G$+B$+B$+B$+G$+B$+B3$+B3$+G$+B3$+B3$+B$+G$+G$+B$;: PRINT@332, CHR$(136+(C*16));
150 C=C+1: NEXT: PRINT@395, "BY ERIC TUCKER";: SCREEN0, 1: FORT=1TO2000: NEXT
160 SOUND200, 4: POKE65495, 0: PMODE3: PCLS2: MD=0
170 DRAW"BM0,50;C4;F10D15R15U30E10C3U10R5D1R3D1L8D8C4F10D30R15U15E10F10D65L80U75": PAINT(6,60), 4, 4
180 DRAW"C1": LINE(0,126)-(86,191), PSET, BF: LINE(144,126)-(255,191), PSET, BF: DRAW"C3": LINE(88,130)-

```

```

(142,191), PSET, BF: LINE(0,160)-(255,191), PSET, BF
190 DRAW"C4": LINE(192,125)-(194,120), PSET, BF
200 LINE(82,126)-(82,66), PSET
210 SCREEN1, 0: FORT=1TO2000: NEXT: X=82: Y=66
220 FORT=0TO14: DRAW"C4": LINE(82,66)-(X,Y), PSET: LINE(82,126)-(X,Y), PSET: SOUND245, 1: FORZ=1TO2000: NEXT: DRAW"C2": LINE-(82,126), PSET: X=X+4: Y=Y+4: NEXTT
230 DRAW"C3": LINE(82,126)-(X,Y), PSET: LINE-(82,66), PSET: PLAY"T6L16V3001CCCV25CCCV20CCCV15CCCV10CCCV5CCC"
240 FORT=1TO1000: NEXT
250 X=192: Y=125: FORT=1TO56: DRAW"C3": LINE(82,66)-(142,126), PSET: LINE(X,Y)-(X+2,Y-5), PSET, BF: FORQ=1TO30: NEXT: PLAY"L32T20V3001DBV20DBV10DB": DRAW"C2": LINE(X,Y)-(X+2,Y-5), PSET, BF: X=X-2: NEXT
260 FORT=1TO1500: NEXT
270 SOUND100, 1
280 CLS: PRINT@107, "VACUUM ROOM": PRINT@198, "PICK UP THE GOLD BAR": PRINT@330, "YOUR SCORE:"; SC: PRINT@362, "MEN LEFT:"; 3-MD
290 FORT=1TO3500: NEXT
300 REM vacuum room
310 PCLS: DRAW"C4BM100,0;G40R152H40;BM100,191;H40R152G40": PAINT(110,5), 4, 4: PAINT(100,185), 4, 4: DRAW"C2BM10,100E8R15F8L31"
320 PAINT(15,98), 2, 2
330 DRAW"C4": LINE(0,40)-(255,40), PSET: LINE(0,151)-(255,151), PSET
340 DRAW"C3": LINE(252,86)-(255,106), PSET, BF
350 PX=200: PY=96: PUT(PX,PY)-(PX+10,PY+12), MAN, PSET
360 SCREEN1, 0: POKE65314, 248: FORT=1TO500: NEXT
370 PLAY"T302L32V5GBGBGV10BGBGV15BGBGV20BGBGV25BGBGV30BGBGV": CT=0: GD=0
380 GOSUB 1140
385 IF PX<=42 THEN PX=42
390 PLAY"T200V10L64O2CD"
400 IF PX>56 AND PX<202 THEN SC=SC+5
430 QW=RND(10): IF QW<8 AND PX=60 THEN PX=60: IF PY<96 THEN DRAW"BM58,45;C4;D51;L2U51C1;D51R2U51;" ELSE DRAW"BM58,96;C4;D51L2U51;C1;D

```

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

Requirements: a Coco or Coco II with a minimum of 32K, One Disk Drive (Disk Ext. BASIC 1.0/1.1, ADOS, or JDOS). Printers supported include: Epson RX/FX, GEMINI 10X, SG-10, NX-10, C-Itoh 8510, DMP-100/105/400/430, Seikoha GP-100/250, Legend 808 and Gorilla Bannana. Send a SASE for complete list of compatible printers. #C332 Coco Graphics Designer \$29.95

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51R2U51"

```
431 IF QW<8 AND PX=60 THEN PX=86
:PY=PY+1:PUT(PX,PY)-(PX+10,PY+12)
),MAN,PSET:LINE(60,PY)-(70,PY+12)
),PRESET,BF:PLAY"T50L32V3104CDV2
1CDV11CD"
```

```
440 PUT(PX,PY)-(PX+10,PY+12),MAN
,PSET:IF PY+4>96 THEN 460
```

```
450 IF PX<202 AND PX>56 AND PY+4
<96 THEN PY=PY-(RND(4)-1)
```

```
460 IF PX<202 AND PX>56 AND PY+4
>96 THEN PY=PY+(RND(4)-1)
```

```
470 IF PY<=42 OR PY>=138 THEN GO
SUB1080:IFMD<3THEN280
```

```
480 IF PX>41 AND PX<47 AND PY>=8
5 AND PY<=100 AND GD=0 THEN PAIN
T(15,98),1,1:PLAY"V31T5L32CDEFGA
B":GD=1:SC=SC+250
```

```
490 IF GD=1 AND PX>=240 THEN PLA
Y"T6L32V3004BBBV25BBBV20BBBV15BB
BV10BBBV5BBB":GOTO510
```

```
500 GOTO 380
```

```
510 REM open pit room
```

```
520 FORT=1TO1500:NEXT:SOUND100,1
```

```
530 CLS:PRINT@104,"MAGIC PIT ROO
M":PRINT@197,"PICK UP THE GOLD B
ARS":PRINT@330,"YOUR SCORE:";SC:
PRINT@362,"MEN LEFT:";3-MD:FORT=
1TO3500:NEXT:FORT=1TO5:GD(T)=0:N
EXT:XY=0:BZ=0
```

```
540 GX(1)=80:GY(1)=40:GX(2)=80:G
Y(2)=150:GX(3)=140:GY(3)=96:GX(4
)=212:GY(4)=60:GX(5)=212:GY(5)=1
30
```

```
550 PCLS:FORT=1TO5:DRAW"BM"+STR$(
GX(T))+", "+STR$(GY(T))+";C2E4R6
F4L14":PAINT(GX(T)+2,GY(T)-1),2,
2:NEXT
```

```
560 DRAW"C3":LINE(0,86)-(4,100),
PSET,BF
```

```
570 HX(1)=60:HY(1)=84:HX(2)=132:
HY(2)=10:HX(3)=132:HY(3)=150:HX(
4)=192:HY(4)=80:SCREEN1,0:POKE65
314,248:PX=12:PY=92:HX(5)=40:HY(
5)=15:HX(6)=40:HY(6)=146:HX(7)=1
32:HY(7)=42:HX(8)=132:HY(8)=118:
HX(9)=192:HY(9)=20:HX(10)=192:HY
(10)=140
```

```
580 R=RND(10):DRAW"C4":LINE(HX(R)
,HY(R)-(HX(R)+30,HY(R)+30),PSE
T,BF
```

```
590 GOSUB 1140:LINE(PX,PY)-(PX+1
0,PY+12),PRESET,BF
```

```
591 IF H<5 THEN PX=PX-2
```

```
592 IF H>59 THEN PX=PX+2
```

```
593 IF J<5 THEN PY=PY-1
```

```
594 IF J>59 THEN PY=PY+1
```

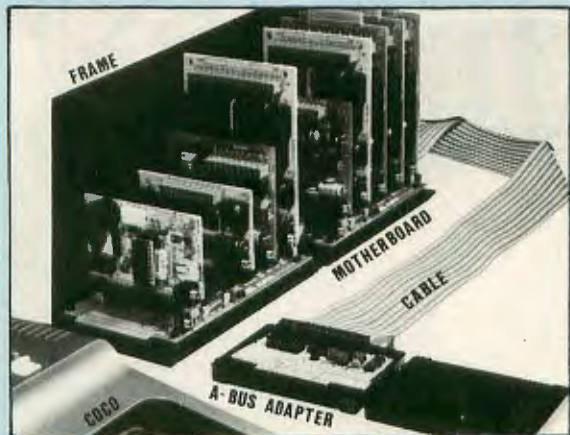
```
600 SC=SC+5
```

```
605 XY=0:FORT=1TO5:IFGD(T)=1THEN
```

The Amazing A-BUS

What will you do with it?

NEW



An A-BUS system with 2 Motherboards and 9 Cards.



A-BUS Adapters

Special:
Complete set of all user's manuals. Typeset, illustrated, with schematics. Only \$10

SHEILA wanted to set up a variety of experiments in her lab. With an A-BUS, the computer can watch the mice instead of Sheila.

HARRY has a model railroad layout that he wished to automate. Now his home computer controls the engines, gates, signals, etc. through the A-BUS.

BOB tests electrical fixtures as they leave the assembly line. He develops test equipment quickly with inexpensive, off-the-shelf, and easy to use A-BUS cards.

But what's an A-BUS? It's the easiest way to connect a variety of cards that sense and control anything outside the computer. With the A-BUS, your CoCo becomes an incredible machine.

What would I need? First, an A-BUS Adapter to convert your computer bus to the A-BUS standard. Then a Cable (with one or two slots) to connect one or two A-BUS Cards. If you need more than two cards, the cable will be connected instead to the A-BUS Motherboard, which has five slots. Up to five motherboards can be chained. Finally, add your choice of A-BUS Cards to fit your project.

I'm not an engineer. Can I use the A-BUS? If you can wire a switch, you can use the A-BUS. No computer hardware knowledge is needed! A screwdriver is all you need for many projects.

What about software? Simple PEEK and POKE commands control the whole system, whether you read the time on the clock, switch the relays, take a temperature reading, or turn a motor.

What if I change computers? Incredibly, this is as simple as replacing the inexpensive adapter card.

CoCo to A-BUS Adapter AR-138: \$49

Works with all CoCo's. Plugs into rom slot or Multipak. Disk systems without Multipak need Y-cable (\$19.95)

A-BUS adapter for: AApple II, II+, IIe. AR-134...\$49

IBM PC, XT, AT and all compatibles. AR-133...\$69

TRS-80 Models 100, 200. AR-135...\$69

TRS-80 Mod 3, 4, 4D. Fits 50 pin I/O bus. AR-132...\$49

TRS-80 Model 4P. Includes extra cable. AR-137...\$62

TRS-80 Model I. Plugs into 40 pin I/O bus. AR-131...\$39

A-BUS Motherboard MB-120: \$99

Will accommodate five A-BUS cards. A sixth connector allows a second motherboard to be added to the first (with connecting cable CA-161...\$12). Up to five motherboards can be joined this way to a single adapter. The motherboard is mounted on a sturdy aluminum frame with card guides.

A-BUS Cable (3 ft.) CA-163: \$29

Connects Adapter to 1 A-BUS card or Motherboard.

Special Cable for two A-BUS cards CA-162...\$39

Relay Card RE-140: \$129

8 industrial relays on board. Contacts are rated at 3 amps. You can control up to 64 cards (512 relays) using several motherboards. Jumpers are used to simply select the card address. The card is easily controlled in BASIC with "OUT" or "POKE". For example, OUT 1,0 turns all the relays off on card #1. Eight LED's show which relays are on.

Digital Input Card IN-141: \$49

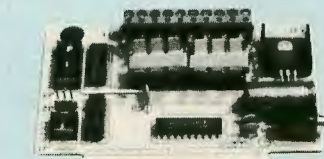
It's safe and easy to connect and read switches, keypads, thermostats, alarm loops, etc. The eight inputs can monitor the presence of voltage or switch position. Simple INP or PEEK commands read the status (On or Off) of the inputs. Each input is optically isolated for convenience and safety.

Analog Input Card AD-142: \$119

With this 8 bit, 8 channel A/D converter, your computer can read voltages, temperatures, pressures, light levels, etc. Take over 100 readings per second in BASIC (several thousand with machine language). It's simple to use, for example: OUT 1,3 selects channel #3, then A=INP(1) reads the voltage on that channel. Input range: 0 to 5.1V. Resolution: 20mV. Conversion time 120us.

Prototyping Card PR-152: \$15

Protocard is 3 1/2 by 4 1/2 in. and accepts up to 10 IC's.



12 Bit A/D Converter AN-146: \$109

This high performance analog to digital converter features accuracy to 0.025%, 130ms conversion time, sign and over range indication. The basic input range is -5 to +5 volts, with 1.2mV resolution, but the gain of the on-board amplifier can be set to measure microvolts. Ideal for a strain gauge, thermocouple, pH meter, etc.



Motor Controller ST-143: \$69

Stepper Motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with stepper motors: Each controller card drives two stepper motors (12V, bidirectional, 4 phase).

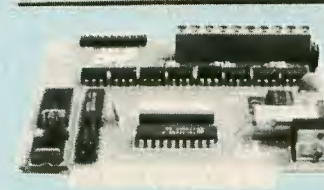
Motor: 48 steps/revolution, 300 steps/second, 1/4" shaft: MO-103...\$15. Power supply: PS-126...\$10

Special Package: the controller card, two stepper motors, and power supply: PA-181...\$99



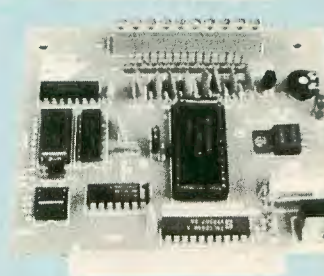
Clock with Alarm CL-144: \$89

It's the most powerful clock/calendar available. The features: ● 5 second/month accuracy. ● Keeps time, date, and alarm for 5 years (even with computer off). ● Can time events down to 1/100 second. ● Periodic "chime". ● Full time and date alarm. ● Four alarm outputs: Computer, LED, Buzzer, and Reed Relay. ● Easy to use; for example H=INP(1) reads the hours, Y=INP(6) reads the year, etc.



Latest Developments

- Voice Synthesizer VS-153
- 15 Bit Analog to Digital Converter AD-155
- Intelligent Stepper Motor Controller ST-154
- Digital to Analog Converter DA-147
- LCD Display (one and two line) LD-151
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CoCo Max IITM



You'll use it all the time and love using it.

What is CoCo Max?

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



CoCo Max disk system, with Y-cable.

Is CoCo Max for you?

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

What made CoCo Max an instant success?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply **pointing** and **clicking** with your mouse or joystick. With **icons** and **pull down menus**, you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The **undo** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

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

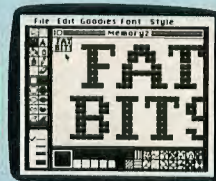
The **paint brush**, with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple. For special effects, the **spray can** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The **Glyphics** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in!

Control Over Your Work

CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats:

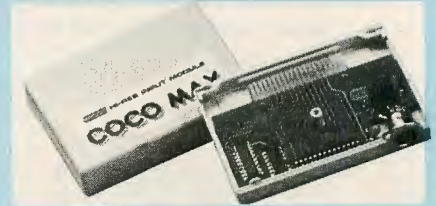
- You can move it around
- Copy it
- Shrink or enlarge it in both directions
- Save it on the electronic **Clipbook**
- Flip it vertically or horizontally
- Rotate it
- Invert it
- Clear it, etc. etc.

All this is done instantly, and you can always **undo** it if you don't like the results.

For detail work, the **fat bits** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color!

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



Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in **fonts** each with 16 variations. That's over 200 typestyles!



Examples of printouts

Printing Your Creations

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

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

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



1 Publish a newsletter or bulletin



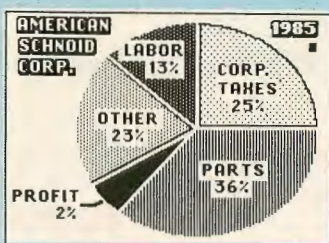
5 Over 200 typstyles to choose from! generate flyers.



2 Fun for children while stimulating creativity.



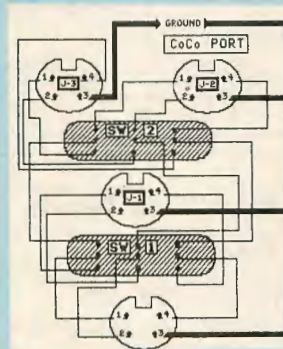
6 A new way to express your imagination.



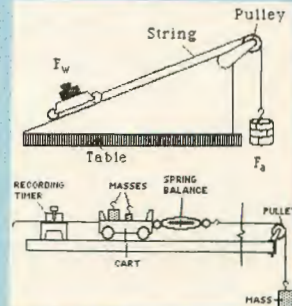
3 Business graphs, charts, diagrams. Also memos



7 Video portrait (with optional digitizer).



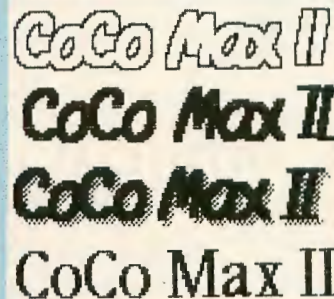
9 schematics and floor plans.



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



8 This is a cartoon.



10 Logos and letterheads.

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.) Disk systems need a Multi-Pak or our Y-Cable. CoCo Max is compatible with any Radio Shack DOS and ADOS. Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except Shrink, Stretch, Rotate, and Glyphics. Also, it has 5 fonts instead of 14. CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10, Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana. Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape \$69.95 with Hi-Res Pack and manual.
CoCo Max II (disk only) \$79.95 with Hi-Res Pack and manual.
Upgrade: CoCo Max to CoCo Max II New disk and manual \$19.95
New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.
Upgrade: CoCo Max tape to disk manuals, disk and binder \$24.95
Y-Cable: Special Price \$19.95
Super Picture Disks # 1, #2, and #3 each \$14.95
All three picture disks \$29.95

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

Font Editor Option

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

Video Digitizer DS-69

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

XY=XY+1:NEXT:IF BZ=0 AND XY=5 AN
D PX<=64 AND PX>35 AND RND(90)<=
2 THEN DRAW"S2C3BM140,96L4D8R4U8
D16G4F4E4H4S4":KX=140:KY=96:BZ=1
:SOUND1,1
606 IF BZ=1 AND PPOINT(KX,KY)<>3
THEN GOSUB 5000:GOTO550
610 PUT(PX,PY)-(PX+10,PY+12),MAN
,PSET
620 Z=RND(10):IF Z<6 THEN LINE(H
X(R),HY(R))-(HX(R)+30,HY(R)+30),
PRESET,BF:SOUND1,1:GOTO580
630 XY=0:FORT=1TO5:IFGD(T)=1THEN
XY=XY+1:NEXTELSENEXT
640 IF XY=5 AND PX<=12 AND PY>85
AND PY<100 THEN PLAY"T6L32V3004
BBBV25BBBV20BBBV15BBBV10BBBV5BBB
":GOTO710
650 FORT=1TO5:IF PPOINT(GX(T)+12
,GY(T))<>2 AND GD(T)=0 OR PPOINT
(GX(T),GY(T))<>2 AND GD(T)=0 THE
N SOUND250,8:SC=SC+250:LINE(GX(T
),GY(T))-(GX(T)+14,GY(T)-5),PRES
ET,BF:GD(T)=1:NEXT ELSE NEXT
660 IF PPOINT(PX+12,PY+13)=4 THE
NGOSUB1020:IFMD<3THEN530
670 IF PPOINT(PX+12,PY-1)=4 THEN
GOSUB 1020:IFMD<3THEN530

```

```

680 IF PPOINT(PX-2,PY-1)=4 THEN
GOSUB1020:IFMD<3THEN530
690 IF PPOINT(PX-2,PY+13)=4 THEN
GOSUB1020:IFMD<3THEN530
700 GOTO 590
710 REM wind tunnel
720 FORT=1TO1500:NEXT:SOUND100,1
:CLS:PRINT@106,"WIND TUNNEL":PRI
NT@197,"TRY TO REACH THE KEYS":P
RINT@330,"YOUR SCORE:";SC:PRINT@
362,"MEN LEFT:";3-MD:FORT=1TO350
0:NEXT
721 K1=0:K2=0:K3=0:CT=0
730 CT=0
740 PCLS:D$="F6G6F6G6F6G6F6G6F6G
6F6G6F6G6F6G6F6G6F6G6F6G6F6G6
6F6G6F6G6F6G6F6G6F6G6F6G6F6G6
"+D$:DX=12
750 PAINT(1,5),3,3:DRAW"C4":LINE
(255,76)-(240,116),PSET,BF:LINE(
255,94)-(225,98),PSET,BF:DRAW"U2
U8D16H8E8":PAINT(223,96),4,4
760 LINE(228,10)-(230,181),PSET,
BF
770 KY$="L4D8R4U8D16G4F4E4H4"
780 DRAW"C2BM208,30"+KY$+"BM208,
140"+KY$+"BM208,85"+KY$
790 SCREEN1,0:POKE65314,248
800 PX=128:PY=92:FORT=1TO1000:NE
XT
810 GOSUB1140:IFPX>=212THENPX=21
2
815 IF J<5 THEN PY=PY-1
816 IF J>59 THEN PY=PY+1
820 IF PX<60 THEN PX=PX+1
830 IF PX>190 THEN PX=PX-1
840 SC=SC+5
850 CT=CT+1:IF CT/5=INT(CT/5) TH
EN DRAW"C3BM"+STR$(DX)+"",0"+D$:D
X=DX+2
860 PX=PX-(RND(3)-1):PLAY"T200V2
0L6401CCC"
870 PUT(PX,PY)-(PX+10,PY+12),MAN
,PSET
880 IF PPOINT(PX-2,PY)=3 OR PPOI
NT(PX-2,PY+12)=3 THEN GOSUB 1080
:IFMD<3THEN710
890 DRAW"BM228,10C3D171R1U171C4L
1D171R1U171L1"
900 IF PPOINT(PX+12,PY+13)=2 AND
PY<45 AND PY>30 AND K1=0 OR PPO
INT(PX+12,PY)=2 AND PY<45 AND PY
>30 AND K1=0 THEN DRAW"C1BM208,3
0"+KY$:SOUND240,4:K1=1:SC=SC+250
910 IF PPOINT(PX+12,PY+13)=2 AND
PY<155 AND PY>140 AND K3=0 OR P
POINT(PX+12,PY)=2 AND PY<155 AND
PY>140 AND K3=0 THEN DRAW"C1BM2
08,140"+KY$:SOUND240,4:K3=1:SC=S

```

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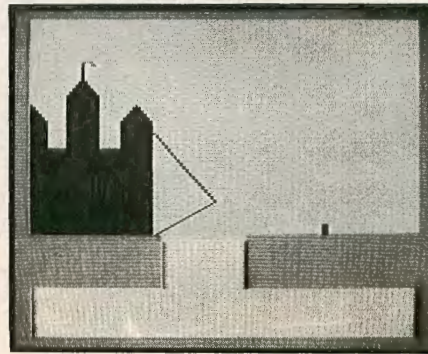
C+25Ø
92Ø IF PPOINT(PX+12,PY+13)=2 AND
  PY<1ØØ AND PY>85 AND K2=Ø OR PP
OINT(PX+12,PY)=2 AND PY<1ØØ AND
PY>85 AND K2=Ø THEN DRAW"C1BM2Ø8
,85"+KY$:SOUND24Ø,4:K2=1:SC=SC+2
5Ø
93Ø IF K1=1 AND K2=1 AND K3=1 TH
EN 95Ø
94Ø GOTO 81Ø
95Ø REM cleared all boards
96Ø SOUND2ØØ,5:SOUND225,1Ø
97Ø FORT=1TO2ØØØ:NEXT
98Ø CLS:PRINT@128," CONGRATULAT
IONS! YOU HAVE":PRINT" COMPLETE
D THE THREE ROUNDS!"
99Ø SC=SC+1ØØØ:PRINT@32Ø," YO
UR SCORE:";SC:SCREENØ,1
1ØØØ SOUND2ØØ,5:FORT=1TO2ØØØ:NEX
T
1Ø1Ø GOTO 26Ø
1Ø2Ø REM pitfall
1Ø4Ø CLSØ:PRINT@48Ø,STRING$(31,2
Ø7);:PRINT@15,CHR$(175);:Z=Ø
1Ø6Ø FORT=15TO1STEP-1:PRINT@Z+15
,CHR$(175);:SOUND1,1:PRINT@Z+15,
CHR$(128);:Z=Z+32:NEXT
1Ø7Ø PRINT@396,CHR$(163);:PRINT@
4Ø3,CHR$(166);:PRINT@461,CHR$(16

```

```

8);:PRINT@463,CHR$(162);:PLAY"T6
L16V3ØØ2CCCV25CCCV2ØCCCV15CCCV1Ø
CCCV5CCC":FORT=1TO15ØØ:NEXT:SCRE
EN1,Ø:POKE65314,248:GOSUB1Ø8Ø:RE
TURN
1Ø8Ø FORT=1TO2Ø:PUT(PX,PY)-(PX+1
Ø,PY+12),MAN,PRESET:SOUND25Ø,1:P
UT(PX,PY)-(PX+1Ø,PY+12),MAN,PSET
:NEXT
1Ø9Ø MD=MD+1:IF MD<3 THEN RETURN
11ØØ PLAY"Ø1V25T3L2BL2.C"
111Ø FORT=1TO2ØØØ:NEXT:CLS:PRINT
@64," T R E A S U R E   Q U E S
T":PRINT@192,"           YOUR SCORE:"
;SC:IF SC>HS THEN HS=SC:PRINT@22
4,"           HIGH SCORE:";HS ELSE PR
INT@224,"           HIGH SCORE:";HS
1115 PRINT@128,"           G A M E
O V E R"
112Ø PRINT@288,"";:INPUT"ANOTHER
GAME";I$
113Ø IF LEFT$(I$,1)="Y"THENSC=Ø:
GOTO16Ø ELSE POKE65494,Ø:END

```



```

114Ø H=JOYSTK(Ø):J=JOYSTK(1)
115Ø IF H<5 THEN PX=PX-2
116Ø IF PX<=8THENPX=8
117Ø IF H>58 THEN PX=PX+2
118Ø IF PX>=242THENPX=242
119Ø IF J<5 THEN PY=PY-1
12ØØ IF PY<=8THENPY=8
121Ø IF J>58 THEN PY=PY+1
122Ø IF PY>=174THENPY=174
123Ø RETURN
5ØØØ PLAY"T3L32Ø4V5CDEFGABAGFEDC
V1ØCDEFGABAGFEDCV15CDEFGABAGFEDC
V2ØCDEFGABAGFEDCV25CDEFGABAGFEDC
V3ØCDEFGABAGFEDC"
5Ø1Ø FORT=1TO1ØØØ:NEXT:CLS:PRINT
@128," CONGRATULATIONS! YOU PI
CKED":PRINT"           UP AN EXTRA M
AN!"
5Ø2Ø PRINT@224,"MEN LEFT:";3-MD:
MD=MD-1:FORT=1TO2ØØØ:NEXT:PRINT@
224,"MEN LEFT:";3-MD:SOUND1,1:FO
RT=1TO15ØØ:NEXT:SCREEN1,Ø:SC=SC+
1ØØ:BZ=Ø:FORT=1TO5:GD(T)=Ø:NEXT:
RETURN

```

Submitting Material To Rainbow

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

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

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

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

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

The CoCo Gallery



1st
PRIZE

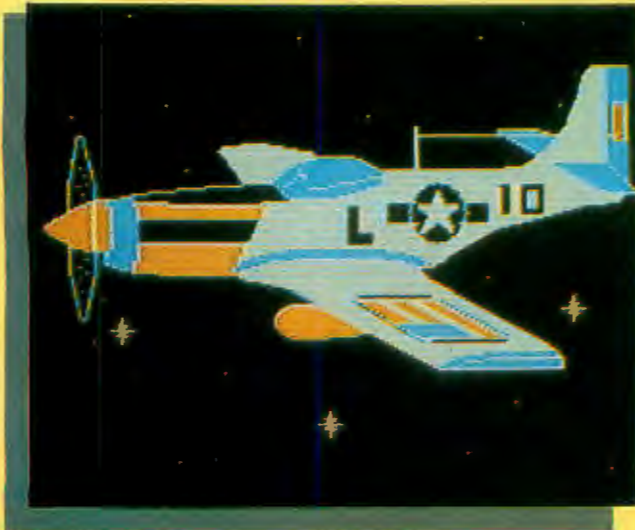
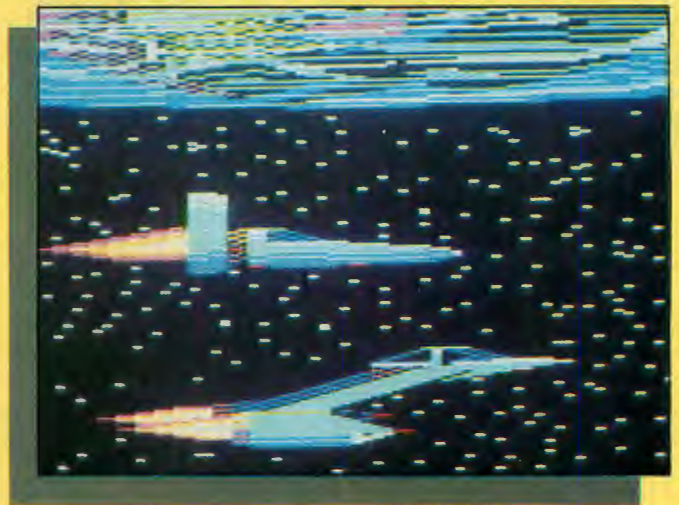
Summer
Clay Ambrose
Bloomington, CA

Taking the gallery back a few months, Clay used *CoCo Max* and *CoCo Paint* to remind us of how wonderful, care-free and relaxing summertime can be.

Orbital Drag Race
Ray Larabic
White Lake, Ontario

2nd
PRIZE

Ray gives us his rendition of galactic entertainment, which was created with *BASIC* and a program Ray devised himself. Ray is 16 years old and lives along the lower part of the Madawaska River.



3rd
PRIZE

P51 Mustang
Anthony Harvey
LaTuque, Quebec

Soaring into the pages of *THE RAINBOW*, this memorable fighter plane was created with *BASIC* and the enduring patience of Anthony, who is 13 years old.

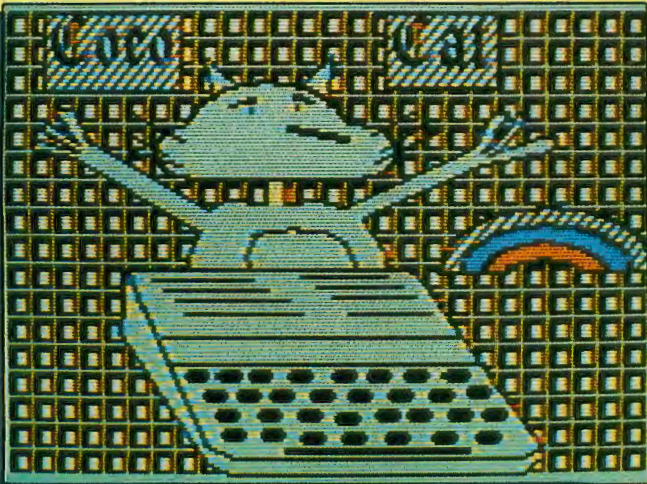
Editor
Woody Pope
 Garland, TX

Woody used BASIC to create this amusing graphic which really hits home with all of us here at THE RAINBOW.



CoCo Cat
Mark Bourdeaux
 Spring Arbor, MI

Mark, who is 13 years old and a freshman at Western High School, graces the CoCo Community this month with this well-known comic figure that was created using *CoCo Max*.



Wolf
Robin Moulder
 Stone Mountain, GA

Robin created the face of this canine predator with the use of BASIC. Robin works part time at Radio Shack and is a full-time student at Devry Institute of Technology for Electronics Engineering Technology.



SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

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

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

Jody Doyle, Curator

Send your entry on either tape or disk to:

CoCo Gallery
 THE RAINBOW
 P.O. Box 385
 Prospect, KY 40059
 Attn: Jody Doyle



*If the Pilgrims
had met Italians
instead
of Indians . . .*

By Bill Bernico

Just think of it. If the Pilgrims had been met at Plymouth Rock by Italians instead of Indians, we wouldn't be having turkey for Thanksgiving. No, we'd probably be having pizza instead. Imagine, no drumsticks, no white meat sandwiches for a week afterward, no worried turkeys. Just good ol' pizza.

With that concept in mind I'd like to present *Holiday Pizza*. This program allows you to make your own pizza with your own toppings. Granted, it is limited to five ingredients besides the dough and sauce, but they're the five most common toppings available.

To make your pizza you need one key ingredient — common sense. The toppings are listed on the left side of the screen and by pressing the first letter of that topping it is added to your pizza. Like I said, first comes the common sense. You could start with any of the toppings but when you make a real pizza you start with the dough and sauce. Same goes here. If you start with anchovies, for example, the sauce covers them up and you won't be able to see them, so start with the dough and the sauce. Then you can add the rest in any order.

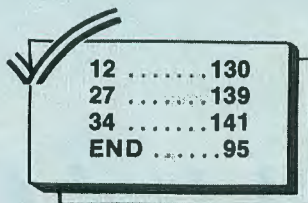
Most ingredients are added immediately. Have patience with the Cheese and Extra Cheese options, though. They take about 40 seconds to complete. As each topping is added, its name is deleted from the list. When the name disappears, you know the topping is added.

When you have the pizza made up the way you like it, press 'F' for finished and the pizza will be carved by the head of the house, just like a turkey. To try the program again, simply press the space bar.

(Questions about this program may be directed to Mr. Bernico at 708 Michigan Ave., Sheboygan, WI 53081. Please enclose an SASE for a reply.) □

Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wisconsin.

A Thanksgiving Pizza Party



The listing: PIZZA

```
1 'HOLIDAY PIZZA
2 'FROM KROMICO SOFTWARE
3 'BY BILL BERNICO
4 '
5 CLEAR500: DIM A$(88): GOTO38
6 PMODE3, 1: PCLS: SCREEN1, 0
7 P$="L2ND2L2G2NF2G2D3NR2D3F2NE2
F2R2NU2R2": M$="ND3U5RD8RU8FD3RU2
FDNRL8UED2RU3": F$="R6BR6R2DL3BL3
L10GR17DL12BL3L3FR17DL3BL4L9RFR6
BR6R2": CIRCLE(158, 96), 96
8 A$="DOUGH": DRAW"C3BM0, 9": GOSUB
35: A$="TOMATO SAUCE": DRAW"BM0, 24
": GOSUB35: A$="MUSHROOMS": DRAW"BM
0, 39": GOSUB35: A$="ANCHOVIES": DRA
W"BM0, 54": GOSUB35: A$="CHEESE": DR
AW"BM0, 69": GOSUB35: A$="PEPPERS":
DRAW"BM0, 84": GOSUB35
9 A$="SAUSAGE": DRAW"BM0, 99": GOSU
B35: A$="EXTRA": DRAW"BM0, 114": GOS
UB35: A$="CHEESE": DRAW"BM8, 122": G
OSUB35: A$="FINISHED": DRAW"BM0, 15
0": GOSUB35
10 C$=INKEY$: IFC$="" THEN10
11 IFC$="D" THEN PAINT(158, 3), 2, 4:
LINE(0, 0) - (60, 16), PRESET, BF
12 IFC$="T" THEN CIRCLE(158, 96), 90
, 4: PAINT(158, 9), 4, 4: LINE(0, 16) -
(90, 30), PRESET, BF
13 IFC$="C" THEN GOSUB21: LINE(0, 60
) - (60, 72), PRESET, BF
14 IFC$="A" THEN GOSUB27
15 IFC$="M" THEN GOSUB29
16 IFC$="P" THEN GOSUB31
17 IFC$="S" THEN GOSUB33
18 IFC$="E" THEN GOSUB21: LINE(0, 10
2) - (60, 126), PRESET, BF
19 IFC$="F" THEN 40
20 GOTO 10
21 FORC=1TO500: X=70+RND(177): Y=1
0+RND(190): PSET(X, Y, 2)
22 IF PPOINT(X+1, Y)=1 THEN PRESET(X
, Y)
23 IF PPOINT(X-1, Y)=1 THEN PRESET(X
, Y)
24 IF PPOINT(X, Y+1)=1 THEN PRESET(X
, Y)
```

```
25 IF PPOINT(X, Y-1)=1 THEN PRESET(X
, Y)
26 NEXT C: RETURN
27 E=130: F=25: GOSUB28: E=197: F=29
: GOSUB28: E=220: F=73: GOSUB28: E=17
0: F=83: GOSUB28: E=108: F=101: GOSUB
28: E=149: F=140: GOSUB28: E=220: F=1
11: GOSUB28: LINE(0, 48) - (65, 60), PR
ESET, BF: GOTO10
28 DRAW"C2BM=E; , =F; "+F$: DRAW"C4"
: RETURN
29 C=190: D=58: GOSUB30: C=140: D=70
: GOSUB30: C=226: D=99: GOSUB30: C=17
1: D=119: GOSUB30: C=215: D=150: GOSU
B30: C=104: D=145: GOSUB30: C=86: D=7
6: GOSUB30: LINE(0, 32) - (70, 43), PRE
SET, BF: GOTO10
30 DRAW"C1BM=C; , =D; "+M$: RETURN
31 H=90: V=122: GOSUB32: H=210: V=80
: GOSUB32: H=181: V=132: GOSUB32: H=1
19: V=40: GOSUB32: H=176: V=30: GOSUB
32: H=135: V=159: GOSUB32: H=150: V=1
00: GOSUB32: LINE(0, 70) - (60, 86), PR
ESET, BF
32 DRAW"C1BM=H; , =V; "+P$: RETURN
33 A=158: B=96: GOSUB34: A=148: B=40
: GOSUB34: A=168: B=152: GOSUB34: A=1
13: B=80: GOSUB34: A=120: B=133: GOSU
B34: A=190: B=103: GOSUB34: A=210: B=
130: GOSUB34: A=205: B=60: GOSUB34: L
INE(0, 86) - (60, 99), PRESET, BF: GOTO
10
34 CIRCLE(A, B), 10, 3: PAINT(A, B), 3
, 3: RETURN
35 FORX=1TOLEN(A$): Y=ASC(MID$(A$
, X, 1))
36 IF Y<0 THEN Y=0
37 DRAW A$(Y): NEXT: RETURN
38 A$(32)="BR4": A$(65)="U6R4D3NL
4D3BR4": A$(67)="NR4U6R4BD6BR4": A
$(68)="RU6LR3FD4GL2BR7": A$(69)="
NR4U3NR4U3R4BD6BR4": A$(70)="U3NR
4U3R4BD6BR4": A$(71)="BU6NR5D6R5U
3L2BD3BR6": A$(72)="U6D3R4U3D6BR4
": A$(73)="BRNU6BR4": A$(77)="U6F2
E2D6BR4": A$(78)="U6DF4U5D6BR
39 A$(79)="R4L4U6R4D6BR4": A$(80)
="U6R4D3L3D3BR7": A$(82)="U6R4D3L
4RF3BR4": A$(83)="R4U3L4U3R4BD6BR
4": A$(84)="BU6R4L2D6BR6": A$(85)=
"U6D6R4U6D6BR4": A$(86)="BU6D4F2E
2U4BD6BR4": A$(88)="UE2H2UDF2E2UD
G2F2DBR4": GOTO6
40 DRAW"BM158, 96C1NU96ND96NR96NL
96NE80NF80NG80NH80
41 IF INKEY$<>CHR$(32) THEN 41 ELSE R
UN
```

The Third One's the Charm

*New commands
and features
of the CoCo 3*

By Mark Siegel

Here we are at the start of a new era in the saga of the Color Computer. The Color Computers 1 and 2 have been great machines. The proof of this is their longevity and popularity. With the introduction of the Tandy Color Computer 3, a new age dawns for the home computer. This new computer can produce startling graphics and run many programs at the same time, and allows for a better human-to-computer interface. Of course, the best part is that it's priced so everyone can afford to buy one.

Let's get down to the facts and figures. First, the Color Computer 3 comes with 128K of RAM and can be expanded to 512K. The graphics *capabilities* are 640 by 225, although only a maximum of 640 by 192 is supported. Up to 16 colors can be displayed on the screen at the same time, and there are 64 different colors to choose from. Both 40-by-24 and 80-by-24 character screens are supported. In addition, these screens have attributes, eight foreground and eight background colors, underlining and blinking. The hardware

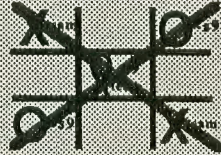
is capable of displaying more lines of text. Keep in mind, however, most TV sets cannot display these extra lines. The Color Computer 3 can run at .89 MHz, like its predecessors. A new 1.79 MHz clock rate is provided. This additional speed allows the Color Computer 3 to outrun most of the PC compatibles, and all of its competition in this price range.

The 6809 CPU has a 16-bit program counter, which means it can only address 64K at any one time. Yet, the Color Computer 3 can have 512K of RAM in it, and the 6809 can execute a program from all the RAM. This is done with a device called an MMU (Memory Management Unit). The MMU is also referred to as a DAT (Dynamic Address Translator). Sounds pretty fancy. Well, it's really quite simple. There are two sets of eight-DAT registers, one for a system mode and one for a user mode.

A memory address has a 16-bit binary value. Each bit, starting with the most significant bit, selects either the upper or lower section of memory. For example, if the highest bit in the 16-bit address is on, the processor will only select memory in the upper 32K of address space. The three most significant bits break memory into 8K blocks throughout the map. These three bits

Mark Siegel is the product manager of Color Computer and home entertainment products for Tandy Corporation.

XTEAM & OS-9



BOTH WINNERS

XTERM

OS-9 Communications program.

- Menu oriented
- Upload/download. Ascii or XMODEM protocol
- Execute OS-9 commands from within XTERM
- Definable macro keys
- Works with standard serial port, RS232 PAK, or PBJ 2SP Pack, Includes all drivers.
- Works with standard screen. XSCREEN, or WORDPAK 80 column board.

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XMENU

Creates a menu driven environment for OS-9.

- Create your own menus
- Works with standard screen, XSCREEN, WORDPAK, O-PAK

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OS-9 hi-res screen

- 51/64/85 chars per line
- Easy menu operation

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XDIR & XCAL

- Hierarchical directory
- Full sorting
- Complete pattern matching
- OS-9 calculator
- Decimal, Hex, Binary
- +, -, *, /, AND, OR, XOR, NOT

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XDIS

OS-9 disassembler

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XWORD

OS-9 word processing system

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

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XSPELL

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XWORD/XMERGE/XSPELL

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AND FOR RS DOS ...

SMALL BUSINESS ACCOUNTING

This sales-based accounting package is designed for the non-accounting oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vendor status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List.

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INVENTORY CONTROL/SALES ANALYSIS

This module is designed to handle inventory control, with user defined product codes, and produce a detailed analysis of the business' sales and the sales force. One may enter/update inventory data, enter sales, run five sales analysis reports, run five inventory reports, set up product codes, enter/update salesman records, and update the SBAP inventory.

\$59.95

PAYROLL

Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware.

\$59.95

These programs are user friendly and menu driven. Sample transactions are included. Each package features a hi-res screen. Each requires a printer, a minimum of 32k and at least 1 disk drive.

ACCOUNTS RECEIVABLE

Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package.

\$59.95

ACCOUNTS PAYABLE

Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package.

\$59.95

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produce eight combinations. This set of combinations point to the eight DATs. Each DAT register can be made to point to an 8K block in the 512K memory map. By changing these DAT registers, the 6809 can address any location in the 1/2-meg address space. Having two sets of DATs allows the 6809 to switch memory maps very quickly. An operating system like OS-9 Level II changes the user's memory configuration during an interrupt, and allows for many programs and/or programs longer than 64K to run within the system.

Now that we have provided the 6809 CPU with a way to address more memory, we can look at how the superb graphics use it. First, let's look at all the graphics modes.

Compatible Modes

64 by 32	8 color
128 by 100	4 color
128 by 192	4 color
256 by 192	2 color

New Modes

160 by 192	16 color
320 by 192	4 color
320 by 192	16 color
640 by 192	2 color
640 by 192	4 color

Most of the games written for the Color Computer use the 128-by-192 four-color mode; this mode takes up 6K of memory. And, of those games, most use two graphics screens for a total of 12K. The 320-by-192 16-color mode uses 32K of memory for just one screen. A game that requires two screens of video uses 64K. That is the maximum amount of memory that you could have in the old Color Computer. You can write some really fine looking programs with this kind of color and resolution. However, to do a program like *Zaxxon* in this kind of resolution would take a lot of CPU time to move such a large section of memory. The new computer has been equipped with both vertical and horizontal smooth scrolling. What this does is allow the video screen to act like a window on top of a larger screen. Thus, we get the effect of moving large amounts of memory without using very much CPU time. It is also important to note that all graphics modes use contiguous memory. This makes address calculations simpler and faster.

The 16-color registers can be set to any of 64 colors. The primary set of colors consists of red, green and blue. Each color has up to three shades. By

mixing the color and shades together you produce the effect of shading and contouring of objects. This allows for anti-aliasing (non-stair-step lines), and many other state of the art display techniques. You can set as many of the color registers to the same color as you want. This allows you to hide objects on the screen and have them appear by just changing their palette color. Even more dramatic effects can be produced by changing the palettes continuously, as in producing a flickering fire on the screen.

Another area addressed by the new computer is the interrupt system. Special interrupt control registers have been incorporated to allow the processor to spend far less time in the interrupt service routine. This hardware allows interrupts to be generated by the keyboard, joystick button, serial port, cartridge port, V-blank and a programmable interrupt generator. These interrupts can be vectored to either the IRQ or FIRQ. The programmable timer interrupt has a 12-bit counter and can use either the 15,000 Hz or a 70-ns clock. The programmable interrupt timer can be used to aid the processor in producing sound through the six-bit D/A converter or to provide a clocking system for the "bit-banger" serial port.

Those of you who like good, crisp hardware-generated text are going to love the CoCo 3. As stated earlier, we have 40- and 80-column text with attri-

Figure 1

ATTR	Displays character attribute, foreground, background, blink and underline
HBUFF	Allocates space outside of BASIC's program area for Hi-Res GET/PUT buffers
HCIRCLE	Draws a circle on Hi-Res screen
HCLS	Clears Hi-Res screen
HCOLOR	Sets foreground and background on Hi-Res screen
HDRAW	Draws an object on Hi-Res screen described by a string
HGET	Copies an area on Hi-Res screen to a buffer
HLINE	Draws a line on Hi-Res screen
HPAINT	Fills an area on Hi-Res screen
HPRINT	Displays text on Hi-Res graphics screen
HPUT	Displays a block stored in a buffer on Hi-Res screen
HRESET	Resets a point on Hi-Res screen
HSET	Sets a point on Hi-Res screen
HSCREEN	Selects Hi-Res mode for display
HSTAT	Returns character location, character and attribute
LOCATE	Positions cursor on a screen
LPOKE	Pokes a byte into any location in the 512K map
ON BRK GOTO	Causes the BREAK key to be trapped
ON ERR GOTO	Causes an error to be trapped
PALETTE	Changes color registers
WIDTH	Selects 32-, 40- or 80-column display
BUTTON	Returns status of firebutton
ERLIN	Returns the line number in which an error occurred
ERNO	Returns number of the error
HPOINT	Returns a point on Hi-Res screen
LPEEK	Peeks a location in the 512K map

butes. In addition, there are 32 international characters in the character set. The programmable timer generates the blink rate for the blinking attribute, color registers 0 to 7 produce foreground colors and registers 8 to 15 produce the background colors. Add in the underline and control of border colors and you can produce some pretty attractive screens. However, you will want a CM-8 color monitor. The CM-8 is not another PC-compatible RGBI monitor, but rather an analog Hi-Res RGB monitor.

Each joystick port now has two fire-buttons. The resolution of the joystick is still 64 positions internally. However, with the Hi-Res joystick adapter and OS-9 Level II, you can get 640 true analog positions.

With all these features added to this new machine, it still maintains compatibility with its predecessor. The exception is software that uses the VDG/SAM semi-graphics modes or undocumented BASIC ROM calls. Most programs should work if they worked on the Color Computer 1 and 2. Third-party products that follow these rules should work:

1. Use only documented ROM calls
2. Do not write to an address above \$FE00
3. Make sure the map is selected for 16K internal and 16K external.

To top off the Color Computer 3, more power has been added to the BASIC ROM in the computer. These range from support of the new graphics to error handling. Figure 1 is a summary of the newly added BASIC commands.

These new features work with the Disk system, giving the user a new Disk Extended BASIC. For compatibility, BASIC still runs at .89 MHz. You will find the 26 new commands both useful and fun.

OS-9 Level II From Microware Systems

The new OS-9 comes with a windowing system. This system allows you to have a multi-user system at one display and keyboard. Until now the only way you could have more than one program requiring keyboard input and display output was to attach a terminal to the Color Computer. Now, you can tell OS-9 to open another terminal on the *same* screen or a different screen. The windowing system allows for multiple screens and multiple resolutions, and all active at the same time. To my knowledge there is no other system at any price that has this capability. In graphics modes, the system allows the features

window to window, the user presses the CLEAR key to move forward to the next window or SHIFT-CLEAR for the previous windows. The window system acts like a super terminal, so you do not use up program memory space for video display.

OS-9 Level II provides many other valuable system functions. Among these is record locking. This allows more than one program to access the same information file at the same time without conflict. Because of the MMU, Level II does not permit memory fragmentation. A full disk driver is included in the system so larger drives can be added in the future.

Developing software under this new system will be a challenge in many ways. First, it is possible to run one OS-9 Level I program under the window system. What this means is that under the Color Computer Level I system, video memory is mapped into the real address space. This Level I video emulation has some additional functionality. Under this system you can have up to two VDG video screens of 6K each or a 16K, 160-by-192 16-color screen, the capability of changing the color palettes and more.

another window, you are playing an arcade game. You switch from a friendly user shell on Window 1 to the arcade game on Window 2. You start moving the joystick around to shoot down the flying saucers. Well, by moving the joystick to shoot at the saucer you pull down the disk utility menu back on our friendly menu. If a programmer is not careful, conceivably, when you push the button to fire at the saucer, the button could be misread by the menu which thinks you have selected to format the disk drive. You finish the game, go to the menu and, because the program did not play by the rules, you have lost all the programs and data on the disk. But take heart; OS-9 provides the information so this need not ever happen.

There are some things that both users and programmers should be aware of. First, if you have more than one task running that does disk file I/O, and one of the programs tells you to swap disks in the disk drive, be careful. By swapping the disk, you may deprive the other program of its data. Here again, the programmer should have taken precautions against this by using good error trapping.

With some good forethought by the companies that produce and sell software, the Color Computer 3 could be a new industry standard.

This new machine will challenge the programming community with new possibilities. It will spark our collective imaginations into producing software unlike any other. It will open new doors, cross new boundaries and set Color Computer owners apart from the crowd. Those who intend to write software for Tandy must use OS-9, but they will find that OS-9 will make their lives a lot simpler.

This new software will allow the Color Computer 3 to grow and mature with new, exciting concepts of what can be done on a home computer. Both Radio Shack and the third-party world can produce new, innovative software, and expand our concepts of how we interact with and use a computer. ☺

Figure 2

Select font	You may use different font styles
Point	Plot a point
Line	Draw a line
Circle	Draw a circle
Get block	Copy a block into a system buffer
Put block	Copy a block from system to screen
Fill	Paint the screen
Use logic	And, or, xor, no logic
Use pattern	Apply pattern to command
Ellipse	Draw an ellipse
Arc	Draw an arc
Create a window	
Use overlay window	
Proportional	Proportionally-spaced text
Bold text	
Invert text	
Underline text	
Download font	
Download buffer	
Scale on/off	
Protect on/off	

described in Figure 2.

In graphics, all windows are scaled to 640 by 192. This allows for programs to be written for one size screen without having to worry about what portion of some other screen the application will run on in the future. To change from

When running any I/O-oriented task, it is the programmer's responsibility to not waste system time or permit his task to endanger I/O.

Here's an example. You have a program that uses the mouse/joystick pointer device on one window and, on



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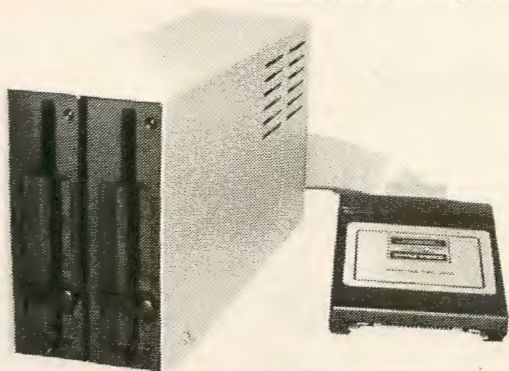
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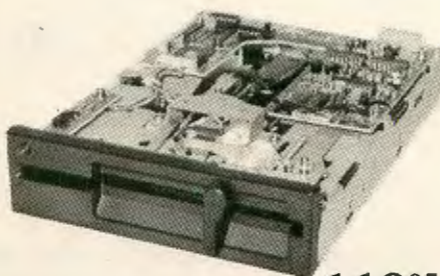
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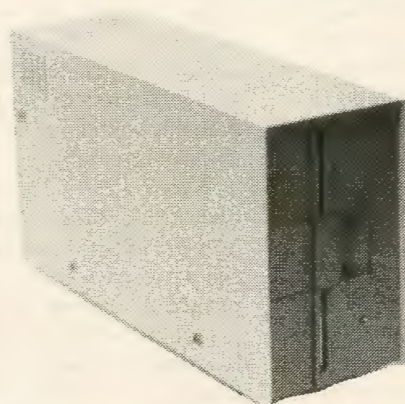
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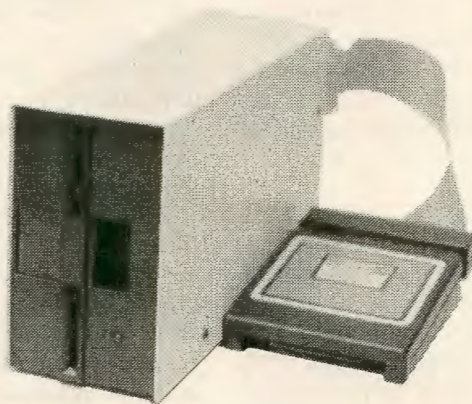
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RTTY for the Color Computer

By Marty Goodman

This article and the accompanying program provide a simple, practical means of using the Radio Shack Color Computer to send and receive RTTY information. Non-licensed radio enthusiasts may find the article and the program of some interest, although most of the commercial international radio text transmissions are sent via microwave and satellite. Indeed, outside of RTTY encountered on the Ham bands, most RTTY transmissions in the HF bands consist of encrypted material.

What Is RTTY?

RTTY is a very old means of encoding text information for transmission over the radio. The version most commonly used encodes a 1 (mark) as a 2125-Hz tone and a 0 (space) as a 2295-Hz tone. This encoding is then used to

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

make up characters consisting of five bits each. This five-bit code is the Baudot code, an early predecessor of the present-day, seven-bit ASCII code. Five bits allow for coding only 32 different characters, but one of those codes is a shift character, which can be used in conjunction with other characters to get a somewhat greater range of characters. Still, only uppercase letters, the numbers, and a limited number of punctuation marks are allowable.

The version of RTTY implemented here can send and receive at 45.45 Baud (60 words per minute).

This may seem slow to those accustomed to 300, 1200 or 2400 Baud modems, but it is faster than many folks can type. More important, it is sufficiently slow that it results in more reliable transmission over radio than even machine generated and received Morse code. Thus, while the RTTY protocol is quite old and slow, and while this program is a fairly limited implementation of it, it still has real practical value to radio amateurs.

Program Characteristics

The program to be presented is a simple one. Many desirable features, such as backspace in the transmit buffer, saves to disk, and transmitting of a previously prepared text file, have not been implemented. Macro 80C Source

code for the program will be available in the Data Communications area on Delphi, so that assembly language programmers may enhance it as they please. The program supports only the slowest Baud rate for RTTY transmission. However, this program allows you to type at the keyboard and have RTTY tones transmitted out the gray (Aux) plug line of the cassette port on the CoCo. RTTY tones are received from a high frequency receiver into the zero crossing detector of the cassette port (black, Earplug).

When an RTTY signal is received, owners of older shortwave receivers need to adjust their variable BFO until the tuning indicator on the RTTY program's screen shows they have adjusted the tones to the right frequency. Reception in such cases is greatly enhanced if a narrow band audio pass filter is used to filter the output of your HF receiver. Such a pass filter should be constructed to pass very narrow bands centered on the two tone frequencies, 2125 and 2295 Hz. Some HF receivers come with a built-in RTTY filter centered on 2200 Hz. If such a feature is available, it should be used. Owners of newer digital receiver equipment will not have a variable BFO, but may be able to get by using an IF shift control that is often provided, combined with a 200-Hz IF filter if that is available.

Hardware Setup

The output of your receiver is fed into the cassette input of the CoCo. As noted, a narrow pass audio filter greatly improves performance. If your audio output is more than a volt peak to peak, you might want to use dual diodes (as illustrated in the WEFAX interface in the February 1985 RAINBOW) as a voltage limiter. Your transmitter's microphone input is fed from the CoCo cassette output port. You may need to use a 100K ohm resistor in series with this signal, and/or a 1K to 10K ohm resistor in parallel with it, in order to match the impedance and amplitude of the CoCo cassette output to your transmitter's microphone input. The cassette motor relay jack is used to key your transmitter. This is all exactly as was the case with the WEFAX program and *Graphicom SSTV*.

Using the Program

Type in (or obtain via RAINBOW ON TAPE, or download from the Delphi RAINBOW ON TAPE database topic area) the program *RTTY.BAS* that follows. Now run the program. This program pokes its data into memory, and creates

the machine language program *RTTY.BIN*. It then allows you to save that program. Now load the *RTTY.BIN* program, and type EXEC.

The screen clears. You see the tuning meter in the left part of the first line on the screen. There is a black cursor at the left side of this tuning meter. When receiving RTTY signals, adjust your receiver so that the black cursor is flipping back and forth between both sides of the tuning meter area, thereby centering the output frequency of your receiver to around 2200 Hz. Three lines up from the bottom of the screen you see the bright yellow receive cursor. This cursor moves as text is received. You will be able to see up to thirteen, 32-column lines of received text on the screen before it scrolls off the top of the screen. The second to last line of the screen shows the transmit cursor in dark red (black if you are using a monochrome monitor on your CoCo). You have two lines of screen in which to see what you have typed. RTTY is used in simplex, and the two parties talking must take turns.

RTTY.BIN for the CoCo starts up in receive mode. Pressing the CLEAR key

toggles it from receive mode to transmit mode and back again. While you are in receive mode, you can still type on the keyboard, and what you type will be saved in a buffer, to be transmitted when you switch over to transmit mode. The BREAK key clears out any material in the transmit buffer that has not yet been sent.

RTTY.BIN recognizes, in addition to the 26 capital letters of the alphabet and the 10 numerical digits 1 through 0, the following punctuation marks: carriage return-line feed pair, space and ! " # \$ & ' () - ; : , . / ?

The program also supports a BEL character, which is received as an up-arrow character to the screen, and transmitted by pressing the up-arrow key. There is no provision for a backspace under Baudot code.

Notes on the Program

Like the *SSTV* routines in *Graphicom*, and the *WEFAX* program, *RTTY.BIN* depends on the use of tightly coded timing loops for its ability to send and receive signals essentially without external hardware. Such code has to be carefully written so all

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branches in the receive or transmit portions take exactly the same, and exactly the right number, of machine cycles. The signal is received and processed by looking for zero crossings and precisely timing the period of each audio cycle received. Neither interrupts nor timers are used. Even CoCo 3 programmers are now discovering that this technique of tight machine loops for timing can actually work better than using interrupts and timers, for less machine time is wasted stacking stuff and returning from unneeded interrupts.

This sort of code cannot be written under OS-9 or any other interrupt-

using, multi-user or multi-tasking system. It is strictly for use in dedicated applications, where the entire machine's resources are servicing only one task. This approach to coding cannot be used on the IBM PC XT or AT (8088/8086-type machines) nor on the Atari 520 ST or 1040 ST. On the Atari 68000 ST systems, machine cycles are stolen unpredictably from the processor in order to service the video (contention type DMA for video) instead of the regularly interleaved video DMA used on the CoCo 1, 2 and 3. On the 8088/8086 processors, there is internal buffering of instructions that makes cycle execution times a nightmare to calcu-

late. On the CoCo, cycles are shared regularly (every other cycle) between the video and the 6809. Therefore machine language loops can be constructed to take up a precise amount of time. The Color Computer is an ideal machine for this sort of application considering its great power, its built-in zero crossing detector, and its moderate cost.

Anyone attempting to modify this program should be careful. If you do not take great pains to keep all the execution times on the loops of code exact, modified versions will either not work at all or their performance will be degraded. □

210	.....	222
904	.....	74
914	.....	83
922	.....	206
931	.....	12
END	.....	112

The listing: RTTY

```

1Ø REM THIS PROGRAM IS PUBLIC DOMAIN, BY N6LQV
2Ø PCLEAR4
3Ø CLS
4Ø PRINT"    RADIO TELETYPE TRANSCIEVER"
5Ø PRINTSTRING$(32, "-");
6Ø PRINT
7Ø PRINT"NOW GENERATING MACHINE LANGUAGE"
8Ø PRINT
9Ø PRINT"PLEASE WAIT..."
1ØØ ST=&HEØØ:AD=ST:LI=9ØØ
11Ø READA$,CS
12Ø IF A$="X" THEN 2ØØ
13Ø FOR I=1 TO 64 STEP 2
14Ø A=VAL("&H"+MID$(A$,I,2))
15Ø POKE AD,A:CS=CS-A:AD=AD+1
16Ø NEXT
17Ø IF CS THEN PRINT"DATA ERROR IN LINE";LI:END
18Ø PRINT@174,938-LI
19Ø LI=LI+1:GOTO 11Ø
2ØØ IF PEEK(&HCØØ)=68 AND PEEK(&HCØØ1)=75 THEN B$="DISK" ELSE B$="TAPE"
21Ø PRINT@96,"PROGRAM IS NOW IN MEMORY AND"
22Ø PRINT"READY TO BE SAVED. INSERT ";B$
23Ø LINEINPUT"AND PRESS ENTER ";A$

```

