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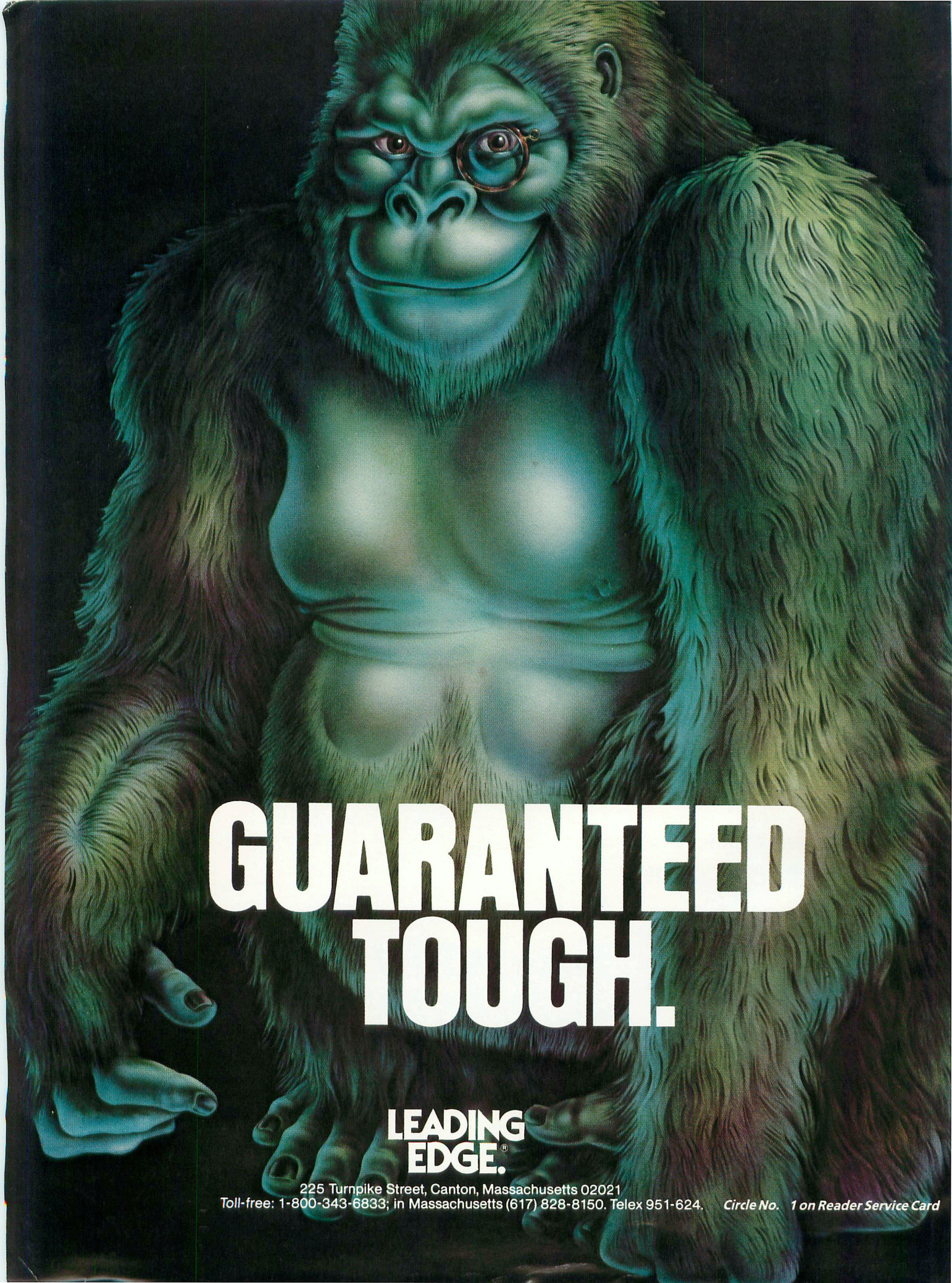