```

24Ø IF B$="DISK" THEN 28Ø
25Ø CSAVEM"RTTY",ST,AD-1,CS
26Ø LINEINPUT"PRESS ENTER TO SAVE AGAIN ";A$
27Ø GOTO 25Ø
28Ø SAVEM"RTTY/BIN",ST,AD-1,CS
29Ø END
9ØØ DATAACC343CF7FFØ1B7FFØ3B7FF21F7FF231A5ØØF42CCFEF8DD4Ø8E12DADD44DD46DD,4625

```

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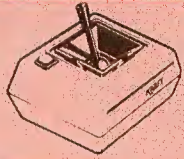
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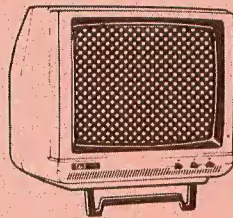
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901 DATA480F4A0F4B8E12029F4E9F5F
0F530F588E0400CE12B2A6C0A7808C04
2025F7CC, 2970
902 DATA6060ED818C060025F98E05E0
9F4C86BFA7848E05A09F5D869FA7848D
568D0220, 3773
903 DATAFA9E5FA6862B30816026028D
409E5DA7808C05C0251A8E0420EC8820
ED818C05, 3403
904 DATAA025F6CC6060ED818C05C025
F98E05A09F5D869FA784394C26088660
A79F005D, 3807
905 DATA20D44C26058E122220064C26
058E12029F5F39965327031700EF0F59
0F5A0F56, 2034
906 DATA6138D78DC558152250721FE
5A2A0A20E25C2B022003CC007FD7564F
D655D359, 3207
907 DATADD598305202406AC01AC0120
D3DD598605975BCC0013975697578D40
4FD655D3, 3292
908 DATA59DD59830520240FDC558152
C900D7560C5712C61220E3DD59D65658
D157065C, 3320
909 DATA0A5B26CFAC94C6088D124FD6
55D359DD5983029025EE965C44444439
8D4C4FD3, 3581
910 DATA59DD59CC000028D42CB028D3A
CB028D36D755C059502B022003CC0000
C10F2202, 2805
911 DATA2003CC0000FD15826063D3DAC
8B20138E0410A68584BFA7859658D758
E686CA40, 3334
912 DATAE78617012639AC01AC018601
5CC1602504A1012005B5FF2027F25CC1
602504A1, 2918
913 DATA012005B5FF2026F2398E0405
CE12D2A6C0A7808C040D25F7CC343CF7
FF21B7FF, 3811
914 DATA018602B7FF200F590F5A9E46
9C442724CC0F61DD518605975BE6809F
46D75C5F, 3331
915 DATA8D54AC94CC00085A26FD045C
8D480A5B26F2EC9B3DAC8BCC15ACDD51
538D3796, 3719
916 DATA5326C7CC343CB7FF21F7FF01
8E0405CE12B7A6C0A7808C040D25F739
B6FF208A, 3926
917 DATA02B7FF20862A975039B6FF20
84FDB7FF20862797503924048DE22004
8DEB2000, 3572
918 DATA801D4A26FDB6FF2088FCB7FF
20D6504FD359DD59935124088D0F9650
802320E2, 3911
919 DATADD5939AC943DAC0139964226
7CDC40C037498A0124022003CCFEF8DD
408E0152, 3388
920 DATA3AB7FF02B6FF008A801F89E8

84E48421FEA7848607DD429E449C4626
C69C4826, 4061
921 DATAC48E12DA9F469F489F443996
42263ADC40C037498A0124022003CCFE
F8DD408E, 3579
922 DATA01523AB7FF02B6FF008A801F
89E884E48426BEA78496414C27088B37
974121FE, 3738
923 DATA20818607DD4216FF7A4A9742
D641CB08D74104432475867FB7FF02B6
FF008440, 3607
924 DATA27058E124220058E127A2000
A685E6852B289E44984AD74A84602609
C41FE780, 2968
925 DATA3D21FE2012C5402604861B20
04861F2000C41FED81A1019F44399E44
5C260E96, 2654
926 DATA4A8440974ACC0004E7803D20
EA5C260BCC0802A780ED81A18B20DC5C
26040353, 3177
927 DATA20055C273AA1843DA18B39D6
4B273EC004D74B8E05E03AEC84ED88E0
CC6060ED, 3840
928 DATA81EC84ED88E0CC6060ED84D6
4B27043DAC84398E05E09F4C86BFA784
21FE3986, 4321
929 DATA60A79F004C9F46CC0020D74B
399E489C442607CC000C5A26FD39A680
9F489E4E, 3224
930 DATAA6862B129E4CA7808C060024
139F4C86BFA784AC8B394C260F128660
A79F004C, 3097
931 DATA8620974B3D3084394C26098E
12229F4EA101200B4C26078E12029F4E
20013D3D, 2124
932 DATA12398045FF41605349558044
524A4E46434B545A4C57485950514F42
47FE4D58, 2865
933 DATA56FD8073FF6D605E78778064
74676C617A687562697263767071797F
66FE6E6F, 3954
934 DATA7BFD8043594E49414D5A5446
4B4F525C4C5856574A4550475E535D55
51258080, 2885
935 DATA80FF363733212A3035272638
2E3E2C233C3DFEFDFC80808080808043
594E4941, 3059
936 DATA4D5A54464B4F525C4C485657
4A4550475E535D555125808080FF802D
31342980, 2819
937 DATA3A2B2F32808080808039FEFD
FC808080808052545459605245434549
56456060, 3436
938 DATA6060604D41524B6D6D7E7C6D
6D53504143455452414E534D49540000
00000000, 2263
939 DATAX, 3584



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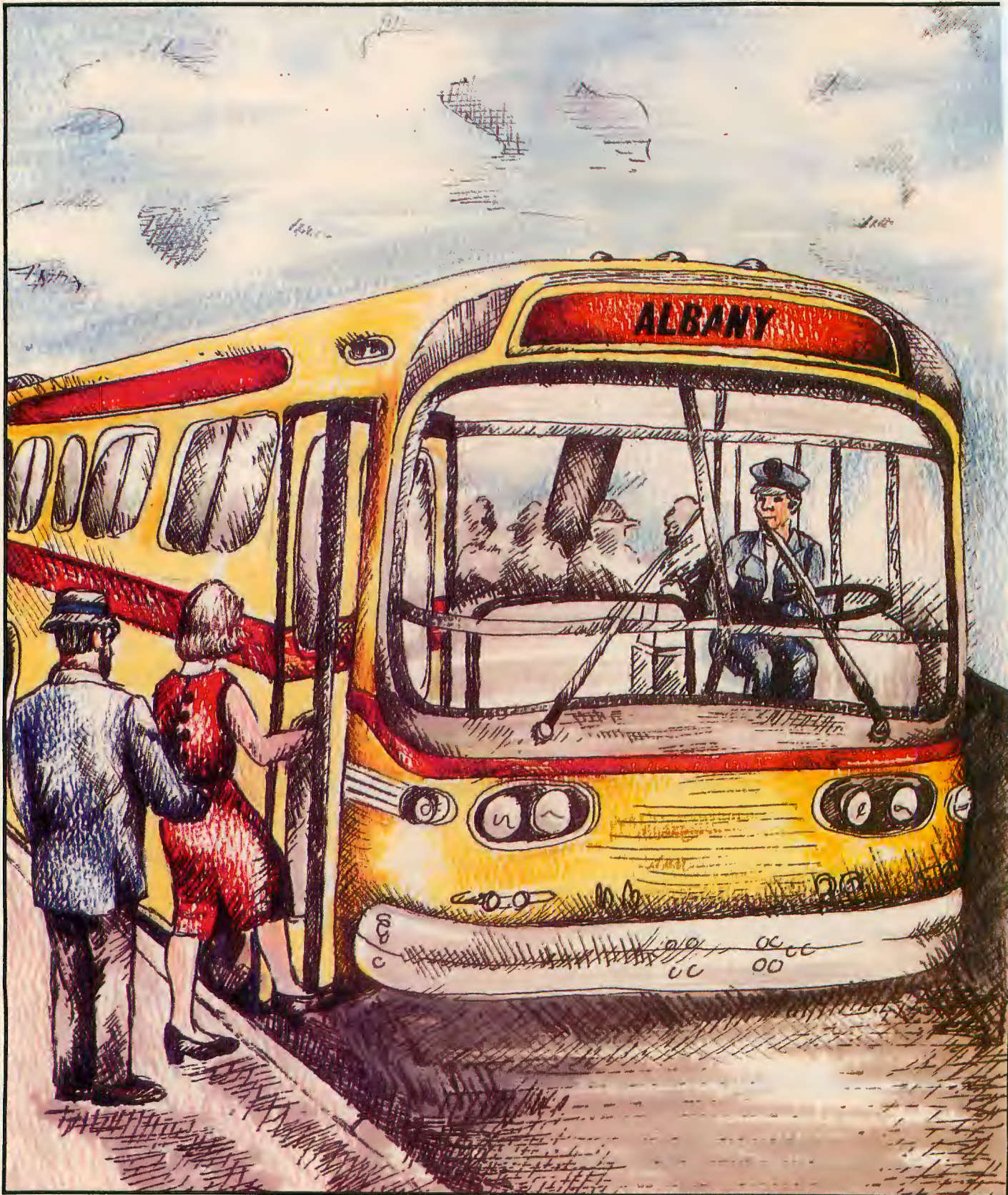


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Put worldwide communication right in your "packet"

Hamming It Up

By Len Popyack

When was the last time you lost sleep playing with your CoCo? For me it has happened only twice — once when I bought my computer back in 1981, and again after I bought my Packet Radio interface.

Have you ever thought about being able to call up anyone's computer system anywhere in the world, leave them a message, transfer a program, or simply chat with them — all for free? It is possible to communicate digitally with anyone via conventional toll telephone lines, but you always have to pay for it. It's also possible to communicate with any other licensed amateur radio operator (or his computer) using Packet Radio.

What Is Packet Radio?

Packet Radio is a way in which any Ham (slang for amateur radio operator) with a Terminal Node Controller (TNC) can send digital information to another Ham with a TNC. The data is transmit-

ted at 1200 Baud and can be sent around the country. When the data arrives at its destination it is guaranteed to be error free. What more could one ask for!

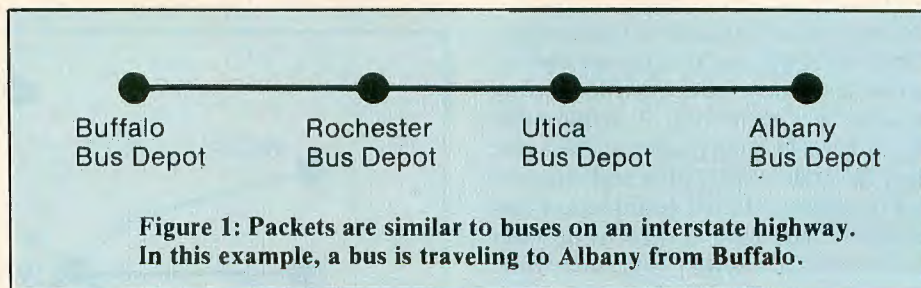
The device that allows the radio transceiver to be connected to your CoCo is called a Terminal Node Controller. Most TNCs are actually self-contained microcomputers. The TNC allows you to connect to another TNC by commanding your TNC to make the connection, similar to the way you command the telephone company to connect you to another number by dialing the number.

Amateur radio packet communica-

low cost. The organization formed was the Tucson Amateur Packet Radio Corporation (TAPR). Many dedicated engineers and programmers from around the country worked together in TAPR to design a low-cost TNC.

Other amateur groups, such as the Amateur Radio Research and Development Corporation (AMRAD), Amateur Radio Satellite Corporation (AMSAT) and the American Radio Relay League (ARRL) took part in packet radio's early development.

To get a feel for what packets are and how they are used, imagine a bus loaded with people. On the front of this bus is



tion actually got started in Canada about 1978. The Canadian government issued a special digital communications license, and packets of data were soon heard in Canada.

It wasn't until November of 1981 that the US amateurs got organized to develop a TNC that could be sold at a

sign displaying its destination. This bus is the packet and the people inside are data.

The bus originated at a bus station, say Buffalo, and its destination is Albany (see Figure 1). The bus only has a limited amount of fuel, so it must make stops at Rochester and Utica for

Len Popyack holds a bachelor's degree in electrical engineering and works as an engineer for General Electric in Syracuse, New York. Len enjoys developing assembly language programs for the CoCo. He is active in Amateur radio and his call is KA2NYJ.

refueling and to check that all the passengers arrived safely and comfortably.

The front of the bus is the packet header, the road is a communication channel and each bus station is a node (see Figure 2). Each packet originates at a node and may stop at a few nodes for error checking and re-transmission to the next node (similar to refueling the bus). The channel (road) is a radio link. This link connects each node to another. By transmitting packets from node to node, one can transfer data from Buffalo to Albany as easily as transferring data across town by conventional phone modems.

During the course of a digital communication, your TNC sends many

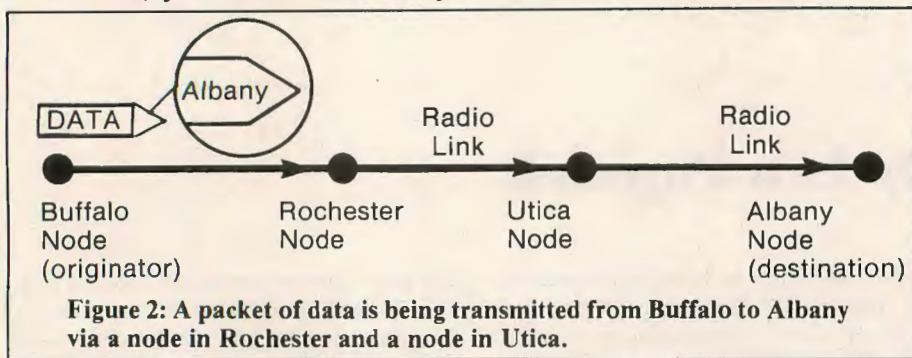


Figure 2: A packet of data is being transmitted from Buffalo to Albany via a node in Rochester and a node in Utica.

packets of data along the path, from node to node, until the packets reach the destination. A packet contains the data you type on your CoCo, along with information that each TNC uses to decide where to send your data (see Figure 3). Additional information in each packet is used for error checking and other packet network information.

The nice thing is that your TNC takes care of all the "dirty work." You simply tell it who to establish a connection with and through which nodes.

A node is a TNC and a radio which is left on. Every packet station can act as a node, receiving and re-transmitting packets to other nodes. A single node can be used by many users at the same time. In other words, your node may be part of many different connections (see Figure 4). You may also be using your TNC to talk to another computer while someone uses your TNC as part of his connection path. The TNC takes care of it all. The connection placed through your node remains transparent to you.

Usually, amateurs tend to use a node with a wide coverage (i.e., capable of receiving and transmitting to a large area). These nodes generally consist of an amateur station with a TNC, a radio and sometimes a computer left on.

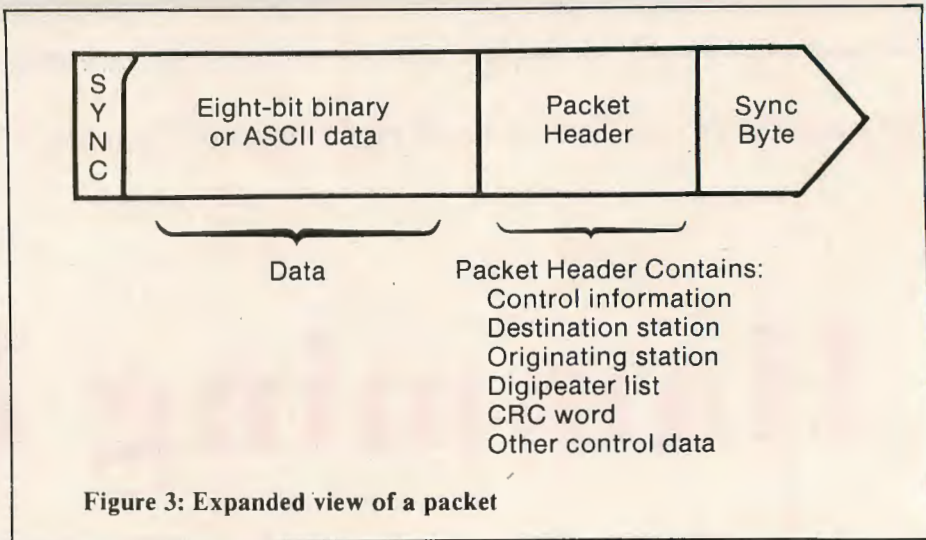


Figure 3: Expanded view of a packet

from about 50 to 100 miles.

One nice thing about Packet Radio is you can use up to eight nodes (digipeaters) to establish the communication path you want. These nodes don't have to be digipeaters per se, but may be local nodes.

Now that you know what a digipeater is (actually just another node), I'll throw a new twist into the digital communication network; gateways. A gateway is a means of access to another location other than the conventional node-to-node link. A gateway could be a high-speed link from the eastern U.S. to the west. It could also be a slow-speed link from east to west.

Think of a gateway as a node that looks to you as being in your area, but links you to a similar gateway at a location very far away (see Figure 6). The actual radio link between gateways can be a variety of communication types. The gateway could be a slow-speed (300 Baud), high-frequency link (Figure 7a), a high-speed, land-based

These "super nodes" are referred to as digipeaters.

Because of the frequency of operation where packet communications takes place (145 MHz 2-meter band), the radio signals have a range of about "line of sight." This limitation dictates high-elevation digipeaters (for a greater line of sight). Most digipeaters are located on mountains or where the elevation of the terrain is the highest for a given area (see Figure 5). Digipeaters in my area (New York state) typically have ranges

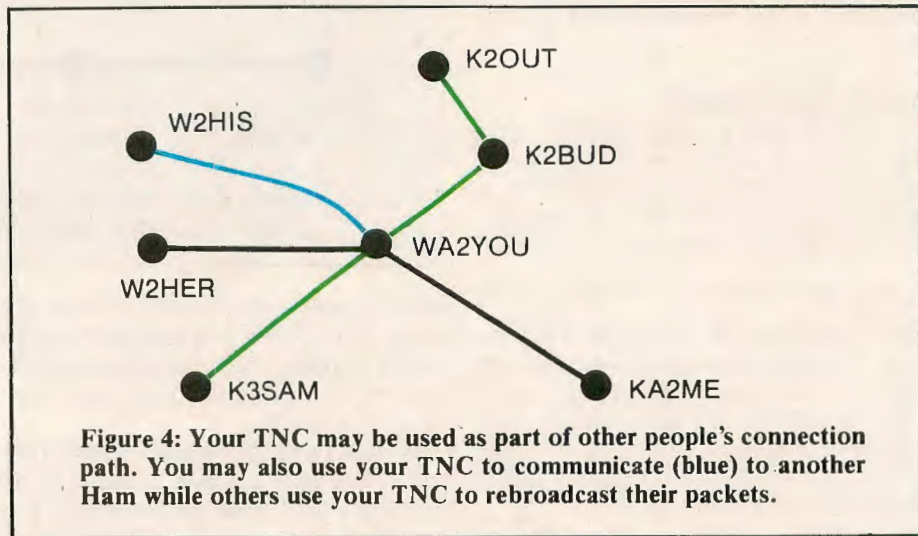


Figure 4: Your TNC may be used as part of other people's connection path. You may also use your TNC to communicate (blue) to another Ham while others use your TNC to rebroadcast their packets.

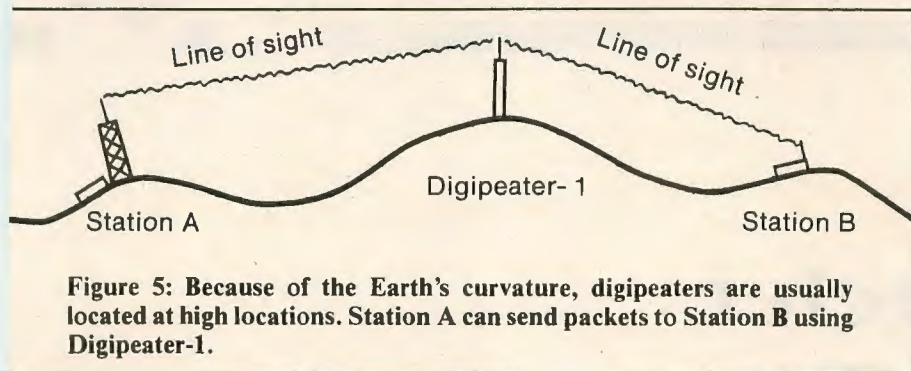


Figure 5: Because of the Earth's curvature, digipeaters are usually located at high locations. Station A can send packets to Station B using Digipeater-1.

communication channel (Figure 7b), or even a satellite link (Figure 7c).

As mentioned before, the Terminal Node Controller which you connect your CoCo to (via an RS-232 cable) is actually a small computer. The TNC has a microprocessor, RAM, ROM and I/O. The TNC consists of four functional parts: the TNC computer, the TNC 1200 Baud modem, the TNC-to-Color Computer interface, and the TNC ROM software.

The TNC computer uses a small eight-bit microprocessor. The MJF-1200 uses a Z80. The Heathkit model HD-4040 uses a 6809. Whichever microprocessor is used, the TNC performs the same basic functions. The user interface is what really matters.

All TNCs have a 1200 Baud modem built into them. This modem produces an analog signal from your CoCo's digital signal and vice versa. The TNC-to-CoCo interface is usually made via an RS-232 link. Run your terminal program and the TNC looks just like your phone modem — almost.

When you connect to the TNC via the CoCo, you actually communicate with the TNC's computer. Most software built into the TNC computer follows the TARP standard. This standard is simply a set of commands used to tell

the TNC to connect and disconnect to another node in the network. There are also commands to tell the TNC to perform a host of other tasks. Among them are telling the TNC to monitor all received packets, displaying and setting the time of day, sending beacon text, and far too many more to list here. For a good introduction to Packet Radio see Jim Grubbs' book, *Get *** CONNECTED to Packet Radio*.

There is as much available on Packet Radio as there are nodes to connect to. Packet Bulletin Board Services (PBBS) are popular. A typical PBBS covers a wide geographical area and allows message transfers from one PBBS to the

next. If you could not connect to your buddy who is several states away, you might leave him an electronic mail message at his local PBBS. How does it get there? Simple. You connect to your local PBBS, leave him the message and direct the message to be sent to your friend's PBBS. During the early morning hours, your message will be transferred from PBBS to PBBS via the Packet Radio network!

I should mention that almost all the PBBSs run the same software (*WORLI*). This frees you from learning the ins and outs of a new PBBS every-time you connect to a different one. Some PBBSs have gateway functions that allow you to "hop" from one network to another (or, more appropriately, one frequency to another).

Where Is Packet Going From Here?

The new Japanese Amateur Satellite Number One (JAS-1), scheduled to be launched in August 1986, will allow packeters to transfer messages worldwide with only a 120 minute delay. JAS-1 will be a message store and forward system. JAS-1 will also allow packets to be sent in real time (ideal for chatting

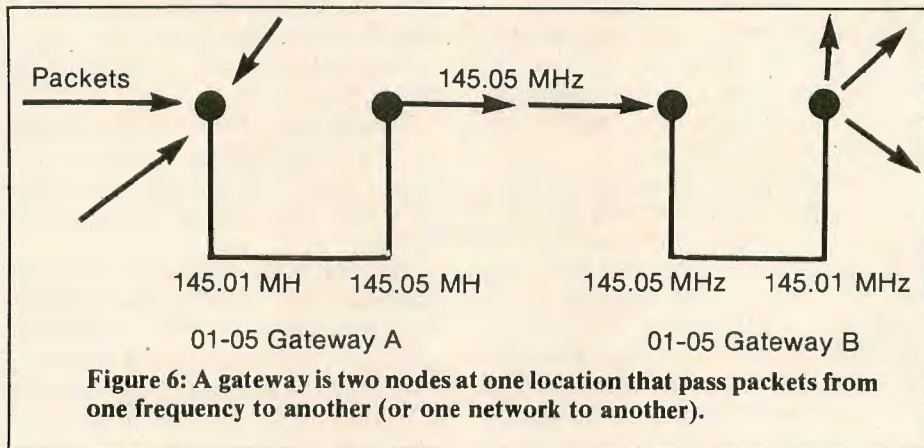


Figure 6: A gateway is two nodes at one location that pass packets from one frequency to another (or one network to another).

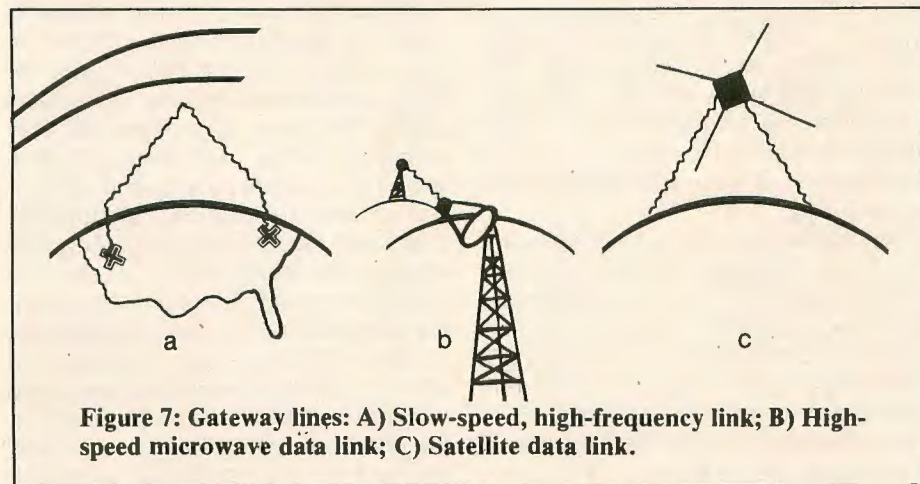


Figure 7: Gateway lines: A) Slow-speed, high-frequency link; B) High-speed microwave data link; C) Satellite data link.

to friends around the globe).

High-speed, land-based gateways will allow many local networks to communicate to distant networks easily. A public Packet Radio network has also been proposed (FCC rule making RM-5241). The future of packet radio is looking very active! If you are a licensed Ham (Technician class or higher), give it a try. If you are a would-be Ham, get out the code practice tapes and the CoCo Morse code simulator software and get going. You might try contacting a local Ham and ask him to give you a demonstration of Packet Radio. I'm sure that's all it will take to keep you awake nights . . . look at me!



One Character Space at a Time

By Joseph Kolar
Rainbow Contributing Editor

As the proud possessor of a working, original model, 4K expanded to 16K ECB, cassette-based CoCo, I am constantly struck with the simplicity, power and versatility of Mr. CoCo.

No matter how intriguing monster-sized keyboards are, how wide the color selections, how many function keys and other goodies to press may beckon, I have a tendency to return to the amazing CoCo. The keyboard is so clutter-free and businesslike that whatever perceived or imagined short-comings there may be, it is a joy for the recruit as well as the veteran CoCo nut to sit down and tickle the keys.

Just as a fledgling pilot learns to fly in a Piper Cub rather than a Lear Jet, so, too, will a newcomer learn best from a simple-to-manage computer, rather than an intelligence-insulting, icon-loaded moron machine with a zillion K memory.

In the last tutorial, we worked with LEFT\$, RIGHT\$ and MID\$, displaying complete words or lines of print on the screen. The theme for today's lesson is

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

one character/space at a time. Practically every bit of text will be displayed on the screen one character/space at a time.

This means we shall use a variable in every LEFT\$, RIGHT\$ and MID\$ statement instead of a constant numeric value (the last value within the parentheses).

You may notice that I am very unimaginative and use the string variable, A\$, repeatedly. CoCo has a tendency to search out and select the last instance of a variable in a listing at the point where it is operating, so this presents no problem. You may prefer to use a different variable in each instance.

Look at Listing 1, which is broken down into segments. Lines 0, 160, 340, 540 and 650 begin the five segments. The GOSUB routine at Line 1000 is used to flesh out the first segment. Since it isn't essential, it was relegated to the end of the listing.

Key in Listing 1 and run it. Not being too clever, I decided to print a heading with my daughter's name and address. But being egocentric, guess who's name I printed? Quick as a flash, it struck me that it was wrong. CoCo got cranky and showed me up with the flashing GOSUB 1000 routine. So, chastised, my name was peeled off, one letter at a time.

However, I would not give up center stage. I insinuated my name at the center just like a ham and, having upstaged one and all, strode off the screen.

My daughter's name was printed at the heading, one letter at a time, but rolled up and off the screen. At this point, her husband, Jimmy (sic), flashed his name on one letter at a time. However, she was indignant and push came to shove and his name was removed to be triumphantly replaced by her own, which was my original idea. Whew!

Now that you know the story, let's get a more detailed explanation. LEFT\$, RIGHT\$, MID\$ and LEN were utilized to create all these interesting effects. List Line 100. It was decided to print the lines simultaneously, one letter at a time. The three lines were put into respective strings and assigned variables. To accomplish the goal, a loop, T, was created to loop enough times to place all three lines, including the longest, on the screen. LEN(A\$) was used as a counter. However, C\$, was the longest line. The number of characters/spaces in A\$, since it was chosen as the counter, had to be greater than or equal to those in C\$. This was done simply, but effectively, by adding enough blank spaces into the A\$ string, so that it

would be a bit longer than the length of B\$.

PRINT@ locations were guesstimated on the first three screen rows, to be adjusted as required. LEFT\$(A\$,T) instructed CoCo to start from the left side of the string, A\$, and print a letter, designated by T, at location 10. Then LEFT\$(B\$,T) told CoCo to put the first letter, 'O', at 40, and LEFT\$(C\$,T) to put the 0th letter, 'S', at 70. A tiny pause followed and then CoCo put on the next trio of letters, where T equals one.

Rather than give you a possibly confusing burst of verbiage, edit Line 90 so 51 becomes 510 and run. Study this slowed down version carefully and rerun it until you can see what is what. Notice how efficiently CoCo tacked on each batch of characters.

In LEFT\$(A\$,T), T is an ever-increasing single digit number augmented by 1. Try adding STEP2 to Line 5, and run. A jerky presentation results when T equals two characters.

This is an unusual way to produce a three-line heading that you may want to save. A little pizzazz goes a long way!

Note that Line 100 could have been zapped and Line 90 could have ended in Z,T. It is not as easy to see the outer

loop, T. There is no law saying that you must compress or multiple-statement-line your program to death. Remember, when you run your program, you don't see the listing. You'll never see the debris, such as Line 105, if you forget to kill it.

For the purpose of instruction, the rule for this tutorial is, "one statement — one program line," except for the FOR/NEXT pause loops.

You will notice a lot of lines like Line 101, which are repeated in this listing and the next one. The programs really cry for GOSUB routines and, when you finalize your programs, you may prefer to make appropriate changes.

Restore Line 90 to 51 and drop the STEP2 from Line 5. List Line 105. We pause, have a short trip to the "wrong" GOSUB routine, and then return for another pause. Now delete Line 105. Run it to make sure it was a fossil.

Now, look at the routine in lines 1000 on. What we want to do is flash on "wrong" and blank it out 10 times with a small pause in each loop and then return to continue the tutorial.

My favorite name was replaced by wrong!. Notice that a few spaces were prefixed to wrong!. It was not neces-

sary to suffix any because without an ending semicolon, the rest of the line would be blanked out by CoCo. The blanking line could just as easily begin at Location 10, rather than stingy 13, (Line 1020) to match Line 1009.

Make it a point to try all the minor alternates to see for yourself. Suppose you deleted up to NEXT in lines 1010 and 1030? What would Line 1040 look like? Not very stimulating. Better replace the removed segments of the two lines.

Coming back from the subroutine, we bump into another pause. The name reappears only to be picked off quickly, one letter at a time, beginning from the left side.

List lines 110 to 150. LEN(A\$) was assigned a variable. To see what the value is, run it and press BREAK when the name is in process of being deleted from the screen. Type PRINT L and press ENTER. Now you know! The reason you must press BREAK while you are in the target area where L is being processed, is that the variable L is used later for other strings and you might easily pass over into one of those areas and pick up the value of the wrong L.

Itching to try out RIGHT\$? Note lines 120 and 130, where everything appears

Listing 1: HEADING

```
0 'LISTING1"
10 CLS
20 A$="JOSEPH KOLAR
30 B$="824 NE 56TH ST.
40 C$="SEATTLE, WASHINGTON"
50 FOR T= 0 TO LEN(A$)
60 PRINT@10, LEFT$(A$,T)
70 PRINT@40,LEFT$(B$,T)
80 PRINT@70, LEFT$(C$,T)
90 FOR Z= 1 TO 51:NEXT
100 NEXT
101 FOR Z= 1 TO 500:NEXT
102 GOSUB 1000
104 FOR X= 1 TO 500:NEXT
105 Z$=A$
110 L=LEN(A$)
120 FOR A=L TO 0 STEP-1
130 PRINT@30-A," "RIGHT$(A$,A)
140 FOR B=1 TO 51:NEXT
150 NEXTA
160 '***
210 A$="JOSEPH KOLAR"
220 L=LEN(A$)
230 FOR A=0 TO L
240 PRINT@214-A, LEFT$(A$,A)
250 FOR B=1 TO 200:NEXT
260 NEXT A
300 FOR A=L TO 0 STEP-1
310 PRINT@202,RIGHT$(A$,A)
320 FOR B=1 TO 200:NEXT
330 NEXT A
340 '***
400 A$="BETTY ANN WHITE"
410 FOR T= 0 TO LEN(A$)
420 PRINT@8,LEFT$(A$,T)
430 FOR Z= 1 TO 50:NEXT
440 NEXT
450 FOR Z= 1 TO 500:NEXT
490 L=LEN(A$)
500 FOR A=L TO 0 STEP-1
510 'PRINT@8,RIGHT$(A$,A)
511 PRINT@8,LEFT$(A$,A)
520 FOR B=1 TO 200:NEXT
530 NEXT A
535 FOR Z= 1 TO 500:NEXT
540 '***
600 A$="JIMY OWEN WHITE"
605 PRINT@8,A$
606 FOR Z= 1 TO 200:NEXT
610 FOR T= LEN(A$) TO 0 STEP-1
620 PRINT@8,LEFT$(A$,T)
630 FOR X= 1 TO 200:NEXT
640 NEXT T
```

to be backward. RIGHT\$(A\$,A) can be defined similarly to LEFT\$(A\$,A), where RIGHT\$(A\$,A) signifies that in the string A\$, beginning from the right end, count A characters.

We expect to use RIGHT\$ to put on the characters, A, one at a time (STEP-1). Note carefully, if we are using RIGHT\$ in Line 120, 0 is the rightmost character, proceeding letter after letter STEP-1, until the leftmost character L is reached.

In effect, we are using RIGHT\$ from left to right exactly opposite from the way it is ordinarily used to mimic LEFT\$'s action.

In order to find our PRINT@ location for the first letter, 30-A (the last character is the first to be removed), the character is removed by the blank space, " ", and RIGHT\$(A\$,A) tells CoCo which A value is to be blanked out.

It might be wise to change 51 to 510 in Line 140 to see this operation proceed slowly. To visualize it more readily, temporarily add the line 132 PRINT@0,A;. Since the A\$ string is in Line 20, it contains the extra blanks which are harmless and go unnoticed. Now run your work.

To make RIGHT\$ pull it from the rightmost position to the leftmost, mask Line 130 with a REM. Add the line 131 PRINT@9," "+RIGHT\$(A\$,A). Run it and delete Line 132.

Did you note that Line 130 removed the name one letter at a time going from right to left, and Line 131 pulled the letters away through a single location, 9, one at a time?

Now, we can get silly. Mask lines 120 and 131. Unmask Line 130. Add 121 FOR A = TO L and run. This displays the line one letter at a time, last letter first, working leftward.

Finally, mask Line 130 and unmask Line 131. Can you guess what will happen? Run it and see.

The line was pushed backward, out of the hole at location 9. Change 510 back to 51 in Line 140. Forget about these last two cockeyed presentations — unmask lines 120 and 130 and either mask or delete lines 121 and 131.

List lines 210 to 330. In Line 210, we changed string A\$ by looping off all the trailing blank spaces (Line 20). We assigned a variable, L, to the length of A\$. In a loop, using LEFT\$, we pulled the name out of a hole, Location 214, and dragged it leftward until it was

completely displayed, pausing for a reasonable time lapse to evoke a smooth, banner-like motion.

Immediately, through the hole at Location 202, we stuffed it down by using RIGHT\$ to maintain our leftward direction, letter by letter, until the entire name vanished down the rat hole.

You may want to return to this part of the program and pull it back out of the hole at Location 202, drag it rightward and bury it at Location 214. You can do it! An answer is given at the end of the tutorial.

List lines 400 to 535. A\$ is a new string, which is placed on the screen using LEFT\$, beginning at Location 8. T is incremented by +1, from 0 up to the value of the last letter of the string. After a pause, it places each succeeding letter in the next available space heading rightward. A long pause sets the completed name in place. Then, assigning L as the length of the string, from the last letter back to the first, the name is rolled up and off the screen using LEFT\$ (Line 511).

If Line 510 is unmasked and Line 511 is masked, using RIGHT\$, the name is removed by being pulled through the hole at Location 8.

```

650 '***
700 A$="BETTY ANN WHITE"
710 FOR T=0 TO 15
720 PRINT@8,LEFT$(A$,T)
730 FOR X=1 TO 200:NEXT
740 NEXT T
750 GOTO 750
1000 '
1005 FOR X= 1 TO 10
1009 PRINT@10,"  WRONG!"
1010 FOR Z= 1 TO 20:NEXT
1020 PRINT@13,"  "
1030 FOR Z= 1 TO 20:NEXT
1040 NEXTX
1050 RETURN
200:NEXTZ
42 PRINT MID$(A$,6,5);:FORZ=1 TO
  200:NEXTZ
43 PRINTRIGHT$(A$,5)
44 FOR Z= 1 TO 500:NEXT
45 CLS
46 '***
47 A$="JOSEPH KOLAR  "
50 FOR T= 0 TO LEN(A$)
60 PRINT@9, LEFT$(A$,T)
70 PRINT@41,LEFT$(B$,T)
80 PRINT@70, LEFT$(C$,T)
90 FOR Z= 1 TO 51:NEXT
100 NEXT
101 FOR Z= 1 TO 500:NEXT
102 GOSUB 2000
103 PRINT@9,A$
104 FOR Z= 1 TO 500:NEXT
110 L=LEN(A$)
120 FOR A=L TO 0 STEP-1
130 PRINT@30-A," "RIGHT$(A$,A)
140 FOR B=1 TO 51:NEXT
150 NEXTA
160 '***
210 A$="JOSEPH KOLAR"
220 L=LEN(A$)
230 FOR A=0 TO L
240 PRINT@213-A," "+LEFT$(A$,A)

```

Listing 2: HOMEWORK

```

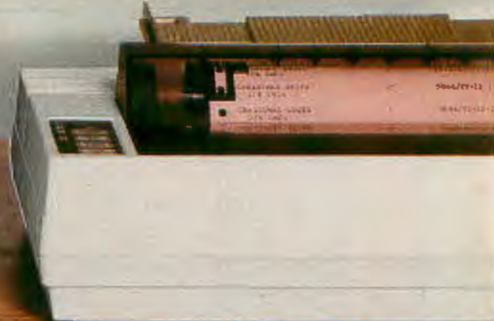
0 '<LISTING2>
5 CLEAR 500
10 CLS
20 A$="BETTY ANN WHITE"
30 B$="824 NE 56 ST."
40 C$="SEATTLE, WASHINGTON"
41 PRINT@8,LEFT$(A$,5);:FORZ=1TO

```

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"Push your name in one direction and when it vanishes, pull out your mate's name from the rat hole and shoot it back across the screen."

List lines 600 to 640. The spot-urging spouse, using the same string variable, A\$, quickly slaps his name in the slot. It doesn't take long to kick him out of the area using LEFT\$ by pecking away at his name going from right to left. Note Line 610. It is equivalent in form to lines 490 and 500 combined into one program line. If it were in two lines, it would read: 610 L=LEN(A\$) and 611 FOR T=L TO 0 STEP-1.

Finally, triumphant, she put her name firmly in the header slot in the simplest manner by using the old faithful A\$ as the string variable containing her name, counting the characters/spaces in her name, putting them into the FOR loop as T and using LEFT\$, placing it on the screen, beginning at Location 7.

Here is a solution to the problem mentioned before. Add lines:

```
331 FOR A=0 TO L:PRINT@202,RIGHT$(A$,A): FOR B=1 TO 200: NEXT B,A
332 FOR A=L TO 0 STEP-1:PRINT@214-A," "LEFT$(A$,A): FOR B=1 TO 200: NEXTB,A
```

If you have a problem, check lines 510 and 511 to see if the proper one is unmasked. To produce a faster, repeated push-pull banner, add 200 FOR C=1 TO 10 and add ,C to the end of Line 332.

In lines 250, 320, 331 and 332, change the pause value from 200 to 50.

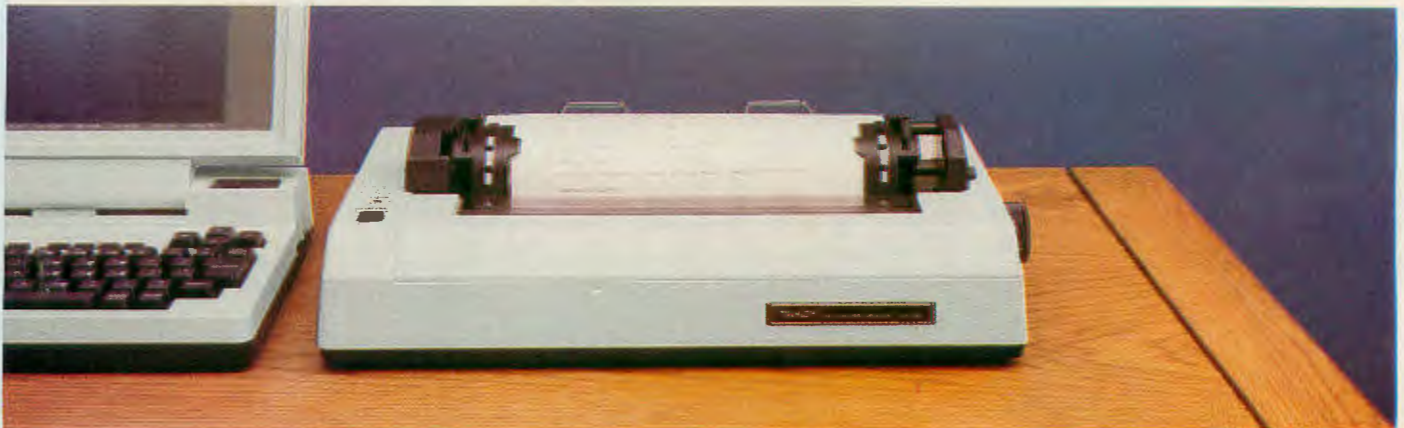
Here's an idea — push your name in one direction and when it vanishes, pull out your mate's name from the rat hole and shoot it back across the screen. You get a nice domestic quarrel effect.

Note that in some instances, as, in lines 130 and 332, a blanking space was required. Remove each and check out the sorry state of affairs.

Listing 2 is a homework assignment. It is one half of a demo program. Make sure you save it on tape. The other half will be a continuation of this listing. It is similar to Listing 1 but not quite. It is hoped that you crack open your notebook and analyze the listing. If you find any of the routines useful, you may want to put them into your Reference Notebook. □

```
250 FOR B=1 TO 200:NEXT
260 NEXT A
270 FOR Z=1TO500:NEXT
300 FOR A=L TO 0 STEP-1
310 PRINT@202,RIGHT$(A$,A)
320 FOR B=1 TO 200:NEXT
330 NEXT A
340 '***
400 A$="BETTY ANN WHITE"
410 FOR T= 0 TO LEN(A$)
420 PRINT@8,LEFT$(A$,T)
430 FOR Z= 1 TO 50:NEXT
440 NEXT
450 FOR Z= 1 TO 1000:NEXT
460 '***
490 L=LEN(A$)
500 FOR A=L TO 0 STEP-1
510 'PRINT@8,RIGHT$(A$,A)
511 PRINT@8,LEFT$(A$,A)
520 FOR Z=1 TO 200:NEXT
530 NEXT A
535 FOR Z= 1 TO 500:NEXT
540 '***
600 A$="JIMY OWEN WHITE"
605 PRINT@8,A$
606 FOR Z= 1 TO 500:NEXT
610 'FOR T= LEN(A$) TO 0 STEP-1
611 FOR T=0 TO LEN(A$)
620 PRINT@8,LEFT$(A$,T)
630 FOR X= 1 TO 200:NEXT
640 NEXT T
650 FOR Z= 1 TO 500:NEXT
660 '***
700 A$="BETTY ANN WHITE"
710 FOR T=0 TO 15
720 PRINT@8,RIGHT$(A$,T)
730 FOR X=1 TO 200:NEXT
740 NEXT T
750 FOR Z= 1 TO 500:NEXT
800 '***
810 B$="JIMY OWEN WHITE"
811 L=LEN(B$)
820 FOR A= 0 TO L
830 PRINT@22-A," "+LEFT$(B$,A)
840 FOR X= 1 TO 200:NEXT
850 NEXT A
860 FOR Z=1TO500:NEXT
2000 '
2010 FOR X= 1 TO 10
2020 PRINT@9," WRONG!"
2030 FOR Z= 1 TO 20:NEXT
2040 PRINT@12," "
2050 FOR Z= 1 TO 40:NEXT
2060 NEXTX
2070 RETURN
```

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Alien Raiders Blitz

By Darrel Behrmann

Raiders is a game requiring skill and concentration. Aliens are stealing supplies from the planet and you must stop them by docking with their ships. To dock with an alien ship, you must be directly above it and not moving at the time of contact. The lower on the screen you are (closer to the bottom) at the time of contact, the more points you score. You must also avoid the bombs traveling up the screen.

The game ends when time runs out or your ship is destroyed by bombs. To begin the game, press the firebutton while the theme song is playing on the title screen.

(You may direct questions about this program to the author at U-251, Road 16, Rt. 1, Napoleon, OH 43545. Please enclose an SASE for a reply.) □

Darrel Behrmann attends Northwest Technical College and is obtaining an associate degree in computer programming. He uses his CoCo to keep the farm's financial records and to do word processing.

26	.....	110
40	.....	180
58	.....	69
74	.....	246
95	.....	70
END	.....	254

The listing: RAIDERS

```

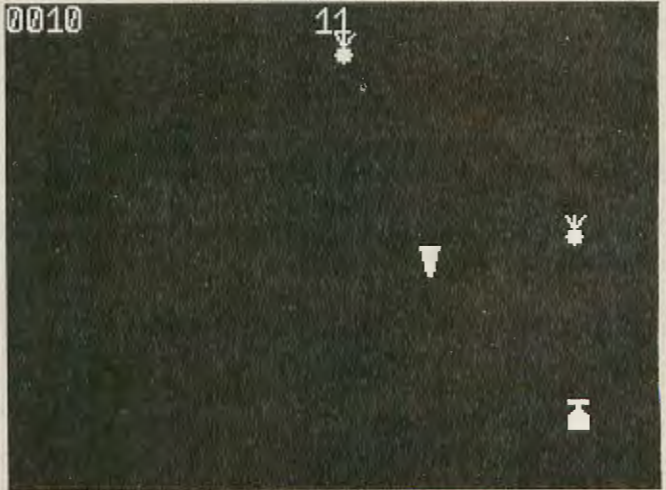
1  '*****
2  '*          RAIDERS          *
3  '*          BY              *
4  '*          DARREL BEHRMANN *
5  '*          U-251 RD. 16 RT. 1 *
6  '*          NAPOLEON, OH 43545 *
7  '*          JANUARY, 1986     *
8  '*****
9  POKE65495,0
10 CLEAR 500
11 DIM EM(8,12),CS(8,12),SS(8,12)
12 AN$(15)
13 GOSUB 95'GET LETTERS
14 PMODE4,1:PCLS0:SCREEN1,1:PMODE3,1
15 COLOR3,4
16 LINE(0,165)-(255,192),PSET,BF
17 LINE(10,164)-(10,104),PRESET
18 LINE-(40,94),PRESET
19 LINE-(70,104),PRESET
20 LINE-(70,164),PRESET
21 LINE-(10,164),PRESET
22 PAINT(40,104),4,4
23 LINE(30,84)-(50,104),PRESET,BF
24 LINE(10,74)-(70,84),PRESET,BF
25 CIRCLE(110,154),10,4
26 CIRCLE(150,154),10,4:CIRCLE(175,154),10,4
27 PAINT(110,154),2,4:PAINT(150,154),2,4:PAINT(175,154),2,4
28 DRAW"BM80,155;C3U10R10E15R90D25L115"
29 PAINT(90,150),3,3
30 LINE(105,135)-(125,145),PRESET,B
31 PAINT(120,140),2,4
32 DRAW"BM16,50;S16C2"+AN$(14)+AN$(10)+AN$(13)+AN$(11)+AN$(12)+AN$(14)+AN$(15)
33 DRAW"C4S4"
34 IFPEEK(65280)<>126 AND PEEK(65280)<>254 THEN PLAY"T12L102ABD":IFPEEK(65280)<>126 AND PEEK(65280)<>254 THEN PLAY"L2CF01ABDL2CF":GOTO33
35 PLAY"V10T255L255"
36 PMODE4,1:PCLS0
37 CIRCLE(3,8),3,5:LINE(0,0)-(3,

```

```

5),PSET:LINE(3,0)-(3,5),PSET:LINE(7,0)-(3,5),PSET:PAINT(3,8),5,5
37 GET(0,0)-(7,11),EM
38 PCLS0
39 LINE(0,0)-(7,1),PSET,BF:LINE(3,2)-(4,3),PSET,BF:LINE(3,3)-(0,6),PSET:LINE-(0,11),PSET:LINE-(7,11),PSET:LINE-(7,6),PSET:LINE-(4,3),PSET:PAINT(3,9),5,5
40 GET(0,0)-(7,11),CS
41 PCLS0
42 LINE(0,0)-(3,11),PSET:LINE-(4,11),PSET:LINE-(7,0),PSET:LINE-(0,0),PSET:PAINT(3,3),5,5
43 GET(0,0)-(7,11),SS
44 PCLS0
45 POKE65495,0:PH=16:PV=1:E1=0:E2=0:G1=0:G2=0:SC=0
46 SCREEN1,1:PCLS0:TIMER=0
47 LINE(PH*8,PV*12)-(PH*8+7,PV*12+11),PRESET,BF
48 J=JOYSTK(0):J1=JOYSTK(1):GOSUB87
49 IFJ<15 THEN PH=PH-1 ELSE IFJ>45 THEN PH=PH+1
50 IFJ1<15 THEN PV=PV-1 ELSE IFJ1>45 THEN PV=PV+1
51 IFPH>31 THEN PH=31 ELSE IFPH<0 THEN PH=0
52 IFPV>15 THEN PV=15 ELSE IFPV<1 THEN NPV=1
53 PUT(PH*8,PV*12)-(PH*8+7,PV*12+11),SS
54 IF E1=0 AND RND(5)=5 THEN E1=1:H1=RND(32)-1:V1=15
55 IF E2=0 AND RND(5)=5 THEN E2=1:H2=

```



```

RND(32)-1:V2=15
56 IF E1=1 THEN LINE(H1*8,V1*12)-(H1*8+7,V1*12+11),PRESET,BF
57 IF E2=1 THEN LINE(H2*8,V2*12)-(H2*8+7,V2*12+11),PRESET,BF
58 V1=V1-1:IFV1<1 THEN E1=0

```

```

59 V2=V2-1:IFV2<1THENE2=Ø
6Ø IFE1=1THENPUT(H1*8,V1*12)-(H1
*8+7,V1*12+11),EM
61 IFE2=1THENPUT(H2*8,V2*12)-(H2
*8+7,V2*12+11),EM
62 IF (V1=PV OR V1-1=PV) AND H1=
PH THEN GOSUB 76
63 IF (V2=PV OR V2-1=PV) AND H2=
PH THEN GOSUB 76
64 IFG1=ØANDRND(1Ø)=1ØTHENG1=1:H
3=RND(32)-1:V3=15
65 IFG2=ØANDRND(1Ø)=1ØTHENG2=1:H
4=RND(32)-1:V4=15
66 IFG1=1THENLINE(H3*8,V3*12)-(H
3*8+7,V3*12+11),PRESET,BF
67 IFG2=1THENLINE(H4*8,V4*12)-(H
4*8+7,V4*12+11),PRESET,BF
68 V3=V3-1:IFV3<1THENG1=Ø
69 V4=V4-1:IFV4<1THENG2=Ø
7Ø IFG1=1THENPUT(H3*8,V3*12)-(H3
*8+7,V3*12+11),CS
71 IFG2=1THENPUT(H4*8,V4*12)-(H4
*8+7,V4*12+11),CS
72 IF V3-1=PV AND H3=PH THEN GOS
UB79
73 IF V4-1=PV AND H4=PH THEN GOS
UB79
74 GOSUB 81
75 GOTO 47
76 PLAY "V1":FORY=1TO3Ø:PLAY"ABA
V+;":CIRCLE(PH*8+4,PV*12-4),RND(
15),RND(4):NEXTY:PLAY"V31":FORY=
1TO3Ø:PLAY"CDCV-;":CIRCLE(PH*8+4

```

```

,PV*12-4),RND(15),RND(4):NEXTY
77 PLAY "V1Ø"
78 GOTO 94
79 SC=SC+PV:SOUND PV*16,1
8Ø RETURN
81 'SCORING DISPLAY
82 PLAY "AABB"
83 LINE(Ø,Ø)-(32,12),PRESET,BF
84 TH=INT(SC/1ØØØ):HD=INT((SC-TH
*1ØØØ)/1ØØ):TN=INT((SC-TH*1ØØØ-H
D*1ØØ)/1Ø):OE=SC-TH*1ØØØ-HD*1ØØ-
TN*1Ø
85 DRAW "BMØ,11;"+AN$(TH)+AN$(HD
)+AN$(TN)+AN$(OE)
86 RETURN
87 'TIMER DISPLAY
88 LINE(12Ø,Ø)-(136,12),PRESET,B
F
89 TI=1ØØ-TIMER/6Ø
9Ø TN=INT(TI/1Ø):OE=TI-TN*1Ø
91 IF TIMER/6Ø >1ØØ THEN GOTO 94
92 DRAW"BM12Ø,12;"+AN$(TN)+AN$(O
E)
93 RETURN
94 POKE65494,Ø:IF PEEK(6528Ø)=12
6 OR PEEK(6528Ø)=254 THEN 45 ELS
E 94
95 AN$(Ø)="BE1BU1U7E1R3F1D7G1L3U
1E1U2E1U2E1BD9BR3"''Ø
96 AN$(1)="BE1R5L2U9G3BD7BR6"''1
97 AN$(2)="BU8BR1E2R2F1D2G2L1G2D
2R6BF1"''2
98 AN$(3)="BE1BU1F1R2E2U2H1NL3E1
U2H1L3G2BD8BR8"''3
99 AN$(4)="BU9BR1D3R5L1U4D9BD1BR
3"''4
1ØØ AN$(5)="BE1BU1F1R2E2U2H1L1H1
L1H1U2R6BD1ØBR1"''5
1Ø1 AN$(6)="BE2BU2E1R2F1D2G1L2H2
U5E1R1E1R1F1BD9BR2"''6
1Ø2 AN$(7)="BU8BE1E1R4D2G1D2G1D3
BD1BR4"''7
1Ø3 AN$(8)="BR3BU1H2U1E2H2E2R1F2
G2F2D1G2BD1BR4"''8
1Ø4 AN$(9)="BR5BU1U9L3G1D2F1R3BR
3BD6"''9
1Ø5 AN$(1Ø)="BE1U4E1U3E1R1F1D3F1
NL4D4BF1BR1"''A
1Ø6 AN$(11)="BE1U9R2F1R1F1D5G1L1
G1L2BD1BR7"''D
1Ø7 AN$(12)="BE1U9R5L5D4R3L3D5R5
BD1BR2"''E
1Ø8 AN$(13)="BE1R5L3U9L2R5BD1ØBR
2"''I
1Ø9 AN$(14)="BE1U9R3F2D1G2L2F4BF
1BR1"''R
11Ø AN$(15)="BE1BU1F1R2E2U1H2L1H
2E2R2F1BD9BR2"''S
111 RETURN

```

Hint . . .

Cursory Change

Here is a little routine that alters the cursor in an interesting way. Type it in and give it a try. You may want to do a little disassembly (a manual one, that is) and apply the technique to other areas of Color Computing.

```

1Ø DATA 26,8Ø,142,128,Ø,166,132,
183,255,223,167,128,14Ø,224,Ø,39
,5,183,255,222,32,239,28,175,57
2Ø FORA=3Ø72 TO 3Ø96: READB:POKE
A,B:NEXTA:EXEC3Ø72
3Ø FOR A=1 TO 255:POKE 41384,A
4Ø NEW

```

Jim Knoppow
Kent, WA



A fix to use the Old-Time Banner Printer with a disk system

The Old-Time Fix

By Horace D. Vaughn

When I opened my May 1986 issue of RAINBOW, I was disappointed to find that the *Old-Time Banner* program [Page 150] would not work with my disk system. I set out to solve this situation and will now share it with the rest of the CoCo Community.

First, if you haven't done so already, save a copy of the *Banner* program on tape using the procedures mentioned in the article. Now, unplug the disk drive from the cartridge port. Then type `POKE 25,6:NEW`. Load in the *Banner* program and delete all lines from 101 on. Save this to another tape as *BANI*.

Reload the original banner program. This time, delete all lines up to and including Line 100. Also, delete lines 160, 998 and 2008. Move the last

Horace Vaughn is a retired Navy chief, presently employed as a marine electrician in Virginia Beach. He has been programming on the CoCo for four years.

`PRINT#J, YPBRDUNDTVZ$` statement in Line 117 to the beginning of Line 118. Save this version to tape as *BAN2*.

Plug the disk controller back into the computer and enter `POKE 25,14:POKE 3584,0:NEW`.

Load *BANI* from tape and save it to disk as "*BANI/BAS*". Load *BAN2* from tape and save it to disk as "*BAN2/BAS*". Type in, save to disk and run *Shorten*.

The first time through *Shorten* use *BANI/BAS* as the input filename and *BAN11/BAS* as the output filename. Run *Shorten* again, but this time use *BAN2/BAS* as the input filename and *BAN22/BAS* for the output filename. Now load *BAN11/BAS* from the disk. Type `MERGE "BAN22/BAS"`. This creates a shortened version of the *Banner* program in memory. It might be wise before we start editing things for you to save this to disk as *BANNER/BAS*.

Now comes the fun part. If you don't have much experience, you may want to

brush up on the `EDIT` command of Extended BASIC, but what we will be doing isn't really all that difficult.

At the beginning of Line 1, add `FORX=1TO3:PRINT#J,YYXZ$:NEXT:`. Add `$Z$` to the end of lines 16 and 1070. Add `:GOTO1` to the end of Line 159. Change Line 161 to read `FORX=1TO12:PRINT#J,YYXZ$:NEXT:GOTO1`. Add `:YY$=Y$:Y$=Y$+V$:` to the end of 2028. Add `FORX=1TO6:PRINT#J,YYXZ$:NEXT:` to the beginning of Line 2034.

The changes should now be complete. Resave this program to disk as *BANNER/BAS*. Always remember to use `POKE25,14:POKE3584,0:NEW` before running the program. Happy "bannering" with disk!

(You may direct your questions about this modification to Mr. Vaughn at 4824 Peach Creek Lane, Virginia Beach, VA 23455, 804-499-1741. Please enclose an SASE when writing.) □

The listing: SHORTEN

```
10 'SHORTEN FOR BANNER MAY 1986
RAINBOW
20 'BY H.D.VAUGHN
30 '4824 PEACHCREEK LN.
40 'VA.BEACH VA. 23455
50 CLEAR1000:CLS
60 INPUT"INPUT FILENAME/EXT====
=====>" :DF$
70 INPUT"OUTPUT FILENAME/EXT====
=====>" :DO$
80 OPEN"I", #1,DF$:OPEN"O", #2,DO$
90 IF EOF(1)= -1 THEN 180
```

```
100 LINE INPUT#1,D$
110 CLS:PRINTD$
120 FOR X=5TO LEN(D$)
130 IF MID$(D$,X,3)="J,Y"THEN190
140 IF MID$(D$,X,3)="998"THEN210
150 NEXT X
160 PRINT #2,D$
170 GOTO90
180 CLOSE:END
190 IF MID$(D$,X+4,1)="V"THEN220
200 L$=LEFT$(D$,X+2):R$=RIGHT$(D$,LEN(D$)-X-2):D$=L$+"Y"+R$:GOTO230
210 L$=LEFT$(D$,X-16):R$=RIGHT$(D$,LEN(D$)-X-8):D$=L$+R$:X=X-10:GOTO230
220 L$=LEFT$(D$,X+3):R$=RIGHT$(D$,LEN(D$)-X-5):D$=L$+R$
230 CLS:PRINTD$:GOTO150
```

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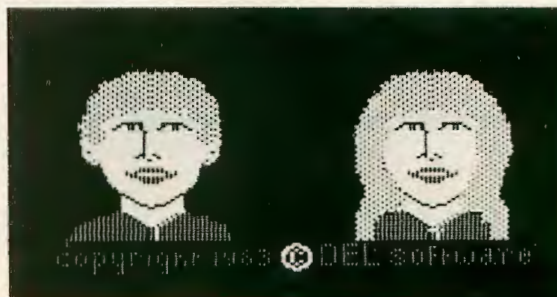


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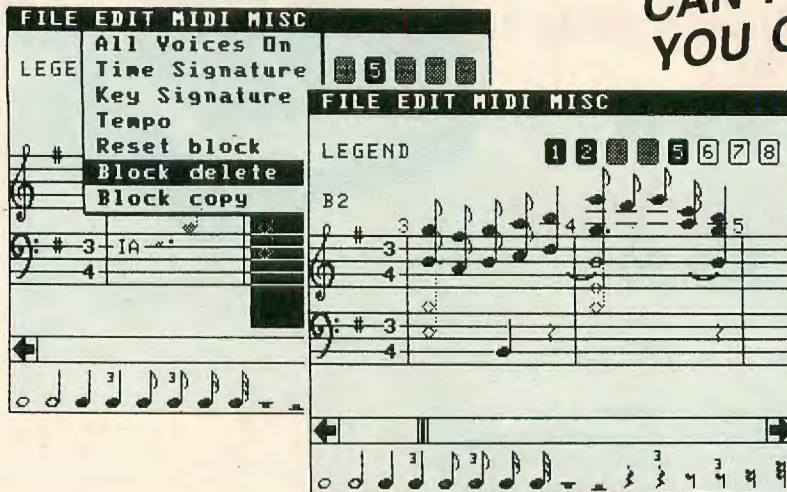
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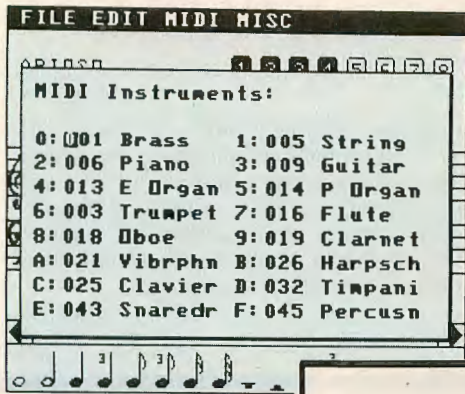
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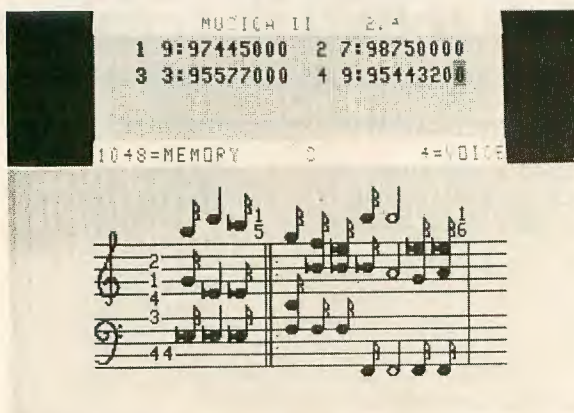
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- Allows you to specify key signature.
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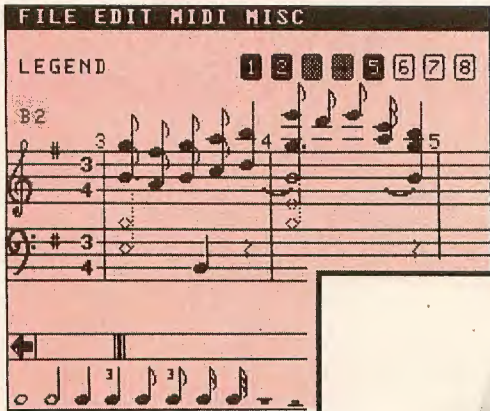
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Prepare for Thanksgiving Cooking With Liquid Measure

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.

Now that November is upon us, our thoughts naturally turn toward that day of culinary feasting: Thanksgiving. While I trust that few of you carve the big bird by the green glow of your CoCo screen, I figured that this would be a perfect time to offer my own Thanksgiving gift to help instruct in a skill that will benefit any kitchen adventurer. So before we roll out the cranberries and stuffing, let's take a look at our latest "Wishing Well" presentation, *Liquid Measure*.

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

The Wish

How many of you have actually tried to convince your spouse that investing in a Color Computer would help her in the kitchen? (Gee, Honey, you could put all your recipes on it.) I know a few people who have actually used this approach. Fortunately, the spouses usually agreed to the purchase for more practical reasons, such as their own interest in learning computer skills.

One of those practical reasons is educational in nature. Followers of the "Wishing Well" will by now be familiar with the fact that education is my primary reason for using the CoCo. I have always tried to find new ways to meet my students' needs using my CoCo while trying to accommodate your wishes as well. Since many of you have written about skills you would like to see serve as the basis for a "Wishing Well" program, *Liquid Measure* seemed to be the next progression. Rather than make it part of our Life Skills series, I have chosen to include some different elements to make the program more exciting and graphically interesting.

For anyone who ever had difficulty finding a way to express certain liquid measurement values in an understanda-

ble manner, *Liquid Measure* should be a big help for you or your youngsters. Using the text character graphics, we will display the material we want presented and then quiz it in a very attractive fashion.

The Program

Written to work on a 16K machine, *Liquid Measure* uses only the graphics capabilities of the CoCo found outside Extended Color BASIC. There are several reasons for this.

Since a good part of our material is covered in written form, we would naturally want to use our text characters for this purpose. If we were to use the high resolution graphics in Extended BASIC, we would need to create a whole graphics character set. While previous "Wishing Well" programs have done just that, our 16 by 32 text format is perfectly suited for our purposes. Also, since we are presenting information in small amounts, using the regular text characters makes our information appear much more visible on the screen.

The next major innovation I have used in this program is a completely inverted screen. Instead of using our green screen with black text, I have made all of the screens except the score

card into an inverted black screen with reverse video characters. My reasons for this are two-fold. First, the graphics of the cups, pints, quarts, etc. look much more dramatic on a black field. Using regular characters would only detract from our intended effect.

Secondly, I was getting a little sick of the big black border around our green screen. Why not have our programs look as classy as the more expensive machines. Therefore, the time was right for an inverted screen. Presto!

One thing which I did not do with this program, however, is make it work on an MC-10. Adding the offset value to the screen pokes would slow down this program more than I would like. Those who need to translate the program to MC-10 should not have too much difficulty. I am starting to feel that very few of you are still using this mini-CoCo at all.

The subroutine that inverts the text is quite simple, actually. Our text is made equal to T\$. We then evaluate each character of T\$ and poke the inverted value to a given screen location. Therefore, be sure to save this program to tape or disk before you run it. A typo in one of the pokes could lock up your machine. Nothing is more frustrating than a locked-up machine when you have taken the time to type in a long listing from these pages. Be safe; save it first.

One special feature, which I included in the title card this time, was a rotating border like you would normally see at an old movie theater. Little flashing lights run circles around the words Liquid Measure until the user presses either ENTER to begin or 'Q' to skip directly ahead to the quiz section. I felt this kind of a change in outlook was a little overdue. I hope you like it.

Using the Program

If you chose to press ENTER at the start of the program, you are slowly walked through a display of the equivalent values, from one cup through one gallon. Since we are using the poke method of string evaluation mentioned earlier, the text slowly scrolls onto the screen character-by-character. To proceed to the next screen, the user need only press ENTER as the screen prompts appear.

At the end of the display, the program proceeds to a short quiz based on the *Homonym Quiz* from a previous "Wishing Well." The big difference between this version and the original is the use of the inverted black screen. I have also adapted any screen references to the homonyms so this quiz section is uniquely designed for the liquid measurement material.

The quiz only contains about 14 possible examples. However, if you want to add any extra quiz problems along the same format, you may enter additional examples (up to 50) in the data statements at the end of the listing. Just be sure that all data is in groups of three items: The first is the value, the second is the correct answer and the third is an incorrect response.

An example might be something like:

```
1000 DATA TWO QUARTS, 1/2
      GALLON, 1/2 PINT
```

When asked to match the value of two quarts to the two possible choices, the answer would naturally be 1/2 gallon. All of my examples are singular expressions (one gallon, one pint, etc.) You may want to use plural examples like the sample I have just shown. Just be sure

to delete my last data line with the end statements in it and replace it with:

```
5000 DATA END,END,END
```

This adds your problems to my own listing. I have put more than one problem in a data line in order to conserve space, although I would suggest that you use one line for each problem you create. You may even choose to delete all of my data. Just be sure to include the triple end statements in the final data line and not to exceed 50 problems. When the program is run, it jumbles the order of the problems and ensures that the appearance of the choices are also jumbled. The user needs only press the letter 'A' or 'B' for an answer in this multiple choice quiz. Pressing the '@' key ends the quiz early and skips directly to the score card. You may either rerun the program by pressing 'Y' for yes or end by pressing 'N' for no.

There is no CPL (Computer Paced Learning) in this program as found in some of my recent programs. Once you run this listing, you will understand why including this feature was not necessary.

Conclusion

While the skills presented in this program might seem elementary to some of you, I think you will find it very useful with youngsters who have not mastered these measurement skills. It also serves as a program guide for those of you who want to examine the program lines to get some ideas on using strings for graphics or text inversion.

Next month, I'll offer a special holiday gift to my readers. Until then, keep your ideas and suggestions coming. □

130	.....77	515	.....10
175	.....202	580	.....196
265	.....107	685	.....45
345	.....47	790	.....163
415	.....223	END	.....32
460	.....198		

The listing: LIQUID

```
1Ø REM*****
2Ø REM* LIQUID MEASURE *
3Ø REM* BY FRED B.SCERBO *
4Ø REM* COPYRIGHT (C) 1986 *
```

```
5Ø REM* 6Ø HARDING AVENUE *
6Ø REM* NORTH ADAMS, MA Ø1247 *
7Ø REM*****
8Ø CLEAR15ØØ:U$=CHR$(152):V$=CHR
$(232)
85 CLSØ:FORI=1TO16:PRINTCHR$(152
)CHR$(232);:NEXT:PRINTCHR$(232);
:PRINT@63,CHR$(152)CHR$(152);
9Ø FORI=1Ø89TO128Ø:READA
95 POKEI,A+128:NEXT
1ØØ PRINT@287,CHR$(232);:FORI=1T
O16:PRINTCHR$(232)CHR$(152);:NEX
T
1Ø5 FORI=1TO17:READA:POKE1382+I,
A:NEXT:FORI=1TO19:READA:POKE1413
```

```

+I,A: NEXT
110 SH=1472:T$=" PRESS <ENTER>
OR <Q>UIZ.":GOSUB195
115 DATA,,,47,32,32,,,36,47,40,,
47,44,47,,47,32,47,,36,47,40,,47
,44,43,,,104,104
120 DATA,,,47,32,32,,,32,47,32,,
47,33,47,,47,32,47,,32,47,32,,47
,32,47,,,,24,24
125 DATA,,,44,44,44,,,36,44,40,,
44,44,46,,44,44,44,,36,44,40,,44
,44,40,,,104,104
130 DATA,63,50,49,63,,,63,60,60,,
55,60,59,,63,60,60,,63,48,63,,63
,60,63,,63,60,60,,24,24
135 DATA,63,52,56,63,,63,60,60,,
63,60,63,,60,60,63,,63,48,63,,63
,61,50,,63,60,60,,104,104
140 DATA,60,48,48,60,,60,60,60,,
60,48,60,,60,60,60,,60,60,60,,60
,48,60,,60,60,60,,24,24
145 DATA2,25,32,6,18,5,4,32,2,46
,32,19,3,5,18,2,15
150 DATA3,15,16,25,18,9,7,8,20,3
2,40,3,41,32,32,49,57,56,54
155 FORI=1TO16:OW$=OW$+CHR$(232)
+CHR$(152):WO$=WO$+CHR$(152)+CHR
$(232):NEXT
160 PRINT@0,OW$;:PRINT@63,V$;:PR
INT@95,U$;:PRINT@127,V$;:PRINT@1
59,U$;:PRINT@191,V$;:PRINT@223,U
$;:PRINT@255,V$;:PRINT@287,U$;
165 PRINT@288,WO$;:PRINT@256,U$;
:PRINT@224,V$;:PRINT@192,U$;:PRI
NT@160,V$;:PRINT@128,U$;:PRINT@9
6,V$;:PRINT@64,U$;:PRINT@32,V$;
170 W$=INKEY$:IFW$=CHR$(13)THEN1
85ELSEIFW$="Q"THEN575
175 PRINT@0,WO$;:PRINT@63,U$;:PR
INT@95,V$;:PRINT@127,U$;:PRINT@1
59,V$;:PRINT@191,U$;:PRINT@223,V
$;:PRINT@255,U$;:PRINT@287,V$;
180 PRINT@288,OW$;:PRINT@256,V$;
:PRINT@224,U$;:PRINT@192,V$;:PRI
NT@160,U$;:PRINT@128,V$;:PRINT@9
6,U$;:PRINT@64,V$;:PRINT@32,U$;:
GOTO160
185 CLS0
190 GOTO230
195 SH=SH-1:T=LEN(T$):IFT<=32THE
N215
200 FORZ=32TO0STEP-1:IFMID$(T$,Z
,1)=" "THEN210
205 NEXTZ:GOTO215
210 S$=LEFT$(T$,Z)+STRING$(32-Z,
32):GOSUB220:T$=RIGHT$(T$,T-Z):S
H=SH+33:GOTO195
215 S$=T$+STRING$(32-T,32)::GOSU

```

```

B220: RETURN
220 S=LEN(S$):FORI=1TOS:Y=ASC(MI
D$(S$,I,1)):IFY>64THENY=Y-64
225 POKESH+I,Y:NEXTI: RETURN
230 CLS0
235 EQ$=CHR$(179)+CHR$(179)+CHR$
(179)+CHR$(179)
240 RR$=CHR$(204)
245 R$=CHR$(128)
250 L$=" "
255 CP$="C."
260 PT$="PT"
265 QT$="QT"
270 GH$="HALF":HG$="GAL."
275 D$=RR$+RR$+RR$+RR$+R$
280 E$=CHR$(205)+L$++L$+CHR$(206
)+R$+R$+R$
285 F$=CHR$(207)+L$++L$+CHR$(207
)+R$+R$+R$
290 G$=CHR$(205)+L$+L$+L$+L$+CHR
$(206)+R$
295 H$=CHR$(207)+L$+L$+L$+L$+CHR
$(207)+R$
300 J$=CHR$(204)+CHR$(204)+CHR$(
204)+CHR$(204)+CHR$(204)+CHR$(20
4)+R$
305 GA$=CHR$(205)+L$+L$+L$+L$+L$
+L$+CHR$(206)+R$
310 GB$=CHR$(207)+L$+L$+L$+L$+L$
+L$+CHR$(207)+R$
315 GC$=RR$+RR$+RR$+RR$+RR$+RR$+
RR$+RR$+R$
320 GOTO395
325 REM CUP
330 PRINT@L+32,CHR$(207)"C."CHR$
(207)CHR$(205)R$;:PRINT@L+64,D$;
: RETURN
335 REM PINT
340 PRINT@L,E$;:PRINT@L+32,F$;:P
RINT@L+64,D$;:PRINT@L+33,PT$;:RE
TURN
345 REM QUART
350 PRINT@L+32,E$;:PRINT@L+64,F$
;:PRINT@L+96,F$;:PRINT@L+128,D$;
:PRINT@L+97,QT$;: RETURN
355 REM HALF GAL
360 PRINT@L,G$;:PRINT@L+32,H$;:P
RINT@L+64,H$;:PRINT@L+96,H$;:PRI
NT@L+128,J$;:PRINT@L+65,GH$;:PRI
NT@L+97,HG$;: RETURN
365 REM GALLON
370 PRINT@L,GA$;:PRINT@L+32,GB$;
:PRINT@L+64,GB$;:PRINT@L+96,GB$;
:PRINT@L+128,GBJ$;:PRINT@L+160,G
C$;:PRINT@L+130,HG$;: RETURN
375 REM HOLD SCREEN
380 T$=" PRESS <ENTER> TO CONT
INUE.":SH=1504:GOSUB195

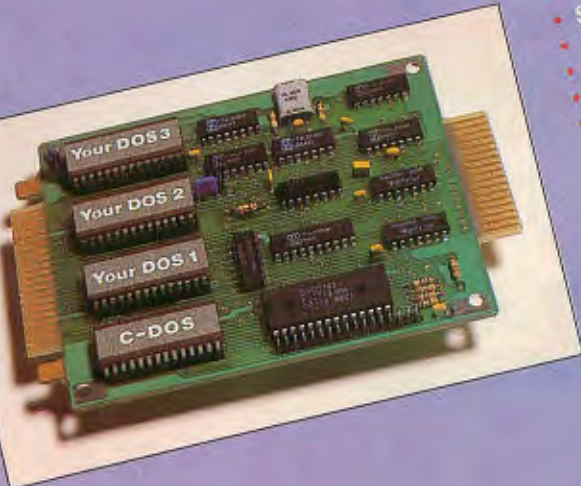
```

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```

385 IFINKEY$(<>CHR$(13) THEN385EL
ERETURN
390 S=LEN(S$):FORI=1TOS:SS=ASC(M
ID$(S$,I,1)):SS=SS-64:IFSS=-32TH
ENSS=32ELSEIFSS=-18THENS=46
395 L=172:GOSUB330:SH=1088:T$="
THIS IS ONE CUP.":GOSUB195
400 T$=" ONE CUP IS THE SAME AS
EIGHT FLUID OUNCES.":S
H=1344:GOSUB195
405 GOSUB380
410 CLS0:L=141:GOSUB340:SH=1088:
T$=" THIS IS ONE PINT.":GO
SUB195
415 SH=1248:T$=" ONE PINT IS THE
SAME THING AS TWO CUPS AND IS S
IXTEEN OUNCES.":GOSUB195
420 L=323:GOSUB340:L=335:GOSUB33
0:L=343:GOSUB330:PRINT@329,EQ$;:
PRINT@361,EQ$;:GOSUB380
425 CLS0:L=77:GOSUB350:SH=1056:T
$=" THIS IS ONE QUART.":GOS
UB195
430 SH=1248:T$=" ONE QUART IS TH
E SAME AS TWO PINTS AND IS THIRT
Y TWO OUNCES.":GOSUB195
435 L=291:GOSUB350:L=367:GOSUB34
0:L=375:GOSUB340:PRINT@361,EQ$;:
PRINT@393,EQ$;:GOSUB380
440 FORI=224TO287:PRINT@I,CHR$(1
28);:NEXTI
445 SH=1248:T$="ONE QUART IS ALS
O THE SAME AS FOUR CU
PS.":GOSUB195
450 L=303:GOSUB330:L=367:GOSUB33
0:L=311:GOSUB330:L=375:GOSUB330:
PRINT@361,EQ$;:PRINT@393,EQ$;:GO
SUB380
455 CLS0:L=76:GOSUB360:SH=1024:T
$=" THIS IS ONE HALF GALLON.":
GOSUB195
460 SH=1248:T$=" ONE HALF GALLON
IS THE SAME AS TWO QUARTS OR SI
XTY FOUR OUNCES.":GOSUB195
465 L=322:GOSUB360:L=335:GOSUB35
0:L=343:GOSUB350:PRINT@361,EQ$;:
PRINT@393,EQ$;:GOSUB380
470 FORI=224TO287:PRINT@I,R$;:NE
XTI
475 SH=1248:T$=" A HALF GALLON I
S ALSO THE SAME AS FOUR
PINTS.":GOSUB195
480 L=303:GOSUB340:L=399:GOSUB34
0:L=311:GOSUB340:L=407:GOSUB340:
PRINT@361,EQ$;:PRINT@393,EQ$;:GO
SUB385
485 CLS0:L=76:GOSUB360:SH=1024:T
$=" ONE HALF GALLON IS ALSO":

```

```

GOSUB195
490 SH=1248:T$=" EQUAL TO E
IGHT CUPS.":GOSUB195
495 FORL=290TO316STEP7:GOSUB330:
NEXTL:FORL=354TO380STEP7:GOSUB33
0:NEXTL:GOSUB380
500 CLS0:L=44:GOSUB370:SH=1024:T
$=" THIS IS ONE WHOLE GALLON.
":GOSUB195
505 SH=1248:T$=" ONE GALLON IS
EQUAL TO ONE HUNDRED AND TWENTY
EIGHT OUNCES.":GOSUB195:GOSUB38
0
510 FORI=224TO287:PRINT@I,R$;:NE
XTI:FORI=0TO31:PRINT@I,R$;:NEXTI
515 SH=1024:T$=" ONE WHOLE GALLO
N IS THE SAME AS":GOSUB195:SH=12
48:T$=" TWO HALF GALLONS.
":GOSUB195
520 FORL=328TO338STEP10:GOSUB360
:NEXTL:GOSUB385
525 FORI=224TO479:PRINT@I,R$;:NE
XTI
530 SH=1248:T$=" FOUR Q
UARTS.":GOSUB195
535 FORL=325TO345STEP6:GOSUB350:
NEXTL:GOSUB385
540 FORI=224TO479:PRINT@I,R$;:NE
XTI
545 SH=1248:T$=" EIGHT
PINTS.":GOSUB195
550 FORL=293TO313STEP6:GOSUB340:
NEXTL:FORL=389TO409STEP6:GOSUB34
0:NEXTL:GOSUB380
555 FORI=224TO479:PRINT@I,R$;:NE
XTI
560 SH=1248:T$=" SIXTEEN
CUPS.":GOSUB195
565 L=186:GOSUB330:FORL=226TO251
STEP6:GOSUB330:NEXTL:FORL=290TO3
15STEP6:GOSUB330:NEXTL:FORL=354T
O380STEP6:GOSUB330:NEXTL:GOSUB38
5
570 PRINT@480,"";
575 CLS0
580 DIM AO(51),A$(51),B$(51),C$(
51),NP(51)
585 SW=30:KZ=RND(-TIMER):FORJ=1T
O51
590 READ A$(J),B$(J),C$(J):IF A$(
J)="END" THEN600
595 NEXTJ
600 J=J-1
605 FORI=1 TO J
610 AO(I)=RND(J)
615 IF NP(AO(I))=1 THEN610
620 NP(AO(I))=1:NEXTI
625 FOR P=1TOJ

```

```

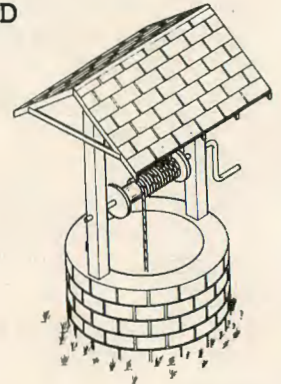
630 FORI=1024TO1535:POKEI,32:NEX
T
635 SH=1056:T$=" REVIEW EXAMPLE
NUMBER"+STR$(P)+" ":GOSUB195
640 SH=1120:T$=" "+A$(AO(P))+
IS EQUAL TO WHICH":GOSUB195
645 SH=1152:T$=" OF THE FOLLOWI
NG CHOICES ?":GOSUB195
650 JK$=A$(AO(P))
655 D=RND(20):IFD=>11THEN665
660 F$=B$(AO(P)):H$=C$(AO(P)):J$
="A":M$="B":GOTO670
665 F$=C$(AO(P)):H$=B$(AO(P)):J$
="B":M$="A":GOTO670
670 SH=1221:T$="A) "+F$:GOSUB195
675 SH=1285:T$="B) "+H$:GOSUB195
680 G$=INKEY$:IF G$=""THEN680
685 IF G$=J$THEN705
690 IF G$=M$THEN705
695 IF G$="@ THEN755
700 GOTO680
705 IF G$=J$THEN720
710 GOTO730
715 IF C(F(G))<>AO(P) THEN730
720 SH=1349:T$="YOU ARE CORRECT!
":GOSUB195
725 CR=CR+1:GOTO740
730 SH=1344:T$=" SORRY! THE COR
RECT ANSWER IS":GOSUB195:SH=1378
:T$=B$(AO(P))+":GOSUB195
735 IR=IR+1
740 SH=1442:T$="(PRESS <ENTER> T
O CONTINUE .)":GOSUB195
745 IFINKEY$<>CHR$(13) THEN745
750 NEXTP
755 CLS:PRINT:PRINT:PRINT
760 PRINT" NUMBER CORRECT = "
CR
765 PRINT
770 PRINT" NUMBER WRONG = "
IR
775 J=CR+IR:IFJ=0THENJ=1

```

```

780 PRINT:PRINT" STUDENT SCOR
E = ";INT(CR*100/J);"%
785 PRINT:PRINT" ANOTHER TRY
(Y/N)";
790 W$=INKEY$:IF W$=""THEN790
795 IF W$="Y" THEN RUN
800 IF W$="N" THEN CLS:END
805 GOTO790
810 REM ENTER DATA AT LINE 1000
815 DATA ONE CUP,EIGHT OUNCES,FO
UR OUNCES,ONE PINT,TWO CUPS,FOUR
CUPS,ONE PINT,SIXTEEN OUNCES,EI
GHT OUNCES
820 DATA ONE QUART,TWO PINTS,TWO
CUPS,ONE QUART,FOUR CUPS,SIXTEE
N OUNCES,ONE QUART,32 OUNCES,FOU
R PINTS
825 DATA 1/2 GALLON,TWO QUARTS,T
WO PINTS,1/2 GALLON,FOUR PINTS,E
IGHT PINTS,1/2 GALLON,EIGHT CUPS
,32 OUNCES,1/2 GALLON,64 OUNCES,
128 OUNCES
830 DATA ONE GALLON,FOUR QUARTS,
FOUR PINTS,ONE GALLON,EIGHT PINT
S,FOUR PINTS,ONE GALLON,SIXTEEN
CUPS,SIXTEEN OUNCES
835 DATA ONE GALLON,128 OUNCES,6
4 OUNCES
840 DATA END,END,END

```



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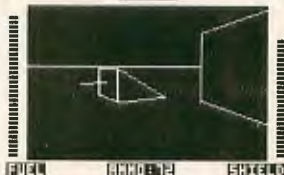
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*A modification to use
Remote2 with
an RS-232 Pak*

The Evolving REMOTE

By Mark Crosby

I have changed Scott Taylor's *Remote2* improved remote terminal driver [November 1985, Page 106] to operate with a modified RS-232 Program Pak. By slightly modifying the

E2 separates the IRQ of the ACIA from positions 4 and 8 of the cartridge connector.

If the jumper is not cut, any data input causes the IRQ to become active,

RCV	PSHS	B	save the contents of B
	LDB	\$FF69	get status of ACIA
	ANDB	#\$08	check for full receive register
	BEQ	NOIN	no input, jump out
	ANDB	#\$07	check for receive errors
	BNE	ERR	jump to error section
	LDA	\$FF6B	load A with data input
	PULS	B	retrieve B
	RTS		go back to calling section

Figure 1

RS-232 Pak, it can be adapted to work with a Y cable and disk drive.

Removing the ROM chip (U3) eliminates the memory conflict between Disk BASIC and the Pak ROM. Cutting the wire jumper connecting pads E1 and

which triggers the non-maskable interrupt and the cartridge interrupt detection input of the computer. When the CART Pin is active, the computer resets. If you have the disk controller connected, the computer shows the opening credits.

After all the hardware modifications are done, it is just the exchange of routines to be able to communicate through the Pak.

The input routine could look like that in Figure 1.

The output routine could look like that in Figure 2.

Mark Crosby, from Hymera, Ind., is a senior at Indiana State University majoring in applied computer technology. He has owned a CoCo for two years and is currently compiling information to construct an interactive space flight Simulation.


```

OUT   PSHS   B      save the contents of B
OUT1  LDB    $FF69  get status of ACIA
      ANDB   #$10   check for full transmit register
      BEQ   OUT1   if full, go back and check again
      STA   $FF6B  transmit data
      PULS  B      retrieve B
      RTS                    go back to calling section

```

Figure 2

These lines replace all programming required for the bit-banger method, and it is a lot faster too.

In addition to making the hardware change and using *Remot232* program or some other routine, you need to tell the 6551 ACIA what communication parameters you want to use. You can do this by poking certain values into the control register (location \$FF6B) and the command register (location \$FF6A). To configure the RS-232 Pak for 300 Baud, one stop bit, 7-bit word length, even parity and no echo, the following values need to be poked to the registers before loading *Remot232*:

```

POKE$HFF6B,54 (press ENTER)
POKE$HFF6A,107 (press ENTER)

```

For different settings, consult pages 15 and 16 of the manual that came with your RS-232 Pak.

One you have made all modifications and poked the control and command registers, LOADM and execute *Remot232*. Now you may control your CoCo via an external terminal, say a Model 100 or a full 80-column terminal.

I tested the modification by changing the RS-232 routines in the *Remote2* program. It worked well at 300 Baud and allowed the use of the printer. □

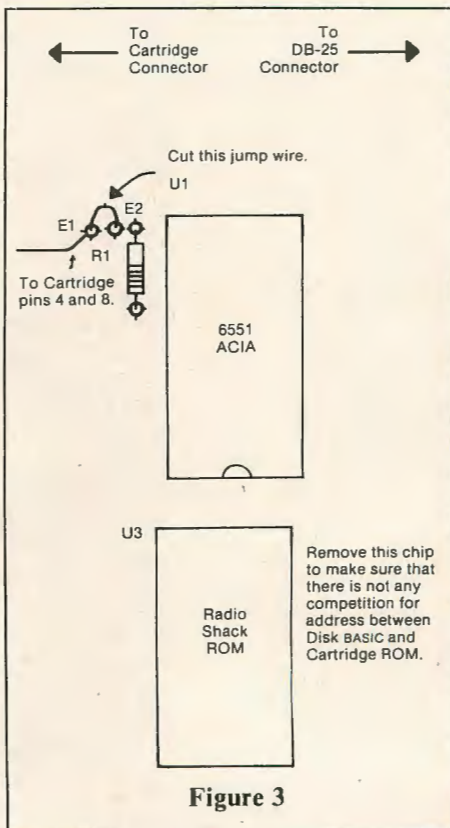


Figure 3

Editor's Note: *Remot232* will be included on RAINBOW ON TAPE as well as RAINBOW ON DISK. To transfer the file from tape to disk, type CLOADM "REMOT232" and press ENTER. When the file has loaded from tape, enter SAVEM "REMOT232", &H7D00, &H7E E4, &H7D32

The listing: REMOT232

```

7D00  00100 *****
00110  * REMOTE2 *
00120  * AN IMPROVED REMOTE *
00130  * TERMINAL *
00140  * DRIVER FOR THE COCO BY*
00150  * SCOTT TAYLOR RAINBOW *
00160  * 11/85 *
00170  * FROM THE ORIGINAL *
00180  * REMOTE PROGRAM BY *
00190  * DAN DOWNARD RAINBOW *
00200  * 11/83 *
00210  * SET TO OPERATE ON A *
00220  * MODIFIED RS232 PROGRAM*
00230  * PAK BY MARK CROSBY *
00240  * 3/86 *
00250  *****
7D00  00260  ORG $7D00
      00270  *EQUATES FOR ROM & RAM
0016A  00280  IHOOK EQU $016A
00167  00290  OHOOK EQU $0167
A000  00300  POLCAT EQU $A000
006F  00310  DEV EQU $6F
0070  00320  FLAG EQU $70

```

```

7D00  01  00330  BREAK FCB $01
7D01  01  00340  CORNER FCB $01
7D02  01  00350  LFFLG FCB $01
7D03  00  00360  PRTFLG FCB $00
7D04  00  00370  ICASE FCB $00
7D05  00  00380  OCASE FCB $00
7D06  9F  00390  CURSOR FCB $9F
7D07  0400 00400  NOSCR L FDB $400
7D09  00  00410  COUNTR FCB $00
7D0A  00420  TABLE RMB $28
      00430  *INITIALIZE RAM HOOKS
7D32  BE  0168  00440  START LDX 1+OHOOK
7D35  AF  8D 012D 00450  STX 1+NTSCRN,PCR
7D39  BE  016B  00460  LDX 1+IHOOK
7D3C  AF  8D 0193 00470  STX 1+IRET2,PCR
7D40  86  7E  00480  LDA #$7E
7D42  B7  0167  00490  STA OHOOK
7D45  B7  016A  00500  STA IHOOK
7D48  30  8D 0048 00510  LEAX OUT,PCR
7D4C  BF  0168  00520  STX 1+OHOOK
7D4F  30  8D 0115 00530  LEAX IN,PCR
7D53  BF  016B  00540  STX 1+IHOOK
      00550  * MOVE TABLE OF ROM ADDRESS
      00560  *SET INKEY$ TO RAMBASED ROUTINE
7D56  8E  AA29  00570  MOVTLB LDX #AA29
7D59  31  8C AE  00580  LEAY TABLE,PCR
7D5C  10BF 0128  00590  STY $128
7D60  EC  81  00600  GETADD LDD ,X++
7D62  ED  A1  00610  STD ,Y++
7D64  8C  AA51  00620  CMPX #AA51
7D67  26  F7  00630  BNE GETADD
7D69  30  8D 0005 00640  LEAX INKEY,PCR
7D6D  31  3C  00650  LEAY -4,Y
7D6F  AF  A4  00660  STX ,Y
7D71  39  00670  RET RTS

```

		00680	*CHECK	KEYBOARD	AND	7DD6	27	67	01250	BEQ	ENTER				
		00690	*RS232	FOR	INKEY\$ 255	7DD8	81	20	01260	CMPA	#\$20				
		00700	*TIMES	IF	NOTHING	IN	\$87		01270	BLO	PULL2				
7D72	96	87	00710	INKEY	LDA	<\$87	7DDC	81	1F	01280	CMPA	#\$1F			
7D74	26	15	00720	BNE	YES		7DDE	22	04	01290	BHI	CMP2			
7D76	86	FF	00730	LDA	#\$FF		7DE0	86	60	01300	LDA	#\$60			
7D78	B7	7D09	00740	STA	COUNTR		7DE2	20	20	01310	BRA	PUTIT			
7D7B	AD	9F A000	00750	INKEY2	JSR	[POLCAT]			01320	*TRANSLATE	ASCII	VALUE	TO		
7D7F	26	0A	00760	BNE	YES				01330	*SCREEN	CHAR	VALUE			
7D81	BD	7E88	00770	JSR	REMIN		7DE4	81	3F	01340	CMP2	CMPA	#\$3F		
7D84	26	05	00780	BNE	YES		7DE6	22	04	01350	BHI	CMP3			
7D86	7A	7D09	00790	DEC	COUNTR		7DE8	8B	40	01360	ADDA		#\$40		
7D89	26	F0	00800	BNE	INKEY2		7DEA	20	18	01370	BRA	PUTIT			
		00810	*CHARACTER	IN	A	REGISTER	7DEC	81	5F	01380	CMP3	CMPA	#\$5F		
		00820	*BRANCH	IF	BREAK	(A=\$03)	7DEE	22	02	01390	BHI	CMP4			
		00830	*CONVERT	TO	STRING		7DF0	20	12	01400	BRA	PUTIT			
7D8B	81	03	00840	YES	CMPA	#\$03	7DF2	81	7F	01410	CMP4	CMPA	#\$7F		
7D8D	1027	3078	00850	LBEQ	SAE09		7DF4	22	0E	01420	BHI	PUTIT			
7D91	7E	A56B	00860	JMP	SA56B		7DF6	80	60	01430	SUBA	#\$60			
		00870	*OUTPUT	CHARACTER	IF	DEV=0	7DF8	20	0A	01440	BRA	PUTIT			
		00880	*INSERT	LINE	FEEDS	IF	NEEDED		01450	PULL	CMPX	#\$60			
		00890	*USE	NEW	PRINT	ROUTINE	7DFA	26	02	01460	BNE	PULL2			
7D94	34	06	00900	OUT	PSHS	A,B	7DFD	26	02	01470	BSR	SCROLL			
7D96	0D	6F	00910	TST	<DEV		7DFF	8D	18	01480	PULL2	PULS	B,X,Y		
7D98	1026	00C7	00920	LBNE	NTSCN1		7E01	35	34	01490	RTS				
7D9C	81	08	00930	CMPA	#\$08		7E03	39		01500	PUTIT	STA	,X+		
7D9E	27	1A	00940	BEQ	RMOUT2		7E04	A7	80	01510	FIXCUR	STX	,\$88		
7DA0	81	0D	00950	CMPA	#\$0D		7E06	9F	88	01520	LDX	LDX	,\$0A		
7DA2	26	0E	00960	BNE	RMOUT		7E08	86	0A	01530	BRA	PULL			
		00970	*CHECK	IF	LINE	FEEDS	ARE		01540	BKSPC	LDY	#\$60	60		
		00980	*TO	BE	SENT	TO	REMO-TERM		01550	STY	,	-X			
7DA4	F6	7D02	00990	LDB	LFFLG		7E10	10AF	82	01560	STX	,\$88			
7DA7	27	11	01000	BEQ	RMOUT2		7E13	9F	88	01570	LDX	LDX	,\$0A		
7DA9	86	0A	01010	LDA	#\$0A		7E15	86	0A	01580	BRA	PULL2			
7DAB	BD	7ED5	01020	JSR	RSOUT				01590	*CHECK	IF	SCROLL	PROTECTED		
7DAE	86	0D	01030	LDA	#\$0D				01600	*AREA	IS	IN	RANGE	OF	\$400
7DB0	20	08	01040	BRA	RMOUT2				01610	*TO	\$500	SCROLL	SCREEN		
		01050	*ECHO	CHARACTER	IN	PRTFLG			01620	SCROLL	LDX	NOSCRL			
		01060	*IF	IT	IS	NOT	=	TO	01630	CMPX	#\$400				
7DB2	F6	7D03	01070	REMOUT	LDB	PRTFLG			01640	BLO	MAKEX				
7DB5	27	03	01080	BEQ	RMOUT2				01650	CMPX	#\$500				
7DB7	B6	7D03	01090	LDA	PRTFLG				01660	BLO	SCROL2				
		01100	*CHECK	OUTPUT	FOR	UPPER-C			01670	MAKEX	LDX	#\$400			
		01110	*OR	LOWER-C	AND	SEND	IT		01680	SCROL2	LDB	\$20,X			
7DBA	F6	7D05	01120	RMOUT2	LDB	OCASE			01690	STB	,X+				
7DBD	BD	7EAC	01130	JSR	CKCASE				01700	CMPX	#\$500				
7DC0	BD	7ED5	01140	JSR	RSOUT				01710	BNE	SCROL2				
7DC3	35	06	01150	ORET1	PULS	A,B			01720	STX	,\$88				
7DC5	34	34	01160	ORET2	PSHS	B,X,Y			01730	LDB	#\$60				
		01170	*CHECK	FOR	BREAK	KEY			01740	LASTLN	STB	,X+			
7DC7	F6	0154	01180	LDB	\$154				01750	CMPX	#\$600				
7DCA	C1	BF	01190	CMPB	#\$BF				01760	BNE	LASTLN				
7DCC	27	2C	01200	BEQ	PULL				01770	RTS					
7DCE	9E	88	01210	LDX	,\$88				01780	*CLEAR	TO	END	OF	LINE	IF
7DD0	81	08	01220	CMPA	#\$08				01790	*'ENTER'	KEY	IS	PRESSED		
7DD2	27	38	01230	BEQ	BKSPC				01800	ENTER	LDA	,\$89			
7DD4	81	0D	01240	CMPA	#\$0D				01810	COMP	CMPA	#\$20			
									01820	BLO	ENT				
									01830	SUBA	#\$20				
									01840	BRA	COMP				
									01850	ENT	LDB	#\$60			
									01860	STB	,X+				
									01870	CMPX	#\$600				
									01880	BNE	INCRE				
									01890	BSR	SCROLL				
									01900	BRA	FINISH				
									01910	INCRE	INCA				
									01920	CMPA	#\$20				
									01930	BNE	ENT				
									01940	STX	,\$88				
									01950	FINISH	PULS	B,X,Y			
									01960	LDX	LDX	,\$0A	01		
									01970	RTS					

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(Reviewed in RAINBOW April '86 issue, pg. 185)



```

7E63 35 06 01980 NTSCN1 PULS A,B
7E65 7E 7DC5 01990 NTSCRN JMP ORET2
02000 *INPUT FROM KEYBOARD OR
02010 *RS232 IF DEV=0
02020 *USE RSIN FOR REMOTE INPUT
7E68 B6 7D06 02030 IN LDA CURSOR
7E6B A7 9F 0088 02040 STA [$88]
7E6F 0F 70 02050 CLR <FLAG
7E71 0D 6F 02060 TST <DEV
7E73 26 5D 02070 BNE IRET2
7E75 32 62 02080 LEAS 2,S
7E77 34 15 02090 PSHS B,CC,X
7E79 AD 9F A000 02100 IN1 JSR [POLCAT]
7E7D 27 02 02110 BEQ RSCHK
7E7F 20 4F 02120 BRA NOCHNG
7E81 BD 7E88 02130 RSCHK JSR REMIN
7E84 27 F3 02140 BEQ IN1
7E86 20 42 02150 BRA IRET1
7E88 F6 FF69 02160 REMIN LDB $FF69
7E8B C4 08 02170 ANDB #$08
7E8D 27 18 02180 BEQ ZEROA
02190 *NEW RS232 INPUT FROM CART
7E8F C4 07 02200 RSAN ANDB #$07
7E91 26 14 02210 BNE ZEROA
7E93 B6 FF68 02220 LDA $FF68
02230 *STORE CHAR IN UPPER RIGHT
02240 *CORNER OF SCREEN
7E96 F6 7D01 02250 LDB LDB CORNER
7E99 27 03 02260 BEQ CHKBRK
7E9B B7 041F 02270 STA $41F
02280 *CHECK FOR BREAK DISABLE
02290 *AND FOR BREAK SIGNAL
02300 *FROM REMOTE TERMINAL
7E9E F6 7D00 02310 CHKBRK LDB BREAK
7EA1 27 06 02320 BEQ NOTBRK
7EA3 81 03 02330 CMPA #$03
7EA5 26 02 02340 BNE NOTBRK
7EA7 4F 02350 ZEROA CLRA

```

```

7EA8 39 02360 RTS
7EA9 F6 7D04 02370 NOTBRK LDB ICASE
02380 *CHECK IF CHAR SHOULD BE
02390 *UPPER- OR LOWERCASE AND
02400 *CHANGE IT ACCORDINGLY
7EAC C1 01 02410 CKCASE CMPB #$01
7EAE 26 0B 02420 BNE CMPB2
7EB0 81 61 02430 CMPA #$61
7EB2 25 15 02440 BLO RET2
7EB4 81 7A 02450 CMPA #$7A
7EB6 22 11 02460 BHI RET2
7EB8 80 20 02470 SUBA #$20
7EBA 39 02480 RTS
7EBB C1 02 02490 CMPB2 CMPB #$02
7EBD 26 0A 02500 BNE RET2
7EBF 81 41 02510 CMPA #$41
7EC1 25 06 02520 BLO RET2
7EC3 81 5A 02530 CMPA #$5A
7EC5 22 02 02540 BHI RET2
7EC7 8B 20 02550 ADDA #$20
7EC9 39 02560 RET2 RTS
7ECA C6 60 02570 IRET1 LDB #$60
7EEC E7 9F 0088 02580 STB [$88]
7ED0 35 95 02590 NOCHNG PULS B,CC,X,PC
7ED2 7E 7D71 02600 IRET2 JMP RET
7ED5 34 04 02610 RSOUT PSHS B
7ED7 F6 FF69 02620 RSOUT1 LDB $FF69
7EDA C4 10 02630 ANDB #$10
7EDC 27 F9 02640 BEQ RSOUT1
7EDE B7 FF68 02650 STA $FF68
7EE1 35 04 02660 PULS B
7EE3 39 02670 RTS
02680 *
02690 ZZZZ *****
7EE4 7D32 02700 END START

```

00000 TOTAL ERRORS

Hint . . .

Multi-Pak Versatility

Many owners of the Multi-Pak Interface (MPI) have found it frustrating that they cannot switch to any of the four slots while remaining in Disk BASIC. Here is a simple method to accomplish this.

The control port at \$FF7F controls two cartridge select lines, the CTS and SCS lines. This location contains an 8-bit value. The high-order four bits control the CTS and the low-order four bits control the SCS. The value of each of these nibbles can range from \$0 to \$3. In rough terms, the CTS nibble selects which slot the processor is using for software and the SCS nibble selects which slot is to be used for I/O.

To select Slot 4 for Disk BASIC and disk I/O, enter POKE&HFF7F,&H33. As another example, suppose you want to keep Disk BASIC software but want to perform I/O out of an RS-232 Pak in Slot 2. Then you would enter POKE&HFF7F,&H31. The idea is that the first hexadecimal digit represents the slot number for software after subtracting a value of one. The second hexadecimal represents the slot desired for I/O after subtracting a value of one.

Stephen R. Wilson
Riverside, CA

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Word Fun: The Three Bears Come of Age

By Steve Blyn
Rainbow Contributing Editor

Once upon a time, there were three bears. Wait a minute! Why do we always have to hear about bears? Why can't it be chickens or cows instead? Talking cows living in a house in the woods are really no more or less preposterous than talking bears. And, for that matter, can't bears jump over the moon?

This month we have a short, fun program. There is really no skill development intended except to develop familiarity with using language. A one-page screen showing the beginning of *The Three Bears* is shown. Five of the keywords in the story are left out and replaced by stars. At the bottom of the screen is a word list.

The appearance of the program's screen is that of a Cloze exercise. But a Cloze program looks for correct answers. We are hoping only for a pleasant reading experience. Any of the words from the word list may be selected. Use the right-arrow to get the

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

special cursor to the word you want to use and press ENTER.

Any of the words may be inserted anywhere in the story. Use the right-arrow to position the word underneath any part of the story and press ENTER. Make sure the last letter of the chosen word is directly underneath the last letter of the word or star line to be replaced. The word you are using will jump up and take the place of the word above.

Youngsters and slow readers especially enjoy this type of program. There are no right or wrong answers. The child gets an opportunity to manipulate story pieces in a creative experience or a just-for-fun activity. There is no real beginning or end. The child can stop at any time to read his story and continue to edit and change it indefinitely.

The story the child creates can be very sensible, very humorous or absolute nonsense. It really doesn't matter which. We are hoping that the children work on using words and creating original thoughts. Sometimes it seems to take a bulldozer to get reluctant readers to become involved in a story. We found that this type of fun approach can often break the ice with these students. Active and enthusiastic participation is certainly better than reluc-

tance and anxiety, and creates a positive and receptive attitude for the experience.

The program can be ended by the child anytime while selecting a new word. Pressing the letter 'E' clears the screen and ends the program.

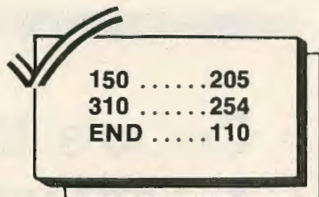
Lines 80 to 120 print the original story with the keywords starred out. Line 150 prints the 16 words we have selected to use. They are contained in the DATA lines 380 to 410. These words can be changed, of course, to add variety to the program. The children should be encouraged to come up with alternative sets of suitable or humorous words of their own. These may be substituted by you into the DATA lines.

Lines 170 to 260 contain the routine for going through the choice of words to use. The cursor, CHR\$(201), is moved from word to word by pressing the right-arrow key, CHR\$(9). If ENTER, CHR\$(13), is pressed, then that word is selected. If the 'E' is pressed, the program ends.

Lines 280 to 360 contain the routine for moving the selected word through the story. Line 350 waits for ENTER to be pressed. When it is pressed, the word is inserted in the story immediately above its current position.

We hope your children enjoy working

with this program. We encourage you to help them alter the data words and even the story itself. This will enable you to create new versions to save and enjoy. Children most enjoy those programs they have had a hand in creating. □



The listing: FUNWORDS

```

1Ø REM"FUN WITH WORDS"
2Ø REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1986"
3Ø C=1
4Ø GH$=STRING$(32,2Ø7)
5Ø DIM A$(18)
6Ø FOR T= 1 TO 16:READ A$(T):NEX
T T
7Ø CLS5
8Ø PRINTØ," ONCE UPON A TI
ME THERE"
9Ø PRINTØ64,"WERE 3 ****. THEY
WENT FOR A";
1ØØ PRINTØ128,"WALK IN THE **
**. A LITTLE"
11Ø PRINTØ192,"**** CAME TO T
HEIR ****.SHE"
12Ø PRINTØ256,"JUMPED ON THE
BABY'S ****. ";
13Ø PRINTØ32Ø,"=====WORD=====
===LIST=====";
14Ø PRINTØ352," ";;FOR T= 1 TO 4
:PRINT:NEXT T
15Ø C=1:FOR T= 1 TO 16:PRINT Ø34
5+(8*T),A$(T):NEXT T
16Ø J$=CHR$(2Ø1)
17Ø M=352:PRINTØM,J$;
18Ø B$="BEARS"
19Ø EN$=INKEY$
2ØØ IF EN$=CHR$(13) THEN GOTO 27
Ø
21Ø IF EN$="E" THEN CLS:END
22Ø IF EN$=CHR$(9) THEN 24Ø
23Ø GOTO 19Ø
24Ø K=8:PRINTØM,CHR$(143);:PRINT
ØM+K,J$;:M=M+K:C=C+1:B$=A$(C)
25Ø IF C>16 THEN M=344:C=Ø:PRINT
Ø48Ø,CHR$(2Ø7);
26Ø GOTO 19Ø
27Ø X=1:GOSUB 37Ø:PLAY"Ø3L25BEG"
:P=34:PRINTØP,B$;
28Ø EN$=INKEY$
29Ø IF EN$=CHR$(9) THEN PRINTØP+
X-1,CHR$(2Ø7);:PRINTØP+X,B$;:X=X
+1

```

```

3ØØ IF P+X=59 THEN P=97:X=Ø:GOSU
B 37Ø
31Ø IF P+X=124 THEN P=161:X=Ø:GO
SUB 37Ø
32Ø IF P+X=188 THEN P=225:X=Ø:GO
SUB 37Ø
33Ø IF P+X=252 THEN P=289:X=Ø:GO
SUB 37Ø
34Ø IF P+X=316 THEN P=34:X=Ø:GOS
UB 37Ø
35Ø IF EN$=CHR$(13) THEN PRINTØP
+X-33,B$;:PLAY"Ø4L5ØCEG":GOSUB 3
7Ø:GOTO 14Ø
36Ø GOTO 28Ø
37Ø PRINTØ32,GH$;:PRINTØ96,GH$;:
PRINTØ16Ø,GH$;:PRINTØ224,GH$;:PR
INTØ288,GH$;:RETURN
38Ø DATA BEARS,GIRLS,BOYS,COWS
39Ø DATA SAND,CITY,WOODS,FIELD
4ØØ DATA DOG,GIRL,MOUSE,SMURF
41Ø DATA HOUSE,ROOM,TOYS,BED
42Ø DATA ,,

```

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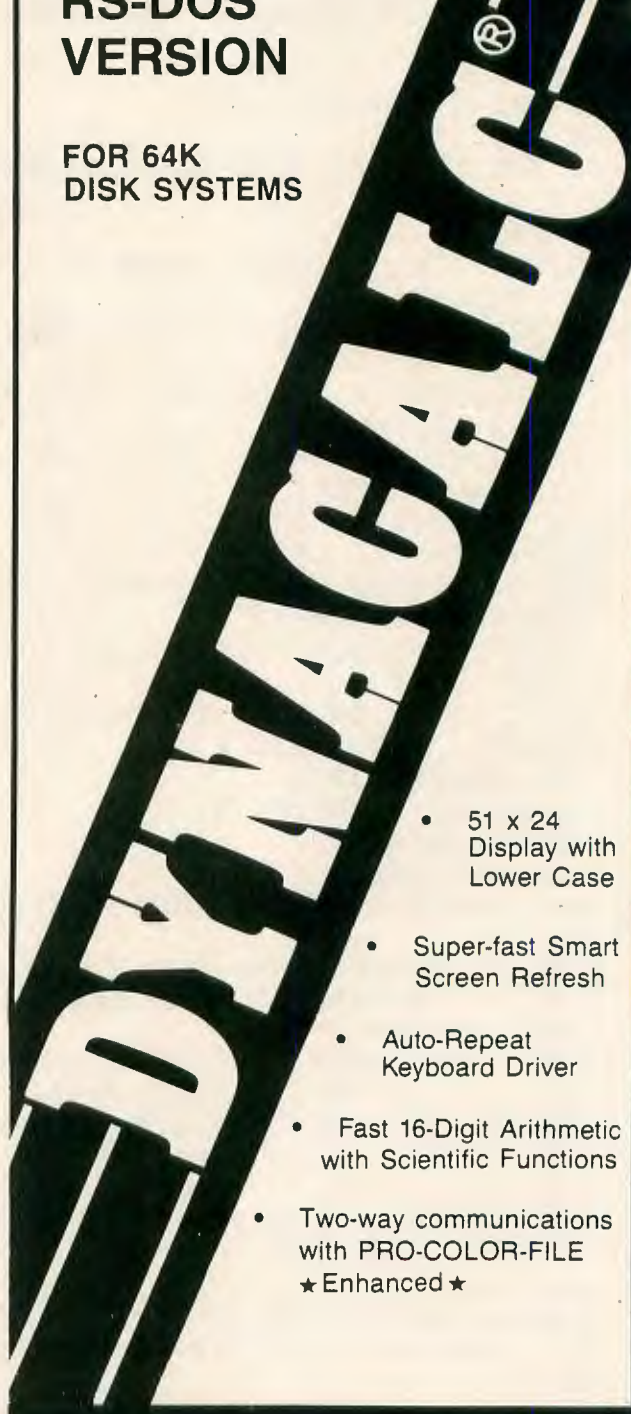
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CORRECTIONS

"The Meaning of Life" (June 1986, Page 196): William Barden has written to offer a correction for Listing 3, *Driver*, which appears on Page 204. Line 490 should read:

```
490 DATA &HCC, &H7F, &H5F, &HFD
```

"Do-It-Yourself Video Output Board" (September 1986, Page 171): Tim McIntosh has written to correct the article which appeared with his video driver schematic. The article states that the driver will properly drive a color composite monitor as well as a monochrome monitor. This, however, is not the case. The driver will *not* work with a color composite monitor. We thank Tim for this correction and apologize for any inconvenience it has caused.

"The Adventure Processor" (August 1986, Page 26): Bill Cook writes to tell us of an inadvertent omission from his *Adv-Pro* program. Lines 630 and 640 create strings consisting of the first four characters of each verb and object keyword. For proper operation, each verb and keyword must contain at least four characters. The program can be corrected by making the following changes:

```
630 A$="NV="+STR$(NV)+"":FORI=1TO
NV":GOSUB172
631 A$="IFLEN(V$(I))<4 THEN V$(I)
)=V$(I)+CHR$(32):GOTO"+STR$(LN):
GOSUB172
632 A$="V1$=V1$+LEFT$(V$(I),4):N
EXT":GOSUB172
640 A$="FORI=1TO 0":GOSUB172
641 A$="IFLEN(O$(I,2))<4 THENO$(
I,2)=O$(I,2)+CHR$(32):GOTO"+STR$(
LN):GOSUB172
642 A$="N1$=N1$+LEFT$(O$(I,2),4)
:NEXT":GOSUB172
```

A previously generated Adventure can be corrected by adding spaces to verb strings consisting of less than four characters. Object keywords which contain less than four characters and appear in data statements must be enclosed with quotes and additional spaces added to bring the total number of characters to four.

"Junk Food" (November 1984, Page 90): David Taylor has written to offer a modification for *Junkfood*. This modification allows the program to load from disk. Enter the following program, *Jnkfix*, and follow the saving procedures listed after it.

```
10 READ W:IF W=0 THEN20 ELSE POK
E W,4:GOTO10
20 READ W:IF W=0 THEN30 ELSE POK
E W,5:GOTO20
30 READ W,Q:IF W=0 THEN40 ELSE P
OKE W,Q:GOTO30
40 W=16084
50 READ Q:IF Q=0 THEN60 ELSE POK
EW,Q:W=W+1:GOTO50
60 END
100 DATA14572,14583,14593,14599,
14605,14621,14631,14680,14702,14
724,14798,14911,14967,14977,1498
8,15064,15073,15102,0
110 DATA14809,14865,14947,14998,
15041,15114,0
120 DATA12314,126,12315,62,12316
,212,14532,201,14535,202,14578,6
,14637,6,14642,126,14643,62,1464
4,224,0,0
130 DATA183,255,199,183,255,200,
183,255,203,126,48,29,183,255,19
8,183,255,201,183,255,202,126,57
,53,0
```

Enter the program carefully and save it. Then perform the following steps:

- 1) PCLEAR1 (press ENTER)
- 2) RUN (Listing 1)
- 3) RUN (Listing 2)
- 4) RUN (Listing 3)
- 5) RUN (Listing 4)
- 6) RUN JNKFIX
- 7) SAVEM"JUNKFOOD",12288,16107,12288

Now LOADM *Junkfood* from disk and execute it.

For quicker service, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG prompt and INFO at the Topic? prompt.

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Wild West Checkers

Tape 5: Stars

Hebrew

Stars ם ן ן ן ן ן ן ן ן ן ן

Victorian (Standard and Reverse only)

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CoBBS Message Editor

**A useful update
for the
CoBBS system**

By Richard Duncan

The *CoBBS* system was presented in November 1985, and quite a few BBSs use it. There are editors for just about every file in use on the system, except for handling the message base for certain problems or desires. The *CoBBS Message Editor* is written to handle some of the problems that occasionally occur during normal BBS operation.

SMH/EDI goes into the message base and allows the user to modify information contained in the header of that message (e.g., menu number it was posted to, active/deleted, private/public, or the to/from/subject information). In addition, there is a renumbering routine that allows a sequential assignment of message numbers starting at whatever the SysOp designates.

The routine can be used offline and does not require that the driver be loaded. There is no error trapping or checking for carrier detect. This editor

would normally only be used by the SysOp and would not require these features. Error trapping and carrier check could easily be added to the routine if required.

Booting Up

On running *SMH* the routine checks the drives assigned to three files: MENU/SYS, HDR/SYS and MSG/SYS. These values will not be correct if the editor is run before the BBS system itself has been booted. When this occurs, you are asked which drive each file is on. Once this is taken care of, the system loads in the name of the various menus you have on the board and then goes directly into the editor.

A menu is displayed before any message information. This is the help menu and can be seen or redisplayed by using the H command. There are 16 commands available.

Move Options

There are five commands that affect movement around the message base. Two commands, + and -, move forward or backward respectively through the message base. The GOTO command locates a particular message number within the base if available. ALL messages are displayed whether they are active or deleted.

Richard Duncan built a UHF television station in Little Rock and is currently the director of engineering for the station. He is active in amateur radio [WD5B] and especially interested in packet communications. Richard lives in Little Rock, Arkansas.

Initially, every message is displayed when entering the editor. If you only want to view one particular area (menu number), use the SET MENU command. When prompted, enter the menu number you want to look at. Return to viewing all messages by using this command and responding with ALL instead of a menu number.

There is a search feature that thumbs through the header information for a match. The SEARCH option prompts for the string you want a match to. This is a global search that checks the to, from and subject at one time. The search starts from the current location to the end of the file. If a complete search of the message base is desired, go to the first message in the base before starting the search.

Toggles

Four toggle commands are available. The PUBLIC/PRIVT toggle determines whether the message is public or private. A message may be deleted or reactivated by the use of the K and A commands. The KILL command is used to delete the current message and the ACTIVATE command allows a

deleted message to be reinstated. A message that has been received can be changed back to waiting on the user to call again by the TOGGLE RCVD command.

Modifiers

Occasionally, there is the need to change the header information of who the message is from, to or its subject. The CHANGE HEADER command allows this. Each particular part of the address is displayed showing what the original information is and requesting the change. If just ENTER is pressed, the current information will be retained, while entering anything on this line causes that part of the address to be changed.

A message can be re-posted to a different menu number by use of the BOARD POST command. Type the new menu number and press ENTER.

There is always a difference in opinion about how a message board should be operated. CoBBS was originally set up to sequentially count the number of messages entered from day one. Some operators like to limit or change the overall message count from time to

time. Using the RENUMBER command allows the SysOp to change each message in a sequential order. It is best to do this when there are no deleted messages in the base or the renumbering will appear broken to a user and will disappear at the next message purge.

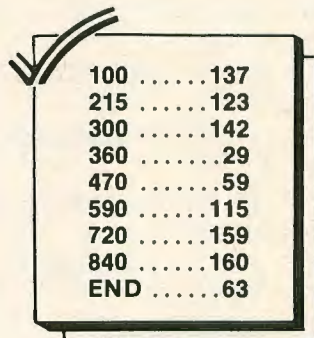
Other Commands

Once the message header appears, the SysOp can then view the message text by using the MESSAGE command. As the text appears, pressing any key stops the scroll and pressing any key again restarts the viewing. Pressing the 'S' key stops the display and returns to the command menu. Scroll control is only available from the keyboard.

The complete message may be dumped at one time to either the screen or the printer with the DUMP MESSAGE command. After selecting this command, choose whether a screen print or printer dump is desired.

The QUIT command allows termination of the message editor and the option of going into BASIC or returning the BBS.

The editor can be used online with the CoBBS system. Again, note that there



100	.....	137
215	.....	123
300	.....	142
360	.....	29
470	.....	59
590	.....	115
720	.....	159
840	.....	160
END	.....	63

The listing: SMH

```

0 'SMH/EDI BY RICHARD DUNCAN
10 CLEAR 5000
15 DIM BN$(255)
20 DR$(0)="0":DR$(1)="1":DR$(2)="
2" :DR$(3)="3":NU$=CHR$(0):MD=-1
25 CLS:PRINT"      SYSTEM MESSAGE
EDITOR"
30 FOR X=4670 TO 4673:IFPEEK(X)<
4 THEN 60
35 PRINT:PRINT"ERROR IN DRIVE NU
MBERS"
40 INPUT"MENU/SYS DRIVE";X:POKE4
673,X
45 INPUT" HDR/SYS DRIVE";X:POKE4
670,X

```

```

50 INPUT" MSG/SYS DRIVE";X:POKE4
671,X
55 GOTO65
60 NEXTX
65 PRINT:PRINT:PRINT"WAIT....":P
RINT"GETTING MENU: "
70 REM - MENU/SS
75 GOSUB945
80 FOR R=1 TO K2 STEP 4
85 GET#2,R:BN$=M5$:BN=ASC(M1$)
90 PRINTBN;TAB(10);M5$
95 K=INSTR(BN$,NU$):IFK=0THEN K=
LEN(BN$)+1:BN$(BN)=LEFT$(BN$,K-1
)
100 BN$(BN)=LEFT$(BN$,K-1):NEXT
R:BN$(255)="SYSOP MSG"
105 CLOSE:GOSUB895:GOSUB920
110 GET#1,1:RE=CVN(H1$):MH=RE
115 FORB=2 TO K1:GET#1,B:F$=H2$:
GOSUB130:IFMID$(F$,2,1)<>"1"THEN
RS=CVN(H1$) ELSE NEXT B:RS=RE
120 ML=RS:GET#1,1:R=1
125 GOSUB205:GOTO270
130 REM
135 F=ASC(F$):E=128:F$=""
140 FOR Q=1 TO 8
145 J=INT(F/E)
150 IF J=0 THEN F$=F$+"0"ELSEF$=

```

"The editor can be used online with the CoBBS system."

is no error trap or carrier detect while in the message editor. To modify CoBBS for online access to this file, follow this procedure: Load COBBS/SYS. Retype Line 34 to read 34 LOAD"SMH/EDI",R. Save COBBS/SYS.

The message editor returns to CoBBS by using the QUIT command and answering 'Y' to the option. There are no other modifications required. Save this editor on Drive 0 under the filename SMH/EDI.

After the modification is made to COBBS/SYS, the editor can be called from the BBS by using a type ~ command. No additional data is required.

The CoBBS software originally came

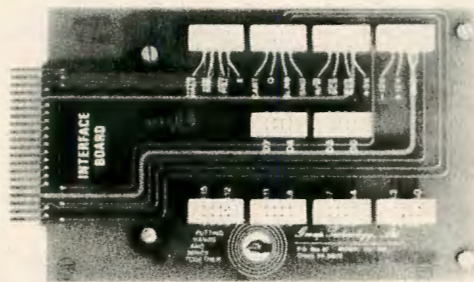
out last fall in RAINBOW [November 1985, Page 135] and is available through back issues of RAINBOW and RAINBOW ON TAPE.

If you are operating a CoBBS system, please send me your phone number, BBS number and hours of operation because I am compiling a directory of CoBBS systems. In a future article I will correct some problems in the original CoBBS and look at some new additions. My address is 9821 Margie Circle, Little Rock, AR 72209-6521. Please enclose an SASE when writing. All letters will be answered as soon as possible. You can also find me on Delphi (username RICH4COBBS). □

```
F$+"1"
155 F=F-(E*J):E=E/2
160 NEXT Q
165 RETURN
170 REM
175 E=1:F=0
180 FOR Q=8 TO 1 STEP -1
185 IFMID$(F$,Q,1)="1"THEN F=F+E
190 E=E*2:NEXTQ:F$=CHR$(F)
195 RETURN
```

```
200 GOSUB295
205 PRINT:PRINT
210 IF MD=-1 THENPRINT"ALL MENUS
" ELSE PRINT"MENU:";MD;"/ ";BN$(
MD)
215 PRINT"MESSAGES";ML;"TO";MH
220 PRINT"<+>NEXT MSG # <G>OTO
"
225 PRINT"<->LAST MSG <M>ESS
AGE TEXT"
230 PRINT"<?>SEARCH <P>UBL
IC/PRIVT"
235 PRINT"<K>ILL MSG <D>UMP
MESSAGE"
240 PRINT"<A>CTIVATE MSG <R>ENU
MBER"
245 PRINT"<B>OARD POST <S>ET
MENU"
250 PRINT"<H>ELP MENU <T>OGG
LE RCVD"
255 PRINT"<C>HANGE HDR <Q>UIT
260 RETURN
265 GOSUB295
270 LINEINPUT"COMMAND: ";CH$
275 IFCH$=""THEN265
280 ON INSTR("+GM?PKDARCQHSBT",
CH$)+1 GOTO 270,370,395,420,450,
505,545,575,600,655,680,735,285,
125,795,825,865
285 CLEAR100:LINEINPUT"RETURN TO
BBS? ";A$
290 X$=LEFT$(A$,1):IFX$="Y"ORX$=
"y"THEN CLOSE:UNLOAD:LOAD"COBBS/
SYS",R ELSE END
295 REM-HDR PRINT
300 IF MD>-1ANDASC(H8$)<>MD THEN
RETURN
305 PRINT#SC:PRINT#SC
310 IF R=1 THENPRINT"SYSTEM RECO
RD #1!"
```

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```

315 MØ=CVN(H1$):KF=INSTR(H5$,NU$
):MF$=LEFT$(H5$,KF-1)
32Ø F$=H2$:GOSUB13Ø:IFMID$(F$,2,
1)="1"THENPRINT#SC;"-DELETED-"
325 KT=INSTR(KF+1,H5$,NU$):XX=KT
-KF-1:IFXX<1THEN MT$="":GOTO33ØE
LSE MT$=MID$(H5$,KF+1,XX)
33Ø KS=INSTR(KT+2,H5$,NU$):XX=KS
-KT-1:IFXX<1THEN MS$="":GOTO335E
LSE MS$=MID$(H5$,KT+1,XX):PF=Ø
335 IFMID$(F$,1,1)="1"THENPRINT#
SC,"PRIVATE"
34Ø IFMID$(F$,3,1)="1"THEN X$="
<RCVD>" ELSE X$=""
345 F5=1:PRINT#SC,"MESSAGE #";MØ
;" ";BN$(ASC(H8$))
35Ø PRINT#SC,RIGHT$(STR$(ASC(LEF
T$(H3$,1))),2);"/";RIGHT$(STR$(A
SC(MID$(H3$,2,1))),2);"/";RIGHT$(
STR$(ASC(RIGHT$(H3$,1))),2);"
";STR$(ASC(LEFT$(H4$,1)));":";
355 A$=RIGHT$(STR$(ASC(RIGHT$(H4
$,1))),2):IFVAL(A$)>9THENPRINT#S
C,A$ELSEMID$(A$,1,1)="Ø":PRINT#S
C,A$
36Ø PRINT#SC,"FROM: ";MF$:PRINT#
SC," TO: ";MT$;X$:F5=1:F4=1:PRI
NT#SC,"SUBJ: ";MS$:PRINT#SC
365 RETURN
37Ø REM- +
375 R=R+1:IF R>K1 THEN R=1
38Ø GET#1,R:SA=Ø
385 IF MD>-1 AND ASC(H8$)<>MD TH
EN 375
39Ø GOTO265
395 REM- -
40Ø R=R-1:IF R<1 THEN R=K1
405 GET#1,R:SA=Ø
41Ø IF MD>-1 AND ASC(H8$)<>MD TH
EN 405
415 GOTO265
42Ø REM- G
425 PRINT:LINEINPUT"MESSAGE #";N
$
43Ø N=VAL(N$):IF N<ML OR N>MH TH
EN PRINT"OUT OF RANGE.":GOTO27Ø
435 FOR X=1 TO K1
44Ø GET#1,X:IF CVN(H1$)=N THEN R
=X:GOTO265
445 NEXTX:PRINT"MSG NOT AVAILABL
E":GOTO27Ø
45Ø REM- M
455 GOSUB46Ø:SC=Ø:GOTO27Ø
46Ø R1=CVN(H6$):R2=CVN(H7$)
465 FOR X=R1+1 TO R2
47Ø GET#2,X:A$=MG$:IFA$=STRING$(
8Ø,255)THENPRINT#SC:RETURN
475 FOR Y=1 TO LEN(A$)

```

```

48Ø PRINT#SC,MID$(A$,Y,1):X$=IN
KEY$:IFX$=""THEN49Ø
485 IFX$="S"ORX$="s"THEN5ØØELSEI
FINKEY$=""THEN485
49Ø NEXTY
495 NEXTX
5ØØ PRINT#SC:RETURN
5Ø5 REM- ?
51Ø U=R:PRINT:LINEINPUT"SEARCH S
TRING: ";S$
515 IF S$=""THEN27Ø
52Ø FOR X=U+1 TO K1
525 GET#1,X
53Ø IFINSTR(H5$,S$)>Ø THEN R=X:G
OTO265
535 NEXT X:GET#1,U
54Ø PRINT"NOT FOUND.":GOTO27Ø
545 REM- P
55Ø F$=H2$:GOSUB13Ø
555 IFMID$(F$,1,1)="1"THENMID$(F
$,1,1)="Ø":GOTO565
56Ø MID$(F$,1,1)="1"
565 GOSUB17Ø:LSET H2$=F$
57Ø PUT#1,R:PRINT:GOTO27Ø
575 REM- K
58Ø F$=H2$:GOSUB13Ø
585 MID$(F$,2,1)="1":GOSUB17Ø
59Ø LSET H2$=F$:PUT#1,R

```

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```

595 GOTO27Ø
6ØØ REM- D
6Ø5 PRINT:PRINT
61Ø PRINTTAB(5);"1-SCREEN"
615 PRINTTAB(5);"2-PRINTER"
62Ø LINEINPUT" >";CH$
625 ONINSTR("12",CH$)+1 GOTO 27Ø
,63Ø,635
63Ø SC=Ø:GOTO64Ø
635 SC=-1
64Ø GOSUB295
645 GOSUB46Ø
65Ø GOTO27Ø
655 REM- A
66Ø F$=H2$:GOSUB13Ø
665 MID$(F$,2,1)="Ø":GOSUB17Ø
67Ø LSET H2$=F$:PUT#1,R
675 GOTO27Ø
68Ø REM- R
685 PRINT:PRINT"MESSAGE RENUMBER
!"
69Ø LINEINPUT"STARTING NUMBER: "
;S$:S=VAL(S$)
695 IF S=Ø THEN 27Ø ELSE ML=S
7ØØ S=S-1
7Ø5 FOR X=2 TO K1
71Ø GET#1,X:S=S+1:LSET H1$=MKN$(
S)
715 PUT#1,X:NEXTX
72Ø GET#1,1:LSET H1$=MKN$(S):PUT
#1,1
725 MH=S
73Ø GET#1,2:GOTO125
735 REM- C
74Ø PRINT:PRINT"FROM: ";MF$
745 LINEINPUT"FROM: ";CH$
75Ø IFCH$=""THEN755ELSEMF$=CH$
755 PRINT" TO: ";MT$
76Ø LINEINPUT" TO: ";CH$
765 IFCH$=""THEN77ØELSEMT$=CH$
77Ø PRINT"SUBJ: ";MS$
775 LINEINPUT"SUBJ: ";CH$
78Ø IFCH$=""THEN785ELSEMS$=CH$

```

```

785 LSET H5$=MF$+CHR$(Ø)+MT$+CHR
$(Ø)+MS$+STRING$(8Ø,Ø)
79Ø SA=1:GOTO27Ø
795 REM- S
8ØØ PRINT:LINEINPUT"MENU # OR AL
L: ";CH$
8Ø5 IFCH$=""THEN27Ø
81Ø IFCH$="ALL" THEN MD=-1 ELSE
MD=VAL(CH$)
815 IF MD<Ø OR MD>255 THENPRINT"
MENU OUT OF RANGE.":MD=Ø
82Ø GOTO27Ø
825 REM- B
83Ø PRINT:PRINT"PRESENT MENU: ";
BN$(ASC(H8$))
835 LINEINPUT"POST TO #";CH$
84Ø IFCH$=""THEN27Ø
845 X=VAL(CH$):IFX<ØORX>255THENP
RINT"VALUE OUT OF RANGE":GOTO83Ø
85Ø PRINT"POSTING TO: ";BN$(X)
855 LSET H8$=CHR$(X):PUT#1,R
86Ø GOTO27Ø
865 REM- T
87Ø F$=H2$:GOSUB13Ø
875 IFMID$(F$,3,1)="1"THEN MID$(
F$,3,1)="Ø":GOTO885
88Ø MID$(F$,3,1)="1"
885 GOSUB17Ø:LSET H2$=F$
89Ø PUT#1,R:GOTO27Ø
895 '-OPEN MSGHDR/SYS-
9ØØ F$="HDR/SYS:"+DR$(PEEK(467Ø)
)
9Ø5 OPEN"D",#1,F$,11Ø
91Ø FIELD#1,5 AS H1$,1 AS H2$,3
AS H3$,2 AS H4$,8Ø AS H5$,5 AS H
6$,5 AS H7$,1 AS H8$,8 AS SP$
915 K1=LOF(1):RETURN
92Ø '-OPEN MSG/SYS-
925 F$="MSG/SYS:"+DR$(PEEK(4671)
)
93Ø OPEN"D",#2,F$,8Ø
935 FIELD#2,8Ø AS MG$
94Ø K2=LOF(2):RETURN
945 '-OPEN BOARD MENU-
95Ø FF$="MENU/SYS:"+DR$(PEEK(467
3))
955 OPEN"D",#2,FF$,25Ø
96Ø FIELD#2,1 AS M1$,1 AS M2$,1
AS M3$,1 AS M4$,16 AS M5$,23Ø AS
M6$
965 K2=LOF(2):RETURN

```

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See Rainbow Reviews
August '86, pg. 149

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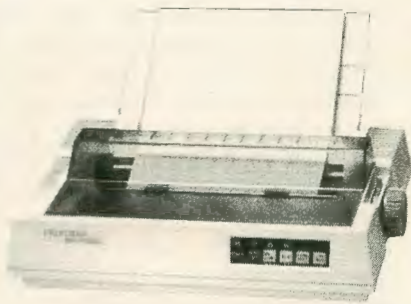
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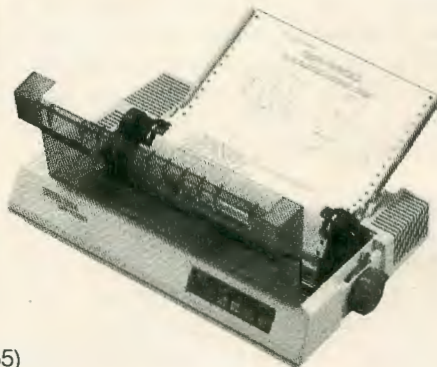
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Printout Sample

789 ; ; <=> ? @ ABCDEF
<=> ? @ ABCDEFGHIJKLM
789 ; ; <=> ? @ ABCDEFGHI
/0123456789 ; ; <=> ? @ ABCDEFGHI
789 ; ; <=> ? @ ABCDEF
<=> ? @ ABCDEFGHIJKLM
789 ; ; <=> ? @ ABCDEFGHI
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789 ; ; <=> ? @ ABCD EFGHIJKLHNDPQ

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A switching system for your BBS



By Ted Kyte

In order to operate a two-CoCo system you will need two CoCos, a BBS program, disk drives (as many as you like on each system), and an auto-answer type modem.

The system I run has four single-sided Radio Shack disk drives on the first CoCo and two double-sided Qumes on the second CoCo.

I run *OCCCS BBS* (Online Color Computer Communications System), written by Steve Odneal, and *ASCII Express*, written by Erik Gavriluk and Greg Miller. The reason for this is that the *OCCCS BBS* program is a complete BBS program to run the main system, and the *ASCII Express* is an in-memory BBS system which leaves all the disk drives free for downloads. On CoCo number one there are two drives for downloads and two drives to handle the system and mail. This leaves CoCo number two with four drives for down-

loads, for a total of six download drives.

The Program

The line numbers I am using are for example purposes only. Do not use line numbers that already exist in your BBS programs unless you know what you're doing.

The *OCCCS BBS* program has been edited to add a function that permits the SysOp to tell CoCo one whether CoCo two is online. Let's assume that in your BBS program the password is the variable `PA$`, and let's assume your password is `SYSOP#1`. Then insert the following lines in your program:

```
500 IF PA$="SYSOP#1" THEN
  LINEINPUT "IS SYSTEM #2
  ONLINE Y/N";SS$
510 IF SS$="Y" THEN PRINT
  "SYSTEM #2 IS ON LINE" ELSE
  PRINT "SYSTEM #2 IS NOT ONLINE"
```

When the SysOp logs on, this enables him to activate access to CoCo two. This can be also be done from a remote terminal. If the power on/off switch is not on and you activate access to CoCo two, then a user attempting to go to CoCo two is quickly logged off.

In your BBS you will have a routine to handle which subroutine the user will go to after making a menu selection.

Now let's assume the variable handling the menu selection is `M$`. Then you need to add a line something like this

```
800 IF M$="D" AND SS$="Y" THEN
  GOSUB 1000 ELSE IF M$="O"
  AND SS$<"Y" THEN PRINT "SORR
  SYSTEM 2 IS NOT ON LINE":
  RETURN
```

In this line we have assumed the routine handling the switch to system two is in Line 1000. If the variable `M$` equals `O` and variable `SS$` equals `Y`, then the program control shifts to the routine in Line 1000 to handle the switching. If either variable does not match, the user will be told "Sorry system two is not on line," and control will be returned to the menu routine.

If everything is OK for going to system two, you can add the routine starting at Line 1000. This can tell the user about any special features of system two he may not be familiar with, or you can switch them right over. We have to add a few lines to handle the switching and they should be something like this:

```
1000 PRINT "YOU WILL NOT BE ABLE
  TO LEAVE ANY MESSAGES OR MAIL
  IN SYSTEM 2 SO PLEASE LEAVE THEM
  IN SYSTEM 1 BEFORE YOU GO."
1010 PRINT:LINEINPUT "GO TO
  SYSTEM 2 Y/N";Q$
1020 IF Q$<"Y" THEN RETURN
1030 PRINT "PRESS <H>"
1040 3 MOTORON:MOTOROFF
1050 GOTO 'LOGOFF ROUTINE'
```

Line 1000 is self-explanatory. Line 1010 is an opportunity for users to back out if they do not want to go to system two. Line 1030 is important; when they are switched to system two, they won't see anything. The user will see `PRESS <H>` as the last thing on his screen before the switch is actually made. This gives them the help list for system two, and they are off and running.

Line 1040 simply makes the modem switch to system two.

Line 1050 sends the control of system one to the logoff routine and restarts system one. You don't have to worry about your modem control codes in the logoff routine because the modem has already been switched to system two and does not see those codes. The reason for logging off system one is to

Parts Description

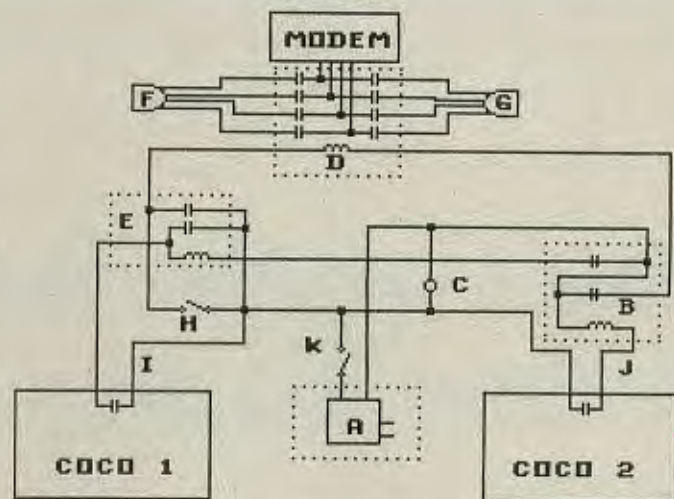
A)	12-volt adapter	RS# 273-1652
B)	12-volt DC DPDT relay	RS# 275-8206
C)	12-volt DC pilot light	RS# 272-334
D)	12-volt DC DPDT relay	RS# 275-8214
E)	12-volt DC DPDT relay	RS# 275-8206
F)	4-pin DIN male plug	RS# 274-007
G)	4-pin DIN male plug	RS# 274-007
H)	SPST toggle switch	RS# 275-662
I)	Cassette cable	RS# 26-1207
J)	Cassette cable	RS# 26-1207
K)	SPST toggle switch	RS# 275-662
	Utility box	RS# 270-233

Component Functions

- A) Converts 115-volt AC house voltage to 12 volts DC to operate the low voltage relays.
- B) Control relay to switch modem from CoCo two to CoCo one, both contacts are normally closed.
- C) Pilot light to indicate power on or off.
- D) Main relay to switch modem from CoCo one to CoCo two and back.
- E) Control relay to switch modem from CoCo one to CoCo two; both contacts are normally open.
- F) Plug to connect main relay to serial port of CoCo one.
- G) Plug to connect main relay to serial port of CoCo two.
- H) Switch to enable manual or automatic operation.
- I) Cassette cable to connect CoCo one cassette relay to switching device. (See special note.)
- J) Cassette cable to connect CoCo two cassette relay to switching device. (See special note.)
- K) Main power on/off switch.

Utility box holds all components and makes a neat finished project.

Schematic



keeps track of the time and date of last user.

Special Note

The cables (I and J) in the schematic can either be cassette cables with the sub-mini phono plugs that normally go to the remote on the cassette, which can be used with female sub-mini plugs (RS# 274-292) on the switching device, or they can be a separate cable made up with a five-pin DIN male plug (RS# 274-003). Use pins 1 and 3 to go to a sub-mini phono plug (RS# 274-290) then to the female sub-mini (RS#274-292) on the switching device.

On the main switching relay (D) be sure to have the pin numbers matched up. If you take Pin 1 from the modem, it must end up being Pin 1 on both CoCo one and CoCo two when the relay is activated or non-activated.

The cable and plug that runs from the modem to the switching device can be the existing cable your modem has and a female plug to match it on the utility box.

This switching system has been running for about six months on a part-time basis. The hours for a one-CoCo system are 24 hours a day, seven days a week, and for the two-CoCo system, seven days a week, from 12:00 midnight to approximately 3:00 p.m. (MST).

I hope some of the RAINBOW readers will benefit from this little project. I can say it has increased the joys of being a CoCo SysOp.

If any readers would like more information on this system, they can call the Wes-Can Color Board at (403) 564-4118, anytime seven days a week, or write to Ted Kyte, Box 818, Blairmore, Alberta, Canada T0K 0E0.

speed up the total reset time when system two is logged off. The instant the user is logged off system two, system one is ready for another call.

In system two, the only lines really required to end the whole two-system switching sequence are as follows:

```

700 LINEINPUT "DO YOU REALLY
WISH TO LOG OFF Y/N";Q$
710 IF Q$ <> "Y" RETURN
720 PRINT "THANKS FOR CALLING
... BYE NOW"
730 PRINT CHR$(43);CHR$(43);
CHR$(43):PRINT "ATS0=1"
740 MOTORON:MOTOROFF
    
```

Your BBS program probably has a line similar to Line 700. If the user selects 'Y', control is passed to Line 720 for the thank you line, then to Line 730, which needs the codes your modem requires to hang up and be reset to the answer mode.

Sequence of Operation

To start the switching sequence, CoCo one does a MOTORON. This closes the internal cassette relay of CoCo one and causes the normally open contacts of relay (E) to close. This activates relay (D) and switches the modem to CoCo two. Then relay (E) acts as its own holding contact as CoCo one does a MOTOROFF.

The modem has switched to CoCo two and CoCo one has returned its internal cassette relay back to the open position. However, relay (E) is still in the closed position.

To return the modem to CoCo one, CoCo two must do a MOTORON. This opens the normally closed contacts of relay (B) and switches the modem back to CoCo one.

When CoCo one does a MOTORON then an immediate MOTOROFF, it is sent to the normal logoff sequence the BBS provides. This updates the user log and

More on the New Video Display Generator

By Tony DiStefano
Rainbow Contributing Editor

Last month I described the new VDG (Video Display Generator) MC6847T1 and the modes that are possible. I also showed you how to hook up a few switches in order to access these modes. The only problem with this is the new VDG is only available in the CoCo 2 'B' model. At home, I have the regular white CoCo. They call it the 'F' board. I wanted the new T1 chip in my CoCo, too. So, with the help of Bill Warnica, I modified my 'F' board CoCo to work with this new chip.

The new VDG and the old VDG are very similar but not pin-for-pin compatible, so you can't just pull the old one out and plug the new one in. It is, however, not too difficult to modify the computer board to make it fit. The new VDG also has built-in hardware that saves two chips on the computer board.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

The chips that are saved are no longer on the 'B' board. That is why the new board is smaller than the older boards. The two chip numbers saved are the 74LS244 and 74LS273. These chips are TTL logic gates used to isolate the CPU data bus from the video data bus.

Without getting into too much detail, these two chips are now part of the VDG and are no longer needed on the main board. At first, it was thought that both of these chips had to be removed from the old PC board and the new VDG completely rewired to fit in. Luckily, it turns out that only one of these chips has to be removed. This saves a lot of wiring.

Like most of my projects, this one requires you to open the computer and dig inside with a soldering iron and some tools. A good hardware hacker with experience is needed to do this one. To do this project, you will need a soldering iron, tools, wire, solder and, of course, a new VDG. More on the parts later.

The upgrade I did was on an 'F' board CoCo. As far as I know, these instruc-

tions work for just about every CoCo and CoCo 2, but on certain models, the VDG and other parts involved are soldered directly onto the PC Board. That means you have to unsolder the chips and insert a socket. This can be done, and I have done it many times, but it requires a solder sucker or chip remover. Soldering experience is necessary. Also, before you start, be forewarned! The jumpers I will tell you to install in the 'F' board may be different on different boards. But, not all is gloom and doom. A little trial and error and you should find the right pin numbers.

There are two parts you need. The first is the VDG, Motorola part number MC6847T1. If you cannot get this part at your local electronics store, try Radio Shack. The part number is MX-6551. The next part is just a plain and simple resistor. The resistor value is 1K or 1000 ohms quarter watt or half watt. That's it; the rest is a little bit of work.

Unplug the computer, undo the case, remove the keyboard, etc. You know, all those boring things.

Now comes the fun part. The first thing you must do is remove the VDG. That's simple. It's the chip marked MC6847, or U9 on the 'F' board. On other boards, the U number might be different but it will always be the MC6847. On some boards the VDG is soldered in. In that case, you must unsolder the VDG and insert a 40-pin socket. Prepare the new VDG (T1) in the following manner. Cut the resistor leads so that it will just fit between pins 25 and 11. Put the resistor across the top of the VDG and solder one end of the resistor to the top part of Pin 25. Make sure the solder doesn't leak down the pin. Next, solder the other end to Pin 11 (same precaution). Now pry out Pin 31 vertically, so it does not insert into the socket when you plug the new VDG in.

Insert the new VDG into the socket. Make sure Pin 1 is in the right place. Now solder a short piece of wire-wrap wire to Pin 1 of the VDG. Don't solder the pin to the socket. You won't be able to get the chip out if you do. (If you prefer, solder all connections to these pins before inserting the chip into the

socket.) Solder the other end of this wire to Pin 31, the one that you bent up before. Solder a second wire to Pin 12 of the new VDG. Run this wire to Pin 10 of the SAM (Synchronous Address

old SAM in my CoCo and it just purrs along. Anyway, back to work. Solder a third wire from Pin 13 of the VDG to Pin 12 of the SAM. That's about it for the VDG. But there is a little more work to do.

The next stage of this project deals with the buffer chip I mentioned earlier. Start off by removing the chip, number 74LS273, from its socket. You no longer need this chip, but keep it in your parts bin for a rainy day or in case you decide to remove the modification and replace the old VDG chip. The modification I did is on the so called 'F' board and the 74LS273 chip labeled U13 on the PC board. It also was not soldered in. It had a socket; all I had to do was pull it. If you are doing this on another board and the IC is not socketed, you must do a little more work. First, remove the old chip. Then solder in a 20-pin socket. You need the socket for this next step.

Prepare eight (about 1.5 inches) short pieces of wire by stripping 3/16 inch of insulation off each end. Use a number 22 or 24 gauge solid wire. Old Bell wire is best. Now insert each wire into the pins of the 20-pin socket as follows.

"Never connect two outputs together, and never connect two inputs together."

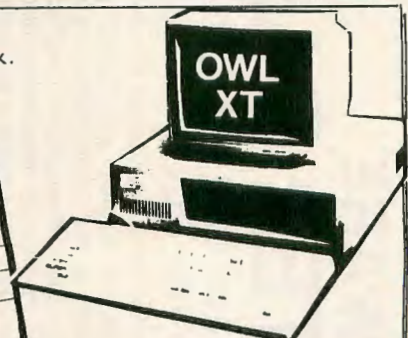
Multiplexer). You remember ol' SAM, she's the one that does all the timing in the CoCo. I did an article on her not long ago in this magazine. Her name is MC6883 or SN74LS783N.

It was said, by whom I don't know, that you needed the new MC6885 or SN74LS785N SAM in order to make this new VDG work, but this rumor turns out to be false. The old one works just fine. As a matter of fact, I have the

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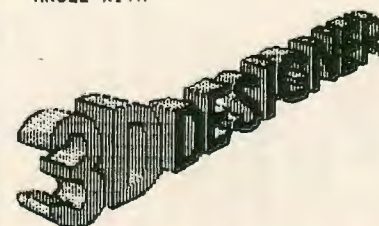
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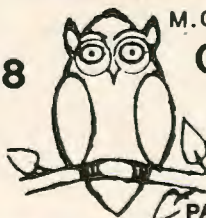
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One End Other End

3	12
4	15
7	9
8	6
13	2
14	5
17	16
18	19

Pins 1, 10, 11 and 20 are left empty. Do not connect anything to these pins. (Pin 10 is ground and Pin 20 is the 5-volt supply. You may use them if you need these power connections in other projects.)

Now, this chip is called an Octal D-type flip-flop. If you recall, many moons (monthly articles) ago, I described flip-flops; they are no more than a sort of latch. This particular chip has eight latches. One for each of the eight data bits of the CPU. Each of these bits has an input and an output. I have arranged the pin numbers in such a way that the One End column pin numbers

are all inputs and all the pin numbers in the Other End column are outputs. This is important to know. Notice that one jumper exists for every in/out pair. If you are trying to modify a board other than the 'F' board, the pin numbers may not match. Not having tried all the CoCos and CoCo 2s, I cannot print every pin diagram. Try to wire the connections as they stand above, but if the screen looks confused and you do not get the same letters on the screen you type on the keyboard, it's because the pinout is different.

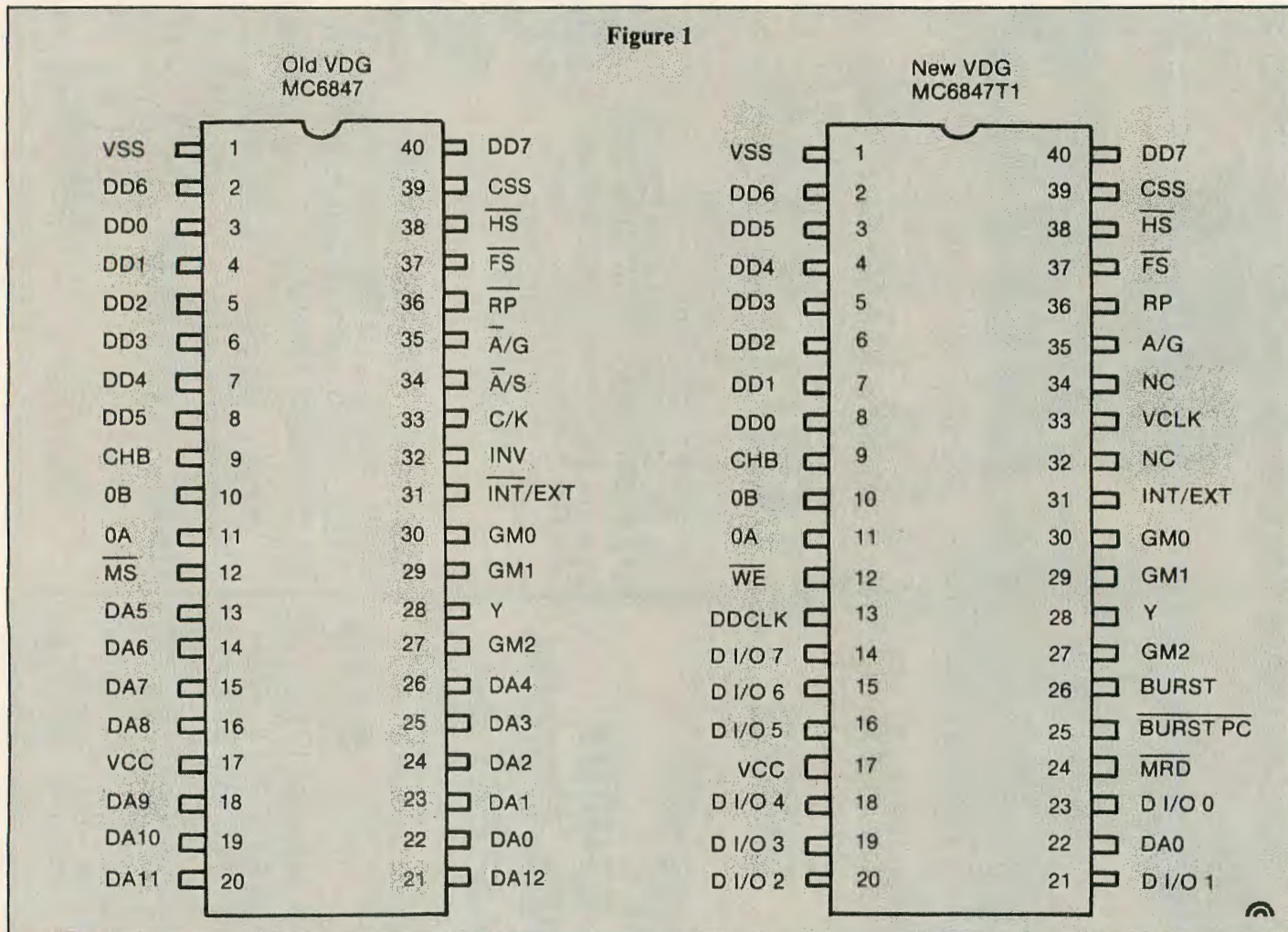
In that case you will have to do a trial and error method to get the right combination. There are two rules to follow: Never connect two outputs together, and never connect two inputs together. The first may cause permanent damage to your computer. Jumper all eight wires and try it. If it is not right, make note of the combination you did and try another. If you do combinations in order, you will eventually get the right combination. When you do, if you send

me the pinout combination and which computer board you did it on, I will print them in the next article I write and give you credit for it.

That's all there is to it! Plug everything back in and turn it on. You now have the new VDG in your CoCo. If you want to access the new modes of the new VDG, you will have to do a little more work. Last month, I wrote on how to access the new modes using switches or software. It works for this modification perfectly. All you have to do is follow the instructions and use the method that suits you best. Next month, I'll show you how to use the new modes without switches. All you will need are a few electronic parts. When you change modes from text to graphics, you won't have to throw all your switches — the electronics will do it for you.

For those who are interested, Figure 1 shows the pinouts of the old and the new VDGs side by side so you can compare the differences between them. □

Figure 1





Coming to 'Terms'

With the CoCo 3

By Rick Adams and Dale Lear

Term 3 is a simple terminal program for the Color Computer 3. It has few features; the purpose of this program is to demonstrate the fact that reliable 1200 Baud RS-232 communication out the CoCo's "bit-banger" port may be obtained by utilizing the programmable interrupt timer included with the Color Computer 3.

Sharp-eyed, technically-oriented users will note that the interrupt routine is driven by setting the new timer at seven times the Baud rate, making the sampling rate on the bit-banger port fast enough for reliable start-bit detection. This luxury is not available on the Color Computer 2. There are only two fixed-rate interrupt clocks built in; one is too fast to use for this purpose, while the other is too slow!

Despite the simplicity of *Term 3*, it

Rick Adams is a systems programmer for a company that develops 68000-based systems software. In addition to writing games, he likes science fiction and is the author of Radio Shack's Temple of ROM. Rick lives in Rohnert Park, California.

Dale Lear owns Dale Lear Software and makes his living developing programs for the Color Computer. He has authored games and other software such as Double Back, Baseball, TSEdit, TSWORD and D.L. LOGO. Dale, his wife Laurel and their six children live in Petaluma, California.

does have some things going for it: it supports true upper- and lowercase letters in the 40- or 80-column modes available on the Color Computer 3, and both input and output are fully buffered, allowing type-ahead.

With a little experimentation, Color Computer users with moderate assembly-language experience could add features to this bare-bones communication demo such as ASCII buffer uploading and downloading, use of the function keys (welcome addition) to generate user-defined text strings, and so on.

TERM3.BAS is the BASIC program that pokes a number of communications parameters into memory, loads the machine language portion of the package and starts things going. The comments regarding the parameters are fairly self-explanatory; the defaults shown will do nicely in the majority of cases. (Note that setting the left margin to '2' avoids the problem of the width 40 mode on a TV set causing the first two characters to disappear.)

The assembly language portion of *Term 3* is named *TERM3.BIN*. Users with assembly language experience may use the source listing shown as *TERM3.SRC* (and their favorite assembler) to produce this file.

Perhaps we'll see some of you on Delphi as you take your *Term 3* program out for a test drive through the telecommunications network. We hope to see you there! □

Listing 1: TERM3BAS

```

10 CLS
20 PRINT "=====
====="
30 PRINT "   TERM3   VERSION 1.0
"
40 PRINT "   COPYRIGHT 1986"
50 PRINT "DALE LEAR AND RICK AD
AMS"
60 PRINT "=====
====="
70 '
80 '*** PARAMETERS ***
90 '
100 '---DISPLAY MODE---
110 '
120 'NUMBER OF COLUMNS (40 OR 80
)
130 CMAX=40
140 '
150 'NUMBER OF LINES (24)
160 LMAX=24
170 '
180 'LEFT MARGIN (FOR TV)
190 LFMAR=2
200 '
210 'FOREGROUND COLOR (WHITE)
220 FCOLOR=255
230 '
240 'BACKGROUND COLOR (BLACK)
250 BCOLOR=0
260 '
270 '---BAUD RATE---
280 BAUD=1200
290 '
300 'TIMER SET TO 7X BAUD RATE
310 T=INT((14318181/4)/(BAUD*7))
320 T1=INT(T/256)
330 T2=T-256*T1
340 '
350 '---AUTOLF---
360 AUTOLF=0
370 '   0-NO
380 '   1-YES
390 '
400 '---DUPLEX---
410 DUPLEX=0
420 '   0-FULL
430 '   1-HALF
440 '
450 WIDTH CMAX
460 POKE &H200,CMAX
470 POKE &H201,LMAX
480 POKE &H202,LFMAR
490 POKE &H203,FCOLOR
500 POKE &H204,BCOLOR
510 POKE &H205,T1

```

```

520 POKE &H206,T2
530 POKE &H207,AUTOLF
540 POKE &H208,DUPLEX
550 LOADM "TERM3"
560 EXEC

```

Listing 2: TERM3

```

00010 *-----
00020 *   TERM3   VERSION 1.0
00030 *   COPYRIGHT 1986
00040 *DALE LEAR AND RICK ADAMS
00050 *-----
00060 *
00070 * TERM3 IS A SIMPLE TERMINAL
00080 * PACKAGE FOR THE COCO 3
00090 * UTILIZING THE PROGRAMMABLE
00100 * INTERRUPT TIMER TO CONTROL
00110 * THE SERIAL PORT.
00120 *
00130 *
00140 *-----
00150 * EQUIV DEFINITIONS
00160 *
00200 00170 BLANK EQU 32
00030 00180 BREAK EQU 3
00040 00190 CR EQU 13
00050 00200 LF EQU 10
00060 00210 BS EQU 8
00070 00220 SZOUT EQU $100 SIZE OF OUTPUT BUFFER
00080 00230 SZIN EQU $100 SIZE OF INPUT BUFFER
00090 00240 ATTR EQU $0
00100 00250 *-----
00110 00260 *DIRECT PAGE COMMON
00120 00270 *
00130 00280 ORG 0
00140 00290 *-----
00150 00300 *
00160 00310 *SCREEN DISPLAY COMMON
00170 00320 *
00180 00330 LINCOL
00190 00340 LIN RMB 1 CUR LINE
00200 00350 COL RMB 1 CUR COL
00210 00360 *-----
00220 00370 * COMMUNICATIONS COMMON
00230 00380 *
00240 00390 XSLICE RMB 1
00250 00400 XBIT RMB 1
00260 00410 XCHAR RMB 1
00270 00420 RSLICE RMB 1
00280 00430 RBIT RMB 1
00290 00440 RCHAR RMB 1
00300 00450 BHOLD RMB 1
00310 00460 XHOLD RMB 2
00320 00470 *-----
00330 00480 * BUFFERED I/O POINTERS
00340 00490 *
00350 00500 GETOUT RMB 2
00360 00510 PUTOUT RMB 2
00370 00520 *
00380 00530 GETIN RMB 2
00390 00540 PUTIN RMB 2
00400 00550 *-----
00410 00560 * PARAMETERS POKED IN BY BASIC
00420 00570 *
00430 00580 ORG $200
00440 00590 CMAX RMB 1 MAX COL
00450 00600 LMAX RMB 1 MAX LINE
00460 00610 LFMAR RMB 1 LEFT MARGIN
00470 00620 FCOLOR RMB 1 FOREGROUND COLOR
00480 00630 BCOLOR RMB 1 BACKGROUND COLOR
00490 00640 BAUD RMB 2 BAUD RATE CONSTANT
00500 00650 AUTOLF RMB 1 0-NO, 1-YES
00510 00660 DUPLEX RMB 1 0-FULL, 1-HALF
00520 00670 *-----
00530 00680 *BUFFERS
00540 00690 *
00550 00700 ORG $4000
00560 00710 VIDBUF RMB $1800 SCREEN
00570 00720 INBUF RMB SZIN INPUT BUF
00580 00730 OUTBUF RMB SZOUT OUTPUT BUF
00590 00740
00750 *-----

```


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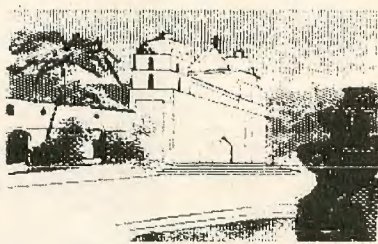
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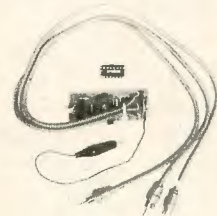
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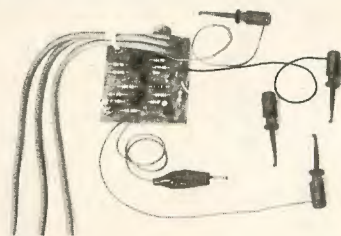
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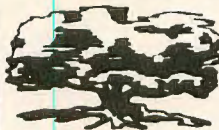
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```

00760 * MAINLINE
00770 *-----
00780          ORG $0000
00790 MAIN
00800
00810 *-----
00820 *INITIALIZATION
00830 *
00840 CLR $FF40      TURN OFF DISK MOTOR
00850 CLR $FFD9      SPEED UP CPU
00860 LBSR CLRSCN    CLEAR SCREEN
00870 *
00880 *              CLEAR I/O BUFFERS
00890 LDX #OUTBUF
00900 STX GETOUT
00910 STX PUTOUT
00920 LDX #INBUF
00930 STX GETIN
00940 STX PUTIN
00950 LDY #SZIN+SZOUT
00960 LDB #-1
00970 ISET
00980 STB ,X+        FILL BUFS W/-'S
00990 LEAY -1,Y
01000 BNE ISET
01010 *
01020 LBSR TIMER     START TIMER
01030
01040 *-----
01050 *BODY OF MAINLINE
01060 *
01070
01080 LOOP1
01090 LBSR RECV  RS232 -> A REG
01100 CMPA #-1
01110 BEQ LOOP2
01120 LBSR PUT  A REG -> SCREEN
01130 BRA LOOP1    (TIS MORE IMPORTANT TO
01140 *              RECIEVE THAN TO TRANSMIT)
01150
01160 LOOP2
01170 LBSR GET  KEYBOARD -> A REG
01180 CMPA #-1
01190 BEQ LOOP1
01200 TST DUPLEX SKIP IF FULL DUPLEX(0)
01210 BEQ LOOP3
01220 LBSR PUT  A REG -> SCREEN
01230 LOOP3
01240 LBSR SEND A REG -> RS232
01250 BRA LOOP1
01260
01270 *-----
01280 *SEND CHARACTER TO SERIAL PORT
01290 * (VIA OUTBUF)
01300 * ENTER W/ CHAR IN A REG
01310 *
01320 SEND
01330 PSHS A
01340 LDX PUTOUT
01350 SND1
01360 LDB ,X
01370 CMPB #-1
01380 BNE SND1 WAIT FOR LAST XMIT
01390 STA ,X+ PUT CHAR IN BUFFER
01400 CMPX #OUTBUF+SZOUT
01410 BNE SND2
01420 LDX #OUTBUF
01430 SND2
01440 STX PUTOUT
01450 PULS A,PC
01460 *-----
01470 *RCV CHARACTER FROM SERIAL PORT
01480 * (VIA INBUF)
01490 * RETURN W/ CHAR IN A REG
01500 * -1 IF NOTHING RECEIVED
01510 *
01520 RECV
01530 LDX GETIN
01540 LDA ,X
01550 CMPA #-1
01560 BEQ RCV1
01570 LDB #-1
01580 STB ,X+
01590 CMPX #INBUF+SZIN
01600 BNE RCV1
01610 LDX #INBUF
01620 RCV1
01630 STX GETIN
01640 RTS
01650 *-----

```

```

01660 * GET CHAR FROM KEYBOARD
01670 * RETURN W/ CHAR IN A REG
01680 * -1 IF NOTHING RECEIVED
01690 *
01700 GET
01710 LBSR XYCALC
01720 LDB 1,X
01730 PSHS B,X
01740 LDB #00
01750 ORB 1,X
01760 STB 1,X
01770 JSR [$0000] CALL BASIC KBOARD ROUTINE
01780 BEQ GET8
01790 ANDA #07F
01800 LDB #0EF CHECK CTRL KEY
01810 STB $FF02
01820 LDB $FF00
01830 ANDB #040
01840 BNE GET9
01850 CMPA #1 BASIC KB DRVIV GIVES A
01860 BEQ GET8 PHONY "=" ON CTRL KEY
01870 ANDA #01F IF DOWN REMOVE BITS 5+6
01880 BRA GET9
01890 GET8
01900 LDA #-1
01910 GET9
01920 PULS B,X
01930 STB 1,X
01940 RTS
01950 *-----
01960 * PUT CHAR TO SCREEN
01970 * ENTER W/ CHAR IN A REG
01980 *
01990 PUT
02000 PSHS A,X
02010 CMPA #32
02020 BHS PUT3
02030
02040 *TEST FOR CONTROL CHARACTER
02050 CMPA #CR
02060 BEQ PUT1
02070 CMPA #LF
02080 BEQ PUT2
02090 CMPA #BS
02100 BNE PUT9
02110
02120 *BACK SPACE
02130 DEC COL
02140 BRA PUT8
02150
02160 *CARRIAGE RETURN
02170 PUT1
02180 LDB LFMAR
02190 STB COL
02200 TST AUTOLF
02210 BEQ PUT8
02220
02230 *LINE FEED
02240 PUT2
02250 INC LIN
02260 BRA PUT8
02270
02280 *PRINTABLE CHARACTER
02290 PUT3
02300 LBSR XYCALC (CALC SCREEN LOC)
02310 LDA ,S
02320 STA ,X (STORE CHARACTER)
02330 INC COL
02340
02350 *
02360 *FIX X-Y LOG
02370 PUT8
02380 BSR XYFIX
02390 PUT9
02400 PULS A,X,PC
02410 *-----
02420 * BRING LINE/COL IN VALID RANGE
02430 *
02440 XYFIX
02450 XY1
02460 LDB LINCOL
02470 CMPB CMAX
02480 BHS HICOL
02490 CMPB LFMAR
02500 BLO LOGCOL
02510 CMPA LMAX
02520 BHS HILIN
02530 BRA XY9
02540
02550 * COLUMN TOO HIGH,

```

60E9		02560	* GO TO NEXT LINE
60E9 F6	0202	02570	HICOL
60EC D7	01	02580	LDB LFMAR
60EE 0C	00	02590	STB COL
60FF 20	E4	02600	INC LIN
		02610	BRA XY1
		02620	
		02630	* COLUMN TOO LOW,
		02640	* GO TO PREV LINE
		02650	LOCOL
60F2		02660	LDB CMAX
60F2 F6	0200	02670	DECB
60F5 5A		02680	STB COL
60F6 D7	01	02690	TST LIN
60F8 0D	00	02700	BEQ XY1
60FA 27	DA	02710	DEC LIN
60FC 0A	00	02720	BRA XY1
60FE 20	D6	02730	
		02740	* LINE TOO HIGH
		02750	* SCROLL
		02760	HILIN
6100		02770	LBSR SCROLL
6100 17	0016	02780	DEC LIN
6103 0A	00	02790	BRA XY1
6105 20	CF	02800	
		02810	XY9
6107		02820	RTS
6107 39		02830	*
		02840	* CALCULATE X/Y SCREEN LOC
		02850	* ENTRY LINE/COL
		02860	* EXIT X-SCREEN LOC
		02870	*
		02880	XYCALC
6108		02890	LDX #VIDBUF
6108 8E	4000	02900	LDA LIN
610B 96	00	02910	LDB CMAX
610D F6	0200	02920	LSLB (ACCOUNT FOR ATTRIBUTE BYTE)
6110 58		02930	MUL
6111 3D		02940	LEAX D,X
6112 30	8B	02950	LDB COL
6114 D6	01	02960	LSLB (ACCOUNT FOR ATTRIBUTE BYTE)
6116 58		02970	ABX
6117 3A		02980	RTS
6118 39		02990	*
		03000	*SCROLL SCREEN UP ONE LINE
		03010	*
		03020	SCROLL
6119		03030	LDX #VIDBUF
6119 8E	4000	03040	LDB CMAX
611C F6	0200	03050	LSLB (ACCOUNT FOR ATTRIBUTE BYTE)
611F 58		03060	CLRA
6120 4F		03070	LEAU D,X
6121 33	8B	03080	LDA LMAX
6123 B6	0201	03090	DECA
6126 4A		03100	MUL
6127 3D		03110	TFR D,Y
6128 1F	02	03120	SCR1
612A		03130	LDD ,U++
612A EC	C1	03140	STD ,X++
612C ED	81	03150	LEAY -2,Y
612E 31	3E	03160	BNE SCR1
6130 26	F8	03170	LDA CMAX
6132 B6	0200	03180	SCR2
6135		03190	LDB #BLANK
6135 C6	20	03200	STB ,X+
6137 E7	80	03210	LDB #ATTR
6139 C6	00	03220	STB ,X+
613B E7	80	03230	DECA
613D 4A		03240	BNE SCR2
613E 26	F5	03250	RTS
6140 39		03260	*
		03270	* CLEAR SCREEN
		03280	*
		03290	CLRSCN
6141		03300	LDB FCOLOR SET FOREGROUND COLOR
6141 F6	0203	03310	STB \$FFB8
6144 F7	FFB8	03320	LDB BCOLOR SET BACKGROUND COLOR
6147 F6	0204	03330	STB \$FFB0
614A F7	FFB0	03340	STB \$FF9A AND BORDER
614D F7	FF9A	03350	LDB #\$54C
6150 C6	4C	03360	STB \$FF90 SET INITIALIZATION REGISTER
6152 F7	FF90	03370	LDB #3
6155 C6	03	03380	STB \$FF98 SET VIDEO MODE REGISTER
6157 F7	FF98	03390	LDB #\$5
615A C6	05	03400	LDA CMAX
615C B6	0200	03410	CMFA #80
615F 81	50	03420	BNE CL1
6161 26	02	03430	LDB #\$15
6163 C6	15	03440	CL1
6165		03450	STB \$FF99 SET VIDEO RES REGISTER
6165 F7	FF99		

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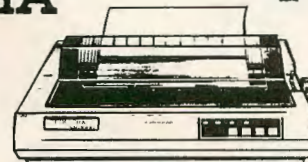
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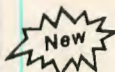
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6168 CC 4000 03460 LDD #VIDBUF
616B 44 03470 LSRA
616C 56 03480 RORB
616D 44 03490 LSRA
616E 56 03500 RORB
616F 44 03510 LSRA
6170 56 03520 RORB
6171 8A E0 03530 ORA #SE0
6173 B7 FF9D 03540 STA $FF9D SET VERT OFFSET REGISTERS
6176 F7 FF9E 03550 STB $FF9E
6179 7F FF9F 03560 CLR $FF9F
03570
617C 8E 4000 03580 LDX #VIDBUF
617F 108E 0780 03590 LDY #80*24
6183 CC 2000 03600 LDD #BLANK*256+ATTR
6186 03610 CL2
6186 ED 81 03620 STD ,X++ CLEAR SCREEN
6188 31 3F 03630 LEAY -1,Y
618A 26 FA 03640 BNE CL2
618C 0F 00 03650 CLR LIN
618E F6 0202 03660 LDB LFMAR
6191 D7 01 03670 STB COL
6193 39 03680 RTS
03690 *-----
03700 * SET UP PROGRAMMABLE
03710 * INTERRUPT TIMER
03720 *
6194 03730 TIMER
03740 *
03750 *SET UP INTERRUPTS
6194 1A 50 03760 ORCC #50 OFF FOR NOW
03770 *
03780 *TURN OFF OLD IRUPTS
6196 C6 2C 03790 LDB #52C
6198 F7 FF01 03800 STB $FF01
619B F7 FF03 03810 STB $FF03
619E F7 FF23 03820 STB $FF23
61A1 F7 FF23 03830 STB $FF23
61A4 F6 FF00 03840 LDB $FF00
61A7 F6 FF02 03850 LDB $FF02
61AA F6 FF20 03860 LDB $FF20
61AD F6 FF22 03870 LDB $FF22
03880 *
61B0 30 8D 0029 03890 LEAX DOFIRQ,PCR
61B4 BF 0110 03900 STX $110 SET FIRQ PROGRAM
03910 *
03920 * SET-UP TIMER INTERRUPT
03930 LDB #560
03940 STB $FF91 SELECT CLOCK
61BC 7F FF92 03950 CLR $FF92
61BF C6 20 03960 LDB #520
61C1 F7 FF93 03970 STB $FF93 ENABLE TIMER INTERRUPT
61C4 C6 5C 03980 LDB #55C
61C6 F7 FF90 03990 STB $FF90 ENABLE GIME FIRQ
61C9 FC 0205 04000 LDD BAUD
61CC F7 FF95 04010 STB $FF95
61CF B7 FF94 04020 STA $FF94 SET UP TIMER COUNT
04030 *
04040 * INIT XMITTER/RECVR
04050 CLR RSLICE
61D2 0F 05 04060 CLR XSLICE
61D4 0F 02 04070 CLR RBIT
61D6 0F 06 04080 CLR XBIT
61D8 0F 03 04090 ANDCC #5AF ENABLE INTERRUPTS
61DA 1C AF 04100 RTS
61DC 39 04110 *-----
04120 * PROCESS TIMER INTERRUPT
04130 *
61DD 04140 DOFIRQ
61DD D7 08 04150 STB BHOLD
61DF 7F FF93 04160 CLR $FF93 CLEAR TIMER INTERRUPT
61E2 C6 20 04170 LDB #520
61E4 F7 FF93 04180 STB $FF93
04190
04200 *
04210 *SERVICE TRANSMITTER
04220 *
61E7 0A 02 04230 DEC XSLICE
61E9 26 3E 04240 BNE XMI9
61EB 9F 09 04250 STX XHOLD
61ED C6 07 04260 LDB #7
61EF D7 02 04270 STB XSLICE
61F1 D6 03 04280 LDB XBIT
61F3 27 04 04290 BEQ XMI1
61F5 0A 03 04300 DEC XBIT

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61F7 26 20 04310 BNE XMI3
61F9 04320 XMI1
61F9 9E 0B 04330 LDX GETOUT
61FB E6 84 04340 LDB ,X ON NEXT BYTE IN BUFFER
61FD C1 FF 04350 CMPB #-1 -1
61FF 27 26 04360 BEQ XMI8
6201 D7 04 04370 STB XCHAR ELSE
6203 C6 FF 04380 LDB #-1
6205 E7 80 04390 STB ,X+
6207 8C 5A00 04400 CMEX #OUTBUF+SZOUT
620A 26 03 04410 BNE XMI2
620C 8E 5900 04420 LDX #OUTBUF
620F 04430 XMI2
620F 9F 0B 04440 STX GETOUT ADVANCE BUFFER POINTER
6211 C6 0A 04450 LDB #10
6213 D7 03 04460 STB XBIT XMIT 10 BITS
6215 1C FE 04470 ANDCC #5FE START BIT->CARRY
6217 20 07 04480 BRA XMI4
6219 04490 XMI3
6219 D6 04 04500 LDB XCHAR
621B 1A 01 04510 ORCC #1 STOP BIT->CARRY
621D 56 03 04520 RORB DATA BIT->CARRY
621E D7 04 04530 STB XCHAR
6220 04540 XMI4
6220 C6 00 04550 LDB #0
6222 59 04560 RORB CARRY->RS232 OUT
6223 59 04570 RORB
6224 F7 FF20 04580 STB $FF20
6227 04590 XMI8
6227 9E 09 04600 LDX XHOLD
6229 04610 XMI9
04620
04630 *
04640 *SERVICE RECEIVER
04650 *
6229 D6 06 04660 LDB RBIT IF NOT RECEIVING
622B 27 06 04670 BEQ RCI1 GO CHECK FOR START BIT
622D 0A 05 04680 DEC RSLICE ELSE
622F 27 18 04690 BEQ RCI3 CONTINUE TO RECEIVE
6231 20 3D 04700 BRA RCI9
6233 04710 RCI1
6233 F6 FF22 04720 LDB $FF22 WATCH FOR START BIT
6236 56 04730 RORB
6237 24 04 04740 BCC RCI2
6239 0F 05 04750 CLR RSLICE NO START, CLEAR COUNTER
623B 20 33 04760 BRA RCI9
623D 04770 RCI2
623D 0C 05 04780 INC RSLICE POSSIBLE START, INC COUNTER
623F D6 05 04790 LDB RSLICE
6241 C1 04 04800 CMPB #4 IF 4 X'S, START RECEIVER
6243 26 2B 04810 BNE RCI9
6245 C6 0A 04820 LDB #10 RECEIVE 10 BITS
6247 D7 06 04830 STB RBIT
6249 04840 RCI3
6249 0A 06 04850 DEC RBIT
624B 27 0F 04860 BEQ RCI4 SEE IF FINISHED BYTE
624D F6 FF22 04870 LDB $FF22
6250 56 04880 RORB DATA BIT->CARRY
6251 D6 07 04890 LDB RCHAR
6253 56 04900 RORB CARRY->RECV BYTE
6254 D7 07 04910 STB RCHAR
6256 C6 07 04920 LDB #7
6258 D7 05 04930 STB RSLICE SET COUNTER FOR NXT BIT
625A 20 14 04940 BRA RCI9
625C 04950 RCI4
625C 9F 09 04960 STX XHOLD
625E 9E 11 04970 LDX PUTIN
6260 D6 07 04980 LDB RCHAR
6262 E7 80 04990 STB ,X+ DELIVER CHAR TO BUFFER
6264 8C 5900 05000 CMXP #INBUF+SZIN
6267 26 03 05010 BNE RCI5
6269 8E 5800 05020 LDX #INBUF
626C 05030 RCI5
626C 9F 11 05040 STX PUTIN
626E 9E 09 05050 LDX XHOLD
6270 05060 RCI9
6270 D6 08 05070 LDB BHOLD
6272 3B 05080 RTI
05090
6000 05100 END MAIN

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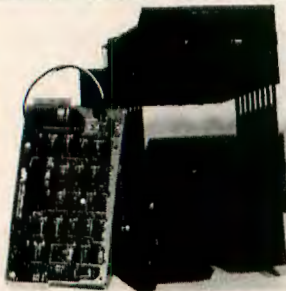
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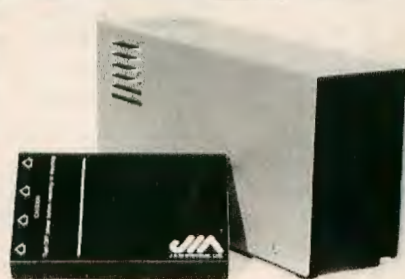
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Using Mail In the SIG

By Cray Augsburg
Rainbow's CoCo SIGop
Username: RAINBOWMAG

We all know that a lot of time is involved in reading and answering mail. I wanted to find a way to make the job easier, and with a lot of searching, I found a way. That has prompted me to devote this column to some of the features and commands found in Delphi Mail.

For starters, how do we get to Mail? Well, you can enter MAIL from the CoCo SIG prompt or the forum prompt. You can also enter /MAIL while in conference. Keep in mind that, upon using CONTROL-Z, you return to the area of Delphi from which you entered Mail. In the Mail section you have access to different files, each of which may contain several folders. When entering Mail you will be in your MAIL.MAI file. Within that file, you can create new folders, each of which can hold several letters. This is the basic structure of the Mail system. The default folder on entering Mail is your NEWMAIL folder. It contains any letters that you have not yet read (or received).

To see the messages in your NEWMAIL folder, enter DIRECTORY. As with other Delphi commands you can abbreviate this to DIR. You should see a complete list of waiting Mail messages. If you don't, then you have no waiting Mail. To see a list of all the folders within your MAIL.MAI file, enter DIRECTORY/FOLDERS or DIR /FOLDERS. Once you have this list, you can get a directory of one of these folders by entering DIR (foldername).

Cray Augsburg is RAINBOW's technical assistant and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.

This sets your new default folder to the name of the folder you chose and then lists a directory of that folder to your terminal. When you finish and leave the Mail section, if you come back into Mail, your default folder is automatically reset to NEWMAIL.

You say you only have one folder, NEWMAIL, in your MAIL.MAI file? Well, we can correct that situation and make your life a lot easier in the process. When you read a message from another user you have several options. First, you can choose whether or not you want to reply. Then you can either delete or save the message. Deleting a message is easy and gets it out of your hair. When you have finished reading the message and replied to the sender, just enter DELETE. The message will be wiped out. But, what if you want to save the message?

Saving a Mail message is just as easy. Instead of typing DELETE, enter FILE (foldername). This files the message in the folder you specify. If the folder does not exist, Delphi asks if you want to create it. This can come in very handy. I have folders named IMPORTANT, PENDING, TODO, JOKES, OS9, and several others. You get the idea. Create as many folders as you need to keep your mail organized. Now when you do a DIR, you will be able to see how your mail setup is structured.

Let's assume you read a message from another user and decide it isn't important, so you delete it. Then your roommate comes in and wants to see the message. What can you do? The Mail system does have safety valves. When you delete a message, it really goes to another folder in your mail system. This folder is named WASTEBASKET. Just enter DIR WASTEBASKET and you'll see your deleted messages there, provided you have not used CONTROL-Z to leave Mail. When you delete a message, a special folder named WASTEBASKET is created. All deleted messages in the same Mail session go there. WASTE-

BASKET is emptied when you press CONTROL-Z.

You can file messages from any folder to another folder. The message appears in the new folder and disappears in the present folder. The only requirement is that you read the message first. Any message you are able to read, you are also able to act on.

If you don't delete or file a message you have just read, where does it go? It goes into another folder named MAIL. It's as simple as that. If you read a message in NEWMAIL and don't delete or file it, it is automatically filed in your MAIL folder on leaving Mail.

To send a copy of a letter to another Delphi user, enter FORWARD after reading the message. Delphi asks to which username to send the copy and then asks for the subject. Enter the appropriate responses and the message will be

DATABASE REPORT

We have been fortunate in having Steve Bjork (6809ER) and Dale Lear (DALELEAR) to whom Tandy chose to give CoCo 3s, as frequent visitors to our service. Dale Lear is our OS-9 section leader. Thanks to them, and to Tandy, who released some of their information to the public, we have been able to supply accurate and detailed information about the machine to our members.

Because there has been so much interest in this successor to the CoCo 2, we have created a special topic area (CoCo 3 News) dedicated to news about and programs for the CoCo 3. Among other things we hope to have will be full specifications for the GIME chip, just as soon as Tandy feels comfortable about allowing us to publish them. I also expect that section to be used for folks to report any problems they find with the machine. In the meantime, we should be able to answer many of your questions about it.

One of the most striking additions to our Graphics topic area is a Macintosh

copied to the other user. You also retain a copy which you may then file. FORWARD works just like the SEND command, only it acts on a letter you have received rather than a new one you want to send. To send a new letter to another user, just enter SEND at the Mail prompt. Then, answer the questions and type your letter. When you are finished, press CONTROL-Z to send the letter and return to the Mail prompt.

If you send a letter to someone and would like a copy sent to someone else, there are two things you can do. First, include both names at the TO: prompt of the send command. Separate the usernames with commas. You can send a letter to as many people as you want using this technique. Another way to send a copy is to enter SEND/LAST. This works just like the SEND command only it sends the same letter you just sent to the first user. This only works if used immediately after the original SEND. You can also send letters to yourself using any of the above techniques. This is great if you need to keep a copy of an important letter you are sending someone.

To reply to a letter you receive, enter REPLY at the Mail prompt following the letter. You are put into the edit mode to create a letter of reply. When you use CONTROL-Z, the reply will be sent to the same person who sent the message.

The READ command is the simplest command in the Mail system, yet it can sometimes be tricky. On entering Mail, you are in the NEWMAIL folder. You can now enter READ or just press ENTER. In either case, your oldest unread message scrolls on the screen. Another READ or ENTER causes the second oldest message to be read. But, what if you want to read the 12th letter? Just enter READ 12. You are taken to the 12th message and subsequent READs or ENTERs take you from there. When you have read the last message in your NEWMAIL file, another READ causes the message "No more messages" to appear on the screen. Another READ beyond this causes the first message to be read again. The Mail system works in a circle.

The READ command can also be used to change to a new folder. Just enter READ (foldername). Your default folder will be changed to the new folder and you'll see the first message filed in that folder come across your screen. If you want to change to a new folder, but don't want to read the first message files there, use DIR (foldername).

Next month we'll see another way to select default folders and do many fancy things in the Mail system. We'll try to cover some new features to be found in Workspace. Till then, keep up the experimentation. Now that you have an idea of how Mail works, go in there,

Picture Converter, written by Erik Gavriluk (ERIKGAV), co-author of *McPaint*. This utility, like the Commodore 64 converter that Eric and I co-authored some time ago, allows CoCo owners to download Macintosh *MacPaint* pictures from bulletin boards, then view those pictures on the CoCo. *MacPaint* pictures may be found on Delphi in the Micro Artists SIG in the Macintosh topic area of the database. Also, I have begun the process of uploading images from the "CoCo Gallery" to the Graphics database for downloading. (These files, unlike the RAINBOW ON TAPE files, are free.)

In the OS-9 topic area Dale Lear has reorganized some of our older files, grouping them more conveniently in logical packages. He's also written an index of all the material in the OS-9 database, which he plans to keep up to date. Milt Webb (MILTWEBB) has given us a tutorial for printing horizontal bar graphs to the screen under OS-9. Bob Montowski (GRAPHICSPUB) has sent us tutorials for novice OS-9 users. He also has given us some fundamental pieces of an OS-9 BBS system, including RS-232 Pak port drivers, and some extra commands for BASIC09. Andrew Ellinor (CROPPER) has uploaded to us an OS-9 terminal program that features Xmodem support, written under BASIC09.

In the General topic area are four new articles by Dale Lear, Rick Adams (RICKADAMS), Cray Augsburg (RAINBOWMAG) and me. Three of them concern information about the CoCo 3, and one is a humorous account of an adventure Rick and I had.

Don Hutchison (DONHUTCHISON) has uploaded some new material to the Source Code for 6809 Assemblers section. Larry Wimble (THE ASSEMBLER) has provided us with instructions for putting a pause control on the CoCo.

Our Utilities section is bulging with new additions. Doug Masten (DMASTEN) has given us a revised command file for BASIC. Larry Wimble has given us *Demon Dialer*, *Circuit Drawer*, a BASIC database program, and others. Jerome Kalkhof (GRUMCLUB) has given us some modem/buffer printing utilities. Richard Trasborg (TRAS) has contributed a disk catalog utility. Milt Webb has given us an encryption program. Robert E. Pierce (RPIERCE) has sent us an edit/display utility.

Our Music topic has received over a

hundred new files in the last month. Dozens of files were contributed by Scott Milliken (IDIOT), Stephen Scherock (SFSCHEROCK) and Tom King (CAPNCRUNCH). Other contributors to the Music topic area this month are Shawn J. Bush (SBUSH), Ned Smith (NEDSM), Ray Wright (RAYWRI), Jim Brooks (XANTHA) and Thomas Patrick Daly (TPD).

In addition to the Macintosh Converter and "CoCo Gallery" material mentioned, our Graphics topic area has swelled with the addition of over 50 new images and programs. Bob Montowski has been one of the principle contributors, as has Richard Trasborg who has uploaded some studies of the female form by Mike Trammell. Bruce Henry (OZ), John Fitzgerald (FITZ), Ray Wright and Andrew Ellinor are other contributors.

Loren J. Howell (XENOS) has contributed to our Games topic area *The Catacombs of Yendor*, and Larry Wimble has given us a logic game. Truman Bryerton (GRANDAD) has given us *Exit Left* and Mike Lucash (MIKELUCASH) has given us *Miner*.

In the Data Communications topic area we have received a new version of *ASCII Express* (Version 2.0) from Erik Gavriluk and Greg Miller (GREG MILLER). This is a powerful combination terminal program and mini bulletin board system. Mike Banks (KZIN) has given us a list of CoCo bulletin boards, and Greg Miller has sent us a useful disk-to-disk transfer program that sends an entire disk of data from one CoCo to another with error detection and correction.

Don Hutchison, who officially joined our staff last month, has been tirelessly at work enabling new files in the database and uploading past issues of RAINBOW ON TAPE material. We have the past three years of RAINBOW ON TAPE files now available online. Eric Tilenius (TILENIUS) has been enhancing the keywords used in the RAINBOW ON TAPE database.

We are staying on top of developments regarding the CoCo 3 on a minute-to-minute basis, while greatly increasing our already huge storehouse of programs, articles and images written for and on the CoCo 1 and 2. Overall, this has been a very active month, and I encourage you to drop by and check us out.

— Marty Goodman
(MARTYGOODMAN)
Delphi CoCo SIG Database Manager

PIPELINE

GO TEAM, GO! *The Professional Football Handicapping System* has been introduced by Software Exchange. This program allows anyone to handicap the weekly NFL games using information found in the daily newspaper's sports section. The system is available on cassette or disk for the Color Computer at \$39.95 plus \$2 S/H. For further information, contact *Software Exchange*, P.O. Box 5382, West Bloomfield, MI 48033, (313) 626-7208.

ALL SYSTEMS GO A six-outlet surge protector for personal computers has been introduced by MicroComputer Accessories, Inc. (MCA). Designed to protect your system from surges, spikes and noise interference, MCA's Surge Protector cuts power in less than one nanosecond and provides surge protection on all three surge paths. Should power intervention occur, the device can be reactivated with the built-in Reset button. The price is \$39.95. For more information, contact *Department L, MicroComputer Accessories, Inc.*, 5405 Jandy Place, P.O. Box 66911, Los Angeles, CA 90066-0911, (213) 301-9400.

PAPER CACHE hi-tech Stationery now produces a complete line of business and personal stationery designed for computer systems. The stationery, which comes in a wide variety of patterns, has pinholes down both edges for operation with the tractor-feed mechanism found on most personal printers. Each order contains 50 continuous pages of stationery and 25 #10 envelopes. The price ranges from \$5.95 to \$9.75. Custom letterhead stationery priced per order. Contact *hi-tech Stationery*, 5901 Warner Avenue, Suite 270, Huntington Beach, CA 92649, (714) 840-6038.

CLEAN SWEEP Ohm/Electronics continues to support its Scooter Products line of protective computer accessories with the introduction of easy-to-use disk drive cleaning kits. Model SCK5.25 is intended for use with 5¼-inch disk drives and includes a cleaning disk and cleaning fluid. The kit also provides for cleaning either single-sided or double-sided drives. Price for the SCK5.25 is \$6.95. Contact *Scooter Products, Ohm/Electronics, Inc.*, 746 Vermont Street, Palatine, IL 60067, (800) 323-2727 (Illinois, call 312-359-6040).

ON THE MOVE Spectrum Projects has notified us of a recent change of address. The new address is: Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414. The C.O.D. order line number is now (718) 835-1344.

FREE CATALOG Support Systems International Corporation has just released a free catalog for computer cables and accessories. The new catalog covers nearly all necessary items for installing your computer system and runs the gamut from data transfer switches to wall outlet plates. Free catalogs are available by contacting *Support Systems International Corporation*, 150 South Second Street, Dept. ES, Richmond, CA 94804, (415) 234-9090.

BOOKWORM Howard W. Sams & Co. has recently added two new selections to its wide line of technical publications. *Understanding Advanced Solid State Electronics*, a 272-page book, covers such topics as logic cells and arrays, microprocessors, graphics processors, linear integrated circuits and bit-slice systems. Glossary, index and chapter review questions and answers are included in this \$14.95 book. John D. Lenk's *Troubleshooting & Repair of Microprocessor-Based Equipment* is

another offering from Sams. This 250-page manual, which retails for \$21.95, contains general procedures, techniques and tips for troubleshooting equipment containing microprocessors. Topics include test equipment, associated problems in troubleshooting, flip-flop and register troubleshooting, current flow analysis and step-by-step procedure for troubleshooting the VCR. All Sams Books are available through bookstores, electronic distributors, or directly from Sams by calling (800) 428-SAMS.

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DOWN ON THE FARM Based on a recently released survey, Farm Computer News has reported that, not only do most of their subscribers own their own computers, but nearly half of them plan to buy another one. The survey also indicated that the most common use for those computers is spreadsheets, with fully 80 percent of the respondents saying that was their primary function on the computer. The next most common use was word processing (76 percent). Apple took the biggest bite out of the ownership market with a 32 percent share. IBM holds a 25 percent share, but Radio Shack is still holding its own with 17 percent.

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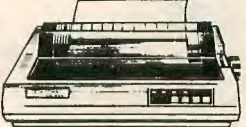
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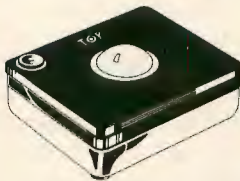
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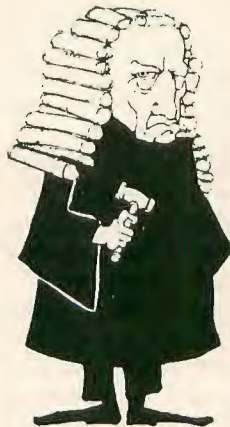
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Use low resolution graphics to create sharp logon messages

Graphically Speaking: The Artistic BBS

By Eric Bailey

The world of telecommunications is expanding rapidly and the CoCo is growing with it. One of the things coming our way soon is telecommunicating with graphics. No one has produced a terminal program for the CoCo that can transfer high resolution graphics, yet. But low resolution graphics are possible through a modem.

I have tried to send graphics of the highest resolution for the CoCo, but it takes over five or 10 minutes for a simple picture. I have experimented to find a way to transfer the high resolution graphics, but have not found a way to make it easy to add to a BBS (Bulletin Board System). A new terminal program and BBS software would have to be written.

I decided to write a program that allows you to create and edit low resolution graphics. Then, if you have a BBS, you can use the data files to create logon messages.

Some bulletin board systems create

Eric Bailey is a 14-year-old self-taught programmer from Urbana, Illinois. He has programmed on several of the Tandy computers and found the Color Computer to be his favorite.

graphics with text. They use the slashes, plus and minus signs, etc. The idea is good, and the systems using graphics seem to attract more people. I used this idea and added a little more.

For a remote terminal to see these graphics, it must be using a CoCo and the terminal program must show the character strings 128 through 255. Some of the new communications packages are in high resolution and do not show these character strings, so the graphics won't appear correctly.

My program, *LWRSEDIT*, creates the graphics with the SET and RESET commands. The save routine PEEKs each character of the screen and saves it in ASCII format. These graphics are in low resolution (64 by 32 pixels), but it is still possible to make some very nice pictures. Pictures can really add excitement to your bulletin board.

Type in the program listing and save it. When run, it asks whether you want to see a command summary or start. The command summary lists all the commands you can use while the program is running.

The program asks for a color. This color is just to start with; you may change it anytime while in the edit mode. It then asks for the name of the

picture to edit. After these questions are answered, the screen turns black and there is a flashing cursor in the color you chose at the first prompt.

To move the cursor, use the four arrow keys. To make a dot the same color as the cursor, press the space bar. The color can be changed by pressing 'C'. When the cursor stops blinking, press the number of the color wanted. Use the colors listed in the main menu. These are the same as the values the CoCo uses in BASIC.

After the color has been changed, some problems may occur. When the cursor is moved over another color, the other colors flash on and off. This is to warn you that if you press the space bar (to make a dot), then all those blinking colors will change too. This is because the CoCo can only mix a color with black. This only happens in a block of four pixels. My advice is to carefully space your picture if you plan to use many colors.

For the text mode, press 'T'; the program offers text with your graphics. Use lowercase for the characters to mix with the background.

To save a picture, press 'S'. It uses the last name you used. To change the filename, use 'F'.

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Finally, there is the load command; press 'L', which loads any picture already created, or it will load the first 512 characters of any data file in ASCII format.

Modifications

With a few modifications, you can change the program to work on a cassette system. Change the save and load routines starting at lines 360 and 420, respectively. Change each expression of #1 to read #-1. Line 470 needs to be changed to a REM statement. It

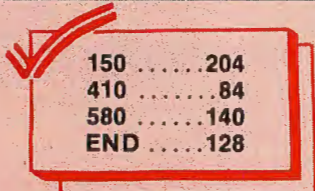
should not be removed, because it begins a subroutine.

The following listing is a short subroutine that can be inserted in a BBS to add graphics. Change the name of the data file to your needs. A short prompt added to the login of your BBS will tell if you should send graphics to them. The question could be, "Are you using a CoCo in 8-bit mode?" This ensures people with other computers won't receive garbage characters.

If the program does not work, try changing Line 40 to 40 PRINT CHR\$(A);.

```
10 OPEN "I",1,"TEST/DAT
20 FOR X = 1 TO 512
30 INPUT #1,A
40 POKE 1023 + X,A
50 NEXT X : CLOSE
```

(You may direct questions about this program to the author at 2016 Vawter #4, Urbana, IL 61801, 217-384-5083. Please enclose an SASE when writing.)



The listing: LWRSEEDIT

```
10 ' LOW-RES GRAPHICS EDITOR
    COPYRIGHT 1986
    BY ERIC BAILEY
20 CLS:PRINTTAB(3)+STRING$(25,19
1)+STRING$(7,"")+CHR$(191)+"LOW
-RES GRAPHICS EDITOR"+CHR$(191)+
STRING$(7,"")+STRING$(25,191)
30 PRINTTAB(8)"BY ERIC BAILEY":P
RINT
40 INPUT"COMMAND SUMMARY
    enter TO START
    COMMAND";Q$
50 IFQ$="C"ORC$="c"THENGOTO560
60 CLS:PRINT"CHOOSE COLOR
    1-GREEN        2-YEL
LOW              3-BLUE        4-RED
                5-BUFF        6-CYA
N                7-MAGENTA    8-ORA
```

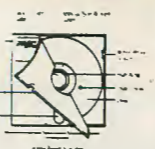
```
NGE"
70 INPUT C:IFC<1ORC>8THENGOTO70
80 INPUT"WHAT IS THE NAME OF YOU
R PICTURE";F$
90 IF F$="" THENPRINT"YOU MUST C
HOOSE SOMETHING.":GOTO80
100 IFLEN(F$)>8THENPRINT"TOO LON
G. REDO":GOTO80
110 CLS(0):X=32:Y=16
120 A4=INT(Y/2):A5=INT(X/2):A6=(
A4*32)+A5:CP=PEEK(1024+A6)
130 FORT=1TO25:NEXTT:SET(X,Y,C):
FORT=1TO25:NEXTT:RESET(X,Y)
140 I$=INKEY$
150 GOSUB 540
160 IFI$=""THENGOTO120
170 IFI$="^"THENY=Y-1
180 IFI$=CHR$(12)THENCLS(0)
190 IFI$=CHR$(10)THENY=Y+1
200 IFI$=CHR$(9)THENX=X+1
210 IFI$=CHR$(8)THENX=X-1
220 IFI$="E"ORI$="e"THENGOSUB550
230 IFI$="Q"ORI$="q"THEN END
240 IFI$="" THENGOSUB350
250 IFI$="S"ORI$="s"THENGOTO370
260 IFI$="L"ORI$="l"THENGOTO430
```

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```

27Ø IFI$="C"ORI$="c"THENGOSUB62Ø
28Ø IFI$="T"ORI$="t"THENGOSUB66Ø
29Ø IFI$="F"ORI$="f"THENGOSUB73Ø
3ØØ IFX<ØTHENX=Ø
31Ø IFX>63THENX=63
32Ø IFY<ØTHENY=Ø
33Ø IFY>31THENY=31
34Ø K=Ø:GOTO12Ø
35Ø SET(X,Y,C):RETURN
36Ø 'SAVE ROUTINE
37Ø GOSUB54Ø:OPEN"O",#1,FF$
38Ø FORQ=1Ø24TO1535
39Ø W=PEEK(Q):PRINT#1,W
4ØØ NEXTQ
41Ø CLOSE#1:GOTO12Ø
42Ø 'LOAD ROUTINE
43Ø CLS:LINEINPUT"FILE YOU WISH
TO LOAD (INCLUDE EXTENSION) ";F
F$:IFFF$=""THENGOTO34Ø
44Ø IFINSTR(1,FF$,"/")=ØANDINSTR
(1,FF$,".")=ØTHEN46Ø
45Ø GOTO47Ø
46Ø PRINT"MUST INCLUDE EXTENSION
":FORT=1TO1ØØØ:NEXTT:GOTO43Ø
47Ø OPEN"D",#1,FF$:E=LOF(1):CLOS
E#1:IFE=ØTHENPRINT"FILE NOT FOUN
D":CLOSE#1:KILLFF$:FORT=1TO1ØØØ:
NEXTT:GOTO43Ø
48Ø OPEN"I",#1,FF$
49Ø FORQ=1Ø24TO1535
5ØØ IFEOF(1)THENGOTO52Ø
51Ø INPUT#1,W:POKE Q,W
52Ø NEXTQ:CLOSE#1
53Ø F$=FF$:X=1:Y=1:GOTO12Ø
54Ø POKE (1Ø24+A6),CP:K=Ø:RETURN
55Ø RESET(X,Y):RETURN
56Ø CLS 'COMMAND SUMMARY
57Ø PRINT"  UP ARROW - MOVE CURS
OR UP      DOWN ARROW - MOVE CURS
OR DOWN   RT. ARROW - MOVE CURS
OR RIGHT  LT. ARROW - MOVE CURS
OR LEFT   'S' - SAVE PICT
URE       'L' - LOAD PICT
URE       'E' - ERASE AT
CURSOR"
58Ø PRINT"                LOCATION
<SPACE> - PUT DOT A
T CURSOR 'C' - PROMPTS C
OLOR     CHANGE, H
IT 1-8   'T' - TEXT MODE
, STARTS ABOVE CUR
SOR HIT  <ENTER> T
O LEAVE"
59Ø PRINT"                'Q' - QUIT
6ØØ INPUT"PRESS <ENTER> TO START
";T$:RUN
61Ø 'CHANGE COLOR

```

```

62Ø I$=INKEY$:IFI$=""THENGOTO62Ø
63Ø D=VAL(I$):IFD<1ØRD>8THENRETU
RN
64Ø C=D:GOTO12Ø
65Ø 'TEXT MODE
66Ø W=INT(Y/2):Z=INT(X/2):O=(W*3
2)+Z:O=O+1
67Ø IFO<1ØRO>51ØTHENRETURN
68Ø I$=INKEY$:IFI$=""THENGOTO68Ø
69Ø IFI$=CHR$(13)THENRETURN
7ØØ IFI$=CHR$(8)THENO=O-1:PRINT@
O," ";:GOTO68Ø
71Ø PRINT@O,I$;:O=O+1
72Ø GOTO67Ø
73Ø FOR XX=1Ø24 TO 1Ø56
74Ø Z=PEEK(XX):POKE 3ØØØØ+XX,Z
75Ø NEXT XX
76Ø PRINT@Ø,"";:INPUT"FILENAME";
F$
77Ø IF LEN(F$)>8THENGOTO76Ø
78Ø FOR XX=1Ø24 TO 1Ø56
79Ø Z=PEEK(3ØØØØ+XX):POKE XX,Z
8ØØ NEXT XX
81Ø RETURN

```



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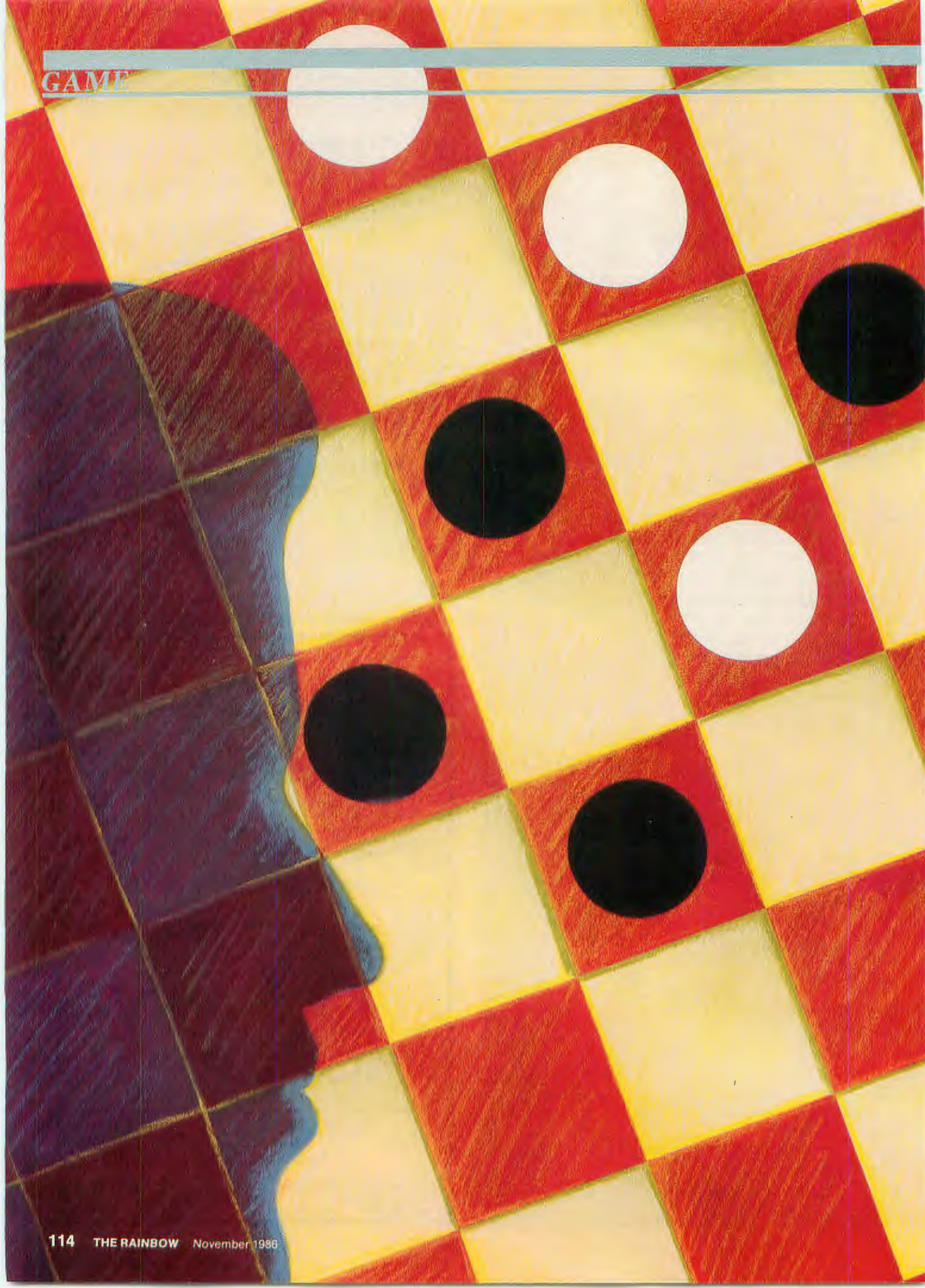
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Checkers with a modem offers a new twist for an old favorite

Long Distance Draughts

By Greg Miller and Erik Gavriluk

Each day more and more CoCo users are becoming interested in telecommunications and are purchasing modems to explore this exciting new world.

We are proud of our new program, *McCheckers*, which combines both modem programming and some of the graphics programming tricks we learned while writing *McPaint*. We are also very pleased to be able to share this program with a larger audience than was possible before, thanks to THE RAINBOW's support.

Greg Miller, 18, is a college freshman majoring in electronic engineering. Erik Gavriluk, 15, is a high-school junior.

The Program

McCheckers is a machine language checkers game two people play over the modem. This means any two people having this program and a modem can play, whether they live across town, or across the country.

To make the file necessary to play *McCheckers*, you need to use two programs. The first, shown in Listing 1, is a BASIC program that draws the graphics checkerboard on which the game is played. Type in and run this program. After the display is generated, press any key to save the graphics screen. Be sure to save a copy of the BASIC program as well.

Listing 2 is a BASIC program to generate the machine language checkers

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game. If you get the Checksum Error message, check the data lines, because it is likely that one or more of them contain an error. Also be sure to save a copy before you run the program; an error in typing could crash the computer.

After running Listing 2, save the completed program on cassette by typing CLOADM"CHECKBORD", &H800 and press ENTER. Then type CSAVEM"CHECKERS", &HE00, &H3300, &H2600 and press ENTER. For disk, type LOADM"CHECKBORD" and press ENTER. Then type SAVEM"CHECKERS", &HE00, &H3300, &H2600 and press ENTER.

How to Play

Load the game and type EXEC. You will see a banner, along with the prompt "Originate or Answer?" The person using the answer mode on his modem should use Answer; the other person should use Originate. The person using Originate goes first.

Next, you are put into the type mode, where you can send commands to your modem (if it responds to commands like

a Hayes Smartmodem). If you have not already done so, you must now establish carrier between you and your opponent. Press BREAK to begin the game.

Both players move the white pieces on the bottom of the board. The program automatically displays the other player's pieces as black.

McCheckers is a complete implementation of checkers; the usual rules apply. Here's a brief overview:

- Pieces only move diagonally forward. A piece may be moved backward only if it is a king. A piece becomes a king when it reaches the last row of the opposing player (the top row on the screen).

- A piece must "jump" if at all possible. (This is an official rule of checkers, but is most often ignored in casual play.)

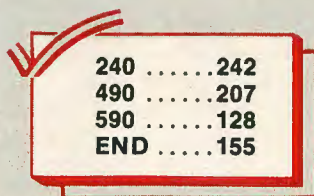
- The game ends when one player has captured all his opponent's pieces, or when a player has no possible move. If a player has no possible move, then the other player wins.

To move a piece, point the arrow to

the piece you want to move, and then to the destination square. If you make an illegal move, you are told so. You can only move a piece when the arrow appears on the screen. If the arrow does not appear on your screen, it means that the other player is in the process of moving. You must wait for the arrow to appear before you can move. When it is your turn (the arrow appears on the screen), you may send a short message to the other player by pressing CLEAR and then typing your message. Messages are displayed on the top line of the screen. If you receive a message, press the joystick button after reading the message; the other player will not be able to continue his turn until after you have done so.

At the end of a game each player is notified as to whether he won or not, and is again put into the type mode, where pressing BREAK begins a new game.

(Questions about this program may be directed to the authors at 3101 Link Road #32, Lynchburg, VA 24503. Please enclose an SASE for a reply.) □



Listing 1: MCDRAW

```

1 ' BASIC PROGRAM TO DRAW
2 ' CHECKERBOARD FOR McCheckers
3 '
10 PMODE 4,1:PCLS1:SCREEN 1,1
20 DIM B(500),B2(500)
30 FOR Y=0 TO 30 STEP 6
40 LINE(0,Y)-(255,Y),PRESET
50 LINE(0,Y+1)-(255,Y+1),PRESET
60 NEXT Y
70 X1=58:Y1=45:X2=195:Y2=180
80 LINE(X1,Y1)-(X2,Y2),PRESET,B
90 LINE(X1+1,Y1+1)-(X2-1,Y2-1),P
  RESET,B
100 LINE(62,48)-(191,177),PRESET
  ,BF
110 GET(0,40)-(13,53),B
120 FOR X=64 TO 190 STEP 32
130 FOR Y=50 TO 160 STEP 32
140 PUT(X,Y)-(X+13,Y+13),B,PSET
150 NEXT Y,X
160 FOR X=80 TO 176 STEP 32
170 FOR Y=66 TO 176 STEP 32
180 PUT(X,Y)-(X+13,Y+13),B,PSET
190 NEXT Y,X

```

```

200 FOR Y=32 TO 44
210 IF Y/2=INT(Y/2) THEN A=204 E
  LSE A=51
220 LC=&HE00+Y*32
230 FOR T=0 TO 31:POKE LC+T,A:NE
  XT
240 NEXT Y
250 GET(0,33)-(255,44),B
260 PUT(0,181)-(255,192),B
270 GET(0,32)-(57,44),B,G
280 GET(196,32)-(255,44),B2,G
290 FOR Y=32 TO 180 STEP 12
300 PUT(0,Y)-(57,Y+12),B,PSET
310 PUT(196,Y)-(255,Y+12),B2,PSE
  T
320 NEXT Y
330 FOR Y=4 TO 26
340 LC=&HE00+Y*32
350 FOR A=7 TO 24
360 READ B:POKE LC+A,B:NEXT A
370 NEXT Y
380 A$=INKEY$:IF A$="" THEN 380
390 CLS:PRINT"SAVING..."
440 A=PEEK(&HC000)
450 IF A=68 THEN SAVEM"CHECKBORD"
  ,&HE00,&H25FF,&HA027:END
460 CSAVEM"CHECKBOARD",&H600,&H1D
  FF,&HA027:END
470 DATA 255,252,15,255,255,192,
  24,31,255,255,255,255,255,25,
  5,255,255,255
480 DATA 255,249,136,31,255,31,3

```

```

, 31, 255, 255, 255, 255, 255, 255, 255, 255,
255, 255, 255
490 DATA 255, 243, 131, 31, 254, 113,
134, 31, 255, 255, 255, 192, 255, 255, 2
55, 255, 255, 255
500 DATA 255, 247, 135, 31, 252, 192,
198, 31, 255, 255, 255, 216, 255, 255, 2
55, 255, 255, 255
510 DATA 255, 231, 143, 31, 249, 128,
204, 31, 255, 255, 255, 152, 255, 255, 2
55, 255, 255, 255
520 DATA 255, 237, 155, 24, 3, 0, 204,
63, 192, 15, 0, 176, 252, 0, 3, 255, 255,
255
530 DATA 255, 205, 155, 3, 195, 5, 140
, 1, 159, 132, 120, 48, 249, 248, 96, 6, 0
, 127
540 DATA 255, 217, 179, 14, 102, 12, 1
2, 240, 48, 193, 204, 48, 243, 12, 55, 19
2, 252, 63
550 DATA 255, 153, 179, 24, 54, 28, 25
, 152, 96, 99, 6, 48, 6, 6, 60, 99, 134, 63
560 DATA 255, 177, 227, 48, 54, 28, 27
, 12, 96, 102, 6, 96, 198, 6, 56, 6, 6, 63
570 DATA 255, 49, 230, 48, 102, 63, 21
9, 12, 192, 198, 12, 97, 140, 12, 48, 12,
12, 63
580 DATA 255, 97, 198, 96, 6, 63, 222,
12, 195, 140, 0, 103, 12, 56, 48, 12, 0, 6
3
590 DATA 255, 97, 198, 97, 6, 63, 222,

```

```

12, 222, 12, 32, 108, 13, 224, 96, 231, 1
92, 63
600 DATA 254, 97, 134, 97, 6, 63, 222,
13, 240, 12, 32, 120, 31, 0, 97, 224, 120
, 127
610 DATA 254, 193, 134, 99, 246, 31, 2
20, 12, 192, 12, 126, 240, 12, 0, 97, 224
, 12, 63
620 DATA 254, 192, 12, 99, 243, 28, 28
, 24, 192, 44, 126, 216, 76, 2, 99, 240, 6
, 63
630 DATA 252, 192, 12, 98, 3, 1, 156, 2
4, 192, 12, 64, 204, 12, 0, 195, 224, 6, 6
3
640 DATA 253, 132, 12, 96, 193, 195, 2
4, 24, 192, 204, 24, 198, 12, 12, 195, 23
6, 6, 63
650 DATA 253, 135, 236, 49, 128, 126,
24, 48, 99, 134, 48, 195, 6, 56, 195, 231
, 12, 63
660 DATA 253, 135, 224, 31, 0, 0, 24, 4
8, 62, 3, 224, 193, 131, 224, 199, 225, 2
48, 63
670 DATA 252, 15, 224, 0, 4, 0, 0, 128,
0, 0, 0, 0, 0, 0, 7, 224, 0, 63
680 DATA 252, 15, 224, 0, 15, 0, 0, 129
, 0, 0, 0, 0, 0, 0, 7, 240, 0, 127
690 DATA 252, 15, 255, 192, 31, 255, 1
92, 129, 128, 56, 2, 4, 8, 2, 7, 252, 0, 25
5

```

201	.....	221	216	.....	153
205	.....	48	219	.....	14
208	.....	133	223	.....	8
212	.....	86	END	.....	85

Listing 2: MCLoad

```

1 ' BASIC loader for McCheckers
2 '
3 GOTO 10
4 GOTO 20
10 CLEAR 1000:PCLEAR 8:GOTO 4
20 CLS:AD=&H2600
30 FOR T=29 TO 1 STEP -1
40 PRINT T;
50 READ A$
60 Z$=LEFT$(A$,2):A$=MID$(A$,3)
70 V=VAL("&H"+Z$):CK=CK+V
80 POKE AD,V
90 AD=AD+1:IF A$<>" " THEN 60
100 NEXT T
110 PRINT:PRINT
120 IF CK<>285767 THEN PRINT"CHE
CKSUM ERROR" ELSE PRINT"DATA COR

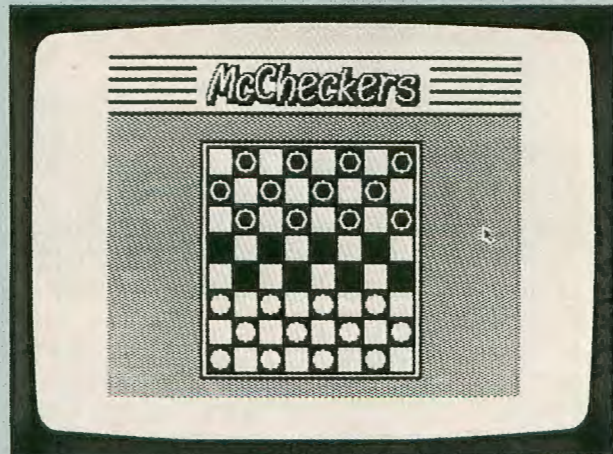
```

```

RECT"
130 END
200 DATA BDA9287F09867FFF408E2C1
6BDB99CBDA1765F814F2706814126F4C
6FFF72C16F72C06BDA9288634B7FF038
E2C6ABDB99CBD2B6D8635B7FF03B62C1
6B72C06BD2FC4C6408E2B7D108E2BBDA
680A7A05A26F9CC0000FD2C14BD29C7A
6842603BD297FFC2C144C810826024F5
CFD2C14C10826E5BD
201 DATA 2B1A8E290FC60C3404EC81F
D2C144FBD295C6AE426F3C60CE7E4EC8
1FD2C148601BD295C6AE426F23261732
C067D2C061026008D8601C603FD2C00B
D2A7F10270605BD2AB3102705FE7D315
82AFB7F3158B6315B812126037E2E25C
C0707B0315DF0315EFD2C14BD29C7A68
46F84B72C0FB297F
202 DATA CC0707B0315FF03160FD2C1
4BD29C7B62C15810726058603B72C0FB
62C0FA7844ABD295CFC31614D102BFF8
A3406CC0707A0E0E0E0FD2C14BD29C76
F84BD297F7D31631027FF6F732C067E2
69ECC0204FD2C00BD2A7F1027059FBD2
AB310270598BD274F7E269E8E2764BF2

```


ECC8E2765BF2ECA8E
 203 DATA 2DF1BF2FBC7E2EDD39FC2FB
 AFD2C14BD29927D2C12102B0645FC2C1
 2FD2C14FD2C0DFD2C07BD29C7A684102
 706342BC381011027063081031027062
 AB72C0FBF2C108E27A7BF2ECA7E2EDDF
 C2FBAFD2C14BD29927D2C12102B0603B
 E2C12BF2C14BF2C0BBD29C7A68410260
 5FDFC2C07FD2C14BD
 204 DATA 29C75FA68481042702C6FFF
 72C027F2C0386FFB72C09B72C0AB62C0
 7B02C0B4D2A01408101276F810210220
 5BDB62C08B02C0C4D2A0140810210220
 5ADB62C07B02C0BF62C08F02C0C2A087
 D2C0227037E2DCA340686016DE42A028
 6FFC6016D612A02C6FFFEDE4B62C07A0E
 0B72C14F62C08E0E0
 205 DATA F72C15BD29C7A6848103270
 68101102605646F84BD297FBE2C14BF2
 C0986FFB72C03BD29D526077D2C03102
 7055CB62C08B02C0C2A15FC2C07FD2C1
 4BD29C7A6848101270681021023053BF
 C2C0B5D2616FC2C07FD2C14BD29C7A68
 4810324028B02A784B72C0FBE2C0BBF2
 C14BE2C106F84BD29
 206 DATA C7B62C0FA7844ABD295CFC2
 C0DFD2C14BD297F7F290B7D2C032717F
 C2C0BFD2C14CC0707FD2C04BD29EB260
 6732C0673290BBE2C07BF2905BE2C0BB
 F2907BE2C09BF29098E2905C607BD2FC
 B3900000000000000000000000000000
 500070000001020104010601010203020
 502070200005020504
 207 DATA 05060501060306050607060
 0070207040706078E1468F62C14583AB
 62C1527B8308902004A26F9392E822E6
 A2EB22E9A347634028DDD108E2954A6E
 04810AEA6C60C3404ECA1ED843088206
 AE426F5326135F634768DBC4FC60CA78
 4A7013088205A26F635F6FC2C1481402
 52581C02421C13325
 208 DATA 1DC1AF24198040C03344444
 444B72C124FC1102505C0104C20F7B72



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C133986FFB72C12B72C1339F62C15585
 858FB2C148E2BBD3A398E0000BF2C048
 602B72C008604B72C01BD2B415D262BB
 D29C7A6848103251086FFC6018D2C261
 D8601C6018D2426158601C6FF8D1C260
 D86FFC6FF8D142605
 209 DATA 20CF1CFB391A04393510BF2
 C141A04390000FD2A24BE2C143410ABE
 4810722E8B72C14EB61C10722DFF72C1
 5BD29C7A68481012704810326CF86027
 D2A242A0286FEC6027D2A252A02C6FEA
 BE4EB61810722B5C10722B1FD2C14BD2
 9C7A6841026FFA53510BF2C141CFB39C
 C00003406ECE4FD2C
 210 DATA 14BD29C7A684B12C000271BB
 12C012716ECE44C8108250B4F5CC1082
 50532621A0439EDE420D632621CFB39C
 C0000FD2C04BD2B415D2658BD29C7FC2
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 4BD29C7A6842729B62BFD81012720FC2
 BFEFD2C147A2C147A
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 47C2C14BD29C7A684270220A51CFB391
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 28E0E0034108E000666061F89686169E
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 C810826074F5CC108260139FD2C04BD2
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 C0126D65F39AD9FA0
 212 DATA 00270781032705BD309E20F
 139FF01FF01FF01FF0101FF01FF01FF0
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 2FF0FF02FF02FF02FF02FF02FF02FF0
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 213 DATA 000000000000000000000000
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 000000000000000000000000000000
 000000000000000000000000000000
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 000000000000000000000000000000
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 04D63436865636B65727320312E300D0
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 B0D3C4F3E72696769
 214 DATA 6E617465206F72203C413E6
 E737765723F20000D202020202020202
 020202D54595045204D4F44452D0D202
 02020205052455353203C425245414B3
 E20544F20424547494E0D00202020202
 02D2D594F552057494E2054484953204
 7414D452D2D0D008E2C9EBD2CEA7E262
 620202020202D2D59
 215 DATA 4F55204C4F5345205448495
 32047414D452D2D0D008E2CC3BD2CEA7
 E26263410BDA9288E05009F883510BDB
 99C396060606060606060606060606
 14C4944604D4F5645606060606060606



WE'RE BRINGING THE COCO

RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send \$20 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged \$3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of programs that you can download and use, just for the cost of the time you spend transferring them. There'll also be corrections for RAINBOW articles, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a \$24.95 value — and a free hour of connect time — a \$7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this \$32.15 value as a *free bonus!*

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our \$31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

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Want to save even more? While you're online you can order, for only \$29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* (\$21.95) and a total of three hours of connect time (\$21.60).

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Problems? Call Delphi:
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DELPHI

TYPE: GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Uninet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Uninet or Tymnet. Canadian residents using Datapac will be charged an additional \$12 (U.S.) per hour.

On Uninet: Call (800) 821-5340 to get the Uninet number for your area. After you call the appropriate number for your own area and make connection, you'll see a prompt of "L?" Press ENTER, the period key (.) and ENTER again. At the "service:" prompt, type GVC (for General Videotex Corporation) and ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type DELPHI and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type SET 2:1, 3:126 and press ENTER. Now type p 1 3106, DELPHI; and press ENTER. Delphi's new rates indicate an additional \$12 hourly surcharge for evening use of Datapac, which means a total of \$18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Uninet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 312561703088 through Uninet, or 310600601500 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type RAINBOWSUB and press

ENTER. At the "PASSWORD:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type RAINBOWORDER and press ENTER. At the "PASSWORD:" prompt, type SENDSUB and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just press ENTER and start over. Remember that at any point, when you're on Delphi, you can type HELP to get help on how to use the system. To get off the system just type BYE.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: GROUP COCO

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password. No time is assessed against your free hour of service while you answer these questions.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in GROUP COCO and **join us on the CoCo SIG!**

More than a book . . .

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The Envelope Please

By Dick McGrath

And the winner is Dick McGrath of Montreal, Quebec! Dick's entry in our Crossword Creator Contest was clever enough to win the judges over. For this winning acrostic, Dick will receive \$25.

Sharpen your pencils and put on your thinking caps. For your entertainment we present Dick's puzzle and his tricky clues. Good Luck!

1	C	2	P	3	U	4	S		5	6	7	8	9		10	11	12	13	
14	B	A	S	E		15									16				
17	E	L	E	C		18									19				
20	R	E	S	T	O	R	E		21				22		23				
			24	O	R	S			25	R	E	T	R	O					
26		27	R	T				29	P	E	T				30		31	32	33
34			S			35	T	E	N			36							
37					38	M	A	N	A	G	E	S			40	C	S	A	
41	D	I	V	I	42	O	D		43	M	I	D		44	P	I	E	R	
45					46	E	N					47	A						
			48	E		49	S			50									
51	52	53		M					54	P	O	I	N	T	E	D	55	56	57
58					59	S	O	W	N	D				61	T	O	T	O	
62					63									64	E	N	O	S	
65					66									67	P	Y	N	E	

Across

- 4. CoCo "hearts"
- 5. "First" competitors?
- 10. His CoCo is in the tent
- 14. 2, 8, or 10
- 15. Business language
- 16. Desk -----
- 17. CoCo power (abbr.)
- 18. Use <CLEAR>
- 19. Early memory core material
- 20. Reset pointer
- 22. Characteristic
- 24. Logical operators
- 25. Reverse rocket
- 26. Modem type
- 29. A cat, dog or CoCo
- 30. Disk divisions

- 34. Teaching acronym
- 35. Decimal base
- 36. Time shares
- 37. Whole number (abbr.)
- 38. Handles
- 40. Confederate States of America
- 41. "/" alternative
- 43. String location
- 44. Dock
- 45. Palm leaf
- 46. Pac people
- 47. Yiddish Sarah (fam.)
- 48. Greek isle
- 50. Not Garfield, but -----
- 51. Warranted
- 54. Indicated in the stack
- 58. Elite or VIP

- 59. Motor or ----- on
- 61. OZ pooch
- 62. General assistant
- 63. Fore & aft rigged craft
- 64. ----- Slaughter
- 65. Triple helices
- 66. Avid CoCo age group
- 67. "Work force"

Down

- 1. Pre-CoCo hacker
- 2. Programmer's complexion
- 3. Employs
- 4. Parts of 30 across
- 5. Maples (species)
- 6. If not B or C try -----
- 7. Father, in Syria
- 8. Semi-conductor type
- 9. Freezing rain
- 10. Start anywhere (OS-9)
- 11. Oriental CoCo transport
- 12. ----- near
- 13. Louis' queen
- 21. Table scrap
- 23. Greek guardian
- 25. Changes title
- 26. Search a cassette
- 27. Mr. Dig
- 28. ----- blast
- 29. ----- pal
- 31. Cast of characters
- 32. Snooted
- 33. Error trap?
- 35. Youngster
- 36. Flashy diode
- 38. Ma Bell connection
- 39. Sloe ----- fizz
- 42. Back pages, usually
- 44. Colored an area
- 46. Component combination
- 47. Reagan's initiative
- 49. One of the significant bytes
- 50. Graphicom "goof" fixer
- 51. Our own design aid (init.)
- 52. Reclined
- 53. "Dr." Alan -----
- 54. Pi-meson
- 55. Mr. "Turn of the Screw"
- 56. English school
- 57. Measured amount
- 60. Bambi's mom



Keycad/Keyflow: CoCocad and CoCoflow Modification

By James Ventling

This is a modification for those who don't always have a joystick or mouse handy to use with either the *CoCocad* (Oct. '85) or the *CoCoflow* (Mar. '86) programs. I wanted to use *CoCoflow* with some of my students but didn't have joysticks to go around. Instead, I changed the program to accept keyboard input. In place of the joystick, the arrow keys are used for cursor movement. The arrow keys may be held down for continuous movement or, for faster movement, hold the 'J' key (for jump) while using the arrows. The CLEAR key is used in place of the firebutton. When making a selection from the icons at the top of the screen, be sure to press the down arrow key until the cursor reappears or the option may de-select before you have a chance to use it.

While using *CoCoflow*, we found that the symbols for decision and connection were too small to place text information in. I made a further modification to increase the size of these shapes. We also discovered that a screen-print utility could be added to *CoCoflow* due to its smaller memory require-

ments. In the original *CoCocad* and *CoCoflow*, to do a screen-print you had to dump all nine screens to disk and then use a separate screen print program. This used 28 grams of disk space! By adding a screen-print routine to the end of *CoCoflow*, you can print directly from memory.

Lines 20 through 30 replace the joystick input with keyboard input. PEEK is used to read the keyboard so you can tell if a key is being held down. The keyboard table is cleared in Line 20 so you can tell when a key has been released. Then the program looks to see if the 'J' key, any of the arrow keys, or the CLEAR key is being pressed.

Variables "XX" and "YY" are used to simulate a joystick input. The variables 'X' and 'Y' are not incremented directly because these variables are also used in some subroutines and could be changed when you least want it. Lines 29 and 30 check to make sure 'X' and 'Y' don't go out of bounds.

Line 121 starts the cursor at a convenient location at the top of the screen near the icon selection. You also have to keep the use of the CLEAR key from being misinterpreted as a keystroke when placing text on the screen. Changing Line 550 so as to ignore the CLEAR key takes care of this.

To change the size of the decision and connect symbols in *CoCoflow*, you

must change lines 120, 910 and 930. In Line 120, array sizes are increased to accommodate the larger symbols. The new DRAW strings and GET-PUT sizes for the larger symbols are in lines 910 and 930.

To add a screen-print routine to *CoCoflow*, first eliminate the screen dump in lines 1970 and 1980. Keep the page-display routine in Line 1980 and add your own screen-print routine starting at Line 2000. I have included a simple BASIC screen-print routine for the C-ITOH Prowriter.

Many thanks to Peter Kerckhoff for creating the original *CoCocad* and to Dennis Page for the *CoCoflow* modification. Remember to give credit to *CoCocad* or *CoCoflow* if you publish any graphics created with these programs.

To make the modification for keyboard input, load *Cococad* or *Cocoflow* and type in Listing 1.

To make the modification for larger decision and connection symbols in *CoCoflow* type in Listing 2.

To add a screen-print routine, change lines 1970, 1980 and 1990. Add the screen-print routine at Line 2000. Don't forget Line 3000.

(You may direct your questions to the author at 2400 Cornwall Drive, Xenia, OH 45385, 513-376-2074. Please enclose an SASE when writing.)

James Ventling lives in Xenia, Ohio and teaches computers and art. He has two daughters and has been programming since 1981.

Editor's Note: The following program listings will be saved in ASCII on this month's RAINBOW ON DISK to facilitate merging with the original *CoCocad* and *CoCoflow* programs. To use from RAINBOW ON TAPE, you will first need to save the files to disk in ASCII format, then use the MERGE command. To use MERGE, load in the original *CoCocad* or *CoCoflow* listing and type MERGE "filename". The filename refers to the ASCII save of either *CoCoMOD1*, *CoCoMOD2* or *CoCoMOD3*, depending on which modification is being used.

Listing 1: COCOMOD1

```
20 FORQZ=339TO344:POKEQZ,255:NEXT:JK=PEEK(340)
21 IFPEEK(341)=247THENYY=YY-1:IFJK=253THENYY=YY-7
22 IFPEEK(342)=247THENYY=YY+1:IFY Y<7THENYY=YY+12ELSEIFJK=253THENYY=YY+7
23 IFPEEK(343)=247THENXX=XX-1:IFY Y<6THENXX=XX-1ELSEIFJK=253THENX X=XX-7
24 IFPEEK(344)=247THENXX=XX+1:IFY Y<6THENXX=XX+1ELSEIFJK=253THENX X=XX+7
25 IFPEEK(339)=191THENP=3ELSEP=0
29 X=XX*4:IFX<3THENX=3:XX=1:ELSE IFX>252THENX=252:XX=63
30 Y=YY*4:IFY<3THENY=3:YY=1:ELSE IFY>188THENY=188:YY=47
```

```
121 XX=16:YY=9
```

```
550 GOSUB60:A$=INKEY$:GOSUB70:IFA $=""THEN550ELSEIFASC(A$)=12THEN 550 ELSEPLAYB$:IFA$=CHR$(13)THEN POKEAD(PG),255:AD(PG)=AD(PG)+1: POKEAD(PG),0:GOSUB110:GOTO520
```

Listing 2: COCOMOD2

```
120 DIM C$(3),A(8),AD(8),C1(1),C 2(1),C3(1),L1(6),L2(6),L3(6),L4 (6),CM(45),CO(45),MD(255),MO(25 5):B$="V31L1004B":NF$="NONE"
```

```
910 DRAW"BD16M+24,-16M+24,+16M-2
```

```
4,+16M-24,-16":XW=48:YW=33:RETUR N:'DECISION
```

```
930 DRAW"BD9U3EUE3RER3FRF3DFD3GD G3LGL3HLH3UHU2":XW=17:YW=17:RETU RN:'CONN
```

Listing 3: COCOMOD3

```
1970 '
1980 FOR PG=0 TO 8:PMODE4,1:SCRE EN1,1:COLOR0,1:PCLS:GOSUB1790
1990 '
2000 'PUT YOUR SCREEN PRINT ROUT INE HERE
2010 CLS:PRINT"GRAPHICS PRINT-OU T FOR PROWRITER":INPUT"READY PRINTER"; QQ
2020 PRINT:PRINT"WHAT SIZE PRINT -OUT?":INPUT"1 OR 2";NN:IFNN<1 O R NN>2THEN2020
2050 PRINT#-2,CHR$(27)CHR$(84)"1 6";:PMODE4,1:SCREEN1,1
2060 A1=3:A2=12:A3=48:A4=192:Z5= 0:ONNN GOTO2180,2210
2180 FORY5=0TO190STEP8:PRINT#-2, CHR$(27)CHR$(83)"0256";:FORX5=0T O255:P5=Z5:FORYY=0TO7
2190 IFPPOINT(X5,Y5+YY)<1THENP5= P5+2*Y
2200 NEXTYY:PRINT#-2,CHR$(P5);:N EXT:PRINT#-2,CHR$(13);:NEXT:GOTO 3000
2210 FORY5=0TO188STEP4:PRINT#-2, CHR$(27)CHR$(83)"0512";:FORX5=0T O255:P5=Z5
2220 IFPPOINT(X5,Y5)<1THENP5=A1
2230 IFPPOINT(X5,Y5+1)<1THENP5=P 5+A2
2240 IFPPOINT(X5,Y5+2)<1THENP5=P 5+A3
2250 IFPPOINT(X5,Y5+3)<1THENP5=P 5+A4
2260 PRINT#-2,CHR$(P5)CHR$(P5);: NEXT:PRINT#-2,CHR$(13);:NEXT:GOT O3000
3000 NEXTPG
```

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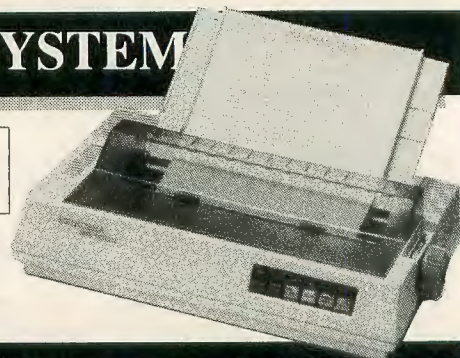
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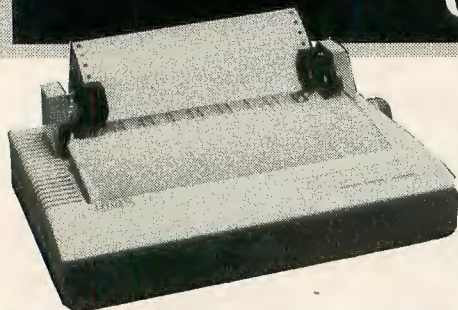
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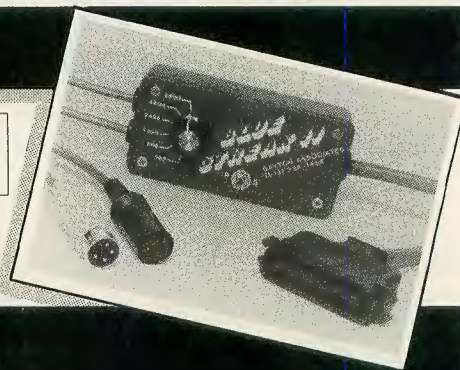
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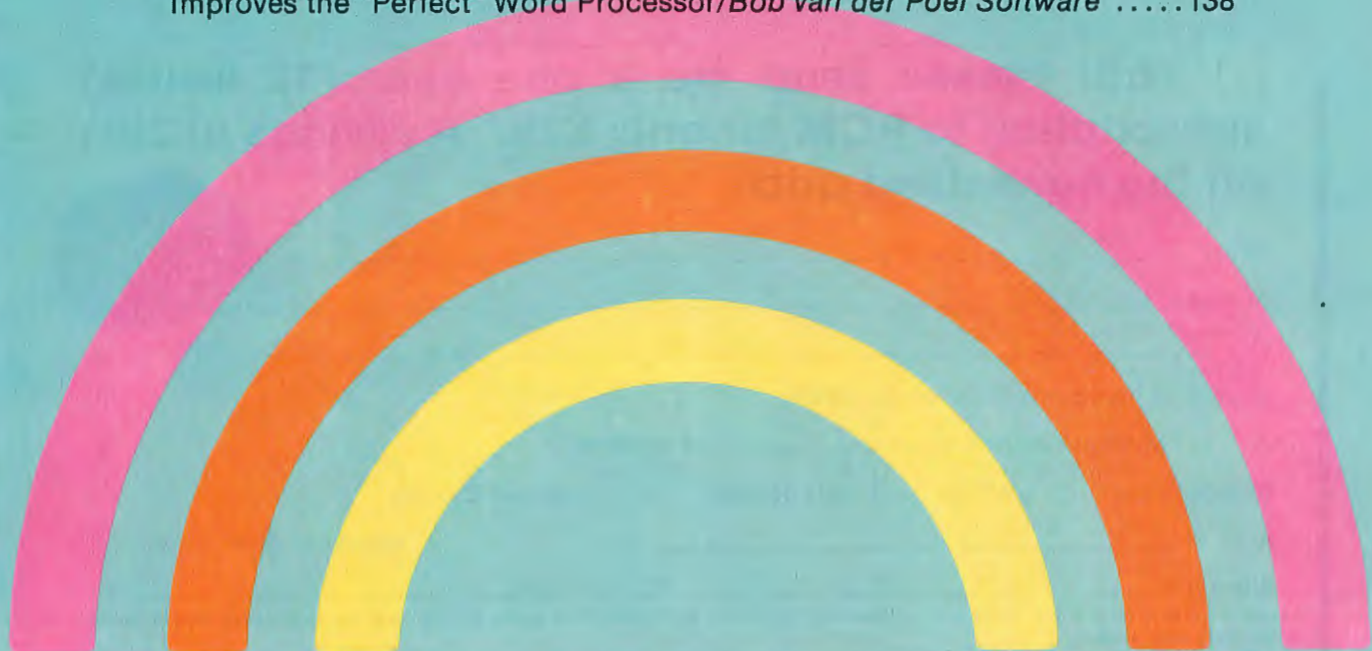
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REVIEWING REVIEWS

OS-9 Version 2.0.0

Editor:

I have been an avid reader of your magazine for well over a year now and consider it an indispensable part of my software library. Although I am not one to write to magazines very often, the review that I read on OS-9 Version 2.0.0 [September 1986, Page 146] has prompted me to write to you today.

In the review it states that it is not possible to make a bootable disk with the config program. This is simply not true. Insert a backed-up copy of the config disk into Drive 0 and type `chx /d0/cmds` and `chd /d0`. Then type `config` and follow the prompts. It eventually prompts you to insert a formatted disk into Drive 1 and installs the new boot file you have designed onto the disk. Then it allows you to install the CMDS and other directories if you want.

The config program allows you to put your own device descriptors and drivers into the selection process (at config run-time) by appending their names with `.dd` for device descriptor and `.dr` for device driver. It lets you put in your own file managers by the same process. I have done this with software for the J&R Banker RAMDisk.

The reviewer didn't mention that the Tandy version of OS-9 still hard codes the description of its floppy drive's disk step rate and number of sides into the CCDISK module. He also failed to mention that some third-party software will not work with Version 2.0.0. I had just purchased a 51-column software screen with various other utilities and was quite saddened to watch my screen "blow up" when I tried it with OS-9 Version 2.0.0. He didn't mention the park command, which is used just before the powering down of hard disks.

Thank you for the best Color Computer magazine in the world and keep up the good work!

Mark F. Sanderson
Houston, TX

OTERM

Editor:

I would like to pass on a compliment to Bernard Pluth, author of *OTERM*. This is a must terminal program for anyone interested in OS-9. After reading the manual, the first and only time, I was impressed with the ease of use of this program. The gentleman who reviewed it in the July 1986 issue of RAINBOW [Page 148] must not be familiar with OS-9. I, myself, have a long way to go with OS-9, but I found reading the manual only once was enough. Thanks, Bernie.

David Guess
Princeton, KY

Casper CoCo Quick Assembler

Editor:

The loading problem with the *Casper CoCo Quick Assembler* reviewed in the September RAINBOW [Page 137] was the PCLEAR bug. The older ROMs fail to update one of their pointers when they move the BASIC program. The PCLEAR 1 fix I remembered from one of my old RAINBOWS was:

```
1 GOTO 999
2 (program)
9999 PCLEAR 1:RUN 2
```

Earl W. Casper
Phoenix, AZ

Memory Manager

Editor:

Thank you for reviewing our *Memory Manager* program [October 1986, Page 139]. I would like to comment on some of the statements that Mr. Church made.

First of all, he said, "The all-RAM mode allows approximately 8K of RAM for storage of a short program or data." He left out the important point that programs can be stored in the upper 8K of memory leaving all of the 32K of lower memory available for strings or data.

For saving programs Mr. Church stated, "Both BASIC and ML programs may be saved, but the beginning, ending and execution addresses must be known for ML programs." Can ML programs be saved to a floppy disk or tape without giving the beginning, ending and execution addresses?

A paragraph is devoted to explaining how inconvenient it is to have a program automatically run. It is much simpler to press the BREAK key to stop the program than to type RUN and press ENTER to start it. Most programs have a menu with options to be selected, and pressing the BREAK key stops the program.

Mr. Church also explains how inconvenient it is to save a copy of a development program to the RAMdisk with a disk or tape being preferred. The purpose of the RAMdisk is to quickly save programs. What could be faster than saving a copy of the development program in the RAMdisk and then running it? Also the *Memory Manager* program allows the first 32K memory bank to be copied into the second 32K bank. This can be used to save a copy of a development program.

I don't understand the implication that a program can lock up the RAMdisk. The RAMdisk occupies the upper 4K bytes of memory in the first 32K bank and stores programs in the second 32K bank. The lower 28K can be used for any program, although Mr. Church implied that complex programs will not run with the RAMdisk installed. Of course programs that use the memory reserved for the RAMdisk will not work.

Two programs included in the package are *RAMdisk* and *Memory Manager*. *RAMdisk* stores programs in the second memory bank. *Memory Manager* allows BASIC programs to be run in either of the 32K memory banks. Mr. Church states, "The two main purposes here are to use memory, either in two banks or an 8K block of memory for data or program storage." Programs up to 32K long can be placed in both banks. The 8K block is for the all-RAM mode where a program can be placed in the upper 8K of memory leaving the lower 32K for strings or data.

The last paragraph implies that only machine language programmers can benefit from the programs because of the quirks in the program. We have not received a single complaint from our customers and I am sure that most are not machine language programmers. If any problems do arise, we will gladly correct them.

Bill Chapple
Dynamic Electronics

Penpal

Editor:

I would like to bring a few items to your attention with regard to the review of *Penpal* [April 1986, Page 184].

When used on a CoCo 2, it intermittently prints `a@a@a@a@a@a@a@a` when 'a' is depressed or `ihihihihih` when 'i' is depressed. This is very frustrating when using the WP package and prevents text where an 'a' is used in the spreadsheet. Four Star knows about this problem and says nothing can be done.

I originally purchased Version 1, then upgraded to Version 2. I phoned and wrote Four Star Software on many occasions. They told me that Version 2 was replaced by Version 2.1 and that they would send it to me. Since then they have repeatedly ignored my complaints.

If these problems could be resolved, I would have no complaints about this package of software. I feel it is disgusting the way that Four Star treats customers. I originally complained well within the 30 day warranty period (after proving the problem was not on my system). A classic case of the buyer beware.

Graham Langford
Pickering, Ontario

We welcome letters to "Reviewing Reviews" and remind you that they may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

RECEIVED AND CERTIFIED

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

This month the Seal of Certification has been issued to:

Battle Hymn — the battle of Gettysburg, a 64K ML game with Hi-Res graphics. Recreate the Battle of Gettysburg from the absence of J.E.B. Stuart to Pickett's charge; from Johnson and Early's failure at Culp's Hill to Hood's victory at Devil's Den; from the attack at Big Round Top to McLaw's run at Peach Orchard. Take charge of 11 Confederate divisions and maneuver your forces against the Union line. *Ark Royal Games, Box 14806, Jacksonville, FL 32238, \$29 plus \$2 S/H.*

B.E.S.T. Expert System Toolkit, 64K artificial intelligence program. This menu-driven approach lets you generate your own rule-based backward chaining expert system. After answering a series of questions, a graph of the responses and correct solutions is displayed. *Thinking Software, 46-16 65th Place, Woodside, NY 11377, \$79.95.*

CK.BAS, a copy/kill program that copies any number of files with any number of tracks up to 80, and kills any or all files on the source drive. Includes T40 and T80 (64K) ML programs that support up to four drives and supports all versions of Radio Shack ROMs. *CoCosoft, 1159 East 9th Avenue, Mesa, AZ 85204, \$34.95.*

CoCo Hymnal, a collection of 40 hymns for the Color Computer. Each of five menus offers a choice of eight hymns. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, disk \$9.95 plus \$2 S/H.*

The CoCo Hymnal II, requires 64K and disk drive. This program contains 29 hymns arranged in four voices. Four different menus allow the selection of the hymns. While the music plays, words to the verses of each song are also displayed on the Hi-Res screen. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, \$9.95 plus \$2 S/H.*

DDAY, a 64K Hi-Res machine language wargame. Use your historical knowledge of the Allied invasion of

France in a game of tactics and strategies. *Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, tape \$23, disk \$25. plus \$2 S/H.*

Disk Programming Package, four utility programs for the Color Computer. *ADDML* appends machine language code to the end of BASIC programs; *UNPACKER* converts compressed BASIC program into single-line statements; *MLBASIC* converts BASIC programs into pseudo-machine language, which can be loaded and executed; *JOIN* links machine language modules and adds auto-execute. *CMD Micro Computer Services Ltd., 10447 124th Street, Edmonton, Alberta, Canada T5N 1E1, Disk \$14.95 plus \$2 S/H.*

Drive 1 Upgrade, single-sided drive that mounts in RS Disk 0 cabinet. *Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414, \$139.95 plus \$3 S/H.*

Filesafe, 32K or 64K disk file encryption program with Radio Shack Disk BASIC 1.0, 1.1 or JDOS. The program encodes all types of standard Disk BASIC disk files with a user supplied password, and features fingerprint and encoding routine. *Emerald Island Software, P.O. Box 1126, Cleveland, OH 44111, \$22 plus \$2.50 S/H.*

FRED, a French electronic verb dictionary that runs on a 16K disk system. Use the program to look up verb forms of any infinitive typed in and display them on the screen. *David Compton, 252 N. Main Street, Suffield, CT 06078, disk \$12.95 plus \$3 S/H.*

Library of FORTH Routines and Utilities, a collection of professional-quality FORTH codes. This book includes routines which show how FORTH's command-building properties can be used to create almost any kind of application. *New American Library, 1633 Broadway, New York, NY 10019, \$22.95; \$31.95 Cnd.*

LYRA, an eight-voice music editor utilizing a complete point-and-click

user interface. *Lyra* allows four-voice music output to the TV speaker, but supports eight voices when output is directed to Symphony 12 or to a MIDI synthesizer. *Speech Systems, 38 W. 255 Deerpath Road, Batavia, IL 60510, disk only, \$54.95.*

McWord, a machine language word processor. Program is written in 6803 assembly language and requires MC-10 microcomputer with 20K RAM and cassette recorder. *Michael Fahy, RD #1, Box 480, Central City, PA 15926, \$25.*

Music Libraries 400, 500, 600, 700, 800, for the Color Computer. Each volume contains over 100 four-voice transcriptions of favorite tunes. *Musica* or a knowledge of music is not required. *Speech Systems, 38 W. 255 Deerpath Road, Batavia, IL 60510, tape or disk, \$29.95 each volume.*

PBH-64 Print Buffer, a printer buffer combining 64K RAM and a serial-to-parallel interface. Includes complete instructions. *Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414, \$149.95 plus \$3 S/H.*

Packer, a program compressor utility which strips BASIC programs of remarks, unnecessary spaces, colons, semicolons and GOTOs; deletes LET statements; and joins lines together. Each option can be executed individually or all six can be executed in one pass. *CMD Micro, 17435 57th Avenue, Edmonton, Alberta, Canada T6M 1E1, \$14.95 plus \$2 S/H.*

Picture Perfect, a 16K ECB graphics screen dump. The program is a combination of BASIC and machine language programs that allows you to print out full-page copies of graphics pictures on any dot-matrix printer that has bit image graphics capabilities. *Hawkes Research Services, 859 Stanford Avenue, Oakland, CA 94608, \$25.*

Print 'n' Wear, specially treated transfer sheets (8½ by 11 inches) that enable the user to computer-design and print iron-ons with dot-matrix or thermal ribbon printers. Print 'n' Wear transfers require Koala Pad or any type of graphics program, hand iron and Print 'n' Wear paper. *Foto-Wear, Inc., 62 Herbert Drive, East Brunswick, NJ 08816, \$8.95 for 4Pak; \$19.95 for 10Pak.*

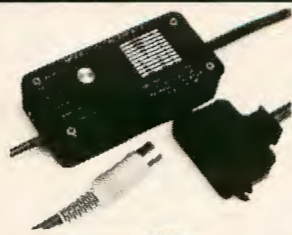
Metric Industries



Model 101 Interface \$39.95

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

with all cables and connectors for your computer and printer.



The Model 104 Deluxe Interface \$51.95

The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer

etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5" x 2.5" x 1.25" and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.



Model 102 Switcher \$35.95

The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These

lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy gauge anodized aluminum cabinet with non-slip rubber feet.



Cassette Label Package \$15.95

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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.



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

The Model 101 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Itoh and many others. They support BASIC print commands, word processors and graphic commands.

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Free shipping on orders over \$50.00. Ohio residents add 5.5% sales tax. Orders under \$50.00 please add \$2.50 for shipping.

Smart Speller, a spelling checker program that searches and replaces common misspellings in OS-9 files. Works with any version of OS-9 and corrects files created with any OS-9 word processor. The disk includes a dictionary and menu-driven dictionary editor to allow altering and customizing of dictionary file and OS-9 assembly source code. *Spectacular Software, Box 363, Mansfield Center, CT 06250, \$9.95.*

Studies in the Parables, a Color Computer 64K disk Bible study program. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, \$9.95 plus \$2.50 S/H.*

Underware Ribbon, lets you create iron-on transfers with your printer. These ribbons come in a variety of colors and can be used on a wide range of printers. (Prices depend on type of printer used.) *Diversions, Inc., 505 West Olive Avenue #520, Sunnyvale, CA 94087, black ribbons, \$14.95 to \$19.95; color ribbons, \$16.95 to \$21.95; Color Pens, \$14.95.*

White Fire of Eternity, 64K graphics Adventure. The scenario places you in the village of Faernarn during the age of monsters and magic, the time of gods and loremasters. Your hunger for knowledge puts you at odds with the loremasters and you storm out of the village only to discover you have become lost in the Forbidden Wood. Your quest for knowledge of the White Fire begins. *Saguaro Software, 4137 E. Bermuda, Tucson, AZ 85712, Disk \$24.95.*

Word Processor, 64K Disk Extended BASIC printer page editor. *Kolesar/BS, 7 Ladd Road, Westfield, PA 16950, \$16.95 plus \$2 S/H.*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does exist — that we have examined it and have a sample copy — but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Judi Hutchinson

Sharpen Morse Code Skills With *Code Practice*

About 25 years ago, my good friend, Steve, and I decided to become hams; no, not actors, but amateur radio operators. The first thing we found out about getting our FCC license was that we needed to learn Morse code. So we got ourselves the *Novice Bible* written by the Amateur Radio Relay League and read all about code.

I remember we walked around the neighborhood (we were teenagers then) "reading" store signs and street signs to each other in code — di-di-di-dit di-dit (hi). I'm sure people thought we had a few screws loose. Eventually, we both got our Novice licenses (five words per minute) and had lots of fun talking to other hams all over the world.

As we progressed in the hobby, our code speed gradually increased, but for me it was a struggle. Copying other hams' imperfect "fists" was not a very good way to become proficient (hams used to use mechanical hand keys to send code). There were some mechanical code machines to rent, but they cost several hundred dollars to buy. I needed all my money to purchase the radio equipment I needed to be a ham.

Now, however, for a mere \$9.95 and your CoCo with a disk drive, you can purchase a program called *Code Practice* from Sunrise Software. This BASIC program, written by Brian Sokol (KA9SRK), is billed as being "written for those who would like to learn or improve their skills with the International Morse Code."

Typing RUN "CODE" starts the program. Short title and copyright screens appear before the first menu is shown. This menu gives you the choices of changing the speed at which you want the code sent (between two and 99 wpm), changing the tone of the code being sent, selecting the code practice mode and exiting. The first two options allow you to customize the program for your own personal preference.

The third option sends you to another menu. This menu gives you three choices: random characters, random QSO (a ham buzzword that means a conversation on the radio) and exit, which returns you to the first menu. The random characters are the alphabet, numbers and punctuation marks. There are 200 characters sent in groups of five. The random QSO is a typical first exchange that most hams use when first making a new "contact." It's almost in plain English, but does contain some ham buzzwords. At the end of either practice session, what has just been sent appears on the screen so you can see how well you're doing.


The disk is not copy protected but it is run protected. You have to plug the code plug, supplied with the program, into the right joystick connector for the program to run. This is a minor nuisance, but it's much nicer than being copy protected.

The manual consists of one and a half dot-matrix pages containing most of the information needed to run the program. Memory capability for the CoCo is not specified, nor is the range of code speeds permissible under the "change speed" selection.

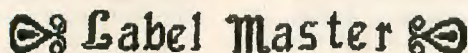

The only thing I question about this program is whether you can really learn Morse code using it. There are no instructions for learning the code. It takes a bit more than an automatic sender to learn it. You need to be told how each character is represented in Morse code — the dots and dashes that define each character. None of this basic information is provided. You'll have to round up the old *Novice Bible*, if they still print it, or find someone to help you get started. (Just about any ham would be happy to help; you can find them by walking around the neighborhood looking for the 15 antennae on the roof.)

The program could be a great help in building your proficiency once you've learned the basics. As long as you realize this limitation, I would recommend this program to anybody, from the rank amateur (pun intended) to the guy like me who has forgotten a lot of dots and dashes.

So for now, 73 (best regards) ES (and) QRT (I have to sign off now) DE (from) K9AKC.

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— C.L. Pilipauskas

Learn About Computer Communications With *The Computer Phone Book*

Reaching out and touching someone over the telephone is easy — pick up the handset, dial the number and voila!, you're talking to the person on the other end. You don't have to be concerned about all the technology that resides between your phone and the person you're calling.

Unfortunately, the state of computer-to-computer communications has not reached the level of simplicity that phone-to-phone communications have. If one wants to get the most out of his computer by linking it with another computer, it is necessary to understand some basics of computer communications.

User documentation is often more of a hindrance than a help. Whoever writes these masterpieces of confusion assumes that you know all there is to know about the basics, so it's easy for a beginner to get lost.

Coming to the assistance of the computer owner who would like to learn the basics of computer communications is a book entitled *The Computer Phone Book*.

The Computer Phone Book is divided into two volumes. The first, *A Guide to Using Online Systems*, starts by explaining, in a well-organized, simple manner, what computer communications consist of. It includes what hardware and software are necessary, what features are required and desirable, and what you can expect to find at the other end of the line.

Although I've been online for over five years, I found the introduction section of the book very informative. The author, Mike Cane, explains complex concepts in a simple, understandable manner. Anyone looking for a detailed explanation of telecommunications, however, should look for another book. Only the basics are to be found here.

Book I is intimidating at first glance; it's 493 pages long. However, only the first 25 pages deal with the basics of computer telecommunications. The remainder of the book deals with the various services which can be accessed when one is online.

Before reviewing the book, I was unaware of some of these services and what they had to offer. I discovered that some of the financial information I gather through online systems can be retrieved at a lower cost using other services.

The Complete Phone Book, Book II, A Directory of Online Systems, resembles your standard phone book, in that it contains listings of the world's major electronic libraries. It includes an overview of available information, names, numbers, profiles of hundreds of systems large and small, special services, and overseas and Canadian systems.

This has to be the largest list of online systems available. *Book II* is 685 pages long, divided into sections covering United States National Systems, United States Local

Systems, United States Bulletin Board Systems, Canadian Bulletin Board Systems and United States Special Services. Where appropriate, these sections are subdivided into geographic areas, making it easy to find systems which are accessible without paying for a long distance call. Each listing contains such information as telephone number, operating hours, costs (if any) and contacts, as well as frank commentary by the author.

While this is great information, it's only useful if it is accurate. Hopefully, the publisher will strive to keep the book current. Purchasers are invited to register for free updates. The first printing, June 1986 was very current at the time of this review. In my 303 area code there were 15 Bulletin Boards listed. I was aware of only three of these. The discovery of the additional 12 local boards alone would have justified the cost of the book.

If you are getting started in telecommunications, both volumes of the *Computer Phone Book* will be of use. Experienced onliners will find new friends through *Book II*.

(New American Library, P.O. Box 999, Bergenfield, NJ 07621, *The Computer Phone Book — Book I*, \$14.95; *Book II*, \$18.95)

— Bruce Rothermel

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CoCo-Util II: An Improved Way to Transfer Data

There is good news for those of you who need to transfer data between the Color Computer and an MS-DOS machine. Mark Data has released a sequel to its powerful programming utility, *CoCo-Util*.

CoCo-Util II provides the capability to migrate disk files from one system to the other. It requires an IBM/PC or compatible, 128K RAM, two floppy disk drives or a floppy and a hard drive and PC/MS-DOS Version 2.00 or higher.

As you can see from the requirements, you use *CoCo-Util* on an MS-DOS machine. So if you have an MS-DOS machine at work and a CoCo at home, you can create data files on your CoCo at home and transfer them to the MS-DOS format at work. When *CoCo-Util* is loaded into the MS-DOS machine, it adjusts itself for the type of video system and the color or graphics card that is active.

The new version has many enhancements. One is the improved use of colors and the screen layout, which includes an option to change the color scheme. If you want the change to be permanent, you can create a configure file that loads each time you call up *CoCo-Util*.

The *CoCo-Util* screen was designed to display as much information as possible without confusion. The layout includes seven areas. The first area, the Dir Info Box, gives information about the current directory that is loaded. This includes the free space left on the drive, and if it is MS-DOS, it displays the pathname to the current directory.

The Date Box displays the day of the week and the system date, along with the DOS version in use. The Files Info Box displays the number of files loaded and the maximum number of files that *CoCo-Util* has room to store in memory at one time. This number is dependent on the amount of RAM. A minimum system of 128K should show a maximum number of between 800 and 900 files. A full 640K has room for 9,999 files.

The Drive Assignment Box displays which drive is assigned to be a CoCo drive and which is the MS-DOS drive. This box is very important when you plan to format a CoCo disk. If you pick the wrong drive, all the data on the disk will be lost. The File Display Box is the largest area. This is where the filenames of the current directory are displayed. The display can show up to three columns of 15 (45 filenames at one time). If there are more than 45 files, you can page up or down through the files. You can also have the displayed files sorted. You have several sort sequence options.

The next area is the Message Line Area. This is the bottom line of the screen and is used to display messages from the program and error messages. The last area is the Menu Box, which is used to display the options available. Since most of the functions are menu driven, another level of options is displayed when many of the options are selected. When *CoCo-Util* first initializes, the primary menu is displayed. The primary menu consists of the following options; Copy, Dir, Erase, Format, Insert, Options, Print, Remove, Shell and View.

The Copy option brings up another menu that allows you to copy between MS-DOS and CoCo files. You can use the

arrow keys to mark the files you want copied or you can use the wild card feature. The asterisk (*) and the question mark (?) are used the same way as in MS-DOS. These files will probably be ASCII files, but *CoCo-Util* also transfers binary files. This can be either an M/L program or a binary basic or data file. While a binary file may not run on a different machine, you can modify it in a word processor and transfer it back, or possibly use it for transferring over a modem. In any case, it will transfer it; it is up to you how you will use the file.

The Dir and Erase options are self-explanatory. The Format option allows you to format a CoCo compatible disk. I do have a suggestion here. The format is only 35 tracks, and there are many people who use 40 tracks. I would like to see an option to allow *CoCo-Util* to format either 35 or 40 tracks.

The Insert option is used to insert a line feed following each carriage return. Normally, CoCo text files have lines that are terminated with carriage returns only. In the MS-DOS world, a line feed is used, too. This option should only be used on ASCII text files because if it is used on a binary file, the file will be unusable.

The Remove option is the reverse of Insert, and again should only be used on ASCII text files. If Insert is used on a binary file, you may try to Remove them, but do not be too hopeful.

The Print option allows you to dump any file to your printer using either an ASCII or a Dump format. This is good for printing an ASCII file or for printing out ASCII text in a binary file. You Adventure gamers may find a use for that. The Dump format prints a file in ASCII and Hex, and prints the relative displacement of each byte. In both formats, non-printable characters are replaced with periods.

The Shell option allows you to temporarily leave *CoCo-Util* and perform something in MS-DOS. The View option is similar to Print, but the file goes to your screen.

I was very impressed with this new version of *CoCo-Util*. The screen layout and use of colors add a professional touch. I would like to see the 40/35 track option for the CoCo disk, but overall I liked the program. I recommend it highly to anyone who needs the capability of transferring data between computers. It is very useful if you have text files to transfer. It can also be used to transfer programs written in CoCo Extended BASIC to an MS-DOS machine, modify them, then compile them to run under MS-DOS. If you already have the original *CoCo-Util*, you can get an upgrade to *CoCo-Util II* for \$12.95 including shipping and handling.

(Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo, CA 92691, \$39.95)

— Dale Shell

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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 checkerboard 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.

...one of the best programs for the Color Computer I have seen...

— Color Computer News, Jan. 1982

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 (LPV11/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminus, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with 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, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

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

...truly a state of the art word processor...
outstanding in every respect.

— The RAINBOW, Jan. 1982

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Ultra Telepatch Improves the 'Perfect' Word Processor

Telewriter-64 is, in my opinion, the most popular word processor available for the Color Computer. I base that on the number of program submission articles written with *TW64* that are sent to the RAINBOW by the CoCo community. I use *TW64* on almost a daily basis and have been delighted with its service.

Many reviews have appeared in the pages of the RAINBOW describing *Telewriter* and many of its enhancements. I recently reviewed *Telepatch II*, written by Bob van der Poel, and was pleased with the extra features it afforded. I honestly thought *Telewriter-64* had been perfected, but boy was I wrong!

Just about the time we think something is perfect, someone comes along and improves it. This is the case with the latest endeavor by Mr. van der Poel, called *Ultra Telepatch* Version 3.0. A lot has already been said about *Telewriter*, so I will just point out the main improvements of this latest effort.

Disk I/O — *Telepatch II* gave the option of calling the I/O from disk or memory. The reason for the option was that buffer space was used if you chose to use the memory

option. In the *Ultra* version, the disk I/O is stored in memory with no loss of buffer space. This is the best of both worlds — speed *and* efficiency.

Word Delete — The original *TW64* features a character delete, but most of us think in words, not characters. The *Ultra* version features word delete. Just move the cursor to the blank space in front of the object word and press CLEAR and 'Y' (for yank). All characters in the word will be deleted to the next space or carriage return.

Insert Space — Pressing CLEAR and the space bar will now insert a space at the cursor position.

Braces — The special characters { and } can be generated by pressing CLEAR-'H' and CLEAR-'J' combinations.

Find and Global Replace — This enables searches and replacements of control characters as well as normal text characters.

Queuing Files — Now you can use a period (.) as well as a slash (/) for filenames.

The *Ultra Telepatch* disk also contains some new files of special interest that can be merged with the T/BAS boot program:

2COLDIR/BAS — Provides a two-column, on-screen directory format.

TODISK — Forces *TW64* to display the disk menu on start up. This is very helpful if, for example, you need to load in an initialization file.

TPRINT — Provides automatic printing of multiple copies of your text files. No longer do you need to sit in front of your CoCo pressing 'P' for each copy.

The boot program is fully remarked so that the program can be tailored to most individual needs. Here you can select your disk drive stepping rate, turn on and off key clicks and all the other useful features added in the earlier enhancement versions. Extra lines have also been added for the user's special requirements, such as defeating reset protection with POKE 113,3 or maybe adding special printer control codes.

One other thing. Remember how you used to have to press CLEAR-UP-ARROW after reading in a file, so it would unfold on the screen? No more. Now the text unfolds automatically as soon as the file has read into the buffer.

I discovered one potential problem quite by accident. After a lot of frustrated searching for both hardware and software problems, I discovered that if either joystick is plugged in and is approximately in the 10 to 11 o'clock position, the computer appears to lock up while attempting to run the boot or patcher programs. This is not a flaw in the program, but apparently the `USR(X)` calls in these programs conflict with the joysticks. Maybe Mr. van der Poel can solve this little quirk on subsequent releases.

Ultra Telepatch is supplied on disk only and requires 64K RAM and an unpatched version of *Telewriter-64*. It can be backed up for safekeeping, and comes with an 11-page instruction manual that is easy to follow.

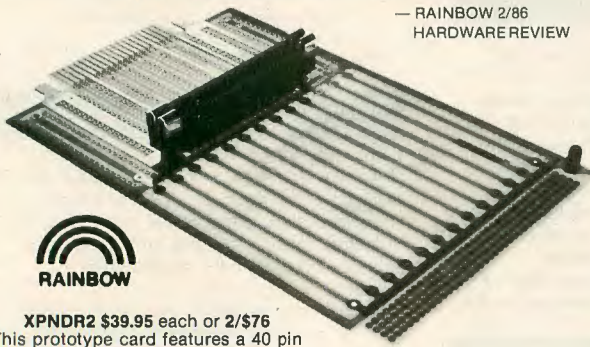
I believe you will find *Ultra Telepatch* as impressive as I have. I've learned that with CoCo, anything is possible.

(Bob van der Poel Software, 17435-57 Avenue, Edmonton, Alberta, Canada T6M 1E1, \$19.95 plus \$2 S/H)

— Jerry Semones

"XPNDR2 and SuperGuide - an Ideal Expansion Card Set"

— RAINBOW 2/86
HARDWARE REVIEW



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This prototype card features a 40 pin connector for projects requiring an on-line disk system or ROM paks. The CoCo signals are brought out to wire-wrap pins. Special gold plated spring clips provide reliable and noise-free disk operation plus solid support for vertical mounting of the controller. The entire 4.3x7 inch card is drilled for ICs. Assembled, tested and ready to run.

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

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Structure Your BASIC Programs with *LISTER*

One of the first things I learned as a programmer is that the most important part of any program is its documentation. The design and a well-commented listing are as important as the code, if not more so. I had to learn how to comment and arrange listings so that they were readable by other software engineers.

The word that best describes all these things is structure. Structured design, structured coding and structured testing add up to a well-organized, easily read document, created by taking a big problem and breaking it into little, manageable pieces.

The listings printed in the magazines and by our CoCo are dictated by hardware constraints: Every character uses memory (even spaces), the screen can only have so many characters and the page has only so much area (although RAINBOW listings are 32 characters wide to match the screen and aid in finding typos — thanks folks!). Once the program is in your hands and you want to understand or modify it for yourself, it would be helpful to have the listing “structured” and have plenty of “white space” for easier reading.

How does one achieve all this structure and white space when it isn't an original program? How about a utility that makes CoCo do all the work, with a little help from your printer? There is a handy little utility that performs all this magic for you. *LISTER*, written by Bob van der Poel, is a machine language program that takes a BASIC listing and breaks up (structures) a long statement (line of BASIC code) into small, understandable pieces. It indents all FOR/NEXT and IF/THEN/ELSE groups up to 11 levels to show where they start and end, with everything else in between. Nesting of those structures in a normal listing makes understanding almost impossible. But structure the listing and the nesting leaps out from the paper. If your printer is capable of printing in an emphasized mode (darker, not bigger) and/or in some other character set (e.g., italics), the results can be downright startling.

This program uses no programming memory. It loads in the area of memory that BASIC reserves for graphics. Since we are only going to make new listings and not actually execute (RUN) the BASIC program, that memory isn't needed.

The author claims the program will run on any model CoCo. It can be purchased on cassette or disk, and is not copy protected. It comes with a well-written manual (though in places it is hard to read because of poor reproduction) and explains in detail what this utility will do and how to do it.

The program is menu driven, prompts for all necessary information and allows you to print the whole program or any range of line numbers. You can print the listing to the screen, a printer, a disk file or to cassette. You can request pagination, which prompts you for the date and title, though you can put whatever you want for the header. The emphasis can be on or off.

The utility is not formatted for any particular printer, so a BASIC program is also provided to customize the *LISTER*

program for your particular brand of printer. The program prompts you for the control codes to make the printer do its thing (emphasis, italics, etc.). The BASIC program loads *LISTER*, modifies it and saves the new version to disk or cassette. This also makes a neat backup program or cassette-to-disk transfer program.

The only problem I had with this utility is that the first time I used it, garbage was printed on my DMP-200 printer. I had it set for 1200 Baud, and the program assumes you are using the Radio Shack standard 600 Baud.

When listing BASIC programs to the screen, especially long ones, it can be a pain stopping them to read a section of code. Mr. van der Poel thought of that, too. The listings to the screen are slowed way down for easier reading. Want to whiz past a section of code? Just hold down the space bar and the listing will rip by. Want to stop it somewhere to study a section? Press ENTER and the listing stops; press any other key to resume. The listing is not particularly neat on the screen, but after all, this program was designed to dump to an 80-column printer.

If you do a lot of BASIC programming or modifying and maintenance of BASIC programs, this utility could be very useful. Although I tried, I couldn't make this program crash. It certainly did everything it claimed to do, and it did it quite well.

(CMD Micro Computer Services Ltd., 10447 124th Street, Edmonton, Alberta, Canada T5N 1R7, \$14.95 plus \$2 S/H)

— C.L. Pilipauskas

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Diary of a Digitizer: Digisector DS-69A

By Kerry Armstrong

FRIDAY, P.M. Wife calls me at work to tell me a package from RAINBOW has arrived. Excitedly, I ask her to open it and tell me what is inside. With computer widow disinterest she reports it is a request for a review of The Micro Works' Digisector DS-69A, and that the package includes a disk, a manual and a ROM Pak. I can hardly wait to get home. She informs me that because it's both Friday and payday, she expects to be taken out to eat this evening. Darn, I wanted to rush home and play with the Digisector. I already know the purpose of the DS-69A is to produce digitized printouts of video pictures. (I've been reading ads in RAINBOW, much to my wife's chagrin — she knows that usually means more strain on the charge cards.) At least I will get a chance to read the manual late tonight.

SATURDAY, A.M. Unlucky break again. Two week-ends a year I have to work. This is one of them. I would rather have done some "serious" work on the DS-69A review. Oh, well. Nothing is planned for this evening. I take the manual to work with me, though. I'll sneak a few peeks at its 26 pages whenever I get a chance.

SATURDAY, P.M. Home from work at last. Time for some hands-on use of the Digisector. By now I have thoroughly read the manual and learned that the DS-69A is an improved version of the original DS-69. This new version supports the use of a color video camera and a 'Y' cable for disk operations, and digitizes a picture four times faster than the original. I've also learned that the DS-69A, like the DS-69, comes in either a cassette or disk version, and functions identically except for the I/O. The manual indicates that the first step is to run the config program on the C-SEE III program disk.

I determine that you don't need to have the hardware/video part set up just to configure the system. I run the config basic program. It asks if I have DS-69 or DS-69A and whether I am using a PBJ C-C Bus, Radio Shack Multipak or a 'Y' cable. (I have the Multipak.) Then it asks which slot I'll be using for the DS-69A ROM Pak. Next, it asks whether I'll be using *CoCo Max* or *MagiGraph*, so

it can automatically add the proper extension to the five-level mode pictures when saved to disk. (The 16-level picture disk saves use the extension PIX.)

Finally, it lists about 15 different printer types and asks which one I'll be using. Epson is one of them and I have an old Epson, but I have my Tandy DMP-130 hooked up to the system. The DMP-130 is not listed on the screen menu, so I try putting the DMP-130 in the IBM mode, which is supposed to be the same as an Epson. No go. It's got all those extra little line feeds that make the printout look like it has been run through a paper shredder. (Micro Works includes three demo pictures on the disk that can be loaded in and printed out for this testing.)



Sample DS-69A Digisector screen dump

While the DMP-130 is still in the IBM print mode, I try the Gemini printer driver (I've had success with this before). I get a whole printout, but it is really squashed. Got to be something better than this. I check the manual, which has several pages about printer drivers. It gives technical data on how to write a custom driver in machine language. It says you can even receive sample source codes from Micro Works to use as a guide in writing one. It also mentions that if you do write a custom driver, they would like you to pass a copy on to them and they will distribute it as public domain software to others who might need a similar driver. Finally, they indicate that you should give them a call before you write a driver, because they might already have one they

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could send you. This is Saturday, however, so I can't call.

Back to the printer menu on the screen. I notice quite a few Tandy DMP printers listed, but not the DMP-130, so I put the printer back into the Tandy mode and begin trying. The DMP-120 and DMP-245 drivers don't work. I try the DMP-100 driver. Eureka! Success at last. The five-level scan picture, BEAR/MGF, prints a small 2½ by 4¼ inch picture. The two 16-level pictures produce 6¼ by 8 inch pictures. (I later learn the pictures are about the same size on the Epson printer, but that they may vary greatly in size on other printers.) Time for a break while I study the manual for the hardware/video set-up.

SATURDAY, MUCH LATER P.M. Time for serious use of the CoCo. I install the DS-69A ROM Pak in the Multipak slot one, and hook up my VCR (the Digisector will use any standard NTSC direct video input). Then I run a standard RCA plug-type video cable from the direct video output of the VCR to the RCA socket on top of the DS-69A ROM Pak. Now it's time to fire up the VCR and the CoCo and boot up the configured C-SEE III program.

The program is menu driven, and optional joysticks may be used instead of keyboard input. I start a prerecorded video tape running and start out with the five-level scan, command 'G' on the menu. I learned from the manual that the five-level scan is the quickest of all the digitizing modes. The DS-69A breaks up a video picture into five different gray levels or brightness levels. If you look at a black and white photograph in a newspaper with a magnifying glass you'll get a good idea of what I'm talking about. Notice that the different areas in the news photo are made up of tiny dots and the density of those dots creates the light and dark areas of the photo. A proper five-level printout should have five distinct areas of grayness or brightness, with the totally black areas being completely filled with dots and the totally white areas being completely devoid of dots.

The C-SEE III program provides me with some control over these areas, since it has on-screen brightness and contrast controls that operate much like they would on a television set. By using these in conjunction with the 'G' command I can just watch my CoCo monitor, make any adjustments to the display, and then press the 'T' key on the keyboard or the left joystick firebutton to save a video picture. The picture is "taken" almost instantaneously. I can review the picture by using the 'M' command, which toggles back and forth between the menu and the five-level picture graphics page. (If the action on the VCR is too fast, the manual recommends freezing the picture before "taking" or digitizing it.)

Next, I shift to the printer menu, make sure the printer Baud rate is correct, press the menu command to print a five-level picture and watch the printer go. Pretty neat so far. If I want to save this picture I can go back to the main menu, then to the disk menu, and save it to disk. Uh oh, look at the clock. I have to work tomorrow too. Reluctantly, I shut everything down for the night.

SUNDAY, P.M. Home from work, chores done. Now back to the CoCo and the DS-69A. Yesterday, I was working on the five-level pictures. These are the only ones that are saved as binary picture files, which can be loaded and displayed from a basic program or loaded into several of the numerous graphic drawing programs and worked on. You merely have to change the extension in some cases. The C-SEE III program will even save them on a Graphcom Picture Disk in the Graphcom format. The possibilities of editing, manipulating and printing are endless. This also

means that if you are unsatisfied with the smallness of the C-SEE III five-level printout, you can load the file into another program that makes a bigger printout. Additionally, it means that you can share your digitized pictures with others and they don't have to have a DS-69 or DS-69A system to print them out.

Today though, I am going to work on the 16-level gray scale pictures. The five-level pictures are good but the picture resolution is rather limited, with only five tones of brightness. Since the human eye normally is only able to perceive 20 to 30 levels of brightness at one time, 16 levels should be great.

The Digisector with the C-SEE program has two modes of 16-level reproductions. One mode scans 128 vertical by 128 horizontal points of brightness across a video picture; the other mode is 256 by 256. Each one of these points is classified by the computer into one of the 16 levels of grayness or brightness and stored in an array in the computer's memory. Because of the hardware limitations of the CoCo, a full 16-level picture cannot be displayed on the screen. What you get is an averaged three-level picture on the screen. You still have the ability to control the brightness and contrast as in the five-level mode, though. Therefore, you have to do some experimenting to get the right levels for printing out. Also, the scans take much longer, particularly the 256 by 256 mode, so "freeze frame" on the VCR is essential.

The resulting picture is not saved to the disk as a binary picture file, but as a data file just as it is stored in memory. The 128 by 128 mode makes a four-granule file, and the 256 by 256 modes make a 15-granule data file. Therefore, you

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cannot load and display these files with a regular graphics program.

I "shot" a few 16-level pictures from the VCR tape and printed them out. They made remarkable graphic pictures. The best were close-ups of the actors with light backgrounds and front-lighted faces. However, getting good printouts at the 16-level modes does require a good deal more "fiddling" with the contrast and brightness controls of the C-SEE program. Time to hit the sack again. More "serious" work tomorrow after work.

MONDAY, P.M. Time to hook up a video camera and see what the DS-69A will do. I dig out my color video camera and plug it into the VCR. (It is possible to get an old closed-circuit video camera and plug it directly into the DS-69A ROM Pak.) This time, as recommended by the Digisector manual, I also hook up a monitor off a tee on the line between the VCR and the DS-69A ROM Pak, so I can compose my shots with the video camera.

I soon learn that even though I am using one of those "low-light" video cameras, I get better indoor pictures if I use an augmented light source. Front lighting and a light background work best. I draft the kids as models. The five-level picture is fast and works fine. Even the 16-level, 128 by 128 mode is pretty fast, but the 16-level, 256 by 256 mode soon gets to be a chore for active kids. Even a few seconds of absolute stillness seems like an eternity to them. I do get some very good printouts though.

Since it begins to look like I'll have to bind my models to the chair, I decide to try another test. I cut out a few pages of models from a clothing catalog. With the zoom lens on my video camera, they make perfect models. They don't move, they don't chew gum, they don't blink, and they don't suddenly have to go to the bathroom in the middle of a long scan.

I spend the rest of the evening "shooting" pictures, trying different light arrangements, saving pictures to disk, printing reams of paper — in short, running the DS-69A and C-SEE III software through all the various tests I can devise. I only come up with two complaints. First, the speed limitations of the CoCo and the time it takes to do a 16-level, 256 by 256 mode scan, and second, the lack of an "abort print" command to abort a printout of the larger 16-level picture. It only takes a few printed lines to tell you that you didn't quite get this one right.

TUESDAY, P.M. Home from work. Time to get to the technical part of the review. First, the manual. As I mentioned it is 26 pages long. It contains sufficient information for the beginner, as well as more detailed information for the technically oriented user or programmer. It explains how to use some of the additional programs on the C-SEE disk to get 64 gray levels and 256 by 256 resolution. (The resulting picture file will be 29 granules long or a full 64K in length!) Also, there is information on how to use the DS-69A as a motion detector in a program called *Burglar/Bas*. As mentioned before, there is information on writing your own custom printer driver. It would have been helpful if Micro Works had included the source codes in the manual for a couple of the printer drivers, like the Epson and Radio Shack ones. Also, a little more needs to be said in the manual about modifying the config basic program to install a custom printer driver.

OK then, time to examine the hardware. The ROM Pak is black plastic, without a sliding door to protect the card edge connector. The manual warns that it contains MOS integrated circuitry, which may be damaged by static electricity, so don't touch the exposed card edge. In addition to the RCA socket for the video cable connection, it also has a small screwdriver access hole so that some adjustments can be made to the width of a picture to adjust those printers that cannot seem to get the width-to-height aspect ratio right. The edge connector is not gold plated.

WEDNESDAY, P.M. Time to write the review. If I can get this thing done, I'll have a long weekend to play before I have to start getting ready to ship everything to RAINBOW. I collect all my notes and reams of printed out pictures. I need a new printer ribbon. The newer the ribbon, the better the picture quality.

Micro Works' advertisements indicate they have been working in the area of video digitizers since 1977. Their expertise really shows in the DS-69A; it does an excellent job. The results are every bit as good as the digitized photos you get at the local fairgrounds. In fact, with recent advertisements for transfer printer ribbons, if someone would come up with a program to "flip" the 16-level gray scale pictures, you could probably print your own photo T-shirts, calendars, and scarfs with your favorite Digisector DS-69A digitized photo.

Micro Works provides a one-year warranty on hardware, as long as the case is not opened. They also offer a refund-satisfaction guarantee. If you are not completely satisfied with the performance of the DS-69A, you may return it, undamaged, within 10 days for a full refund. They'll even pay for the return shipping cost. However, from my all-too-brief experience with it, I bet they don't have very many folks taking them up on their refund offer.

(The Micro Works, P.O. Box 1110, Del Mar, CA 92014, 64K disk or cassette, \$149.95)

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Pick a Winner: Probaloto Version 2.0

Probaloto by Gary Olander is a program used for selecting lottery numbers and numbers for other games of chance. I refer readers to the review of the first version, which appeared in the October '85 issue, for details of program operation.

Probaloto can be used to choose numbers from a selected range to suit the requirements of the particular lottery to be played. For example, when used for what is called the regular lottery game, *Probaloto* can pick six numbers from one to 40. The numbers selected can be strictly random if desired, but the real power of the program is geared towards making weighted random selections. To utilize this feature, lists of past winning numbers (available at ticket sales locations) are entered into a data file. Using this data file, selections can be weighted towards either the most picked or least picked numbers, depending on your philosophy regarding the workings of lady luck. The weighted selection procedure operates as if you place numbers in a hat in proportion (direct or inverse) to how many times that number has been picked. Selection from the hat is then random, but weighted. All of this is easily accomplished with this menu-driven program.

Version 2.0 includes several new features and improvements over the first version. After printing or saving a data file with the old version, the user was returned to the beginning of the program with initial questions about the particular lottery being played. I suggested it would be more efficient to return to the main menu at this point, and Version 2.0 does just that. The new version also makes it easy to return to the main menu if you make an error while entering a data file, or to exit *Probaloto* without going to the main menu. The new Reset option makes it easy to reset the printer or the specifications of the lottery. In addition, *Probaloto* now checks the amount of memory and automatically adjusts the data file to that size to allow large data files to be used even with 16K machines.

For most purposes, *Probaloto* sorts the numbers selected. When selecting three or fewer numbers with Version 2.0, the numbers are not sorted. This is so the weighted selection procedure can be used to pick win, place and show in a horse race. With the printed odds entered into a data file and weighting done towards the least picked, first, second and third places can be selected randomly, weighted by the odds.

Of my criticisms mentioned in the prior review, only one remains. The data file printout still consists of a narrow column of figures near the left margin, using more paper than would be necessary if it were better formatted. Mr. Olander responded, pointing out that not knowing how many numbers are to be printed makes formatting difficult. From my programming experience, I have to agree—but I know it can be done. As the printout for a one to 48 lottery still takes less than one sheet, my criticism is very minor.

Probaloto is easy to use and does just what it purports to do. Version 2.0 does it even better. I would recommend it to anyone interested in using their CoCo to attempt to pick winners.

(Gary Olander, 322 Haymarket Pl., Gahanna, OH 43230,
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— Stanley Townsend

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Liberate Your CoCo With PBH-64 Print Buffer

Most of us are familiar with the advantages of a software printer spooler that stores text in protected RAM, allowing the computer to do other tasks while the printer prints the stored text. On the CoCo, however, there are distinct disadvantages to software spooling — specifically, that valuable memory is used and computer I/O functions are slowed down.

The PBH-64 Print Buffer solves both of these problems, and at the same time provides a serial-to-parallel interface. With this easily-attached device, your text is stored in its own 64K memory leaving CoCo completely free to go about other tasks without I/O slowdown. It still takes time, however, to fill the PBH's memory, so the longer the text or program listing, the longer it will take for CoCo to be ready to do something else.

As a test, I printed out a 10K *Teletwriter-64* file at 9600 Baud through both the PBH and my trusty old serial-to-parallel interface. The difference was impressive! The PBH was filled in 18.54 seconds. At that point, my CoCo was able to go about any other task I wanted it to do because the printer was now being controlled by the PBH-64 Print Buffer. It took two minutes and 39 seconds to print the file through my parallel-to-serial interface. I was so impressed

with the ability of the PBH to control the printer, I even turned off the computer while printing continued! This is not recommended, since AC-line spikes can occur which could cause malfunctions in printing, but it does make you a believer.

There is no printer Baud rate select switch on the PBH-64 Print Buffer. All there is, besides a power-on light, is a button labeled CLEAR that must be pressed whenever you want to load in different text or change the printer Baud rate from its previous speed. You can select printer speed by simply typing the familiar POKE 150, X or adding the POKE into your BASIC programs. Just like CoCo, this device defaults to 600 Baud.

The only negative point I can see with this unit is that it does not contain a "repeat" or a "copy" button to allow multiple copies of the text in its memory. After talking to PBH's president, Jim Baxter, I learned that while he agrees it would be a desirable feature, it would require additional I.C. chips and components that would not fit on the existing printed circuit board. He felt the added cost could not be justified in terms of added sales. Who knows, maybe if they get enough requests for the feature it can be added on later models. Or perhaps some hardware hacker will come up with a modification to this current version that will incorporate the feature.

The unit is well-built and housed in an off-white plastic box to match the present CoCo color. It comes well-packaged, and includes a plug-in wall transformer for its power source. Also furnished is a cable to attach the unit to any Centronics-compatible printer. (I used it with a Gemini-10X.)

Hook-up is a snap. Plug in the power source and connect the furnished ribbon cable between your printer and the PBH-64. You will have to supply your own serial printer cable (RS 26-3020) to connect your CoCo to the PBH-64.

I like this product. It's easy to use and comes with an illustrated four-page instruction manual that even includes a schematic. (How about that, hardware hackers?) So, if you would like the convenience a hardware printer spooler offers, you will like what this product can do.

(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414, \$149.95 plus \$3 S/H)

— Jerry Semones

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


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Challenging *LEO* Keeps You on Your Toes

In this game you must explore the planet Leonax. Although you have a tank with an adjustable cannon, your fuel and ammunition are limited. As you go exploring, you will notice Leo eggs scattered through the levels. From these eggs hatch various types of Leo creatures who do their utmost to destroy you. Your ultimate goal is to survive as long as possible.

LEO requires 64K and two joysticks, is available in disk or cassette versions and uses the high-speed POKE. If your computer can't utilize the high-speed POKE, this software won't run.

The game is nicely packaged, but the instruction sheet contains only the barest minimum to get you started.

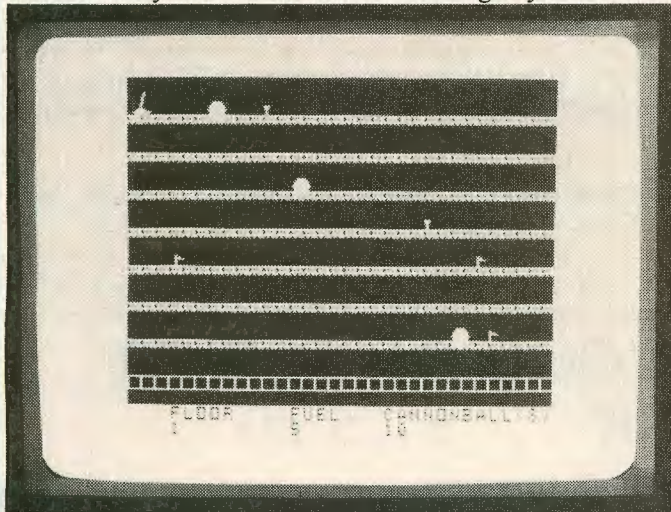


Figure 1: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

Learning to play the game is a matter of trial and error as you try to figure out what is going on. For instance, you are told that flags and pylons replenish your fuel and ammunition, but you are not told that you must leave the tank in order to pick them up.

After loading and executing this machine language game, you are treated to a lengthy display of the title and copyright with some cute graphics. Unfortunately, any time you are killed you must sit through this long display before you can start playing again.

You need to use both joysticks, the space bar and the ENTER key to play. The left joystick controls the forward speed of the tank as long as you still have fuel. The right joystick aims the cannon. Shooting straight up or down usually destroys the tank. Pressing the space bar fires the cannon. Of course, this only works if you are in the tank and have ammunition left. Pressing the ENTER key allows you to exit the tank. While on foot you can move forward or backward, and traveling on foot conserves fuel.

Each screen consists of eight floor levels scattered with Leo eggs, fuel flags and ammunition pylons. (See Figure 1.) The Hi-Res graphics are cute but unsophisticated. You must work your way down the eight levels and leave the screen to get to the next screen. The types of Leos and the

placement of flags and pylons are different each time, but otherwise the screens are identical.

There is no score other than the number of screens you survive. Your tank cannon is a stun gun and can be used to blow holes in the floor (for a shortcut) or to immobilize a Leo. If you take too long to reach the bottom of the screen, the Leo will wake up and chase you again.

In order to collect flags and pylons you must leave the tank and travel on foot. This is also the only way to travel backward. If the tank is destroyed or runs out of fuel (or if you simply like danger), you can abandon it and continue on foot. You can sometimes maneuver a Leo into cutting through the floors and you can then use the holes as shortcuts. If you lose or abandon the tank, you receive a new tank when you reach the next screen.

Occasionally, between screens, a bonus round of target practice gives you extra fuel and ammunition. There seems to be no way, however, to predict when these bonus rounds will occur.

LEO is fun and challenging to play. There is no single strategy or easy pattern to follow. Instead, you can easily spend many enjoyable hours trying out new tricks to get past the Leos.

If you are tired of mindless shoot-'em-ups, give *LEO* a try.

(Lomig Inc., c.p. 105, Succursale A, Jonquiere, Quebec, Canada G7X 7V8, cassette \$24; disk \$26.95)

— James Ventling

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Organize Your Amway Business With *CoCoachiever*

CoCoachiever was developed for the Color Computer by T&M Enterprises. It requires a 64K Color Computer and one disk drive. The program was written by and for Amway businesses and distributors, and allows you to keep track of distributors, orders, PV-BV bonuses and price lists. The current version of the program contains prices for May 1, 1986.

The system contains a loader menu which allows you to select a printer Baud rate. Once selected, the program loads in the Master menu. Before the menu is displayed, the computer loads the stock numbers. In fact, the stock numbers are loaded every time you go from one part of the program to another. This is because each menu application has its own basic program, which is automatically loaded. This is great for organization and development of a software package, but it does slow things down a bit!

Distributors are entered into the program by name and ADA number. There are prompts for Sponsor's Name and PV-BV.

Other items on the Distributor menu allow you to List Distributors, Review/Revise PV-BV, Calculate PV-BV Bonuses, Add Miscellaneous PV-BV Items and Return to

the Master menu. For most functions, a hard copy can be obtained by answering the prompts. Your printer must be online or the program will hang up.

The Master menu has three items: Input or Check Orders, Distributors menu and Price List menu. To enter or check orders, insert the date and distributor number, then list quantity and item number (stock number). The printed copy is an invoice or packing list for filled orders. There are some nice features here, including the capability of handling returns, exchanges, tax and charges. By entering the stock number, the items are listed (or printed) out with all information, including the price that was stored on the program disk. The completed order contains the item totals, the PV and BV, the wholesale and retail amounts, sales tax and handling charge.

The Price List menu requires a password. Once entered, you can input/add to the price list, change the price list by stock number, change the price list by record number or print the price list.

The *CoCoachiever* is a menu-driven system that is well-developed and easy to use. The printed documentation is brief (five pages) but adequate. For someone in the Amway business, this program could help tremendously in organizing and keeping up with records. In the words of the Amway system, "Go and grow, and we will see you at the top!"

(T&M Enterprises, 2301 Cromwell Drive, St. Maries, ID 83861, \$49.95)

— J.D. Ray

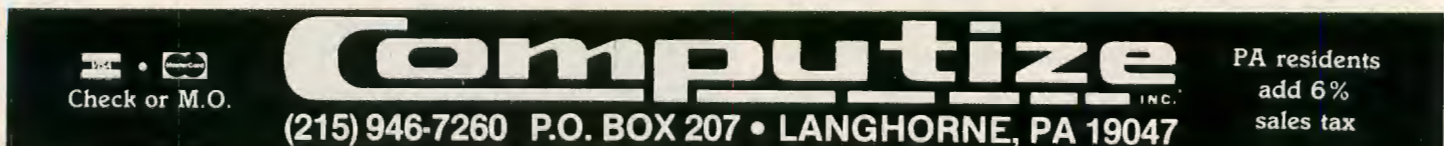
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Paper Route Delivers Action

Ever since I saw the first few Diecom games, I have had an admiration for their quality and graphics. So I was thrilled to receive *Paper Route* to review. When I opened the package, I thought WOW!, this is going to be great, and I was right. *Paper Route* is an excellent example of Diecom's commitment to superior quality and graphics.

Paper Route is a 64K action game that requires one joystick. It is made for only one player. The object of the game is to direct a paperboy along his normal route, while delivering newspapers to his customers. This is by no means an easy task. The customers' houses are marked with red doors. You must deliver a newspaper to each house every day, or the customer will cancel his subscription.

You start out with 10 newspapers to deliver. At various points along the way, you find extra papers (in stacks of 10) that you can pick up by riding over them with your bike. As the game progresses, these papers will be in fewer and harder places.

Bonus points are awarded for many things. First, breakage points are awarded for knocking over garbage cans and tombstones, and for smashing windows. Also, at the end of each delivery, you are awarded 250 points for each house you successfully deliver to. If you deliver to all the houses, then you have made a "perfect run" and you get 500 points for each house. Your accumulated bonus, or breakage points, are added to your score at the end of each day's delivery. Also, bonus men are awarded every 20,000 points.

Your delivery is not an easy task at all. There are many obstacles that get in the way, such as potholes in the sidewalk, people on the sidewalks (some are throwing boomerangs), fences, holes and cars. In the later screens, you encounter running dogs and remote-controlled minicars. If you purchase this game, don't expect to get past the first screen the first week you have it. This game is not easy!

Paper Route has a pause function and a high-score board, which is erased each time you turn the computer off.

A slight problem with this game is the sound effects. However, I enjoyed it from the day I opened the package, and I highly recommend *Paper Route* for all CoCo game players. Diecom knows what it's doing.

(Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8, tape or disk, \$28.95, \$38.95 Cnd.)

— Pat Downard

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Facilitate Learning With *Flash Card Drill*

If you're a teacher, parent or student preparing for a test, you may want to be aware of *Flash Card Drill* by Thompson House. This program helps drill students and others, just like the familiar "flash cards" used in classrooms and homes by teachers and parents.

Almost everyone has come into contact at one time or another with the "flash card" concept. A word or picture is shown to a student and a short response is needed. For example, for learning state capitals, the state Washington is shown and the correct response would be its capital, Olympia. (Don't feel bad if you missed it — that's a tricky one!)

The CoCo and the *Flash Card Drill* program can help in this endeavor. And the program can be customized to meet your needs — whether they be state capitals, foreign language words or any other topic that needs short responses such as a flash card calls for. Being a math teacher, I found that it also generates math flash card lessons such as addition and multiplication facts.

Flash Card Drill is on disk and consists of two specific programs — FLASH/BAS and FCD/BAS. With these core programs, separate data files for various flash card types can be generated and saved for further use.

Unfortunately, no other documentation is sent with the disk. Thompson House could help immensely by providing start-up instructions and perhaps taking the user through a sample session.

To start *Flash Card Drill*, type RUN"FLASH". A title screen appears and then the program automatically runs FCD/BAS.

At this point, there is a prompt for whether teacher instructions are needed. The instructions given on the screen prompt the teacher through a process to develop a practice lesson to be run by the student.

The main menu consists of three options: Teacher Menu, Student Menu and Run a Program. The Teacher Menu allows composing lessons, saving lessons and an option to return to the main menu. The Student Menu allows the user to make his own lesson, load a previously-saved lesson, load a lesson consisting of errors from a previous session or run a program.

When the user begins to compose a lesson, one drawback is immediately apparent. *Flash Card Drill* uses the CoCo's graphics screen display, and because of this and the size of the characters produced by the program, the length of the questions and answers is limited to a maximum of 12 characters. This is fine for many purposes, but being a teacher, I found it a little restrictive. However, since the flash card concept usually involves very short responses, this may not be a problem for many users. This drawback is not a fault of the program, but simply the result of using the graphics display screen with the large characters developed for the program.

Up to 30 questions and answers can be entered per lesson, a reasonable number to work with during a session. After entering your desired questions and answers, an edit feature is built in, which helps perfect and correct your lessons. They can then be saved on tape or disk.

The flash card lesson itself consists of a graphics screen with general instructions such as Give answer, Name capital or any other desired directions, along with the questions. The questions can be displayed either randomly, or in the order they were entered.

As you progress through the lesson, a scorecard of the number of correct responses is given at the bottom of the screen. If an incorrect response is given by the student or child, the same question appears again and again until the correct response is entered. This can be a very frustrating experience for the user. It would be better if, after a predetermined number of incorrect responses, the correct response were provided and a new question displayed. If the student does get stuck on a question, he can press the slash key (/) to move on to the next question, but this does not help him learn what the correct response was.

The sessions consist of at least 10 questions, even if your initial set-up had less than 10 questions. (The questions are repeated until at least 10 questions have been asked.) If you have a file of more than 10 questions, then 30 questions are asked, with some of them repeated, until 30 questions have been presented. Remember that a maximum of 30 questions is possible with *Flash Card Drill*.

After a session, the user is given a listing of the missed questions and answers. This error trapping is useful for both student and teacher, since feedback is a necessary part of the educational process.

After viewing the missed questions and answers, an option is given to either save errors or continue to practice. There is no option to end the session or return to the main menu at this point, which is another choice that should be offered to the user.

The Save Errors option enables the user to save the missed problems on disk, tape or printer. The printer option produces a nicely formatted "report card" of missed questions and answers.

In summary, *Flash Card Drill* is an educational program for the CoCo that is simple to use by teacher, parent, student or child. It enables lessons to be composed by the teacher, or even by the student, in a relatively easy way. Lessons can be saved and then loaded for further use, and the program is error-trapped for convenience and feedback. It can be used for words, short phrases and math problem flash card generation.

Flash Card Drill is definitely worth a place in many educational and home environments. If you're a teacher or parent who likes to customize lessons for your class or child, then *Flash Card Drill* is a program you may want in your software library.

(Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3, 32K disk, \$22.95)

— Donald A. Turowski

CyberTank Won't Let You Go

To tell the truth, when I first realized I was to review a game, I was somewhat disappointed. It seems that most games I've run across become uninteresting and even annoying after several plays. If you are one of the many people who feel the same way, I think you will be in for a pleasant surprise with *CyberTank* from Mark Data Products.

CyberTank is a Simulation in which you find yourself in a futuristic tank besieged by Autonomous Land Vehicles (ALVs), which are actually four different types of enemy tanks with varied armaments and capabilities.

You, of course, are not left defenseless. Along with a non-renewable shield, you have many types of weapons at your disposal, including B-1 stealth plating, radar, cannon and rockets. However, you only have a limited supply and must use them judiciously lest you become destroyed before you can re-supply.

One of the things that makes the game interesting is that you must be, in effect, three people: the gunner, the loader and the commander. You have a separate screen for each one; when and how well you change screens can affect how long you stay alive.

The gunner's screen is where you will spend most of your time while in combat. (See Figure 1.) From here you aim and fire on the enemy. You have a small radar indicator, so you know from which direction you are being attacked. You also have fuel and shield gauges.

The loader's screen is where you decide what type of weapon and munitions to use and make them ready to use. You also access the supply depot from here.



Figure 1: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

The last screen, the commander's screen, is a cumulative radar map of the sector you are in currently. (See Figure 2.) The effectiveness of your radar screen is determined by equipment used by the loader. a small number of weapons to call upon. However, as you progress to different sectors via the teleport device you pick up at the munitions depot, you accumulate more and deadlier weapons.

The documentation mentions no ultimate goal other than to kill the enemy and stay alive, and I didn't find a way to finally win. But to be fair, I only got as far as Sector 7, so I don't know what happens in later sectors.

The program comes in a nice, black vinyl book, is on a copy-protected disk and has six pages of documentation.

To use *CyberTank* you need 64K and one disk drive. Joysticks are not necessary.

The main complaint I have with *CyberTank* is the lack of understandable documents. The reference manual makes sense *after* you've figured out how to play the game, but doesn't help much the first few times you play.

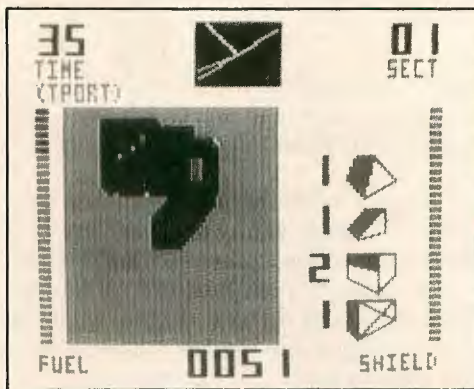


Figure 2: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

To sum up, *CyberTank* takes good strategy and quick hands to survive, and I've had many enjoyable late night marathons with it. Hopefully, the documentation will be re-written; in spite of that, I highly recommend *CyberTank*, especially to all of you who have become bored with games.

(Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, disk only, \$27.95.)

— Bill Tottingham

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Here is an interesting action game for Adventure lovers. *Quest for Reality* comes on tape and works on your 32K ECB CoCo with one joystick. (You must remove your disk controller.)

As is customary in most Adventure games, you use two-word commands to move through a maze or cavern in which you encounter many evil creatures to thwart your progress toward the goal of locating the "Orb of Reality." At the start of the Adventure you are supplied with a torch that will burn for eternity. This torch, a magical bow and an infinite supply of arrows are all you need to solve this Adventure.

You press N, S, E or W to move about the caverns in which you have been placed by a mysterious being. The creatures you encounter soon drain your strength, so you must align the small, square bow sight over your target and fire quickly. The creature's strength can be measured during your battle by the vertical line next to the combat screen. As the creature's strength decreases, so does the line.

There is also a MAP command you can use to orient yourself, but I found it to be of little help because of its small size. As in most Adventures, you also have to gather items to assist you in your quest.

While this Adventure is OK, it's not great. *Quest for Reality* is fun and will keep your interest for a while, but eventually the action becomes predictable. I did like the moving eyeball that frequently appeared in the text screen as if to watch my next move! I enjoy Adventures and I'd rank this one above average.

(Brainbank Software, Rt.2 Box 1015, Friendsville, TN 37737, \$21.95 plus \$1.50 S/H)

— David Gerald

Add a Second Disk Drive In Minutes With Drive 1 Upgrade

Here is a project that will not only upgrade your present single-drive system to two drives, but will save you money at the same time. Although the upgrade does require breaking the warranty seal on your Radio Shack Drive 0, the process is simple and quick. And best of all, you will be proud that you did it yourself.

Drive 1 Upgrade is a single-sided, half-height TEC FB-501 drive that takes just minutes to mount in your Radio Shack FD-501 Color Thinline Disk #0 Cabinet (RS #26-3131). The only tool required is a Phillips head screwdriver. The seven necessary steps are explained in an easy-to-understand installation sheet that comes with the well-packaged disk drive.

After turning off the computer and unplugging the disk drive, simply unplug the ribbon cable from the rear of your existing Drive 0. Then remove the six screws (three on each side) that hold the top of the drive case to the bottom. After taking off the top cover, remove the black plastic cover on the front of the drive above Drive 0. This cover will no longer be needed.

Next, mount the new Drive 1 above Drive 0 onto the brackets extending from Drive 0. Four screws for this are provided with the new drive. Now the power connection is made. A white connector with four wires (yellow, white, black and red) is plugged into the mating connector on the Drive 1 circuit board. It will only go in one way, so don't worry about putting it in wrong. The flat ribbon cable supplied with your Drive 0 has a second connector that up to now was not being used. Simply plug this gray connector onto the circuit board, making sure the red line on the cable is facing the outside of the drive case. The other gray connector connects to Drive 0 as it did originally. Put the top cover back on and fasten it with the six screws you took

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ENGINEERING

lot easier for programmers. With OS-9 Level II the limited memory problems all but disappear and the new windowing environment makes programming point-and-click software much easier.

So, what would we like to see in our software Christmas stocking next Christmas? Let's dream.

Since OS-9 Level II is made for multi-tasking and multi-view makes windowing a snap, maybe someone will come up with a management tool like this for OS-9. Think about the possibilities: In one window you can access your rolodex with a click of the mouse. Select a name, click the mouse again and dial the phone. While you are on the phone you can study your "to do" list in another window. Or, open a document window under one of your headlines and take notes from the call. If you want to keep a record of your calls for billing purposes, you can use the program's date and time stamp to put the time at the beginning and end of the notes from the call. When you hang up, click on another window and you can look at your calendar. Select the amount of time in each segment of your day and push another button and *More* creates a subheadline for each period of the day. At this point you only need to add your own assignments or meeting notes.

What else can you do? Select a section of your outline and pick an option from a pull-down menu and it instantly prints a bullet chart you can print directly on an overhead transparency. If you would rather have things printed in neat little boxes, make another menu selection and a neatly formatted organization chart pops onto your screen.

What about the items in your "to do" list that require you to write a letter or memo? Do you need to quit the program and start up a word processing program? No! You simply click twice on a marker in front of your headline and a text window opens and you can create a document of any length. Of course, you can also put a document containing graphics under a headline. Finally, all or any part of your outline can be exported to any other word processing program.

This is advanced idea processing combined with desktop publishing. I can't wait to run it on the new CoCo 3.

UNIX Comments From Kevin Kuehl

Kevin Kuehl of Valparaiso, Indiana, has contributed many excellent programs to these pages. Recently, after we published a description of Brian Lantz's

KShell, Kuehl wrote to let us know that the quote expansion feature Brian added was not pure UNIX. In fact, he quoted from a paper and book by Steven Bourne, author of the famous *Bourne Shell*.

"There are three quoting systems used on UNIX systems, the single quote, the double quote and the escape character," Bourne wrote. "The single quote transfers whatever is inside the pair verbatim to the program. The double quote transfers everything but single quotes and escape characters. The escape character transfers the next single character to the program."

Kuehl, calling for correct information about UNIX in RAINBOW also gave examples from a book named *The UNIX System*:

```
echo \?yields?
echo \\yields\
echo xx'***'xx
  yieldsxxx***xx
echo The date is 'date'
.yieldsThe date is date.
```

Complete Rainbow Guide to OS-9 Brings Hackers Together

Kevin Darling has sent us a great story from North Carolina. It seems that Steve Croom was having problems with his hard disk drive. When Darling found out that Croom, a Navy man stationed on the West Coast, was from North Carolina, too, and was planning to come home on leave soon, he suggested that Croom bring the drive and he would try to fix it.

"As I prepared to leave for the airport I realized we had no idea of what each other looked like," Darling said. Trying to think of an identifying object, I grabbed *The Complete Rainbow Guide to OS-9* on the way out. When I reached the arrival gate, I simply sat down and laid the book on the table next to me. Sure enough, Steve spotted the book.

"We still can't believe that we never met before, except on the OS-9 SIG, and he gave me a \$700 hard disk drive on faith. The only ID he ever saw from me at the airport was *The Complete Rainbow Guide to OS-9*."

We also received a short thank you note from Eric W. Tilenius. We mentioned several months ago that he was looking for some talented programmers.

"Thanks to you, I've been in touch with some very talented and interesting people," Tilenius said. He promised us

one of the very first copies of *Print Shop* when it comes out. Should be fun!

Databases Are Gold Mines

Since we're talking about telecommunicating, here's a tip. The databases managed by the many Special Interest Groups (SIGs) on most of the commercial services are a gold mine. For example, the OS-9 section on RAINBOW's CoCo SIG on Delphi is really beginning to take shape.

Check out Steve Bjork's fantastic bouncing ball demo program. You'll have a fantastic demo to show off your Color Computer if you download the binary code. And, if you download the source code, you'll see how Steve makes magic with graphics and animation. If you need a good screen-oriented editor, download the *Dolphin Technology Text Processing System* from the CoCo SIG's OS-9 database. It's written in C and has many machine language routines to speed up crucial sections of the program. If you contribute more than \$20 to the author you'll receive Version 2.00 of this editor. Version 2.00 has been expanded and includes merge, block duplicate, printer output and display memory, as well as search and replace features.

OS-9 Level II Program Development System Has Screen Editor

When you buy OS-9 Level II for \$79.95, you get BASIC09 with it. Now that's a bargain for high level language programmers.

There is also a program development system available that features a screen editor, assembler and linker.

The screen editor is the SCRED editor that has been available for other OS-9 Level II and 68000 systems for several years.

SCRED is straightforward and easy to use. It can be used to create or modify any text file. It lets you do either line or character oriented editing.

SCRED has three modes, Command, Edit and Insert. A set of commands is available in both the Command and Edit modes. The top line of the terminal displays the line number your cursor is on, the column number, the name of the file being edited, the amount of space left in your buffer and the mode you are working in. If your file is larger than the memory buffer used by SCRED, simply issue the (More) command when you want to write out the section of text you are working on and read in another. SCRED displays 80 characters on the



KISSable OS-9

Looking At Blue Sky For OS-9 Level II

By Dale L. Puckett
Rainbow Contributing Editor

It's been a long wait — but well worth it. The new Color Computer 3 is simply *outstanding*. The graphics knock your socks off. With the new windowing capability that is now a part of OS-9 Level II and the promised *Multi-View* visual shell, we should see some really super software soon.

It's Time for Frank to UnFLEX His Bias

As I stared at the outstanding resolution, bright colors and amazing animation on the new Color Computer 3's screen, I couldn't help but remember the debate we had with Frank Hogg in the May 1984 issue of THE RAINBOW. Here's a sample from Frank's article titled, "On OS-9 Matters, Frank FLEXes His Bias."

"First, Tandy did not do a pure OS-9. Close, but not pure. The disk driver will only support single-sided drives and at the maximum, only 40 tracks. To put BASIC09 on the system disk, you have to

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide and co-author, with Peter Dibble, of The Official Rainbow Guide to OS-9, is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.

delete files; otherwise it won't fit. A single-drive user is plumb out of luck. You can't change the stepping speed of the drives either. So, if you have drives better than Tandy's, you will not be able to utilize the extra speed.

"Second, Tandy does not provide a Hi-Res screen with OS-9. You are left to work with the pathetic 16 by 32, uppercase only screen . . ."

I debated Frank then because we were already publishing articles that told how to work around the limited disk size and upgrade the performance of OS-9 on the CoCo. Level I OS-9 on the original Color Computer 2 was and is a bargain. Level II OS-9 on the Color Computer 3 is a steal.

It's time for Frank to unflex his bias. Tandy has listened to us and eliminated many of our complaints. For example, the disk drivers in OS-9 Level II read information about the physical configuration of your disk drives from the device descriptors like they're supposed to. There is now a Hi-Res screen. In fact, with the new windowing capability of OS-9 Level II, we can view our text on 24 80-character lines and create several windows onscreen containing high resolution graphics or additional text. Since OS-9 is multi-tasking we can have the output from a different task going to each of these windows. The promised *Multi-View* shell makes the windowing features so easy to use that anyone can use them.

Volkswriter Deluxe for OS-9

On the OS-9 68000 scene, MicroTRENDS has announced that *Volkswriter Deluxe* is being ported to OS-9. The program was named the best of 1984 by the editors of *PC Magazine*. It is fast, reliable and easy to use. All commands are logical and concise, requiring the fewest keystrokes per function of any word processor.

Volkswriter Deluxe OS-9 features text merge, note pad, horizontal scrolling, multi fonts, expanded document size, unlimited moves, onscreen tutorial and help keys, special characters and printer installation. It runs on the MicroTRENDS 68000 Jonathan card that plugs into the Apple II.

If this program is written in a high level language maybe the folks at MicroTRENDS will convince Lifetree Software to move it on to the new Color Computer 3. We can only hope.

During his address to the OS-9 Users Group Community Buffet at RAINBOWfest Palo Alto, Computerware's Paul Searby called on software developers "to set as a priority the task of making OS-9 on the CoCo more user friendly." At the time he praised Tandy for releasing products like *Deskmate*, *Micro Illustrator*, *OS-9 Profile* and *Robot Odyssey*. He also put his money where his mouth is by supporting Mike Bailey's *The Last Word*.

The great news is that the new Color Computer 3 is going to make it a whole

to the current program counter location plus \$39, location \$442. This location is in the screen area and has been filled with a \$39 previously. The \$39 is executed as an RTS instruction which causes a return to the BASIC program. The "DONE!" message is then displayed at the screen start. All of which goes to prove that video memory is simply computer memory after all!

11) The annotated code for this problem is:

```

LDX      #0      clear count of men=women
CLR      CNT      clear 255 to 0 value
LOOP1    CLRB     clear count of 1s (men)
DEC      CNT      get next value
LDA      CNT
BEQ      OUT      go if 256 times
LOOP2    LSLA     shift out next bit of 8
BCC      NEXT1    go if 0 (woman)
INCB     bump count of men
TSTA     set CC
BEQ      FIN      stop if no more 1s (men)
NEXT1    BRA      LOOP2    loop, counting men
FIN      CMPB     #4      4 men counted?
BNE      NEXT2    go if not
LEAX     1,X      bump count of men=women
NEXT2    BRA      LOOP1    continue for 256 permut'ns
OUT      RTS      return
CNT      RMB      1      count of 255 to 0

```

This code determines the probability that the number of men will equal the number of women. A probability of one means that the number of men will *always* equal the number of women. A probability of zero means that the number of men will *never* equal the number of women. The probability here is obviously somewhere in between.

In this problem there are eight users at a table. We're not told whether they are men or women. If we let each bit of a byte represent an individual user, however, we can use the assembly language subroutine to figure out the probability. Men are represented by a 1 bit while women are represented by a 0 bit. Let's try a simpler case first. Suppose that there are only four users at a table. The possible permutations are:

```

0000 4 women
0001 3 women, 1 man
0010 3 women, 1 man
0011 2 women, 2 men
0100 3 women, 1 man
0101 2 women, 2 men
0110 2 women, 2 men
0111 1 woman, 3 men
1000 3 women, 1 man
1001 2 women, 2 men
1010 2 women, 2 men
1011 1 woman, 3 men
1100 2 women, 2 men
1101 1 woman, 3 men
1110 1 woman, 3 men
1111 4 men

```

The probability here is the number of times that men equal women divided by the total number of cases, or $6/16 + 3/8 + .375$.

You can see that the number of times women equal men can be computed by generating the binary numbers from zero to 15 and then counting the number of cases where there are two ones. The same thing can be done for a group of eight users (or any size group). The previous code generates the binary numbers from 00000000 through 11111111 and then counts the cases where the number of ones is four. The result is $70/256$, or a probability of .273 that the number of male CoCo users will equal the number of female CoCo users. This little program is great for those Color Computer social gatherings.

12) I'll bet you forgot about the obscure ABX instruction! This instruction takes the contents of B, treated as an unsigned number, and adds it to the X Register, with the result going into X. This is a handy way to increment the X Index Register when it is used as a pointer, which it often is.

Pi Revisited

The column on generating pi drew a lot of interest from readers. First to respond was Carey Bloodworth of Swink, Okla., who noted a more efficient way to generate pi and informed me that his program ran three times as fast as the one in the column. (At that point I had produced a program that was twice as fast as the one appearing in the column, but Carey's sounds faster). If you're interested in this problem, contact Carey at P.O. Box 17, Swink, OK 74761.

Andre Needham of Renton, Wash. sent a pi formula that converges much faster. He also noted that he has memorized pi to 42 places. Bruce Arsenault of Nova Scotia also sent a long letter detailing a faster algorithm.

Michael Frank, 4515 Oak Hill Road A-5, Chattanooga, TN 37416, sent a program that calculates 1000 digits of pi in six minutes by an efficient divide routine. Sounds like Carey and Michael should communicate.

Edward Freeman Yendall of North Fort Meyers, Fla., sent a fascinating letter describing computer processing of a special form of prime numbers called Mersenne primes. His original work (he included a printout) was done in the 1950s on a Burroughs Datatron computer! Edward has now duplicated the work on the CoCo.

If enough readers are interested in problems of this sort, I'd be happy to oblige you in future columns. Let me and RAINBOW know.

Next month, I'll be back with more CoCo assembly language topics. Till then, keep assembling.

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7) Sorry, I just couldn't resist this one. Admittedly, this application has limited use. However, the code is:

```

ADD#  #1    bump by one
DAA                    decimal adjust

```

The DAA instruction is one you may never have used. It is a "decimal adjust" that allows BCD, or binary-coded-decimal operations. In BCD, the decimal digits of zero through nine are coded in each four bits. Each four-bit chunk, called a "nibble" or "nybble," can only contain values of 0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, or 1001, and cannot contain the values 1010, 1011, 1100, 1101, 1110, and 1111. The DAA is used after an add or subtract to adjust the binary add back to proper BCD form. If this were not done, the add:

```

00011001 (19 in bcd)
+00110101 (35 in bcd)
-----

```

would result in

```

00011001 (19 in bcd)
+00110101 (35 in bcd)
-----
01001110 (not 54 in bcd!)

```

instead of

```

00011001 (19 in bcd)
+00110101 (35 in bcd)
-----
01010100 (54 in bcd)

```

The adjustment is made by adding +6 to either or both nibbles. In the problem here, the DAA causes the adjustment of the least significant nibble if the result is 10 to 16.

8) The answer is a snap if you know your shifts:

```

ASRA    divide by 2
ASRA    divide by 4
ASRA    divide by 8

```

As you probably know, shifting right by one bit divides by two, by two bits divides by four, and so forth. Dividing by any power of two can be done by the appropriate number of right shifts. However, if the number to be shifted is a signed, two's complement number, a logical shift (LSR, LSL, etc.) won't work. The two's complement number -100 is 10011100. Shifting right one bit logical results in 01001110, or a value of +80. However, shifting right one bit arithmetic results in the correct result of 11001110, a value of -50.

If the value cannot be evenly divisible by a power of two, a negative result is sometimes rounded down by one. The number -105 in two's complement form is 10010111; shifting right arithmetic results in 11001011, or -53.

9) The code here is a bubble sort that sorts the data in buffer into ascending order. Values of 23, 56, 1, 3 and 17, for example, would be sorted into 1, 3, 17, 23 and 56. The bubble sort is a simple sort, but not very fast. Here's the annotated code:

```

LOOP1  LDY    #0          load "swap" flag
        LDX    #BUFFER    point to start
LOOP2  LDD    ,X+         get two entries, and bump
        CMPA  ,X          compare pair
        BLO   NEXT       go if in order
        LDY    #1         set swap flag
        EXG  A,B         exchange the two
        STD  -1,X        store swapped pair
NEXT   CMPX  #BUFEND     at end
        BNE  LOOP2      go if not at end
        LEAY -1,Y       test for swap
        BEQ  LOOP1      go if still unsorted

```

The bubble sort compares two entries at a time, starting from the top of the table. (See Figure 2.) If the second entry is less than the first, the two bytes are swapped and a "swap flag" is set to one. One complete pass is made through the table and the swap flag is checked. If at least one swap occurred, another pass is made. This process continues until no swaps have been made, indicating that the data is sorted in numerical order. The LEAY -1,Y above is a tricky way to test that Y contains a one. If Y contains a one, a zero results after the LEAY and the zero condition code is set, otherwise the zero condition code is not set.

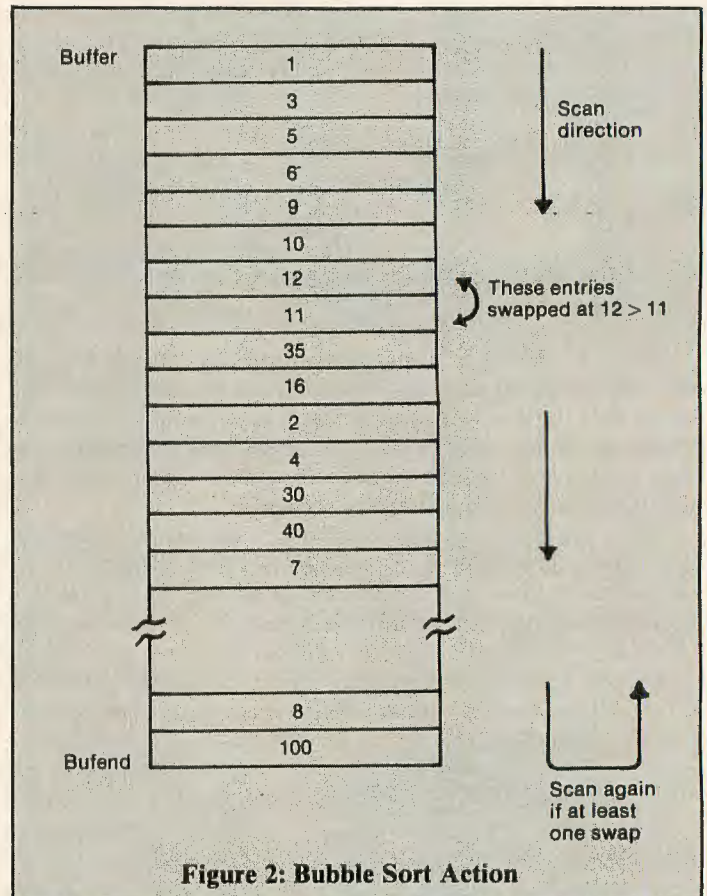


Figure 2: Bubble Sort Action

10) There's no reason why assembly language code can't be located in the text screen area. Of course, it has a tendency to be destroyed by data displayed on the screen! This subroutine can be relocated to the screen by a BASIC program as follows:

```

100 DATA &H86, &H39, &H8E, &H06, &H00, &HA7, &H82, &H20, &HFC
110 CLS
120 FOR I=&H400 to &H400+8
130 READ A: POKE I,A
140 NEXT I
150 DEFUSR0=&H400
160 A=USR0(0)
170 PRINT "DONE!";
180 GOTO 180

```

The subroutine is relocated to the first portion of the text screen. You'll see garbage characters fill up the first nine screen bytes. These garbage characters represent the machine language bytes of the assembly language program. The USR0 transfers control to the subroutine and it starts storing ASCII \$39 characters to the text screen, starting from the screen end. An ASCII \$39 is a "9" character, and therefore, nines start filling up the screen. When a \$39 replaces the second byte of the BRA LOOP instruction, however, the branch is done

Still puzzled? This routine finds the square root to the next lowest integer of the number in OP. For example, if OP contained 41,000, the result in the U Register would be 202. The crux of the algorithm is the fact that the square root of a number is equal to the total number of odd integers in the number. The square of 100, for example, is $100 - 1 = 99 - 3 = 96 - 5 = 91 - 7 = 84 - 9 = 75 - 11 = 64 - 13 = 51 - 15 = 36 - 17 = 19 - 19 = 0$. The number of odd integers is 10 — 1, 3, 5, 7, 9, 11, 13, 15, 17 and 19.

4) The huge program that solves this problem is shown below:

```
SEX          sign extend B into A
```

This instruction is one of the more interesting in the 6809 repertoire, but it does nothing more than "sign extend" the operand in B into the A Register. If the sign bit, Bit 7, of the B Register is zero (positive), zeroes are put into the A Register. If the sign of the B Register is one (negative), all ones are put into the A Register.

In case you're hazy about two's complement notation, remember that it's a way of expressing both positive and negative numbers. An eight-bit register can hold values of -128 through +127 in this format. Positive numbers have the sign bit set to zero and the number in bits 6 through 0 of the Register. A +100 would be 01100100, for example. Negative numbers have the sign bit set to one and the two's complement of the value in bits 6 through 0. A -100 would be 10011100.

Why SEX? Since 16-bits adds and subtracts, and other arithmetic processing is done in the D Register (A and B combined), it's a handy way to make a 16-bit signed number out of eight bits.

5) Some of the possible ways to load A with the contents of Location \$3E00 are:

```
LDA $3E00    extended addressing
LDA -$1FF,X  indexed addressing
LDA $40,Y    indexed addressing
LDA $3E00    direct page addressing
LDA B,Y      accumulator offset addressing
LDA $3E00,PCR program counter relative addr
```

A dark horse candidate is:

```
LDD $3E00
```

which loads A, but also clobbers the contents of the B register.

The extended addressing mode specifies the memory address in the last two bytes of the three-byte instruction. The indexed X-addressing example adds the contents of the X Register, \$3FFF and -\$1FF to get the effective address of \$3E00 before the load is done. The indexed Y addressing adds \$3DC0 in Y to \$40 to get the same effective address. The direct page addressing example computes the effective address by using the contents of DP as the upper eight bits of the address and the second byte of the instruction — \$3E, \$00 in this case. The accumulator offset adds the contents of index Register Y and the contents of B. The PCR example puts an offset of -\$104 in the last two bytes of the four-byte PCR instruction. The effective address is computed by adding the current contents of the program counter \$3F04 (the start of the instruction after the LDA) to an offset of -\$104 to get an effective address of \$3E00.

That wasn't too bad, was it?

6) This problem isn't hard to follow if you write down the results. The X Register points to an open-ended buffer area as shown in Figure 1. Each entry in the buffer is made up of two bytes. Zero is put into the first entry and one into the next to initialize the subroutine. The FIBO loop adds the nth entry to the (n + 1) entry. The result is put into the (n + 2) entry. The pointer in X is then bumped by two. A BSR then calls the FIBO code again. Why the BSR instead of a BRA? No reason other than to demonstrate a simple case of recursion. The FIBO code is called repeatedly until the result is so large that overflow results. In this case the RTS is executed to return from the subroutine. Since there are many levels of BSRs at this point, each return is made to the first RTS repeatedly, much like peeling the layers of skin on an onion.

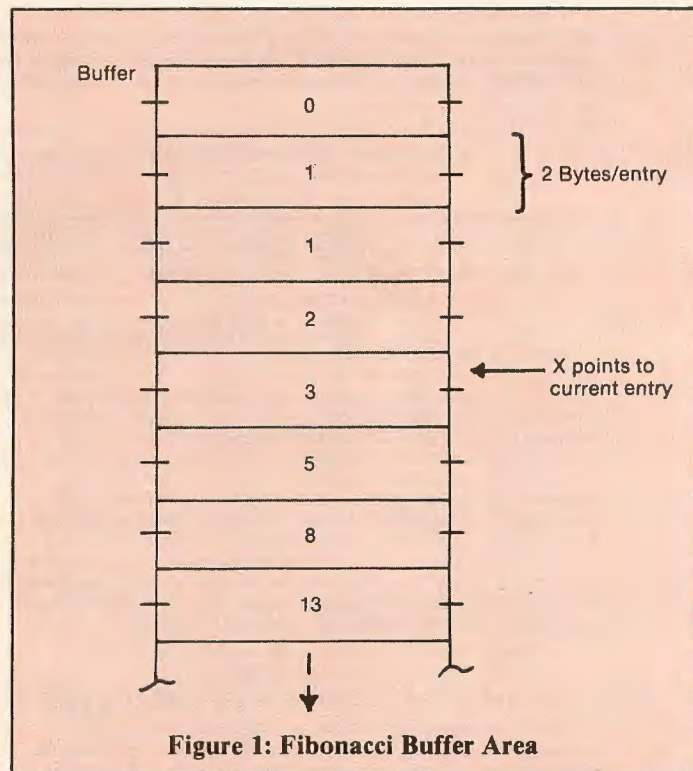


Figure 1: Fibonacci Buffer Area

The results in the buffer area look like this: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2504, 4181, 6765, 10946, 17711, 28657. Each term is computed as the sum of the two preceding it. This sequence is a famous mathematical sequence known as the Fibonacci series, with applications in diverse areas, including computer algorithms.

Overflow occurs when the 23rd term is reached with a result of 46,368. At this point, the stack is 23 levels deep and uses 46 bytes for return addresses! If you run this code, make certain you have enough room for the stack. The annotated code is:

```
FIBOS  LDX    #$BUFFER  start of buffer
        LDD    #0       initialize first term
        STD    ,X       in first 2 bytes
        LDD    #1       initialize 2nd term
        STD    +2,X     in second two bytes
FIBO   LDD    ,X       get nth term
        ADDD  +2,X     add nth+1
        BVS  OUT      go if too large
        STD  +4,X     store nth+2
        LEAX +2,X     bump
        BSR  FIBO     call compute term
OUT    RTS          many happy returns
BUFFER RMB    100
```

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) The A Register contains a value of zero through 14. Write a routine to convert the values as follows:

Zero through eight become one through nine

Nine through 15 become 16 through 22

The routine must consist of fewer than 10 instructions.

) This one shouldn't be too bad. The A Register contains a two's complement number. Divide this number by 8. The result must be valid for either positive or negative numbers. As an example, -100 divided by 8 must produce a result of -12, and +100 divided by 8 must produce a result of +12.

) A table containing values of zero through 255 starts at BUFFER and ends at BUFEND. What does this code do?

```

LOOP1 LDY #0
      LDX #BUFFER
LOOP2 LDD ,X+
      CMPA ,X
      BLO NEXT
      LDY #1
      EXG A,B
      STD -1,X
NEXT  CMPX #BUFEND
      BNE LOOP2
      LEAY -1,Y
      BEQ LOOP1
  
```

) This is an assembly language subroutine that's called from a BASIC program. It starts at Location \$400, the beginning of the text screen. What does it accomplish? Or does it even run?

```

      LDA #39
      LDX #600
LOOP  STA -X
      BRA LOOP
  
```

) At a recent Color Computer User's Group party, there were eight CoCo freaks at a corner table. The following program determines which of these probabilities?

a) The probability that there will be twice as many men as women among the users.

b) The probability that there will be an equal number of men and women among the users.

c) The probability that there will be more men than women among the users.

d) The probability that the user on the left will have an autographed copy of *The Complete Rainbow Guide to OS-9*.

```

      LDX #0
      CLR CNT
LOOP1 CLR B
      DEC CNT
      LDA CNT
      BEQ OUT
LOOP2 LSLA
      BCC NEXT1
      INCB
      TSTA
      BEQ FIN
NEXT1 BRA LOOP2
FIN   CMPB #4
      BNE NEXT2
      LEAX 1,X
NEXT2 BRA LOOP1
OUT  RTS
CNT  RMB 1
  
```

12) Finally, the last problem: Which two registers in the 6809 can be added together with one instruction?

The Answers

1) This *should* have been an easy one if you remembered that the 6809 has a multiply instruction called MUL. The code is this:

```

LDA #230  load A with decimal 230
LDB #15   load B with decimal 15
MUL      find product in D
  
```

The result, 3450, is in D after multiplying 230 in A and 15 in B (\$E6 in A and \$0E in B). Remember the MUL instruction is an unsigned multiply. This means each operand in A and B can be zero through 255 and represents only positive numbers. The maximum product will be 255 times 255 or 65,025 (\$FE, \$01).

2) The code in the question is reproduced again with comments below:

```

      LDD OP1  load D with operand 1
      LDU #0   clear quotient
      SUBD OP2 subtract divisor
LOOP  BLO OUT  go if residue < 0
      LEAU 1,U bump quotient
      BRA LOOP 'til residue < 0
      OUT JMP OUT dummy
      OP1 FDB XXX 16-bit dividend
      OP2 FDB XXX 8-bit divisor
  
```

This code is a divide routine that divides a 16-bit operand in D by an eight-bit operand in memory. The quotient result is in U at the end of the divide. Unfortunately, the 6809 doesn't have a divide instruction, so any division has to be accomplished in software. The division here is not a particularly effective division because it divides by repetitive subtraction. If OP1 is 65535 (\$FFFF) and OP2 is one, for example, the loop is executed 65536 times! However, the code here is uncomplicated compared to a bit-by-bit divide and it's not bad to use occasionally.

3) The code in the question is reproduced again with comments below:

```

      LDD #1  integer
      STD INT store for subtract
      LDU #0  clear result
      LDD OP  get square
LOOP  SUBD INT subtract 1, 3, 5, etc.
      BLO DONE go if residue < 0
      LEAU 1,U bump result
      LDX INT set next odd integer
      LEAX 2,X
      STX INT
      BRA LOOP loop 'til residue < 0
DONE  JMP DONE dummy
      DONE JMP DONE dummy
      OP  FDB XXX number to find SQR
      INT RMB 2 holds odd integers
  
```


BARDEN'S BUFFER

Presenting a Quiz for Color Computer Assembly Language

By William Barden, Jr.
Rainbow Contributing Editor

Our local Color Computer Users Group in Orange County, Calif., is an organization with somewhat eclectic interests. Within the organization are special interest groups on BASIC, assembly language, sushi and automatic weapons. In spite of the weird aspects of the user's group, it's fun to attend the meetings. At the last meeting, the chairman of the SIG on assembly language, presented an enjoyable little assembly language quiz. (Actually, it wasn't that enjoyable. The doors were locked and we couldn't get out until we had tried the quiz.)

The quiz is reproduced in this month's column so you can test yourself and see if you really know assembly language as well as you think you do. Readers who get all answers correct will be treated to a sushi lunch and a used AK-47 assault rifle the next time they're in Orange County. The answers to all questions are at the end of this column. A score of 10 to 12 qualifies you as a master assembly language programmer, 7 to 9 indicates that you are a professional AL programmer, 4 to 6 marks you as a journeyman AL programmer, and less than 4 means you better go back and hit the books to brush up on your programming skills.

The Quiz

- 1) Here's an easy one to begin with. Write an assembly language program to load the A Register with decimal 230 and the B Register with decimal 15, and then find the product of the two numbers in the D Register (A and B).
- 2) What does this code do?

```

                LDD    OP1
                LDU    #0
LOOP           SUBD   OP2
                BLO    OUT
                LEAU   1,U
                BRA    LOOP
                JMP    OUT
OP1            FDB    XXX
OP2            FDB    XXX
    
```

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

- 3) Here's a relative toughie, but if you write down the results for a few test cases, you should be able to see what this code accomplishes:

```

                LDD    #1
                STD    INT
                LDU    #0
                LDD    OP
LOOP           SUBD   INT
                BLO    DONE
                LEAU   1,U
                LDX    INT
                LEAX   2,X
                STX    INT
                BRA    LOOP
DONE           JMP    DONE
OP             FDB    XXX
INT            RMB    2
    
```

- 4) If you're reeling from the last problem, here's one that should be easier. The B Register contains a two's complement number. Write a short piece of code to put a zero into the A Register if B is positive, or a -1 into A if B is negative. Hint: The 6809 instructions RELGN and POLITCS are *not* used in the code.
- 5) This one tests your addressing mode capability. Location \$3E00 contains a constant. The X Register contains a value of \$3FFF. The Y Register contains \$3DC0. The DP register contains a value of \$3E. The B Register contains \$40. Write down at least four ways to load the A Register with the constant. Assume the instruction to be used is located at \$3F00.
- 6) Here's a tricky one. What does this code accomplish?

```

                LDX    #$4000
                LDD    #0
                STD    ,X
                LDD    #1
                STD    +2,X
FIBO           LDD    ,X
                ADDD  +2,X
                BVS   OUT
                STD    +4,X++
                BSR   FIBO
OUT            RTS
                RTS
    
```

TUTORIAL

Readable Equivalents to C

By Calvin Dodge

When I first began programming in C, I had a problem remembering which conditional operators did what (like "!=" for not equal rather than "<>"). Fortunately, the C pre-processor statement "#define" made it easy to rename things and help my memory. I created a file in /d1/DEFS called logic.h containing the following:

```
#define TRUE 1
#define FALSE 0

#define EQUALS ==
#define NOTEQUALTO !=

/* bitwise operations */
#define AND &
#define NOT ~
#define XOR ^
#define OR |

/* logical operations */
#define LAND &&
#define LOR ||
#define LNOT !

#define MOD %

/* end of "logic.h" */
```

Now, in every program I have a line near the beginning that says #include <logic.h>. When I type if(a EQUALS b), the compiler knows I mean if(a == b). This makes it easier to avoid typing if(a=b), which means "make a equal to b, then see if a is non-zero."

I hope this technique helps make your programming easier and your programs more readable. A C program can use all the readability it can get!

(Questions about this tip may be directed to the author at 4490 North Yukon Court 2A, Wheatridge, CO 80033, 303-420-9758. Please enclose an SASE when writing.) ☺

Calvin Dodge is a self-employed programmer/consultant. He enjoys OS-9 and C and loves his CoCo. His wife, Elsi, teaches emotionally and behaviorally disturbed children and uses the CoCo to write assignment sheets, reports, and so on. They live in Wheatridge, Colorado.

Let's get into edit mode and call our procedure sieve:

```
B:e sieve
PROCEDURE SIEVE
*
E:
```

A common error I make is to forget the ending quote when I print a string. Here is what happens when I make that mistake:

```
E: print "Missing quote
print "Missing quote
^
Error #041
- No Ending Quote
*0000 ERR print "Missing quote
E:
```

When a syntax error like this is detected, the cursor is positioned just before the offending line in the procedure as indicated by the "*". To correct the error, type a c in the control character position. Follow it with a delimiter character which can be a slash or any punctuation character. Next comes the character(s) to change. Here we need to add a character, so enter an e to position where the added character is to go, following with a delimiter matching the first one and then e". Here is how it looks and the result:

```
E:c/e/e"
print "Missing quote"
E:
```

The cursor is now just past the line in the program. If you go back to look at the line again by typing a dash as a control character, it looks different:

```
E:-
*0000 PRINT "Missing quote"
```

Once the line is right, BASIC09 compiles it. On going back, the line was decompiled and the keyword PRINT was capitalized. It is good practice to enter programs in lowercase. Then, when you go back over the code or list it to the printer, only the keywords are capitalized. The program will be easier to follow. Now issue a control character 'd' to delete the line:

```
E:d
```

Now enter the following *sieve* program.

```
PROCEDURE sieve
DIM sizeof:INTEGER
sizeof:=8190
BASE 0
DIM flags(8195):BOOLEAN
DIM i,prime,k,count,iter:INTEGER
PRINT "10 iterations"
SHELL "date t"
FOR iter:=1 TO 10
count:=0
FOR i:=0 TO sizeof
flags(i):=TRUE
NEXT i
PRINT "initialized"
FOR i:=0 TO sizeof
IF flags(i) THEN
prime:=i+i+3
(* print prime *)
k:=i+prime
WHILE k<=sizeof DO
flags(k):=FALSE
k:=k+prime
ENDWHILE
count:=count+1
ENDIF
NEXT i
NEXT iter
SHELL "date t"
PRINT count; " primes"
END
```

Now we can start looking at some of the parts that will be in most BASIC09 procedures. Like PASCAL, BASIC09 lacks the dynamic memory management in conventional BASICs. Therefore, variables must be dimensioned to inform BASIC09 how to arrange data memory.

```
DIM sizeof:INTEGER
sizeof:=8190
BASE 0
DIM flags(8195):BOOLEAN
DIM i,prime,k,count,iter:
INTEGER
```

There are a variety of variable types in BASIC09, but only Boolean and Integer appear in our example. The variable flags (8195) is an array starting with a 0th member (base 0) with 8195 members. A Boolean variable uses only one byte, so the array flags (8195) uses 8196 bytes with its 0 member. Integer variables use two bytes each — more bytes are used to dimension them than their data uses.

Variables are not automatically initialized when the program is run. A variable is assigned memory space. That space may contain any sort of garbage. The following code makes 10 passes through the program and initializes the variable count and array flag (8195) at the beginning of each pass:

```
FOR iter:=1 TO 10
count:=0
FOR i:=0 TO sizeof
flags(i):=TRUE
NEXT i
PRINT "initialized"
```

Following the initialization is the

program code that does the real work. BASIC09 custom calls for assignments to be made with ":=" rather than just '='. This follows PASCAL practice. For example, the line count:=0. However, if we wanted to know if count were a zero in an IF statement, the ':' is not used and will give an error. The right way is IF count=0 THEN.

OS-9 modules can be called from a running BASIC09 program. Shell "date t" is an example. The sieve program prints the date and time when the program starts and, when it has finished, it serves as a timer except you need to subtract the start time from the finish time to get elapsed time.

With the program properly entered, type the control character q and press ENTER to leave edit mode. Now BASIC09 checks that variables have all been declared and that all control structure keywords match up properly. If you get error messages, from system mode type e and press ENTER which puts you back in edit with your procedure to make corrections. Many times a bunch of error messages show up. One missing NEXT or ENDIF near the front of the procedure confuses BASIC09 and it produces an error message for each succeeding control structure. When this happens, I list the program from system mode to the printer with the command list myprogram >/p. All error messages produced on leaving edit are printed at the end of the listing.

Let's assume you escaped edit mode without incident. Type save sieve to save the program to your current data directory. Finally type run sieve.

OK, how fast is fast? The C version compiled with the Microware C compiler under OS-9 on my CoCo executed in 24 seconds. Not bad for a machine running at .9 MHz. For comparison, a 22 second time was reported for a C compiled program on an IBM PC at 4.77 MHz clock. Because of lack of integers and memory, the sieve cannot be run under CoCo BASIC. BASICA on an IBM PC was reported with a 1,990 second benchmark running integer variables.

Fanfare please! The BASIC09 sieve took 450 seconds on my CoCo. There was no difference between running source code in the compiler and packed code. More about packing in a later column. I expect doubling the clock rate on the CoCo 3 will halve the run time. Now you know one reason I have not moved to a Tandy 1000 or something similar.

Whenever you are in system mode you can press ENTER and a directory of BASIC09 procedures in your workspace is displayed. An asterisk (*) appears to the left of the last active procedure. This directory also lists the size of each procedure in the workspace, its data space requirements and available workspace memory. Since none of the procedures is running at this time, no data space is allocated. The situation arises when the data space needed by a procedure is larger than available workspace memory. BASIC09 flags this by printing a question mark after the data space requirement for the procedure.

You cannot run a procedure when there is insufficient data space. It is important that you be able to run the source code version of your program from BASIC09 system mode because Debug mode is available. There are a number of strategies available to make this happen. One is to enlarge the workspace to use all available memory. A second is to keep procedures small and load them only as needed. A third is to limit data memory requirements until the procedure is totally debugged.

This third option depends on how you dimension variables. We'll discuss that in a later column.

Now it's time to write a short program and get some hands-on experience. With the new CoCo 3, it is going to be fun to measure just how much faster it is at the 1.7 MHz clock rate. There are lots of possible benchmark measures, but one that is generously documented is the *Sieve of Eratosthenes* program to calculate prime numbers. Versions of the program in various languages including C and PASCAL, along with execution times on various microcomputers were published in "Eratosthenes Revisited: Once More Through the Sieve," by Jim Gilbreath and Gary Gilbreath, Page 283, *Byte Magazine*, January 1983.

In BASIC09 system mode, type `e sieve`. This puts you into edit mode, ready to type in the program. You know you are in the editor because the B: prompt of system mode is replaced with an E: prompt. The cursor sits in the space after the colon. Chapter 4 of the BASIC09 manual gives a good description of how to use the editor.

The first character entered after the

E: prompt is the command character. BASIC09 source code may be line numbered or not. The ability to eliminate line numbers is one of the language's major strengths. A space typed at the control character position permits entry of any characters that follow as a string. When the ENTER key is pressed, BASIC09 attempts to compile the preceding string to a condensed form known as I code. If it can, all is well and the E: prompt returns for entry of the next line or a control character. If the line cannot be compiled, it is reprinted on the screen with an arrow pointing to the suspected error point along with an error message. At minimum, the message may look like this example from the manual: `01FC ERR #43`.

The 01FC is the number of bytes from the beginning of the procedure to the error that was interpreted to be #43.

To illustrate, let's do a step-by-step example. BASIC09 is loaded and we are at the B: prompt:

```
Basic09
ready
B:
```

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BITS AND BYTES OF BASIC

BASIC09 on the CoCo 3

By Richard A. White
Rainbow Contributing Editor

The new Color Computer 3 is here and it's what many of us had been waiting for in a new CoCo. As expected, Level II OS-9 is provided which can fully utilize a 512K machine. The Level II OS-9 package includes BASIC09 rather than an assembler and sells for a modest \$79.95.

While all software that runs on a CoCo 2 will run on the new machine (provided undocumented ROM calls are not used), these programs run in the CoCo 2 mode and do not use the enhancements in the CoCo 3. Current BASIC09 provides some graphics support for CoCo 2 modes. Level II BASIC09 is expected to support the new graphics modes. This, coupled with the fact that BASIC09 comes with Level II OS-9, should drastically increase its popularity. Up to now, there has been little incentive for the more casual user to buy BASIC09. The only available software for BASIC09 comes from the OS-9 Users Group. Because of the small group of owners, there has been no commercial BASIC09 software. This may change.

BASIC09 has always had major advantages over Extended Color BASIC. Two of these are speed and programming ease. Provided adequate graphics commands are available in the new version, it will be possible to write game programs that otherwise would need to be written in assembly language or C. This is not to say BASIC09 rivals machine language in speed; it doesn't. But it is much faster than Extended Color BASIC or, for that matter, GW-BASIC running

on MS-DOS machines. Couple this with the 1.7 MHz microprocessor speed, and all sorts of programming doors open.

In most respects, BASIC09 is a programmer's dream. First, it is very modular. Separate procedures may be saved separately and loaded as needed from the disk. When the procedure has been used and is no longer needed, it can be killed, freeing memory for other procedures.

Though the current BASIC09 editor is a line editor, it does do syntax checking as each line is entered. I will put up with a line editor just to get this feature. Further, other checks are made when you leave the edit mode. Forget a NEXT, for example, and you are told.

The Debug mode is another highly appreciated feature. The syntax and other program details may be correct and the darned thing still won't work. With Debug, you can single step through the program and really see what is happening.

In the February RAINBOW (Page 231), I talked about how to get set up to use BASIC09. Those instructions may not necessarily apply to the Level II version. Still, if you are just getting started with BASIC09, you may want to study that column. In March, I discussed what happens when you first get BASIC09 up and running (Page 226). I'm going to summarize some of that material, but you may want to read that article, too.

The BASIC09 distribution disk comes with four files. At minimum, two of these, basic09 and runb must be copied to the CMDS directory of your system disk. We'll worry about the other files later. With the CMDS as your execution directory, type EX BASIC09 #10K. BASIC09 loads and you are in its system mode. The #10K provides 10K bytes of workspace. If you don't do this, BASIC09

defaults to a 4K byte workspace of which a little over 1K is allocated for BASIC09's own use. You can change the workspace size from system mode. Type mem 10000 to get 10K bytes. Type mem and available workspace memory is displayed. Available memory for the workspace depends on which procedures are loaded when you boot OS-9. I can use as much as 14K and still have some memory left outside BASIC09 for loading and using disk-resident OS-9 utilities.

You can do a number of things in the system mode. Type e or edit, and a procedure name, and you enter the edit mode. This is the line editor which permits you to write a program module or edit one whose source code was loaded while you were in the system mode. Once you have entered and edited your program, you will want to run it to see if it works. While in edit mode, type q and press ENTER to return to system mode. Now you can type run and the procedure name to run the program. Note that in BASIC09, programs or program modules are called procedures.

Despite the syntax checking the editor does as you enter program lines and the checking done when you quit the editor, there may still be problems in your program. Some of these BASIC09 will find as the program runs. In this case, it puts you into Debug mode and displays the offending line along with an error message. If you have printerr in your boot and the file of error messages on your system disk, you get an error number and message. Otherwise, you get only an error number which you can look up in the BASIC09 manual. At this point, make sure you understand which line has offended BASIC09 and the type of error, and press ENTER to return to the system mode.

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS database management program.

HT=(RND(5026)+10):GOSUB HT

However, this always sends the computer back to Line 0. Hopefully there is a simple answer to this problem and I will feel foolish when I see it.

Kurt Hegle
Duluth, MN

I have seen the following lines in a few programs:

```
10 X=RND(10):IF X=0 THEN 10
20 ON R GOTO 30,40,50,60,70,80,
90,100,110,120
```

See if this method will work for you, Kurt.

• I have written a mailing list program which writes a disk file containing all the information. Since I own a CoCo that won't handle the speed-up poke, the program is extremely slow. I have been contemplating rewriting the program in machine language but I can't figure out what to do with the disk routine. The disk manual lists only one built-in subroutine and it doesn't tell me how to update the directory. How is the directory set up and how do I update it?

Blair G. Learn
Trafford, PA

It sounds like it would be simple, doesn't it Blair? Well, it's not. Communication between the CoCo and disk files is accomplished by the use of FCBs, or file control blocks of data. A description of how all of this works is beyond the scope of this column, but if you can follow an assembly listing of the machine code I would recommend *Disk BASIC Unraveled*, available from

Spectrum Projects. This book also explains how all of this works, but it's not for casual reading.

• I am interested in writing some assembly programs to access the disk drive directly without calling *DSKCON*. I have the addresses for the controller's registers, but I need the specifications for these registers. For example, I know that the status/command register is at \$FF48 but I don't know what the status bits represent. I know several of the commands, but I am looking for a complete list. I am hoping to write a CoCo-MS-DOS utility that would allow cross copying and formatting similar to the one published in *THE RAINBOW*.

David Fulmer
Herminie, PA

David, I would again suggest *Disk BASIC Unraveled*. It has an extensive explanation of the WD 1793 Floppy Disk Controller, including commands and the buffer addresses you mention.

• My printer requires receipt of an actual line feed character to perform this function. It cannot be derived from carriage return. Is there a poke or relatively simple software modification to cause the carriage return/line feed combination?

David Schoepf
Vicksburg, MS

We have printed a program for generating LF's several times in the *RAINBOW*. If you want to obtain a copy of the

program without looking through the back issues, try the BASIC database on Delphi. Look for a program called *LFCCR*, David, submitted by you-know-who. I use this program all the time.

• What are the advantages/disadvantages of a Multi-Pak versus a triple Y cable?

If I only have three ROM Paks, is there a reason why I should consider a Multi-Pak?

Philip Raleigh
Augusta, MI

If you are using ROM Paks, Philip, you have to have a Multi-Pak. ROM Paks have no address decoding scheme to distinguish where they are located in memory. Another way to state the same thing is that all ROM Paks are at the same memory address, \$C000. By using a Multi-Pak you select the one you want to use by enabling the chip select line for that particular slot. Some other hardware has address decoding circuitry, therefore a Multi-Pak is not necessary.

Your technical questions are welcomed. Please address them to: Downloads, *THE RAINBOW*, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG > prompt, pick DELPHI MAIL, then type SEND and address TO: DANDOWNARD. Be sure to include your complete name and address.

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DOWNLOADS

Extending Your BASIC ROM

By Dan Downard
Rainbow Technical Editor

• *A few months ago, one of my relatives bought a 16K CoCo 2 with standard Color BASIC. It was child's play to upgrade it to 64K, and I can easily buy an Extended BASIC ROM in Montreal. Do I only have to replace the chip or is there any jumper or soldering needed to complete the job?*

Alain Hetu
Montreal, Quebec

On the original Color Computer and most CoCo 2 models, Alain, the Extended BASIC ROM is a 24-pin chip that simply plugs into the empty socket next to the existing Color BASIC ROM. With this version, no jumper changes are necessary.

On a number of CoCo 2s manufactured in Korea, the existing Color BASIC 24-pin chip is installed in a 28-pin socket; to install Extended BASIC, you replace this chip with a different 28-pin device that contains both Color BASIC and Extended BASIC. In addition, several jumper wires (marked 64K next to the wire and 128K near an adjacent hole) will have to be changed so that the 128K side is connected to the center hole.

Check your machine before buying a ROM to install in it, and make sure the dealer sells you the right chip for your version of the CoCo.

Dan Downard is an electrical engineer and has been involved in electronics for 27 years through Ham radio (K4KWT). His interest in computers began about eight years ago and he has built several 68XX systems.

• *I am working on a BBS program right now and was wondering how to make the user's screen clear in this program. I know it is a type of character code but I don't know what the code is.*

Steve Slack
Bear, DE

It depends on what type of terminal software the BBS user has, Steve. Normally an escape sequence is used by most modern terminal emulation software to clear the screen and home the cursor. Unless your BBS has the capability of customizing the user in terms of his terminal type, I wouldn't even try to send a clear screen code.

• *I have an Adds-Regent-200 Terminal. Is there any way to use the monitor with my CoCo? The Regent monitor uses separate horizontal, vertical and video inputs. Could it be interfaced with the RS-232 I/O?*

John G. Wood
Schenectady, NY

John, there are two ways to use the terminal, but you can't use just the monitor. The *Remote2* program in this issue of the RAINBOW permits operation of your CoCo from a remote terminal.

Another way to accomplish this task is by using the multi-user features of OS-9. OS-9 has the ability to be shared by a remote terminal either through the serial I/O input on the rear of your CoCo, or by use of an RS-232 Pak.

• *I'm attempting to start a new BBS in San Diego and Denver for the Color Computer. The problem is that I can't find an I/O driver for a BASIC program. If you can help me at all I would really appreciate it.*

Matthew Lemons
San Diego, CA

Matthew, the *Remote2* program mentioned in the previous letter will also solve your problem, and for the price of your RAINBOW magazine.

• *I am using a 64K Color Computer in Mexico City which is at an altitude of 7,250 feet above sea level. In the environmental specifications for the CoCo it says: altitude -100 to 6,000 feet above sea level. Why? Will I have any problems? So far it's working just fine.*

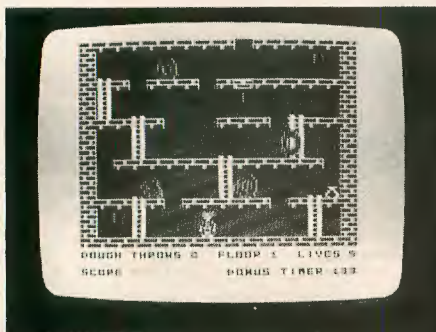
A. Bromberg
Mexico City, Mexico

I am sure your CoCo will work fine in Mexico City, but I do not know the reason for the altitude limitation. I'm sure we have someone reading the column who can satisfy our curiosity, though.

• *I am writing a program in which I would like to GOSUB a random choice of lines between 11 and 5036. Here is how I am attempting to do this:*

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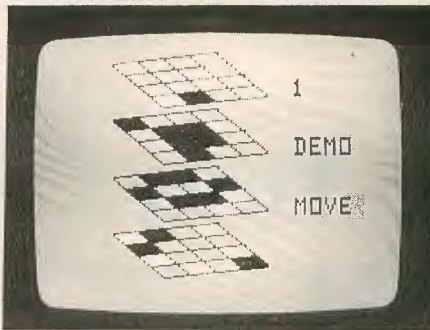
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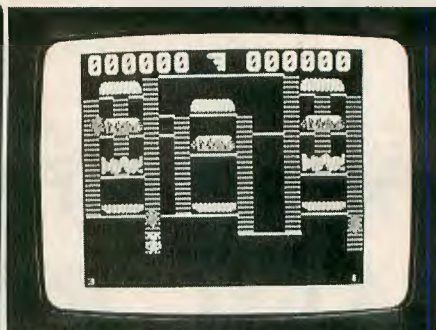


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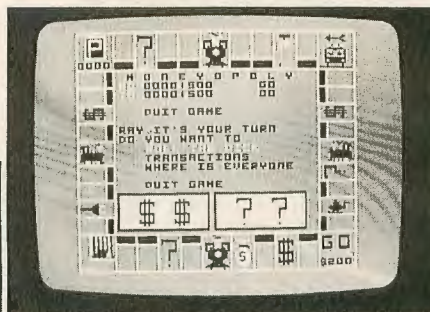
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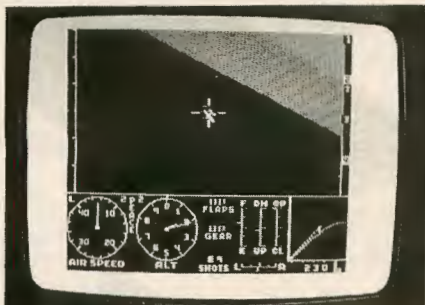
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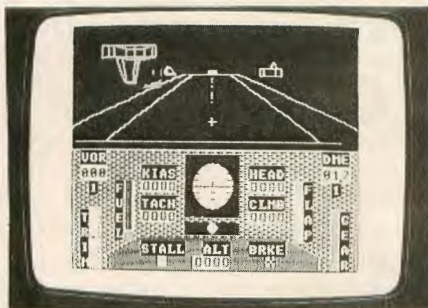
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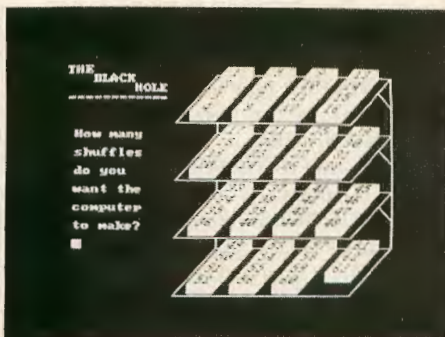
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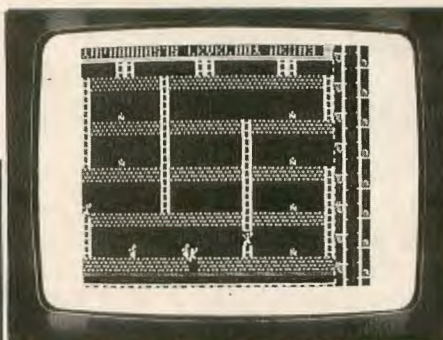
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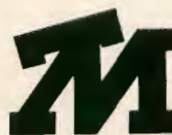
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● *I have a CoCo 1 (Catalog No. 26-3003) I have upgraded to 64K. I cannot get the high-speed poke (POKE 65495,0) to work.*

*Ronald J. Hauck
Hilton, NY*

Neither the CoCo 1 nor 2 was designed to run with either high-speed poke. The chips on the board and the layout of those chips and their support circuitry were not designed for reliable operation at those speeds. It is true that some CoCo 1s and most CoCo 2s do appear to run faster after the high-speed poke, but I recommend never using it for any serious computing. All models of CoCo 1 computers are less likely to even appear to run properly at higher speeds because of RFI "smog-control" capacitors on the 'E' and 'Q' clock that distort the clock signals. These capacitors are best yanked out in the interests of cleaner operation at the normal speed. On your 'F' or "NC" board revision model of CoCo, this means cutting out C36 and C37 (both small 56 pF [picofarad] disk capacitors). On earlier 'D' and 'E' board CoCo 1 models, these are numbered C73 and C75. While you are at it, I suggest you cut out C30 (also a 56 pF capacitor). On 'D' and 'E' board CoCo 1s that means cutting out C86 (a 220 pF capacitor).

The CoCo 3 was designed from the start to properly operate at full double speed.

● *I am attempting to use my CoCo as a terminal for my IBM PC compatible. I use the MODE command and changed consoles to COM1 using MS-DOS' CTTY command. I am using VIP Term on my CoCo, but I cannot get this to work. I suspect a problem in the way I wired my null modem cable.*

*Bruce Bell
Rockmart, GA*

● *I am trying to use Deskmate's Telecom to transfer data between my CoCo and my Tandy Model 100. I can get keypresses on the M 100 to display on the CoCo screen but not the other way around. I also tried using the software in my RS-232 Program Pak for my CoCo, but had the same problem. Can you help?*

*Graeme Mead
Kuala Belait, Brunei*

I own both a Model 100 and an IBM PC XT-compatible, and I, too, had problems getting my CoCo to talk properly to them. I use the PBJ 2SP dual RS-232 Pak and *Mikeyterm* on my CoCo, and use *PROCOM* on my PC compatible and either normal Telecom or Telecom enhanced by Sigea System's *XTEL* on my Model 100. The solution to my cable problem involved arranging for proper handshaking on the RS-232 control line(s). Those using PBJ 2SP-Pak or the bit-banger port itself should use the following cable:

CoCo bit banger or PBJ 2SP port four-pin DIN connector	Model 100 or PC compatible DB25 connector
Pin 1 (carrier detect)	Pins 6, 8 and 20 (short those pins and hook them to Pin 1 of CoCo)
Pin 2 (RD)	Pin 2 (TD)
Pin 3 (gnd)	Pin 7 (gnd)
Pin 4 (TD)	Pin 3 (RD)

In addition, on the DB25 connector that plugs into the M 100 or PC compatible, short Pin 4 to Pin 5.

If you are using an RS-232 Pak, the needed null modem connector will have DB25 connectors at both ends:

CoCo RS-232 Pak DB25 connector	PC Compatible or M 100 DB25 connector
Pin 2 (TD)	Pin 3 (RD)
Pin 3 (RD)	Pin 2 (TD)
Pin 7 (gnd)	Pin 7 (gnd)
Short together pins 5, 6 and 8 of CoCo RS-232 Pak DB25 connector	Short together pins 4 and 5, and short pins 6, 8 and 20 of the M 100 or PC compatible connector.

(On the PC compatible, pins 4 and 5 are not connected to pins 6, 8 and 20.)

In general, the problem Mr. Mead described is one in which the DCD or DSR line going to the UART of the RS-232 Pak is not properly activated, causing the transmitter part of the UART to shut down. Shorting the pins as I described should tie those lines high and allow proper functioning of the RS-232 Pak, for Pin 5 of that pack is internally tied high (active). Note there

is no such thing as an "all purpose" null modem connector. Such a connector must always be tailored to the idiosyncracies of the particular implementation of the RS-232 lines of the machines being used.

● *I just looked inside my CoCo 2 (Catalog No. 3134A) 16K Color BASIC (non-Extended) computer, preparing to upgrade it to 64K using two 4464 DRAM chips. I saw five jumpers near the ROM socket (four above it and one to the side of it) labeled 128K/64K. Does this mean I can upgrade my CoCo 2 to 128K?*

*Greg Vargo
Oklahoma City, OK*

Those five jumpers have nothing to do with the RAM memory of your computer, which cannot be upgraded beyond 64K. Rather, they relate to the number of bits in the ROM chip used for the BASIC operating system. They are provided to allow upgrading from Standard Color BASIC to Extended Color BASIC. Previously, such an upgrade consisted of adding an extra 24-pin, 8K-by-8 Extended BASIC ROM. This ROM had a total of 64K bits of data on it. On your model of computer, however, the upgrade to Extended Color BASIC consists of removing the old 64K, 24-pin ROM chip, moving all five of those jumpers to the 128K position, and inserting a 28-pin, 128K ROM chip (\$40, Catalog No. 26-3018). You will have to use a wire cutter and soldering iron to move those five jumpers.

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

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

For quicker response time, your questions may also be posted in the FORUM section of RAINBOW's CoCo SIG on Delphi. In FORUM, type ADD and address your questions to the username MARTYGOODMAN. Marty is on most every evening to respond to FORUM messages. Other CoCo SIG members may also reply to questions posted in this public message area. Please be sure to leave your name and address in any FORUM questions, since those of wide interest will be selected for publication in this column.

Memory Expansion Magic

By Marty Goodman
Rainbow Contributing Editor

• *While upgrading a CoCo 2 (Catalog No. 26-3134B) from 16K to 64K, I noticed board pads for eight 4164 (64K by 1) chips and sockets for two 4464 (64K by 4) chips. Can memory be increased either way or can both be added for 128K with switching?*

I am interested in upgrading my CoCo to 128K using the Polycom board. Is this feasible?

*Phil Creasy
Hermitage, PA*

I have seen the board you refer to. The CoCo 2 in question was *not* designed to be upgraded to more than 64K by Radio Shack. The upgrade using two 4464 chips is by far the preferred approach.

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

All 128K CoCo 1 or CoCo 2 upgrades are obsolete. The only memory upgrades to even consider are the 256K and 512K upgrades. Of these, the two to consider are the J&R Banker and the Disto RAM Disk Card, both advertised in RAINBOW. The J&R Banker has the advantage of not requiring a multipack, but unless you make a correction in its design (outlined in a file on Delphi in the hardware hacking topic area) it causes incompatibilities with existing software. It is installed inside the CoCo and requires some electronic ability. The Disto RAM card requires a multipack and is less flexible than the J&R Banker in that video memory cannot be addressed to it and access is slower. However, it will work with all models of CoCo, including the CoCo 3, and it can be upgraded to 512K or even to one megabyte. Installation is easy, just plug it into the multipack.

Neither upgrade works well as a RAM disk under Disk BASIC, but both work excellently as a RAM Disk under OS-9.

• *I want to offset load an ML program to an address in memory below the address it normally goes to. The Disk BASIC Manual only tells me how to offset load it to an address above where it normally goes. Can you help me?*

Andrew Elliner (CROPPER,

The offset load address works in groups of 65,536 address locations (Modulo Hex 10000). That is, if you have an ML program that normally loads starting at Hex 8000 and you want to load it in starting at Hex 4000, type `LOADM "filename",&HC000`. As another example, if you saved your Disk BASIC ROM to disk using `SAVEM "ROM", &HC000,&H0FFF,&HA027`, and now want to load it into memory starting at Hex 3000 in RAM, just type `LOADM "ROM", &H7000`. In general, to offset load an ML file that normally loads in at Address S to Address N (where N is smaller than S), type: `LOADM "filename", (65536-S)+N`

```

Ø329          ENDIF
Ø32B          NEXT count
Ø336          erase=1
Ø33D          ENDLOOP
Ø341          REM *
Ø345          REM * this subroutine uses an input value
Ø36D          REM * of Ø to 6Ø to draw a hand on the clock
Ø398          REM * at the Ø to 36Ø degree positions
Ø3BD          REM *
Ø3C1 1Ø      angle=36Ø/6Ø*lasttime(count)
Ø3D6          IF count=3 THEN
Ø3E2          radius=12Ø
Ø3E9          ELSE
Ø3ED          radius=16Ø
Ø3F4          ENDIF
Ø3F6          x2=x1+SIN(angle)*radius
Ø4ØB          y2=y1-COS(angle)*(radius/2)
Ø423          RUN gfx2("line",x1,y1,x2,y2)
Ø443          RETURN

```

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

- Use 64k of RAM for program storage and/or variables
- Full Floating Point arithmetic expressions with functions
- Full sequential and direct access disk files allowed
- BASIC source and M.L. output I/O to disk, tape or memory
- Many new commands that expand your programming capability

Commands Supported

1. I/O -Commands
CLOSE CLOAD CSAVEN DIR DRIVE DSKIS DSKOS FIELD FILES
GET INPUT KILL LSET OPEN PRINT PUT RSET USING
2. Program Control Commands
CALL END EXEC FOR STEP NEXT GOSUB GOTO IF
THEN ELSE ERROR ON..GO RETURN STOP SUBROUTINE
3. Math Functions
ABS ASC ATN COS CVN EOF EXP FIX INSTR
INT LEN LOG LOC LOF PEEK POINT PPOINT RND
SGN SIN SQR TAN TIMER VAL
4. String Functions
CHR\$ INKEY\$ LEFT\$ MID\$ MKNS RIGHTS STR\$ STRINGS
5. Graphic/Sound Commands
COLOR CLS CIRCLE DRAW LINE PAINT PCLEAR PCLS PLAY
PMODE PRESET PSET RESET SCREEN SET SOUND
6. Other/Special Commands
DATA DIM LLIST MOTOR POKE READ REM RESTORE RUN
TAB VERIFY DLD DST IBSHFT LREG PCOPY PMODD PTV
REAL SREG SWP VECTD VECTI

Compiled Program Speed (Time in minutes:seconds)

Program	Interpreter	MLBASIC
Eratosthenes Sieve	6:58.7	0:06.3
Matrix Fill, Mult, Sum		
10x10	0:30.9	0:02.5
String Manipulation	6:22.5	2:17.7
Floating Point	0:32.6	0:30.6
Disk I/O		
(2000 PRINT/INPUTS)	2:21.5	0:27.6



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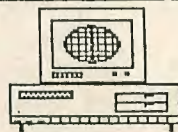
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Listing 4: clock4

```

0000      REM *
0004      REM * clock4
000F      REM * run the clock
0021      REM *
0025      REM * define the variables to use
0045      REM *
0049      DIM x1,y1,x2,y2:INTEGER
005C      DIM count,erase,radius,angle:INTEGER
006F      DIM time(3),lasttime(3):INTEGER
0084      DIM gettime:STRING
008B      REM *
008F      REM * initialize the variables
00AC      REM *
00B0      x1=320
00B8      y1=95
00BF      erase=0
00C6      DEG
00C8      REM *
00CC      REM * set the drawing color to "cyan"
00F0      REM * and the drawing mode to "XOR,"
0113      REM * producing "red" hands on the
0134      REM * white portion of the clock face
0158      REM *
015C      SHELL "display lb 32 06"
0170      SHELL "display lb 2f 03"
0184      REM *
0188      REM * this is the actual time-keeping
01AC      REM * loop
01B5      REM *
01B9      REM *
01BD      REM * wait for the time to change
01DD      REM *
01E1      LOOP
01E3          WHILE DATE$=gettime DO
01EE              ENDWHILE
01F2              REM *
01F6              REM * get the time, convert to integer, and save in time array
0233              REM *
0237              gettime=DATE$
023D              time(1)=VAL(MID$(gettime,16,2))
024F              time(2)=VAL(MID$(gettime,13,2))
0261              time(3)=5*VAL(MID$(gettime,10,2))+time(2)/12
0281              REM *
0285              REM * determine whether hours, minutes and/or
02B1              REM * seconds changed, if so, redraw the hand
02DD              REM *
02E1              FOR count=1 TO 3
02F1                  IF time(count)<>lasttime(count) THEN
0304                      IF erase<>0 THEN
0310                          GOSUB 10
0314                      ENDIF
0316                      lasttime(count)=time(count)
0325                      GOSUB 10

```



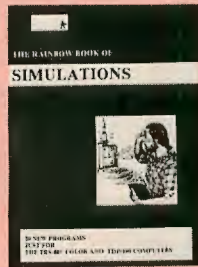
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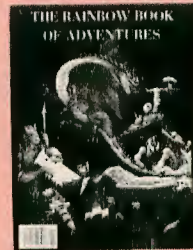
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Listing 3: clock3

```
0000 REM *
0004 REM * clock3
000F REM * draw the hour numbers
0029 REM *
002D REM * define the variables to use
004D REM *
0051 DIM x1,y1,x2,y2,a:INTEGER
0068 REM *
006C REM * set drawing mode to "store"
008C REM *
0090 SHELL "display lb 2f 00"
00A4 REM *
00A8 REM * set the foreground color to "black"
00D0 REM *
00D4 SHELL "display lb 32 00"
00E8 REM *
00EC REM * the following data statements
010E REM * define the roman numerals for
0130 REM * the 3, 6, 9 and 12 o'clock
014F REM * positions
015D REM *
0161 DATA 296,16,312,32
0173 DATA 312,16,296,32
0185 DATA 320,16,320,32
0197 DATA 336,16,336,32
01A9 DATA 292,16,340,16
01BB DATA 292,32,340,32
01CD DATA 440,87,480,87
01DF DATA 440,103,480,103
01F1 DATA 444,87,444,103
0203 DATA 460,87,460,103
0215 DATA 476,87,476,103
0227 DATA 300,159,332,159
0239 DATA 300,175,332,175
024B DATA 304,159,312,175
025D DATA 312,175,320,159
026F DATA 328,159,328,175
0281 DATA 160,87,192,87
0291 DATA 160,103,192,103
02A1 DATA 164,87,164,103
02B1 DATA 172,87,188,103
02C1 DATA 172,103,188,87
02D1 REM *
02D5 REM * start drawing
02E7 REM *
02EB FOR a=1 TO 21
02FB READ x1,y1,x2,y2
030C RUN gfx2("line",x1,y1,x2,y2)
032C NEXT a
0337 REM *
033B REM * finished, "chain" to run
0358 REM *
035C CHAIN "ex basic09 clock4"
```

```

0592      SHELL "display lb 40 00 c9 00 5f"
05AF      SHELL "display lb 4a 01 b7 00 9d"
05CC      REM *
05D0      REM * finished with the background,
05F2      REM * "chain" to the ticker
060C      REM *
0610      CHAIN "ex basic09 clock2"

```

Listing 2: clock2

```

0000      REM *
0004      REM * clock2
000F      REM * draw the tick marks around the face
0037      REM *
003B      REM * define the variables to use
005B      REM *
005F      DIM angle,color,x1,y1,x2,y2,x3,y3,a,b:INTEGER
008A      REM *
008E      REM * initialize the variables
00AB      REM *
00AF      x1=320
00B7      y1=95
00BE      color=1
00C5      DEG
00C7      REM *
00CB      REM * set the drawing mode to "XOR"
00ED      REM *
00F1      SHELL "display lb 2f 03"
0105      REM *
0109      REM * draw the ticks
011C      REM *
0120      FOR a=0 TO 11
0130          FOR b=0 TO 4
0140              angle=a*30+b*6
0152              x2=SIN(angle)*191
0161              y2=COS(angle)*95
0170              IF b=0 THEN
017C                  x3=SIN(angle)*165
018B                  y3=COS(angle)*82
019A              ELSE
019E                  x3=SIN(angle)*175
01AD                  y3=COS(angle)*87
01BC              ENDIF
01BE              color=color+1
01C9              IF color=8 THEN
01D5                  color=1
01DC              ENDIF
01DE              RUN gfx2("color",color)
01F0              RUN gfx2("line",x1+x2,y1-y2,x1+x3,y1-y3)
021C          NEXT b
0227      NEXT a
0232      REM *
0236      REM * end of ticker, "chain" to numbers
025C      REM *
0260      CHAIN "ex basic09 clock3"

```


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```

026B    REM * for the next circle
0283    REM * circle 1
0290    REM *
0294    SHELL "display lb 50 00 bf"
02AB    SHELL "display lb 4f"
02BC    SHELL "display lb 32 06"
02D0    REM *
02D4    REM * circle 2
02E1    REM *
02E5    SHELL "display lb 50 00 77"
02FC    SHELL "display lb 4f"
030D    SHELL "display lb 32 05"
0321    REM *
0325    REM * circle 3
0332    REM *
0336    SHELL "display lb 50 00 66"
034D    SHELL "display lb 4f"
035E    SHELL "display lb 32 04"
0372    REM *
0376    REM * circle 4
0383    REM *
0387    SHELL "display lb 50 00 55"
039E    SHELL "display lb 4f"
03AF    SHELL "display lb 32 03"
03C3    REM *
03C7    REM * circle 5
03D4    REM *
03D8    SHELL "display lb 50 00 44"
03EF    SHELL "display lb 4f"
0400    SHELL "display lb 32 02"
0414    REM *
0418    REM * circle 6
0425    REM *
0429    SHELL "display lb 50 00 33"
0440    SHELL "display lb 4f"
0451    SHELL "display lb 32 01"
0465    REM *
0469    REM * circle 7
0476    REM *
047A    SHELL "display lb 50 00 22"
0491    SHELL "display lb 4f"
04A2    SHELL "display lb 32 00"
04B6    REM *
04BA    REM * circle 8
04C7    REM *
04CB    SHELL "display lb 50 00 11"
04E2    SHELL "display lb 4f"
04F3    SHELL "display lb 32 07"
0507    REM *
050B    REM * this section draws a white "bar"
0530    REM * over the bottom half of all the
0554    REM * circles, leaving the upper half as
057B    REM * the "rainbow."
058E    REM *

```

Editor's Note: To modify these routines for operation on a 128K CoCo 3, follow these steps:

- 1) Delete the merge and shell lines from *window1* and do not use the procedure file to create window 1 yet.
- 2) Start BASIC09 and enter the listings. On *clock1*, *clock2* and *clock3*, however, do not enter the chain command lines which appear at the end of each of these listings.
- 3) Use pack to place each of the four clock listings in your CMDS directory.
- 4) Type `chd/d0/cmds` and press ENTER. Then enter the following command line:

```
merge clock1 clock2 clock3
clock4 runb>/d0/clocks ENTER
```

Then type `chd/d0` and press ENTER.

- 5) Enter the following command line:

```
attr /d0/clocks r e w pr pe pw ENTER
```

- 6) Type `window1` and press ENTER to create window 1.
- 7) Enter `load /d0/clocks` and then enter the following commands while still in the normal window:

```
clock1>/w1 ENTER
clock2>/w1 ENTER
clock3>/w1 ENTER
clock4>/w1& ENTER
```

- 8) Now you may use the CLEAR key to enjoy your CoCo clock. Keep in mind, because of the graphics memory requirements, you will not have any working memory left while the clock is running.

Listing 1: clock1

```
0000 REM *****
0021 REM * RainbowTime
0031 REM *
0035 REM * Programmed by Greg L. Zumwalt
0057 REM *
005B REM *****
007C REM *
0080 REM * clock1
008B REM * draw the clock face background
00AE REM *
00B2 REM * set the drawing mode to "store"
00D6 REM *
00DA SHELL "display lb 2f 00"
00EE REM *
00F2 REM * set the foreground color to "white"
011A REM *
011E SHELL "display lb 32 07"
0132 REM *
0136 REM * set the background color to "blue"
015D REM *
0161 SHELL "display lb 33 04"
0175 REM *
0179 REM * clear the screen
018E REM *
0192 SHELL "display 0c"
01A0 REM *
01A4 REM * place the draw pointer in the center of the screen
01DB REM *
01DF SHELL "display lb 40 01 40 00 5f"
01FC REM *
0200 REM * the following "circle" sequences
0225 REM * draw a circle, then fill it,
0246 REM * then change the foreground color
```

RainbowTime to run; eliminating them will save typing time). After you enter the last line, type:

q

This puts you back in the BASIC09 command mode. Continue by typing:

```
save  
kill
```

The *clock1* program is now on the disk, and BASIC09 is ready for *clock2*. Follow the same procedure for entering the *clock2*, *clock3* and *clock4* programs substituting *clock2*, *clock3* and *clock4* as the name of the program to edit.

Running *RainbowTime*

Now that the four *RainbowTime* programs have been entered and saved on the disk, we start the clock by typing in the following:

```
kill  
load clock1  
run
```

You see the clock being built, one section at a time, and as one program chains to the next, you see the name of the next program appear on the screen. When *clock4* begins, three hands appear (hours, minutes and seconds) with the second hand moving as each second passes.

Each of the four *RainbowTime* programs use OS-9 Level II graphics commands in drawing the various parts of the clock. As you can see in the program listings, there are a variety of methods available to send these commands (SHELL, PRINT CHR\$, etc). The *RainbowTime* programs intentionally use the various methods for the purpose of illustration. Examine each method carefully, as each has its own advantages and disadvantages.

The clock face is created by the programs *clock1*, *clock2* and *clock3*.

Clock1 starts the drawing of the clock face by setting the screen background to blue, drawing a white circle, then filling it. It then draws seven smaller concentric circles, filling each in a different color. Finally, the BAR command is used to erase the lower half of the seven smaller circles, leaving the upper half as the rainbow. Notice that *clock1* uses SHELL "display . . ." to send graphic commands. *Clock1* finishes by performing the chain to *clock2*.

Clock2 draws the tick marks on the

clock face. After initialization, a dual FOR/NEXT loop is entered. The two loops draw four short tick marks and one long tick mark (for the hours) around the outside edge of the clock face, 12 times. Notice that *clock2* uses the command RUN GFX2 to set the foreground color and draw the tick mark lines. This method of issuing graphic commands uses the BASIC09 graphics interface module GFX2. The end result is the same; however, the GFX2 method requires the GFX2 module in memory, thus leaving less for your programs. *Clock2* finishes by performing the chain to *clock3*.

Clock3 draws Roman numerals at the 3, 6, 9 and 12 o'clock positions using LINE DRAW commands. The data statements contain the starting and ending points for each line in each Roman numeral. A FOR/NEXT loop reads the data statements and sends them to GFX2 as line drawing commands. *Clock3* finishes by performing the chain to *clock4*.

Time Keeping for *RainbowTime*

Clock4 is the run time program of *RainbowTime*. After declaring and initializing variables and setting up for screen drawing, a loop is entered that performs the time keeping function.

The WHILE statement waits for the time to change by comparing the time with the string variable GETTIME. If the current time is different from GETTIME, the current time is copied to GETTIME and a conversion process from string to integer begins.

The integer time is saved in the three-element array, TIME. The three elements in the array represent seconds, minutes and hours, respectively. The seconds and minutes are simply converted from string to integer. However, the hours are modified. The hours are first multiplied by five to place them in the range of five to 60, like the seconds and minutes (this is so the hand drawing subroutine at Line 10 can use the same equation for determining where the hands should point). Then, the value (minutes/12) is added to hours. This gives the hour hand five distinct positions between the hours tick marks.

The time array is then compared element by element with a second three-element array, LASTTIME. If a difference is found, the hand associated with the difference (seconds, minutes and/or hours) is erased from the LASTTIME position and drawn at the LASTTIME = TIME position.

The subroutine at Line 10 converts the zero to 60 value passed to it in the LASTTIME(COUNT) element to the zero to 360 degree angle, ANGLE. ANGLE, using the BASIC09 SIN and COS functions, defines the X and Y endpoints (X2 and Y2) of the clock hand using radius as the vector length. The origin of the hand (X1 and Y1) is always in the center of the clock. Note that radius is set to 120 if COUNT equals three, otherwise it is set to 160. (When COUNT equals three, the hours variable is being redrawn, so the hand is shorter.)

So there you have it — *RainbowTime*. What if you decide it would be nice to have *RainbowTime* on the screen while you work on other programs in another window, but on the same screen? Well, this requires a scaled down version of *RainbowTime*, designed for a smaller window.

What? You don't want to type in the entire program again changing each and every data value? I don't blame you. Refiguring all of those values for a smaller window would take hours!

Well, relax, OS-9 Level II and the windowing system come to the rescue. The windowing system's scaling mathematics convert the 640-by-192 screen coordinates of *RainbowTime* into whatever size window you define, automatically! Whenever you design a program that generates graphics, always base the graphic coordinates on the 640-by-192 screen size. Then, OS-9 will properly scale the coordinates for any size window your program is run on.

Experiment With *RainbowTime*

I hope you enjoy *RainbowTime*. It was designed to illustrate the use of a wide variety of the OS-9 Level II graphics commands.

Try running *RainbowTime* on a different size window, or even a different graphics screen type. Experiment with the colors and the color palette. Try adding the remaining hour numbers. Add an alarm function by comparing GETTIME with a date/time string the user can enter.

Remember, *RainbowTime* is running as one task on a multi-tasking computer system. This means that *RainbowTime* can run while you do other programming. By experimenting, you will see how easy it is to create your own powerful multi-tasking environment using Microware's OS-9 Level II, BASIC09, windows and graphics on the Tandy CoCo 3. □

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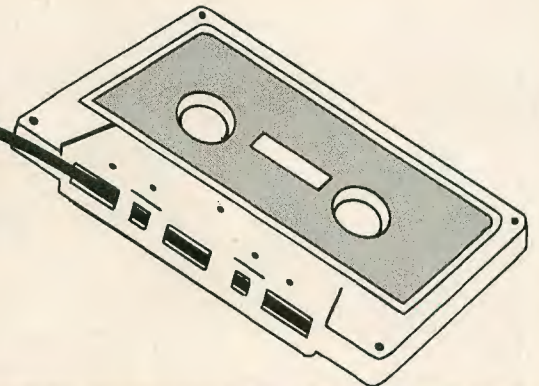
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Programs from Our Past Telecommunications Issues:

November 1985 — *Computer Trapshooting*, a game that simulates the real-life sport of skeet shooting; *XFER16*, a communications program for transferring files over telephone lines; *C-QLS*, a Ham utility that logs entries and writes out QSL cards; *Remote2*, an enhanced version of *Remote*, a remote terminal driver published in the November 1983 Communications Issue; *Horse*, a two-player Simulation of the popular basketball game; *CoBBS*, part one of a complete bulletin board system; *Screen Pokes Made Easy*, several programming utilities that demonstrate how to hide credit lines in poke statements; *Little Black Book*, a personalized phone and address directory; *Coax*, a Ham utility that determines the various factors related to transmission line loss; *BASIC Training*, creates jargon from Latin prefixes, roots and suffixes; and *Education Notes*, demonstrates the uses of Radio Shack's Electronic Learning Book and a number-matching game for preschoolers.

November 1984 — *EZ List*, a utility that allows the use of arrow keys to list program lines one at a time; *The Message Center*, a bulletin board for saving and displaying messages at home; *Road Race*, a game for racing fans in which you must finish a given driving course without blowing your engine; *Rain-Board*, programs to help set up a BBS; *CC-Talk*, a smart terminal package; *Junkfood*, a game in which you eat all the "edible" foods to gain points; *Handler*, the first of three parts on disk file organization; *CLOAD Command Fixer*, a tape utility that searches for the end of a file; *Personal Savings*, a personal savings and loan calculation program; and *DosStart*, a disk utility to store a BASIC command in Drive 0 and have it executed by typing DOS.

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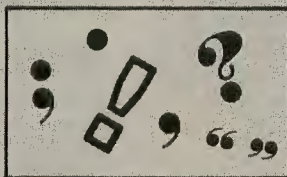


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Living on Rainbow Time

By Greg L. Zumwalt

I have been using the CoCo 3 for quite some time now. I must say, my enthusiasm for this machine hasn't waned a bit. I've seen a variety of benchmarks comparing machine X with machine Y using "mflops," "FFTs," etc. Well, I've got my own benchmark for computers that reads: The power of a computer is directly proportional to the length of time it holds my attention.

And that's the reason for *RainbowTime*. *RainbowTime* is a real-time analog clock that remains on the CoCo 3 screen while I work (to remind me that after 12-14 hours of CoCo 3 experimenting, its time to sleep).

In our previous window discussion, "The Color Computer 3 Does Windows, and More" (September 1986, Page 20), we created examples of windows using text only output. This time, we'll put the CoCo 3 into high gear and experiment with the graphics displays.

OS-9 Level II Graphics

The OS-9 Level II windowing system supports six screen types summarized in Figure 1.

Using the DWSET command (the "create a device window" command), the user has the choice of any of the six available screen types.

Notice that screens five, six, seven and eight are graphics screens. In our last discussion on windows, we used Screen 7, a graphics screen, as a text display by merging a graphics character set with it. This time, we're using Screen 8, again merged with a character set, but also including the use of some of the OS-9 Level II graphics commands.

BASIC09 and Chains

RainbowTime is written as four separate BASIC09 programs. The first three build the "static" portion of the clock; the last is the running portion. Each program performs a specific task, and when finished, calls the next. This process continues until the fourth program is called and the clock begins running.

In BASIC09, the process of calling programs in this manner is called chaining. The advantage of chaining is that when a program has completed its task, it can be erased, and the next program loaded in its place. In our example, once the clock face has been created, the programs that created it are no longer required. By using chaining, these programs are removed from memory, leaving more memory for other tasks.

Getting Started

We need to create a type eight device window. Remember the OS-9 build command? We will use it to build a procedure file to create the window. At the OS-9 prompt, enter the following:

```
build window1
inix w1
merge sys/stdfonts >/w1
display 1b 20 08 00 00 28 18 07
00 00 >/w1
shell i=/w1&
```

After the last line, press ENTER twice. When the OS-9 prompt appears, continue by typing:

```
window1
```

When the OS-9 prompt appears this time, press the CLEAR key, and Device Window type eight appears on the screen. We are now ready for BASIC09.

The four BASIC09 programs that create *RainbowTime* are entered and saved on the disk individually. To do this, we must first enter BASIC09. From the OS-9 prompt on Window 1 type:

```
basic09 #12k
```

This loads BASIC09 into the CoCo 3 and allocates 12,000 bytes of memory for us to use.

Now we will enter the *clock1* program. At the BASIC09 prompt on Window 1 type:

```
e clock1
```

This tells BASIC09 the name of the program to edit, *clock1*. BASIC09 responds with a PROCEDURE *clock1* followed by the BASIC09 edit prompt. Proceed from here by carefully typing in the *clock1* program shown in Listing 1 (the programs contain many REM statements that are not necessary for

Number	Size	Color	Memory	Type
01	40 by 24	8 & 8	1600	Text
02	80 by 24	8 & 8	4000	Text
05	640 by 192	2	16000	Graphics
06	320 by 192	4	16000	Graphics
07	640 by 192	4	32000	Graphics
08	320 by 192	16	32000	Graphics

Figure 1: Screen Types

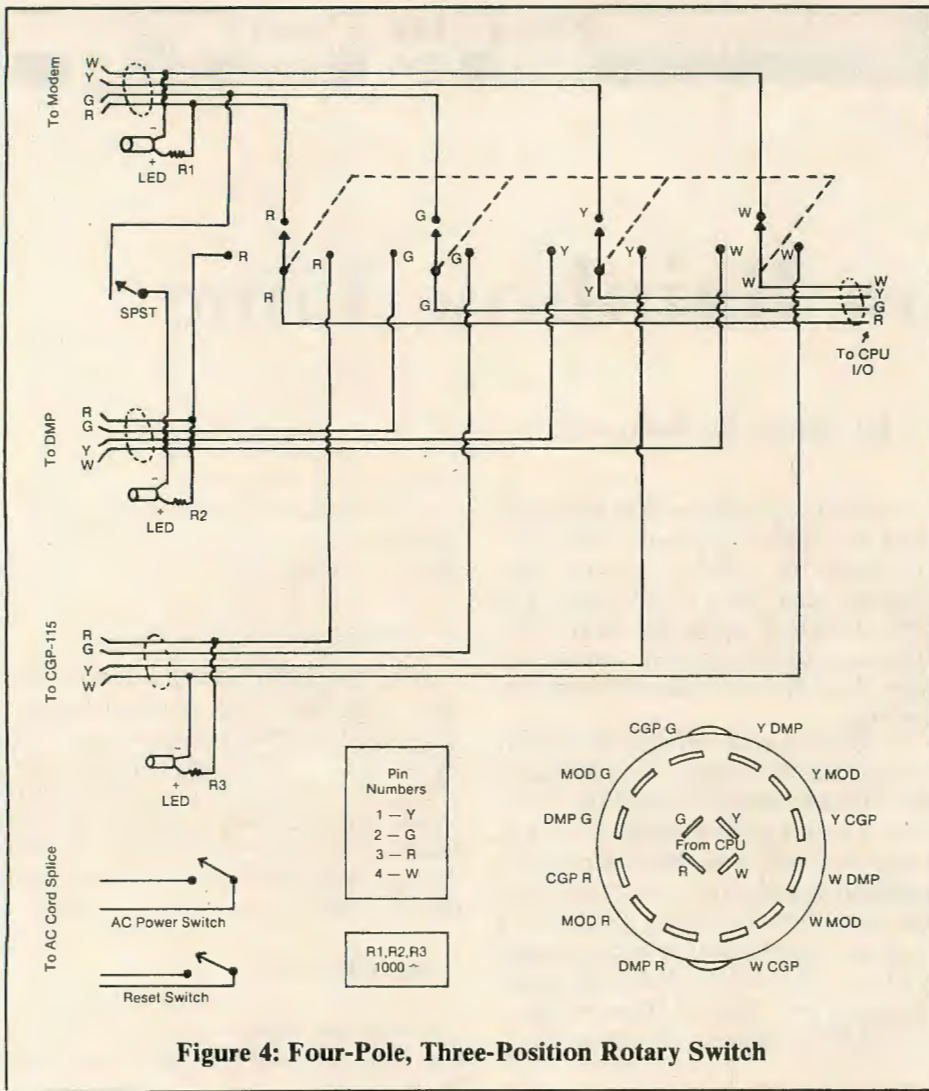


Figure 4: Four-Pole, Three-Position Rotary Switch

computer again, so I figured out another way to connect the A/C on/off switch. I opened up one lead of the power cord and, using "wire nuts,"

spliced the leads from the remote reset switch to the internal

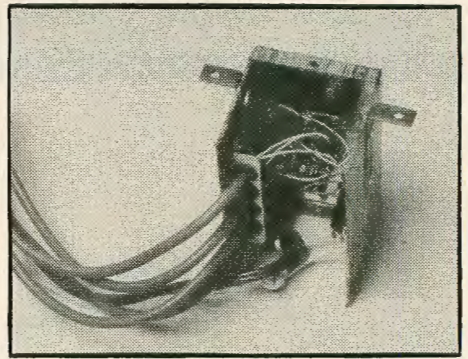


Figure 3

Reset switch. These can be seen in Figure 2.

The cables I used are serial printer and modem interface cables, Radio Shack part number 26-3020. For my purposes, cutting two cables gave me the required four needed to interconnect the two printers and the modem to the CPU. Figure 3 shows an inside view of the completed switcher.

Finally, I dressed up the box with some scraps of the contact paper I used when I built my computer table, which blends it in and gives it a finished appearance.

I haven't been using this device too long; however, I can already say that I wish I had built it sooner because it's a real convenience. In particular, I like having the A/C power and Reset switches located where they are easy to reach.

(Questions about this project may be directed to the author at 8350 East McKellips Road, Apt. 111, Scottsdale, AZ 85257. Please enclose an SASE for a reply.)



The Super Switcher

By Robert C. Merryman

This device incorporates several features which, individually, have been described in the past, but not in this combination or format. Collectively, they are very useful in conjunction with the CoCo.

It started out as a simple switching device consisting of a four-pole, three-position rotary switch and a 2 by 2 by 2¼ inch mini-box built to switch the computer serial I/O port between my modem and CGP-115 graphics printer. Later, when I acquired a dot-matrix printer, it became necessary to switch three peripherals.

Then an article was published in THE RAINBOW (October 1984) which described how to connect the modem and printer by a switch, so what was fed into the computer from the modem would also drive the printer making a hard copy of what appeared on the screen. This seemed like a good idea and I decided to add that feature to the switcher, along with three LEDs to indicate which peripheral was connected to the computer's I/O port.

Since one of the three LEDs would always be lit when the computer was on, it would also serve as an on/off indicator. The idea seemed to grow, and before long I decided I would add remote control switches to control the computer on/off and reset functions.

The original mini-box was now much too small, so I obtained a larger box which measured 4 by 2¼ by 2¼ inches. The rotary switch, mentioned before, came out of my junk box. The LEDs are Radio Shack part number 276-018 — they come two to a package. The AC power on/off switch is a Radio Shack square push button switch (push-on/

Bob Merryman has been a licensed Ham Radio operator for the past 50 years and has built many pieces of electronic equipment. Two years ago he added computing to his list of hobbies and has built several items associated with this hobby, too.

push-off) rated at 3 amps, and is part number 275-617. The Reset switch is a Radio Shack square push-button switch (part number 275-618). The SPST toggle switch also came from the junk box, but any switch will work. The rubber grommets, miniature two-prong connector, together with the scrap metal for the mounting brackets and cable holding shelf, were also from the junk box.

Figure 1 illustrates the completed

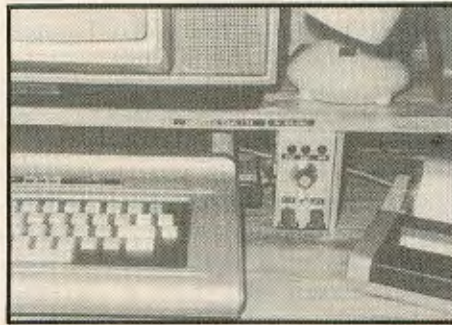


Figure 1

device mounted under the shelf and to the right of the keyboard, by means of two L brackets. The three LEDs are labeled "CGP," "MOD" and "DMP" (color graphics printer, modem and dot-matrix printer, respectively). Below the knob, on either side of the toggle switch, are labels "P/M" and "OFF" (printer and modem connected, or off). Beneath the two push-button switches are labels reading "A/C PWR," on the left side, and "RESET" on the right. The labels were made with a Dymo label maker.

Figure 2 illustrates how the cables are fed through the rear of the box, through loosely fitting grommets, to allow removal of the back cover for access to the parts. I labeled the cable alongside of the grommet so I wouldn't get confused while wiring the device. To hold the end of the cables in the box so there would be no strain on the wires, I used a small piece of aluminum bent into a 90 degree angle. Holes were then drilled to receive the four grommets, which were suffi-

ciently small to really grab the cable tightly. The bracket is fastened to the side wall of the box by means of pop-rivets. After stripping off about two inches of the outer covering from the cable, I pushed the cable end into its proper grommet (lined up with grommets on back cover) and with a twisting motion, pushed the cable through just far enough to have the outer cover show beneath the grommet. This was done one cable at a time, soldering the four connections before proceeding to the next cable.

The two zip-cord wires going to the A/C and Reset switches, are also fed through grommets in the back of the box and then tied in a knot to prevent them from being pulled out. They are then soldered to their respective switches.

Before I completed the switcher, I replaced the keyboard with an upgraded board (Figure 1 was taken before the upgrade). While the case was open, I soldered the miniature two-prong plug leads (female end) to the internal Reset switch using the two

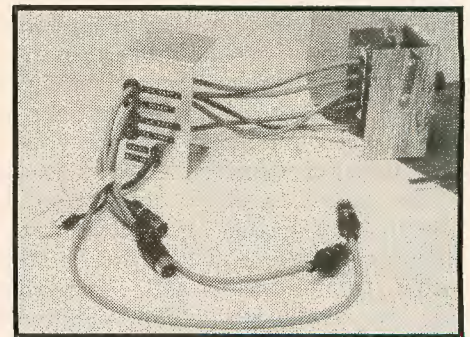


Figure 2

terminals on the right side and closest to the front of the computer. After securely soldering the wires to the Reset switch terminals, I fed them out of the case under the Reset switch button. There was plenty of room without having to cut or drill the case.

When I finally finished my switcher project, I didn't feel like opening the

Group activities are wonderful things, but individual parental activities can be very helpful also. Of course, encouragement for your own child is necessary. Parents should encourage their children to learn on the computer, and to engage in a variety of activities, not just playing Simulation games or programming in BASIC. I assume that most people reading this have a Color Computer in the home. A home computer is helpful for the school child, but not really needed. Parents can provide encouragement by looking at work brought home from school, suggesting

"Just as education begins with parents, so it can also end with parents."

after-hours projects for their child, and a host of other activities limited to the school computer. A home computer is simply an added attraction, although one I would strongly recommend.

Encouragement, however, does not need to stop with your own child. Parents can provide encouragement for their local computer education program and for the school. A simple note delivered to school expressing your encouragement will go a long way toward staff morale. Just like you, teachers like to receive recognition for their efforts.

Parents can show support for the computer program in their local schools in a variety of ways. A show of support for the program at school board meetings will long be remembered. Perhaps you are in a position to help the program receive publicity, through your local newspaper, radio station or television station. A story, for example, about a class having an art lesson on computers might attract the local news media. Our culture is still impressed with the creativity of young children when dealing with computers. News reporters love to interview a child who uses jargon terms to explain what a computer program does.

Perhaps you are in a position to arrange a field trip for a class to a computer facility, or a business that uses computers. Perhaps your own business uses computers in ways that would be interesting for a field trip. This

type of lesson can tie in well with a career awareness activity, and might be welcomed by school people.

You can contribute time to your school, without having a major event like a field trip. You might volunteer to do a presentation on the way you use your computer. If you use a microcomputer in some unusual way, your school might enjoy a visit from you to explain your particular application.

Parents can contribute more than time and funds raised through a group. You can contribute your expertise (and your own child's expertise) by such things as reviews of programs. Reviews by parents might be especially important for any software purchased by a PTA. Teachers, even when they have the monetary resources for reviews, are hard pressed to find time to provide adequate reviews for all educational software available today. Parents can help screen software, and provide a focus for teacher reviews. In fact, it may be worthwhile to have several parents review the same software, in order to get a wider perception of quality.

This article would not be complete without a special note for those parents who are *not* interested in computers. It may well be that in your home, one adult is interested in computer applications, and one adult has a strong aversion to electronic equipment. The computer hater still has a parental obligation to be involved in the child's education. If you are such a person, and forced to read this by a loving spouse, please realize that when your children are older, they will have to be more involved with machines than you. You can still provide support for your child's computer education, without having to touch a keyboard. Go ahead, get involved with the computer program, even if not with the computer.

Just as education begins with parents, so it can also end with parents. Parents cannot help but demonstrate their attitudes toward education. With the right attitudes and behaviors, children will realize that education is a life-long effort, not something that ends with formal schooling. Computer learning should not end with formal schooling, any more than other areas of study.

Your comments, thoughts, suggestions are welcome. Please write me at 829 Evergreen, Chatham, IL 62629. Until next month, keep on learning, and demonstrating that learning never ends. Share the fun.

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The Most Important Educators of All

**By Michael Plog, Ph.D.
Rainbow Contributing Editor**

When we think of the process called schooling, we often think of people. Generally, the relationship between teachers and students is the first thought we have concerning the schooling process. Sometimes we expand those initial thoughts to include administrators. We know that principals are extremely important in a child's education. Upon further reflection, we all admit that program directors, central office administrators and superintendents are also crucial to the education process, even if never seen by a child.

In moments of rationality, we may even include all the support staff that helps to keep a school going. Bus drivers, lunchroom workers, and all the other people involved in education play a role (even if not immediately noticed) in the lives of children.

These are all very important, but we often ignore the most important people in the education of a child — parents.

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in the central office of a school district and is currently employed at the Illinois State Board of Education.

The education process begins with parents, long before the child goes to school. During the school years, parents shape the way a child approaches lessons, the classroom, teachers, the entire institution. The attitudes a child has toward school are heavily dependent on the behaviors of parents. Positive behaviors, in the form of interest and support, can help a child do well in school; behaviors showing a lack of interest are reflected in the child's lack of enthusiasm.

It is important for parents to realize that teachers have the best interests of the child in mind, even when parents disagree with teachers about those interests. Conversely, teachers should realize that parents also have the best interests of their child in mind, even when the two groups disagree. All players — parents as well as school personnel — have a role to play in the educational process. A parent ignoring that role diminishes the value of school for the child.

The importance of parents extends beyond the general notion of schooling to the more specific components of the educational system, such as computer education. What should the role of parents be in the area of computer education?

Some roles for parents include group activities; some are individual efforts. One obvious group activity is to provide funds for hardware and software for classes. Schools are always in need of materials. Tax dollars need supplementing for those things necessary for a quality education. Parent organizations, such as PTAs (Parent-Teacher Associations) raise funds for school use. Some of those funds could be directed toward computer hardware and software. Does the school need a new printer? How about a large television set or monitor connected to the classroom computer, so a demonstration can be viewed by more than a few students? I am positive that your school could use something in the way of computer equipment or supplies, possibly a hard disk or extra paper.

Football teams and marching bands have booster clubs of interested parents. What about the computer club? Does your community have a support group for the computer club? Does your school even have a computer club? Perhaps a discussion with school personnel would lead to the creation of such a support group. (A side thought — wouldn't it be interesting to have a bake sale with the prices listed in binary code?)

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20 IFC<>76450THENPRINT"DATA ERRO
R":STOP
30 PRINT@162,"IF YOU HAVE NOT AL
READY SAVED STAR GETPUTPAINT,
DO SO NOW.
40 PRINT:PRINT" OTHERWISE, TYPE
CONT AND PRESS ENTER."
50 STOP
60 X=256*PEEK(27)+PEEK(28)+699:A
=INT(X/256):B=X-256*A
70 POKE474,A:POKE475,B:POKE27,PE
EK(474):POKE28,PEEK(475):CLEAR
80 X=256*PEEK(27)+PEEK(28):M=X-6
99:FORI=M TOM+698:READD$:D=VAL("
&H"+D$):POKEI,D:NEXT
90 FORJ=0TO2:POKEM+7+J,PEEK(401+
J):NEXT:DEL10-
100 DATA 16,1,1B,81,AD,27,3,7E,C
2,4D,9D,9F,81,C4,27,4,81,C5,26,E
C,34,2
110 DATA 86,4,97,7C,9D,9F,BD,B7,
3D,34,10,BD,B2,6D,A,7C,26,F4,97
120 DATA 7C,9D,9F,E6,67,54,54,54
,E7,67,EC,62,54,54,54,E0,67,2B
130 DATA 3D,5C,DD,41,CC,20,20,D0
,42,D7,50,E6,65,3D,E3,66,D3,BA
140 DATA 1F,2,E6,61,E1,65,25,24,
C1,BF,22,20,E0,65,5C,D7,43,96,42
150 DATA 3D,DD,44,9E,27,30,1,A6,
80,91,7C,27,6C,84,C0,81,40,26,B
160 DATA EC,81,30,8B,20,EE,32,69
,7E,B4,4A,A6,68,81,C4,26,F5,10
170 DATA DF,7D,DC,21,93,7D,DD,7D
,DC,27,93,44,83,0,3,DD,27,DD,23
180 DATA DC,21,93,44,83,0,3,DD,2
1,93,7D,1F,3,9E,7D,DD,7D,35,4,E7
190 DATA C0,30,1F,8C,0,0,26,F5,1
0,DE,7D,DE,27,33,41,96,7C,A7,C0
200 DATA 9E,44,AF,C1,D6,42,A6,A0
,A7,C0,30,1F,5A,26,F7,8C,0,0,27
210 DATA 48,96,50,31,A6,20,EA,1F
,13,A6,68,81,C4,26,A,AE,C1,9C,44
,25,92,9E,44,20,D8
220 DATA 9E,44,33,42,9D,9F,81,B0
,27,7,81,B1,27,6,86,A6,8C,86,A4
230 DATA 8C,86,AA,A7,8C,4,D6,42,
A6,A4,A6,C0,A7,A0,5A,26,F7,A,43
240 DATA 27,6,96,50,31,A6,20,EB,
9D,9F,32,6B,39
250 DATA 81,C3,27,25,8B,79,81,AA
,27
260 DATA 7,44,81,55,10,26,FE,DE,
97,50,9E,BA,33,89,18,0,DF,51,9D,
9F,A6
270 DATA 84,98,50,A7,80,9C,51,26
,F6,35,90,86,3,97,7C,9D,9F,BD
280 DATA B7,3D,34,10,32,61,BD,B2
,6D,A,7C,26,F2,BD,B7,3D,9F,42

```

```

290 DATA 35,54,D7,42,D7,45,1F,10
,C6,20,3D,D3,BA,1F,3,1F,10,54
300 DATA 54,54,8D,2B,F,44,1F,32,
8D,11,3,7C,D6,50,8D,1F,33,A8,E0
310 DATA D6,43,D7,45,C6,FF,D7,44
,1F,31,DC,BA,C3,17,E1,DD,7D,9C
320 DATA 7D,25,1,39,1F,30,93,BA,
2A,9,1F,98,DD,50,5A,4C,DD,52,39
330 DATA D6,51,3A,A6,84,5C,D1,52
,26,59,5A,D1,53,26,17,81,FF,27
340 DATA EC,84,3,81,3,27,5E,A6,1
,81,FF,27,6,84,C0,81,C0,27,52,39
350 DATA 5A,D1,53,22,26,81,FF,27
,48,E6,1F,C1,FF,26,4,C,53,20,DA
360 DATA 84,C0,81,C0,26,8,A,51,A
,52,30,1F,20,30,A6,84,84,3,81,3
370 DATA 26,CA,20,26,81,FF,27,22
,A,51,30,1F,A6,84,81,FF,27,18,A
380 DATA 52,20,D2,5A,5A,D1,53,22
,E,81,FF,27,A,E6,1,C1,FF,26,A0,C
390 DATA 51,30,1,96,51,97,53,E6,
84,C1,FF,26,3C,D6,45,E7,84,30,1F
400 DATA A,53,2A,F0,D6,51,1F,31,
5C,3A,D7,52,E6,84,C1,FF,26,4B,D6
410 DATA 45,E7,80,C,52,C6,20,D1,
52,26,EE,33,C8,E0,D,7C,26,3,33
420 DATA C8,40,3,44,26,3,96,42,8
C,96,43,97,45,16,FF,26,E6,84,57
430 DATA 24,C9,57,24,C6,57,24,F,
57,24,C,57,24,C,57,24,9,E6,84,D4
440 DATA 45,20,9,C6,F0,8C,C6,C0,
DA,45,E4,84,E7,84,20,A7,E6,84,58
450 DATA 24,BC,58,24,B9,58,24,F,
58,24,C,58,24,C,58,24,9,E6,84,D4
460 DATA 45,20,9,C6,F,8C,C6,3,DA
,45,E4,84,E7,84,20,9A,16,FD,4B,0
,0,0

```

Listing 4: GETPUT4

```

1 REM *** STAR GETPUTPAINT ***
BY H. ALLEN CURTIS
COPYRIGHT (C) 1985
2 POKE334,158:POKE335,27:POKE336
,110:POKE337,26:POKE401,126:POKE
402,1:POKE403,78
10 PMODE4,1:PCLS1:COLOR0,1:SCREE
N1,1
20 LINE(0,96)-(127,191),PSET,B
30 CIRCLE(64,144),40:CIRCLE(120,
96),70
40 *PAINT84,164,170,170:*PAINT12
0,60,116,248:*PAINT114,150,170,8
5:*PAINT60,104,170,85
50 *GET0,96,127,191,C
60 *PUT128,0,255,95,C,PSET
500 GOTO500

```

Editor's Note: Listings 2 and 4 use the *GET and *PUT routines generated for Disk BASIC 1.0. For any other system configuration, including cassette, you will need to run Listing 1 and/or Listing 3 to generate the proper routine for your specific system.

70	.....	32
130	.....	42
200	.....	90
END	.....	46

Listing 1: GETPUT1

```

1 REM *** STAR GETPUT ***
  BY H. ALLEN CURTIS
  COPYRIGHT (C) 1985
2 REMPOKE334,158:POKE335,27:POKE
336,110:POKE337,26:POKE401,126:P
OKE402,1:POKE403,78
10 FORI=0TO288:READD$:D=VAL("&H"
+D$):C=C+D:NEXT:CLS
20 IFC<>33110THENPRINT"DATA ERRO
R":STOP
30 PRINT@162,"IF YOU HAVE NOT AL
READY SAVED  STAR GETPUT, DO SO
NOW.
40 PRINT:PRINT" IF YOU HAVE SAV
ED STAR GETPUT, TYPE CONT AND P
RESS ENTER."
50 STOP
60 X=256*PEEK(27)+PEEK(28)+289:A
=INT(X/256):B=X-256*A
70 POKE474,A:POKE475,B:POKE27,PE
EK(474):POKE28,PEEK(475):CLEAR
80 X=256*PEEK(27)+PEEK(28):M=X-2
89:FORI=M TOM+288:READD$:D=VAL("
&H"+D$):POKEI,D:NEXT
90 FORJ=0TO2:POKEM+4+J,PEEK(401+
J):NEXT:DEL10-
100 DATA 81,AD,27,3,7E,C2,4D,9D,
9F,81,C4,27,4,81,C5,26,F3,34,2
110 DATA 86,4,97,7C,9D,9F,BD,B7,
3D,34,10,BD,B2,6D,A,7C,26,F4,97
120 DATA 7C,9D,9F,E6,67,54,54,54
,E7,67,EC,62,54,54,54,E0,67,2B
130 DATA 3D,5C,DD,41,CC,20,20,D0
,42,D7,50,E6,65,3D,E3,66,D3,BA
140 DATA 1F,2,E6,61,E1,65,25,24,
C1,BF,22,20,E0,65,5C,D7,43,96,42
150 DATA 3D,DD,44,9E,27,30,1,A6,
80,91,7C,27,6C,84,C0,81,40,26,B
160 DATA EC,81,30,8B,20,EE,32,69

```

```

,7E,B4,4A,A6,68,81,C4,26,F5,10
170 DATA DF,7D,DC,21,93,7D,DD,7D
,DC,27,93,44,83,0,3,DD,27,DD,23
180 DATA DC,21,93,44,83,0,3,DD,2
1,93,7D,1F,3,9E,7D,DD,7D,35,4,E7
190 DATA C0,30,1F,8C,0,0,26,F5,1
0,DE,7D,DE,27,33,41,96,7C,A7,C0
200 DATA 9E,44,AF,C1,D6,42,A6,A0
,A7,C0,30,1F,5A,26,F7,8C,0,0,27
210 DATA 48,96,50,31,A6,20,EA,1F
,13,A6,68,81,C4,26,A,AE,C1,9C,44
,25,92,9E,44,20,D8
220 DATA 9E,44,33,42,9D,9F,81,B0
,27,7,81,B1,27,6,86,A6,8C,86,A4
230 DATA 8C,86,AA,A7,8C,4,D6,42,
A6,A4,A6,C0,A7,A0,5A,26,F7,A,43
240 DATA 27,6,96,50,31,A6,20,EB,
9D,9F,32,6B,39,16,FE,E2,0,0,0

```

Listing 2: GETPUT2

```

1 REM *** STAR GETPUT ***
  BY H. ALLEN CURTIS
  COPYRIGHT (C) 1985
2 POKE334,158:POKE335,27:POKE336
,110:POKE337,26:POKE401,126:POKE
402,1:POKE403,78
10 PMODE4,1:PCLS1:COLOR0,1:SCREE
N1,1
20 LINE(0,96)-(127,191),PSET,B
30 CIRCLE(64,144),40:CIRCLE(128,
96),70
40 POKE178,1:PAINT(64,144),,0:PO
KE178,5:PAINT(120,90),,0:POKE178
,139:PAINT(120,100),,0
50 *GET0,96,127,191,C
60 *PUT128,0,255,95,C,PSET
500 GOTO500

```

70	.....	116
130	.....	41
200	.....	89
260	.....	44
350	.....	169
410	.....	4
END	.....	114

Listing 3: GETPUT3

```

1 REM *** STAR GETPUTPAINT ***
  BY H. ALLEN CURTIS
  COPYRIGHT (C) 1985
2 REMPOKE334,158:POKE335,27:POKE
336,110:POKE337,26:POKE401,126:P
OKE402,1:POKE403,78
10 FORI=0TO698:READD$:D=VAL("&H"
+D$):C=C+D:NEXT:CLS

```

allow sequential loading with a single CLOADM command. To learn about *Link*, see my article, "Link," which appeared in the January 1985 issue [Page 58].

In using *Link*, you need to know the lowest address of the *GET storage area as well as the highest RAM address. The addresses must be expressed in hexadecimal. The lowest address serves as both the entry and first address in *Link's* address scheme. The addresses can be derived as follows: After running to completion your BASIC program with *GETs, type and enter: PRINT HEX\$(256*PEEK(39)+PEEK(40)+1), HEX\$(256*PEEK(116)+255). Before applying *Link*, be sure to remove from your BASIC program the *GET statements and any commands that are no longer required for drawing and painting. Then save the shortened BASIC program.

For many applications, *Star Getput* will be ideal for generating graphics and animating them smoothly and quickly. However, there may be occasions when the shapes and sizes of display objects will depend on the program's current input data. For instance, the size and orientation of wedges in pie charts will

be dependent on the data being entered during the current running of a program. Pre-stored *GET display information cannot be relied on in such cases.

To increase the speed of graphics generation in programs of the foregoing type, I developed the program, *Star Paint*, in the previously mentioned article, "Festive CoCo." *Star Paint* adds the command *PAINT to CoCo's repertoire of BASIC commands. *PAINT not only colors objects at speeds consistent with *PUT's execution rate, but also conveniently colors objects in a multi-tude of hues.

The programs, *Star Getput* and *Star Paint* cannot be employed together. Listing 3 was written to remedy this situation. With this program, called *Star Getputpaint*, you can make full use of all three commands, *GET, *PUT and *PAINT, in your BASIC programs.

The purpose of Listing 3 is to produce a two-line version of *Star Getputpaint*, the analogue of the *Star Getput* two-liner.

If there are any remains of the two-line version of *Star Getput* in your computer (such as stored *GET information), turn the computer off and on

again before typing Listing 3. To shorten your typing chore, you may want to load Listing 1 and take advantage of the close similarity of lines 1 through 240 in listings 1 and 3.

After you have correctly typed Listing 3, save and run it. When the program has completed execution, it will be in two-line form. Without changing the rest of Line 2, delete the word REM. Then save the two-liner.

Adding a few lines to the two-line version of *Star Getputpaint* yields Listing 4. This program illustrates the combined use of *GET, *PUT and *PAINT. It executes much like Listing 2 but faster.

The use of *Star Getput* or *Star Getputpaint*, places a small restriction on cassette-based systems: The functions USRB and USRS must not be employed in programs containing *GET, *PUT or *PAINT.

In conclusion, *GET going, and *PUT your new graphics capabilities to work.

(You may direct questions about this program to Mr. Curtis at 172 Dennis Drive, Williamsburg, VA 23185, 804-229-7086. Please enclose an SASE when writing.) □

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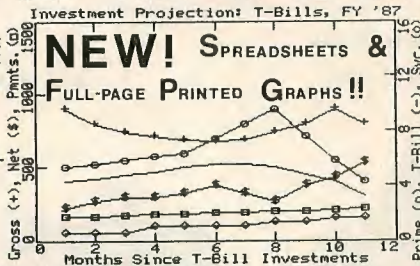
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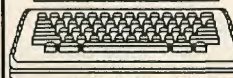
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A final example will lead into a discussion of the means of turning *GET's memory retention to advantage: Delete lines 30, 40 and 80. Change the *GET in Line 50 to *PUT and then append a comma and PSET to the end of that changed statement. Running the program shows that the same designs are displayed as previously, even without the commands initially used to draw and paint them. Moreover, the designs are generated faster now.

What this all implies is that if the *GET information stored in high RAM can be loaded along with the BASIC program, neither *GETs nor the commands used to generate the stored display information need to be included in the BASIC program. The elimination of all these commands will make the BASIC program both shorter and faster. Furthermore, *Star Getput* will not destroy any string information because it will no longer need to assign *GET storage areas.

With disk systems it is a simple matter to load the *GET information with the BASIC program. It can be accomplished by the following steps:

- Run the BASIC program with the *GETs present to make sure all *GET storage areas are assigned and the needed information stored.
 - Remove the *GET statements as well as all those commands which are now unnecessary for drawing and painting.
 - Save the *GET storage information by typing and entering: `SAVEM"STORE",256*PEEK(39)+PEEK(40)+1,256*PEEK(116)+255,0.`
- The address `256*PEEK(39)+PEEK(40)+1` is the lowest address in the *GET storage area. The address `256*PEEK(116)+255` is the highest RAM address.

- Now, determine precisely what the lowest *GET storage address is by typing and entering: `PRINT256*PEEK(39)+PEEK(40)+1`
- Add to the BASIC program `3 IFPEEK(39)=PEEK(116) AND PEEK(40)>252 THEN CLEAR100,1a:LOADM"STORE"` where 1a has been used to represent the address determined in Step 4. Therefore, when typing Line 3, insert the address determined in Step 4 in place of the letters 1a. In the

case of our example program, the inserted address should be 11427 or 27811 depending on whether you have a 16K or 32K byte RAM.

- Save the BASIC program with the newly added line.

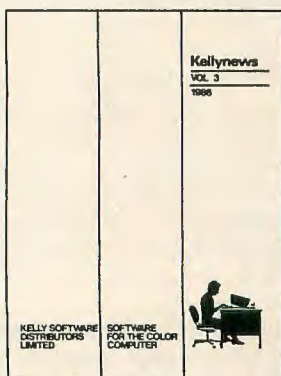
If you try this six-step procedure on the example program, turn your computer off and on following the last step. This removes the *GET information from high RAM. Then type and enter `RUN"EXAMPLE"` where it is assumed that `EXAMPLE` is the filename you specified for the example program. The `RUN` command causes the program to be loaded; the program in turn loads the *GET storage area, and then executes. If the program is stopped and rerun, it will not go through the now unnecessary process of loading the *GET display information.

With cassette-based systems it is less straightforward to load *GET information along with the BASIC program. It can be readily accomplished with the aid of a machine language program such as *Link* which combines program files — BASIC and data — on tape to

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comprising the *GET and *PUT machine language routines. Lines 10 and 20 provide a check on the accuracy of your typing of the DATA values. Lines 30 through 50 inform you when to save *Star Getput*. Lines 60 through 80 store the machine language routines. Line 90 makes sure the routines are compatible with your system. Special typing care should be taken with lines 2, 60, 70, 80 and 90; errors in lines with POKEs can cause program self-destruction.

After you have correctly typed and saved *Star Getput*, run it. The program will stop at Line 50. To resume execution, type CDNT and press ENTER. When *Star Getput* has completed execution, it consists of only two lines — the REM statements of lines 1 and 2. Line 90 caused the deletion of all but those two lines. Hidden from listing view in the greatly shortened *Star Getput* are its *GET and *PUT routines, which are safely stored immediately after Line 2. Adding your own lines of programming to *Star Getput* will not overwrite the machine language routines, but merely move them to a position immediately following the last line of BASIC programming.

To activate the machine language routines, you must delete the full word REM and nothing else from Line 2. After making the deletion, save the two-line version of *Star Getput*. It will necessarily be the basis of any program you write containing *GETs and *PUTs. The two-line version of *Star Getput* must always be used with the same system configuration as the one on which it was generated.

If you used *Rainbow Check PLUS* as an aid in the accurate typing of *Star Getput*, turn off your computer now. This will erase *Rainbow Check PLUS* from your computer's high RAM which will be needed shortly. Then turn your CoCo on again and load the two-line version of *Star Getput*.

Adding a few lines of BASIC programming to the two-line *Star Getput* yields Listing 2. This program and edited versions thereof will be used to illustrate the workings of *GET and *PUT.

Run Listing 2. Lines 10 through 40 serve to draw and paint the design in the lower-left quarter of the display. The *GET statement of Line 50 stores the design. The *PUT of Line 60 retrieves the design and rapidly places it in the upper-right quarter of the display. The rapidity of *PUT execution accentuates the slowness of BASIC's PAINT command. For a much faster method of

painting consistent with *PUT's speed, see my article, "Festive CoCo" [July 1986, Page 46].

To compare the speed of PUT with that of *PUT, stop the program by pressing the BREAK key and add the following lines to the program:

```
45 GOTO400
400 DIMA(308):GET(0,96)-(12
7,191),A,G
410 PUT(128,0)-(255,95),A,P
SET
```

Run the changed program and notice how slowly the design is formed on the upper-right quarter of the display.

Delete the entire GET statement from Line 400 and rerun the program. This time PUT forms a black rectangle in the upper quarter of the display. Without a previous GET, the 'A' array contains all zeros corresponding to black pixel codes. The program did not remember the design stored in the previous run of the program.

Surprisingly, once display information has been stored by *GET, *Star Getput* can retain this information on subsequent runs with *GET deleted. To verify this, delete Line 50 containing *GET. Also, delete lines 45, 400 and 410 to remove the remains of the GET/PUT part of the program. Then run the program to see that it accomplishes the same design transfer as before.

Next, edit Line 60 by replacing the *PUT action, PSET, with AND. Running the program again shows that AND works just as fast as PSET. If you are familiar with how AND functions with PUT, you will immediately realize that it works the same way with *PUT but much faster. Replacing AND with OR in Line 60 and running the program another time reveals that OR executes as fast as PSET or AND and otherwise functions as it does with PUT.

It is possible to *PUT a portion of the display information stored by *GET. To illustrate this, edit Line 60 by changing the y1 value from zero to 48; also change OR to AND. Then run the program. This demonstrates that when the difference between y2 and y1 in *PUT is less than a similar y-ordinate difference in *GET, *PUT will write a proportional part of the stored information on the screen. However, making the difference between x2 and x1 less in *PUT than in *GET results in a scrambling of the display information. This can be verified by changing 128 to 228 in Line 60 and running the program.

Thus far, we have only discussed a single *GET, *PUT combination. A program may have several such combinations. To show this, make the following program changes: Restore x1 and x2 in *PUT to their original values by changing 228 to 128 and 48 to zero in Line 60. Delete Line 20. Delete the first CIRCLE command in Line 30. Delete from Line 40 all but the final POKE and PAINT. Insert Line 50 as follows:

```
50 *GET16,26,199,166,Z:*PUT56,
50,239,190,Z,AND
```

then run the program.

The next example exhibits a peculiarity of the *GET command. Add the following three lines to the program and run it:

```
70 S$="TEST":T$="THIS IS A "+
S$
80 *GET160,80,223,100,0
90 FORJ=1TO2000:NEXT:SCREEN0,
1:CLS:PRINTT$
```

After the graphics display is complete, there will be a slight pause and gibberish will be printed on the text screen. However, running the program again produces the expected text screen message, THIS IS A TEST.

There is an explanation for this curious phenomenon. When *Star Getput* assigns a high RAM area to each *GET command, it overwrites whatever is in the memory area where strings are stored. *Star Getput* assigns another area for strings but does not try to recover the lost string information. However, in rerunning the program, T\$ was stored in the new string storage area which was left untouched by *Star Getput* because it had no new *GET areas to assign.

The fact that the assignment of *GET memory areas will destroy string information would appear to be a serious defect. However, it is easily overcome. Merely write a line or two of dummy *GETs early in your program before forming any strings. The *GET areas will be assigned early. Later, when the corresponding real *GETs are executed, no new *GET memory areas will be assigned and there will be no string information loss.

Remember, in an earlier example it was shown that the program would run without *GETs after their display information had been stored. This *GET capability can be turned to advantage to eliminate the string loss possibility, as well as providing memory and time savings.

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Vastly increase GET and PUT speeds

PUT Speedy GETzales to Work

By H. Allen Curtis

It is pointed out in Radio Shack's manual, *Going Ahead With Extended Color BASIC*, that in simulating motion, the GET and PUT statements can move objects faster than any other combination of ECB commands. Unfortunately, the GET/PUT movement of relatively large objects is far from being fast enough.

The goal of this article is to significantly increase the CoCo's PUT speed to permit fast and smooth GET/PUT movement of large objects. I have added two commands to CoCo's BASIC vocabulary. The two commands are new varieties of GET and PUT and will be referred to as *GET and *PUT, respectively. *PUT executes twenty times faster than PUT. This allows a BASIC programmer to generate graphics dis-

H. Allen Curtis lives in Williamsburg, Virginia. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work.

plays (stationary or animated) at machine language speeds.

The format of *GET is much like that of GET, but streamlined. Gone are the parentheses, minus sign and full graphics indicator, 'G'. The format is as follows: *GETx1,y1,x2,y2,d, where x1 and y1 form the x1,y1 coordinate of the upper-left corner of a rectangular area on the display; x2 and y2 form the x2,y2 coordinate of the lower-right corner of the same rectangular area and 'd' is a letter A to Z denoting the destination memory area at which a copy of the rectangular area is stored.

*GET does *not* store the rectangular display information in array form. For maximum speed, it stores the information directly in high RAM. *GET automatically reserves the required amount of protected high RAM. The destination letter is not a variable but merely a label identifying the area in which the display information is stored.

For increased speed, *GET and *PUT were designed to work in PMODE4 only. Limiting *GET and *PUT to

PMODE4 is no real disadvantage because of the many techniques that have been developed to paint in a multitude of colors in PMODE4.

In PMODE4 there are 256 picture elements (pixels) in a display line. Each line is composed of 32 bytes containing eight pixels each. For increased speed, the whole byte in which the 'xi' (i=1,2) point is contained is transferred from display memory to RAM. For instance, *GET28,5,154,25,A would store in 21 partial lines (five through 25), each consisting of 16 bytes containing points 24 through 159.

The format of *PUT is as follows: *PUTx1,y1,x2,y2,s,a, where x1 and y1 form the x1,y1 coordinate of the upper-left corner of a rectangular area of the display; x2 and y2 form the x2,y2 coordinate of the lower-right corner of the same rectangular area; 's' is a letter A to Z denoting the source memory area containing the data to be displayed and 'a' is one of three possible actions — PSET, AND, OR.

The three actions are defined as follows: PSET, set each display point in the source memory area; AND, form the logical AND of each byte in the rectangular display area with each corresponding byte of the source memory area and write it on the display; and OR, form the logical OR of each byte in the rectangular display area with each corresponding byte of the source memory area and write it on the display.

The three actions are not optional. One of the three must be specified for each *PUT given. *PUT does not support PRESET and NOT actions in the interest of increased speed. Consistent with *GET, no partial bytes of *PUT are written on the display from the source memory. Every whole byte containing an x1 or x2 point is written on the display. The whole byte requirement is an important factor in the extremely fast *PUT execution rate.

Your computer's ECB ROM contains machine language routines for the execution of the statements GET and PUT. To add *GET and *PUT to CoCo's BASIC command repertoire, analogous machine language routines must be generated and stored in RAM. Listing 1, called *Star Getput*, does the required machine language routine generation and storage.

In the listing, the DATA values of lines 100 through 240 contain the 289 bytes



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If you have been waiting for a game for your color computer that has everything, your wait is over. **WARP FACTOR X** is here. This all graphics simulation game requires strategy, fast thinking, an eye for detail, and above all experience in knowing the capabilities of your starship and its computer. (See review in Feb. 85 issue of Rainbow.) It requires 32K one disk drive and comes packaged in a vinyl library case. **\$34.95**

DARKMOOR HOLD (Rainbow Review 8/86)

You and your comrades will explore the levels of Darkmoor Hold in an effort to gain great riches and defeat the dark wizard. The Wizard will soon realize the threat you pose and the many monsters you meet and battle will become stonger and more powerful as you move through the 10 levels of Darkmoor. A keen eye will help you find weapons and armor to aid your battle along with treasures for you to keep. Your party consists of a Dwarf, an Elf, and you, the Human, each with their own special attributes. The weapons, armor and treasure are placed randomly in each level to provide a new challenge each time you play. You may also save the game you are playing since defeating the evil Wizard is not an easy task. It has great graphics and an impressive text screen to give you more fun than a barrel of elves. Requires 64KEB and 1 disk drive. **\$29.95**

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I can't find the POKE25,6:NEW equivalent for a Disk BASIC system. Can you help?

Kevin Armalay
Pendel, PA

RX Kevin, The equivalent is POKE 25,14:POKE&HE00,0:NEW

Is there a good Hi-Res screen dump for a DMP-100 printer?

Harry H. Hull
Martinsville, IN

RX Radio Shack markets *BW-Dump* as part of their Hi-Res screen dump utilities package which is compatible with your printer.

How can I get colors in PMODE4?

Ben Ariel
Natanya, Israel

RX You get the extra colors using artifacting, Ben. For example, if you draw two single pixel wide vertical lines on a PMODE4 screen, the double pixel wide line will appear either red or blue.

How do I speed up the clock on my CoCo as turbo enhancements do the IBM PCs? Has anyone heard anything about the new CoCo that was discussed at the Microware convention last year?

Christopher Oxenreider
Montevideo, MN

RX The new CoCo 3 uses a 68B09 with a 2-MHz clock for twice the speed of current CoCo 2s. Christopher, see the September 1986 RAINBOW for first impressions of the CoCo 3.

I would like to know the real differences between a cassette and a disk drive.

Pete Hagemeyer
Bethlehem, PA

RX Pete, the advantages of a disk over tape include speed of data transfer, reliability of data transfer and direct access capability.

I would like to dump graphics screens from Radio Shack's Micro Illustrator which runs under OS-9. Would Radio Shack's OS-9 High Resolution Screen Dump program work with it?

Charles Ward
Louisville, KY

RX It will work if you use one of Radio Shack's 9-pin dot-matrix printers.

I have been having some problems trying to print text screens from my programs on my printer. I have included a sample program that is typical of the programs I am trying to print. They all work great on the computer screen, but I can't get my printer to reproduce them. Can you help?

Helga Craig
Uniondale, NY

RX Insert GOSUB 1000 in your program where you want it to dump the screen, Helga.

```
1000 FOR I=1024 TO 1535 STEP 32
1010 A$=""
1020 FOR J=I TO I+31
1030 A$=A$+CHR$(PEEK(I+J));
1040 NEXT J
1050 PRINT #2, A$
1060 NEXT I
1070 RETURN
```

How can I change the print width for Disk Spectaculator (RS 26-3256)?

David Bacus
Detroit, MI

RX David, to patch your *Spectaculator* program, type the following:

```
PCLEARB ENTER.
LOADM "SPEC/BIN" ENTER.
POKE &H244E, <new printer
width +1> ENTER
SAVEM "SPEC/BIN", &H1400,
&H35FF, &H1400 ENTER
```

Note: for the ROMpak version, the print width is at Address \$D0AF.

How can I fix the RND function so that it generates a different sequence of random numbers immediately after I power up my CoCo?

Dan Frances
Kent, WA

RX Insert X=RND(-TIMER) at the beginning of your program to seed the CoCo's random number generator, Dan.

I saw several dump programs in the May 1986 issue of RAINBOW which I tried on my CoCo. None of the programs worked on my printer, a DMP-110. Please send me a program for my printer or tell me where I can find a useful screen dump program for my machine.

Danny McVey
Pendleton, IN

RX Well Danny, *Versadump* is a user-configurable screen print utility for most 9-pin dot-matrix print-

ers. It appeared in the March 1985 issue of *HOT CoCo* in an article entitled "Printer Answers."

I have replaced my ROM BASIC 1.0 CoCo with a CoCo that uses BASIC 1.1. The only problem I have with it is that my word processor, *Telewriter-64*, will not work with the BASIC 1.1. Is there any way I can make my word processor compatible with the updated BASIC?

Charles Ross
Allentown, PA

RX Charles, a program called *Telepatch II*, from Spectrum Projects, allows you to use the 1.1 ROM. It also provides several additional features to enhance *Telewriter-64*. It sells for \$29.95.

How do I disable the I/O Error when loading a BASIC program so that I can at least salvage the portion of the program up to the error?

Charles Gibson
Edwardsville, IL

RX "Doctor ASCII" contained a program that allowed you to load a BASIC program up to the point where the I/O Error was encountered. For more information, Charles, look in the November 1983 *HOT CoCo*.

VIP Library refers to the LCA-47 lowercase adapter and its attributes. Do you have any further information on this subject?

Joseph Johnston
Swanton, VT

RX The article "80 Applications," in the November 1982 *80 Microcomputing* [Page 78] contains instructions for building your own LCA-47 lowercase adapter for the CoCo including schematic, Joseph.

I want to play games on my CoCo with a friend over the phone. Do you know of anything available that will allow me to do this?

Denis Bowers
Ontario, Canada

RX Denis, *Bit 232* published in "Doctor ASCII" in *HOT CoCo* February 1986, allows two CoCos to send and receive information via the RS-232 port using BASIC. Also, see the *McCheckers* game on Page 114 of this issue.

For a quicker response, your questions may also be posted in the Forum section of RAINBOW's CoCo SIG on Delphi. In Forum, type ADD and address your questions to the username DOCTOR ASCII. You may also send questions to DOCTORASCII via Delphi Mail.

available that will allow me to do this?

A. Obner
Hendersonville, NC

R_x Only high level language source code such as C, PASCAL, BASIC, etc., saved in ASCII can be transferred to CoCo ASCII files. They may then need customization due to hardware or I/O differences. The program that allows you to do this is *CoCo Util II*. It sells for \$39.95. Contact Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, (714) 7768-1551.

R_x Does anyone offer FORTH for the CoCo? How about FORTH on a ROM chip to replace BASIC?

Charles Beckers Jr.
Middletown, RI

R_x There are no FORTH ROM chips available for the CoCo that I know of, Charles. Frank Hogg Laboratory offers eFORTH for FLEX or Disk BASIC for \$79.95. Contact them at 77 James St., Syracuse, NY 13203, (315) 474-7856.

R_x I have a Radio Shack Line Printer VIII which I use in my business. The printer works great except, due to my heavy use, the pins wear out and break. Radio Shack only offers the entire print head unit which costs \$99, but I only need the pins. Do you know where I can obtain these pins separately?

Marvin D. Petersen
Sepulveda, CA

R_x The print head is sold by Radio Shack only as a unit. TEK's part number is HE82C117101 for the head. Marvin, I suggest you contact NEC and/or C.Itoh, which are the other companies that import TEK printers under their labels.

R_x Where can I get a ribbon for my printer without having to buy the entire cassette the ribbon fits into?

Marlene
Fresno, CA

R_x BCCOMPCO, 800 South 17, Box 246, Somersville, MO 65571, (417) 932-4196 is a supplier of ribbons without the cartridges for various popular computer printers, Marlene. Another solution is to re-ink your ribbons with MacInker from Computer Friends, 6415 S.W. Canyon Ct., Portland, OR 97221, (503) 297-2321.

R_x How do authors split the screen so that the upper half is graphics and the lower half text? I'm interested in

writing my own Adventure and would find this technique very useful.

Jason Johnston
Lillooet, British Columbia

R_x The text is generated with high resolution graphics using a program such as Computerware's 64K *Screen Expander* software, Jason.

R_x How can I find the start address, length and end address of a machine language/binary file written on tape? I want to read these programs and store them on disk with the proper information so they can be loaded and run from disk.

Paul L. Bishop
Aurora, Ontario

R_x Load the program into memory, Paul. The start address is `PRINT PEEK(487)*256+PEEK(488)`. The end address is `PRINT PEEK(126)*256 + PEEK(127) - 1`. The execution address is `PRINT PEEK(157) * 256 + PEEK(158)`. To obtain the length, simply subtract the end address from the start address and add 1.

R_x Is there a disk-to-tape or tape-to-disk copier that I can use to transfer my files? How can I find out what type of board I have?

Jason Munson
Tucson, AZ

R_x See Roger Schrag's "The Limosine Utility: A Tape to Disk Transfer Vehicle" (RAINBOW, January 1984) for the transfer utility you want. Look at the lower right-hand corner of the printed circuit board for the serial number of your machine, Jason. CoCo board serial numbers ended with the letters 'D', 'E' and '285' or 'NC'. The former are known as 'D' and 'E' boards, and the latter as 'F' boards.

R_x I need a head alignment kit. Do you know where I can obtain one for my CoCo? I asked a salesman at Radio Shack and he had no idea.

Ron Clifton,
Charleston, SC

R_x J&M Systems, 15100-A Central SE Albuquerque, NM 87123, (505) 292-4182, sells *Memory Minder*, a disk drive diagnostics program and a special precision alignment disk with versions for single- and double-sided drives. [See review in RAINBOW September 1986, Page 144.]

R_x Does anyone offer a program similar to Print-Shop? The program is used to make signs or posters on regular-size paper.

David Jones
Frostburg, MD

R_x *CoCo MAX II* from Colorware gives you the capability to put text and graphics together on the CoCo's screen much like the acclaimed Apple McIntosh's *MacPaint*. Hopefully, David, the makers of *CoCo MAX II* will come out with a super version for the new CoCo 3.

R_x I am looking for a COBOL compiler. Do you know of any on the market at the present time?

Robert Lett
Columbus, MS

R_x Frank Hogg Laboratory sells both OS-9 and FLEX COBOL compilers for the CoCo, Robert. *Crunch COBOL* for FLEX is \$99.95 and *CIS COBOL* for OS-9 is \$400.

R_x I need a BBS program for one or two disk drives. Do you know where I can obtain one?

Paul Bolton
Shreveport, LA

R_x Paul, RAINBOW published a bulletin board program in November 1985 called *CoBBS*, by Richard Duncan. It was largely written in BASIC, thus easily customizable for your own computer applications.

R_x I am looking for a word processor for my CoCo that would allow me to edit two files independently, but side by side. Do you know of any word processors in the works that would allow me to do this?

Paul Whiting
Madison, WI

R_x No, not for the CoCos 1 or 2, but with windows on the CoCo 3, the capability is there. You could have two *Stylograph* sessions operating in separate windows and switch back and forth between them, Paul.

R_x I just purchased a TRS-80 Touch Pad but cannot find any software advertised to work with it.

Michael J. Fath
Wadsworth, OH

R_x It simulates a joystick, Mike, so many joystick-compatible programs will work with it.

Introducing a new Rainbow column

Rainbow to the Rescue

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

In the fall of 1985, when Radio Shack did not offer a "Super CoCo" to compete with the new Commodore and Atari offerings, the publishers of *HOT CoCo* magazine apparently assumed the CoCo was dead so they killed their magazine. In time, the people at Peterborough [CW Communications/Peterborough Inc.] evidently thought CoCo owners would switch over to the Tandy 1000.

After the demise of *HOT CoCo*, my column, "Doctor ASCII," was switched to another of their magazines, *80 Micro*. But, it was clear to me from the beginning that the days of Color Computer coverage in *80 Micro* were numbered. I was given some hope when Tandy surprised everyone by releasing sales figures [first quarter, 1986] indicating that CoCo sales were still quite high; 36,000 versus 42,000 for all of the Tandy MS-DOS systems [Editor's Note: These figures do not even include Christmas sales, in which the CoCo is always a clear standout!] But, alas, additional coverage of the Color Computer in *80 Micro* did not materialize and existing coverage was relegated to the rear of the magazine.

Rather, *80 Micro* reaffirmed their support for Tandy's Z80 and MS-DOS products, so it came as no surprise to me when I received a telephone call informing me that the "HOT CoCo" section of *80 Micro* and, consequently, "Doctor ASCII" were being killed.

Wanting to preserve my long estab-

Richard Esposito is a project engineer for TRW's Government Systems Group. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.



lished column, I immediately called THE RAINBOW. Editor and Publisher Lonnie Falk and Managing Editor Jim Reed were both cordial and supportive. They understood my commitment to the CoCo Community and shared my enthusiasm for carrying on. They, too, wanted "Doctor ASCII" to continue.

So, thanks to THE RAINBOW, the tradition continues. [Editor's Note: With the gracious consent of Eric Maloney, editor-in-chief at *80 Micro*, the column will continue to be known as "Doctor ASCII."] And, with the introduction of the new Color Computer 3, the CoCo is stronger than ever — a great new force in the home market. I am pleased to be affiliated now with THE RAINBOW staff and with publisher Lonnie Falk, whose faith in the Color Computer has never wavered.

How is the INKEY\$ statement used in programming? I'm attempting to write programs to assist me in per-

forming research in my psychology classes.

*Scott Lane
Walla Walla, WA*

RX The INKEY\$ function checks momentarily to see if a key is depressed, Scott. If a program contains the statement `100 A$=INKEY$`, most likely A\$ will contain an empty string after it is executed unless you are Johnny-on-the-spot pressing the key the moment your CoCo looks for it. The usual code that uses it is as follows:

```
100 A$=INKEY$: IF A$ <> "" THEN
100
```

With this code, the CoCo keeps executing the INKEY\$ function until it returns a non-null character which can then be found in the variable A\$.

Is there a program on tape to convert the computer screen to 80 columns instead of 32?

*Todd Johnson
Rochester, MN*

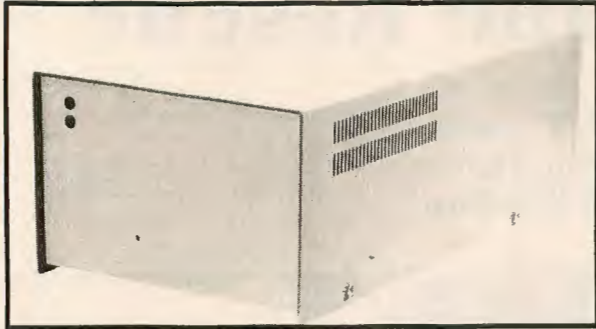
RX PBJ's *Wordpak* plugs into Radio Shack's MultiPak interface and drives an 18-MHz or greater composite video monochrome monitor. Software drivers are available for FLEX, OS-9 and Disk BASIC. Most Radio Shack software will not run using *Wordpak* unless it is specifically designed to use it, Todd. Elite Software and Cer-Comp are the leading marketers of *Wordpak*-compatible Disk BASIC software. Most FLEX and OS-9 software using PBJ's drivers uses the full 80 columns with little or no modification.

I need to use IBM-compatible programs on my CoCo at times and was wondering if there is any software

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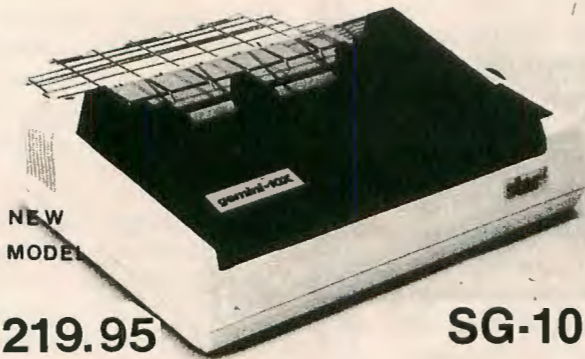
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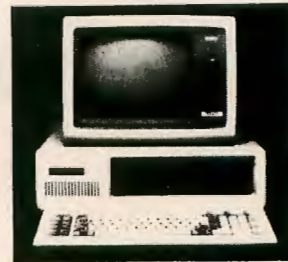
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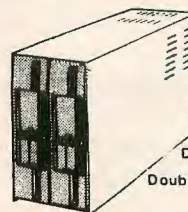
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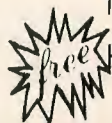
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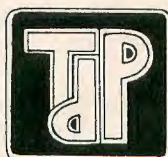
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

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Become a Hi-Res Hero With *Dragon Blade*

Those who like playing Adventure games are in for a treat. Prickly-Pear Software has created an animated, Hi-Res Adventure that sends you into the Middle Ages with style.

The object of the game is to find the Dragon Blade, which is the only thing that will kill the ancient dragon that has been terrorizing your small medieval village.

In its last attack, the dragon killed your father, the chief of the village. Now you must succeed him as chief, and somehow save the village from further attack.

You begin your quest in the Forest of Lore, soon discovering that the quiet countryside holds mystery and danger. As you search for the Blade, you encounter gargoyles, witches and a menacing guardian. You may fall into an abandoned mine shaft and find yourself wandering in a dark maze, or facing a monster who can turn you into stone with a single look. Despite these risks you must forge ahead, gathering the tools and knowledge that will allow you to slay the dragon and save your village.

Some Hi-Res Adventures are so slow you have to wait more than you play, but *Dragon Blade* is quick enough to keep the action rolling. The graphics are first-rate. (See Figure 1.) They are well-designed and do a good job setting the stage for a medieval quest. Several screens bring the Adventure to life with animation.

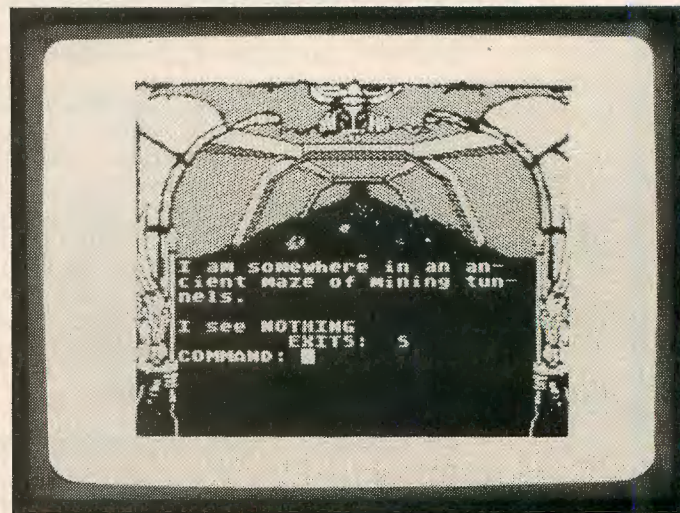


Figure 1: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

Dragon Blade is definitely worth buying if you enjoy Adventure games — and it would make a great Christmas gift for your favorite CoCo nut.

(Prickly-Pear Software, 213 La Mirada, El Paso, TX 79932, 64K disk required, \$29.95)

— Andy Dater

out when you started, and you're finished. The whole process doesn't take over 10 minutes.

Drive 1 Upgrade is of excellent quality, with a heavy, die-cast frame and rigidly mounted printed circuit board. The half-height design is very popular and the TEC brand is well-known in the drive industry. The drive is capable of accessing 40 tracks and runs easily at 6 ms head stepping rate. The circuit board flat cable connector features gold-plated contacts. It also incorporates a direct drive DC brushless motor with no belt. I checked the speed of the new drive and it was 298.8 RPM, which is well within correct operating limits. I assume that the speed can be changed with some internal adjustment, although it was not documented.

My only complaint with this upgrade is that it is noisy during track-to-track access, but it's no worse than the Radio Shack Drive 0. Setting the stepping rate at 6 ms greatly reduces the noise, as many CoCo users have already discovered.

I believe this upgrade should be investigated by any CoCo user interested in adding extra disk drives. It's not difficult to install (no soldering is required) and you can save \$60 or more by doing it yourself.

(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414, \$139.95 plus \$3 S/H)

— Jerry Semones

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be very short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

“... pick an option from a pull-down menu and it instantly prints a bullet chart you can print directly on an overhead transparency.”

screen, although it can accept lines up to 256 characters long.

So far I have only heard of two drawbacks to the Color Computer 3 as far as OS-9 Level II is concerned. The first is the fact that the Tandy Sound/Speech Cartridge does not work with it because OS-9 always runs at 1.79 MHz and the Sound/Speech Cartridge can only deal with .89 MHz. The good news is you can add a switch to bypass the XOR gate in the Sound/Speech Cartridge and it will work at the higher clock speed. The other drawback is that a modification must be made to the expansion interface to allow it to run. You need to take it to a computer center to have it modified.

Larson's SysGo Revisited

In May of this year we published an alternate SysGo module for OS-9 Level I, Version 1.00 or Version 1.01. Also that month, we discussed various techniques you could use to force OS-9 to start up in a RAM disk. David Curtis, of Heath, Ohio, put the tips into action and sent us the completed product. It is listed here. Curtis also submitted a simple utility that takes the place of the Micro-

soft BASIC CLS command. Interestingly enough, we received another CLS program from John Bowden of the U.S. Navy's COMTHIRDFLLT N-2 in Pearl Harbor, Hawaii. Bowden's code shows how to fork a new process since it clears the screen by calling the OS-9 display command. If you have both display and CLS loaded in memory, this method is fast, too.

Version 2.00

Along with his program listings, Curtis sent a question. "Why bother with OS-9 Level I, Version 2.00?" he asked. "The 80-column driver won't run my WordPak I. The disk driver won't handle double-sided drives. The hard drive Tandy supports is out of sight price-wise. The config program is nice and permits easy creation of a custom system disk. That's about it."

I guess the answer to that question revolves around what you are going to do with your computer. If you plan on running all the new programs coming out for OS-9, you'll most likely need the latest version of the operating system. Some programs operate across a number of operating systems; many

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won't. Almost all of the new Tandy software products require OS-9 Level I, Version 2.00 to operate.

Starting BASIC09

Ray Preston of Rarotonga in the Cook Islands was one of a group of recent writers wanting to know how to get BASIC09 up and running.

Here's the problem. Tandy did not put BASIC09 in the CMDS directory on the production disk. They put it in the root directory. If you have two disk drives, leave your system disk in Drive

/d0 and plug the BASIC09 disk into Drive /d1, then type:

```
OS9: chx /d1
OS9: Basic09
```

If you have a single-drive system, take out the system disk and plug the BASIC09 disk in Drive /d0, then type:

```
chx /d0
basic09
```

This should put you on the air once and for all.

OS-9 Software Sourcebook

The OS-9 Software Sourcebook written by Phyllis Casel can help you find that software you're looking for. It's available from Microware Systems Corporation, 1866 N.W. 114th Street, Des Moines, IA 50322, (515) 224-1929. Give them a call.

If all goes well, by the time I write the next installment, we will be settled in here in New York City and will have had our hands on the new CoCo 3 for several weeks. Now if we can just get our hands on Level II OS-9! □

Listing 1: sysgo

```

00001          ifpl
00003          endc
00004
00005      000D          c.cr      equ      $d
00006      0000      87CD009A      mod      eom,name,$C1,$81,start,$00C8
00007      000D      53797347      name     fcs      /SysGo/
00008      0012      06          fcb      6
00009      0013      2F5230      newdir   fcc      "/R0"
00010      0016      0D          fcb      c.cr
00011      0017      2F52302F      newexe  fcc      "/R0/"
00012      001B      434D4453      cmds    fcc      /CMDS/
00013      001F      0D          fcb      c.cr
00014      0020      5368656C      shell   fcc      /Shell/
00015      0025      0D          fcb      c.cr
00016      0026      53746172      startup fcc      /Startup -p/
00017      0030      0D          fcb      c.cr
00018
00019      0031      55007412      initdat fcb      $55,0,$74,$12
00020      0035      7FFF03B7      fcb      $7F,$FF,$03,$B7
00021      0039      FFDF7EF0      fcb      $FF,$DF,$7E,$F0
00022      003D      0C          fcb      $0C
00023
00024      000D          idatlen equ      *-initdat
00025
00026      003E      308C55      Start   leax     <rti,pcr
00027      0041      103F09      os9     f$icpt
00028      0044      308CEA      leax     <initdat,pcr
00029      0047      CE0071      ldu     #0071
00030      004A      C60D          ldb     #idatlen
00031      004C      A680      movidat lda,x+,pcrt,$F0,pcr
00032      004E      A7C0      sta     ,u+
00033      0050      5A          decb
00034      0051      26F9      bne     movidat

```

```

00035 0053 308CC5 leax <cmds,pcr
00036 0056 8604 lda #4
00037 0058 103F86 os9 i$chkdir
00038 005B 308CC2 leax <shell,pcr
00039 005E 338CC5 leau <startup,pcr
00040 0061 CC0100 ldd #0100
00041 0064 108E0015 ldy #21
00042 0068 103F03 os9 f$fork
00043 006B 2527 bcs infloop
00044 006D 103F04 os9 f$wait
00045 0070 308CA0 leax <newdir,pcr
00046 0073 8603 lda #3
00047 0075 103F86 os9 i$chkdir
00048 0078 308C9C leax <newexe,pcr
00049 007B 8604 lda #4
00050 007D 103F86 os9 i$chkdir
00051 0080 308C9D restart leax <shell,pcr
00052 0083 CC0100 ldd #0100
00053 0086 108E0000 ldy #0000
00054 008A 103F03 os9 f$fork
00055 008D 2505 bcs infloop
00056 008F 103F04 os9 f$wait
00057 0092 24EC bcc restart
00058 0094 20FE infloop bra infloop
00059 0096 3B rti rti
00060 0097 E1ED78 emod
00061 009A eom equ *
00000 error(s)
00000 warning(s)
$009A 00154 program bytes generated
$0000 00000 data bytes allocated
$1948 06472 bytes used for symbols

```

Listing 2: cls

```

00001 * Clear Screen Utility
00002 * by David Curtis / Heath, OH
00003 * To use cls load cls; link cls and
00004 * type cls anytime you want to clear the screen
00005
00006
00007 nam cls
00008 ifpl
00010 endc
00011
00012 0000 87CD0028 mod endpgm,name,type,revs,start,size
00013
00014 000D 636CF3 name fcs /cls/
00015 0011 type set prgrm+objct
00016 0081 revs set reent+1
00017 D 0000 char rmb 1
00018 0010 size equ *
00019
00020 0010 5F start clrb
00021 0011 860C lda #0C

```

```

00022 0013 308DFFE9 leax char,pcr
00023 0017 A784 sta 0,x
00024 0019 108E0001 ldY #01
00025 001D 8601 lda #01
00026 001F 103F8A os9 i$write
00027 0022 103F06 os9 f$exit
00028 0025 C33547 emod
00029 0028 endpgm equ *
00030 end

```

```

00000 error(s)
00000 warning(s)
$0028 00040 program bytes generated
$0001 00001 data bytes allocated
$18D0 06352 bytes used for symbols

```

Listing 3: alternat.cls

```

00001 * Alternative version of CLS that forks a process
00002 * to use the DISPLAY utility to clear your screen.
00003
00004 nam cls
00005 ifpl
00007 endc
00008
00009 0000 87CD003E mod clsend,name,type,revs,start,size
00010 000D 636CF3 name fcs /cls/
00011 0010 02 edition fcb 2
00012 0011 type set prgrm+objct
00013 0081 revs set reent+1
00014 D 0000 rmb 300
00015 D 012C size equ .
00016
00017 0011 7368656C shlstr fcs /shell/
00018 0016 64697370 cmdstr fcc /display 0C/
00019 0020 0D fcb $0D
00020
00021 0021 308DFFEC Start leax shlstr,pcr
00022 0025 338DFFED leau cmdstr,pcr
00023 0029 108E000A ldY #0A
00024 002D 8601 lda #1
00025 002F 5F clrb
00026 0030 103F03 os9 f$fork
00027 0033 2503 bcs error
00028 0035 103F04 os9 f$wait
00029 0038 103F06 error os9 f$exit
00030 003B EA7E5C emod
00031 003E clsend equ *
00032 end

```

```

00000 error(s)
00000 warning(s)
$003E 00062 program bytes generated
$012C 00300 data bytes allocated
$18FD 06397 bytes used for symbols

```

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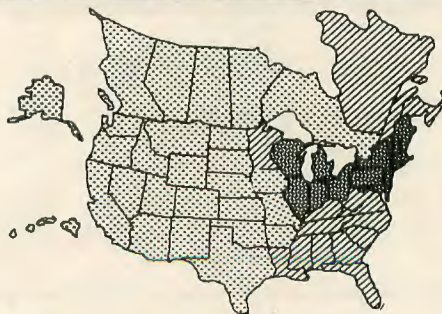
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- Multiple Hi-Res character fonts (user re-definable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
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This program contains some of the popular features found in "HARDCOPY" such as 1x1, 2x2 and posters; but color scan produce full color printouts of your favorite 6K graphics files. You can also create colorful banners up to 27" in length, or dump a disk's entire graphic contents to paper.

Colorscan will print program listings in blazing color, make remarks in red, line numbers green, search for strings and print in blue, etc. All these features and more.

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GRAPHICOM PART II DOES NOT REQUIRE GRAPHICOM TO RUN!



Graphicom Part II is a video processing package that provides many functions that are missing in Graphicom. Here are just a few of the features provided by Graphicom Part II:

ENLARGE/REDUCE/ROTATE
Enlarge or reduce any portion of a graphic screen, just like a photographic enlarger! Rotate by any degree or fraction of a degree around any point on the screen.

PAINT
Paint or "fill-in" any irregular area on the screen! More than 50 different colored patterns available. Additional paint patterns may be user-defined.

PAN & ZOOM
"Zoom in" x2, x4, or x8 on any portion of the screen to do fine pixel work. Allows editing of Graphicom character sets with ease!

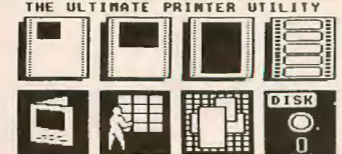
TYPESETTER & FONT EDITOR
Add text in 16 different sizes, also supports user definable foreground & background colors. Design & Edit characters for use in the typesetter.

PIXEL BLASTER
Allows the user to easily substitute or remove colors. Widen lines, swap BLUE & RED without effecting BLACK & WHITE, etc.

Graphicom Part II requires a 64K extended disk basic system, and supports 1 to 4 disk drives, keyboard or joystick (analog or switch type) input. It will load and save both Standard BIN files and Graphicom screens. All functions support color or Hi-Res operation, as well as the 4 screen display modes.

**ARE YOU LOOKING
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SCREEN PRINT
PROGRAM?**

HARDCOPY



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- HARDCOPY** - Hardcopy is more than just a screen print utility, compare these features with any other graphic dump program on the market:
- Full GRAPHICOM/GRAPHICOM PART II compatibility! Loads STANDARD 6K images, GRAPHICOM pictures, and COCO MAX pictures too!
 - BLACK & WHITE or GREY SCALE printing. In GREY SCALE printing, colors are printed as user definable patterns. Supports hi-res in all 4 GRAPHICOM display modes!
 - 1x, 2x, 3x PRINTOUTS - Three menu options are reserved for the most frequently used printout sizes; 1x (quarter page), 2x (half page), and 3x (full page).
 - GRAPHIC LABELS - The label printing option allows the user to create custom mailing or disk labels with professional looking results.
 - GREETING CARDS - The greeting card option allows the user to custom design greeting cards using both text and graphics.
 - GIANT POSTERS - The poster option provides the user with a means of reproducing a hi-res graphic to a multi-sheet poster.
 - SPECIAL EFFECTS - The special effects option allows the user to directly control the printing directives; ROTATION, X/Y SIZE, X/Y FLIP, X/Y GRID, X/Y FILL, TAB, WINDOW, POS/NEG IMAGE, and more!
 - USER CALL - Have an application that HARDCOPY doesn't quite match? HARDCOPY routines can be added to EXTENDED BASIC through the USR command!

HARDCOPY* requires a 64K Color Computer or Color Computer II, and at least one disk drive. It supports 1 to 4 disk drives, keyboard or joystick input. Please specify printer and cat. number when ordering.

* Due to hardware differences, some features may function differently on certain printers.

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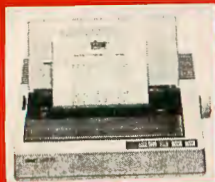
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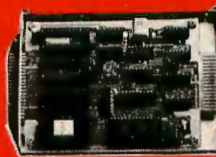


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DC-3

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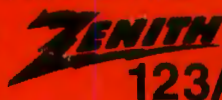
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Which?

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2 smaller

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