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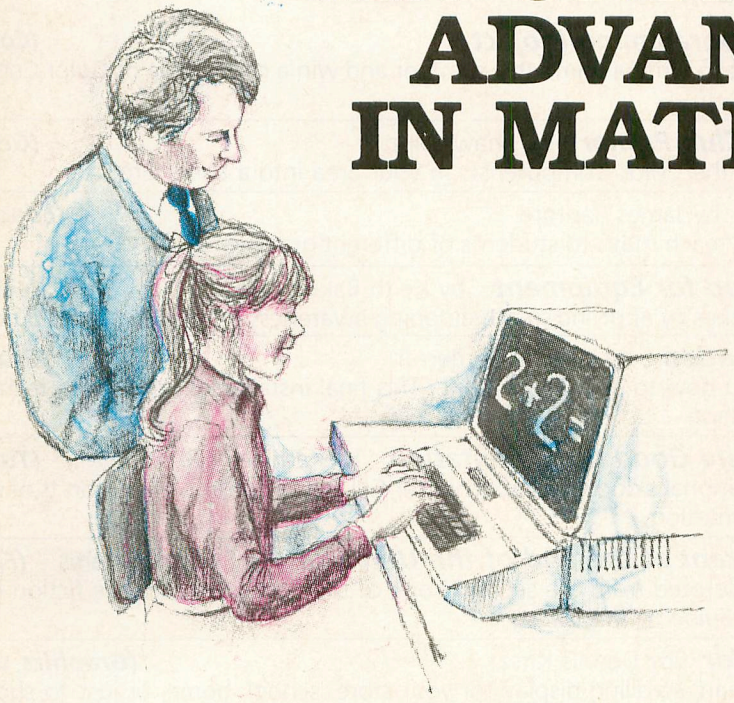

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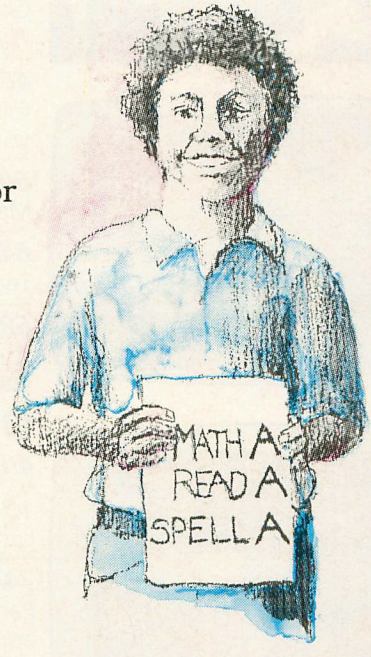

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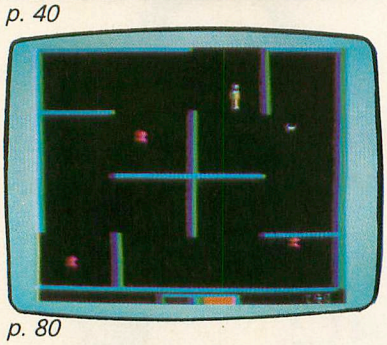
THE Color Computer... MAGAZINE

Vol. 1, No. 4
June 1983

p. 40



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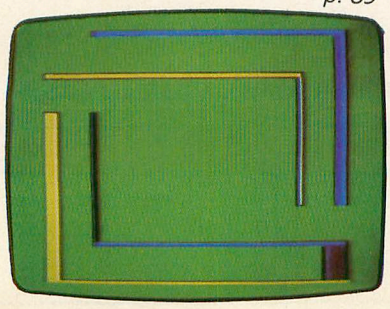

FEATURES

16/Summer Programming Project ***(Contest)***
We challenge you to write a game this summer and win a cornucopia of Color Computer prizes.

19/Computer Club Primer by Shawn Jipp ***(General)***
How to organize the Color Computerists in your area into a Users Group.

26/Math Drill by James Sanford ***(Education)***
This program will teach math to students of different grade levels.

30/How to Shop for Equipment by Keith Baker ***(General)***
Avoid costly mistakes by applying smart shopping awareness to your computer purchases.

32/Color Animation by William Barden Jr. ***(Graphics)***
Part I showed you how to animate in Basic. This final installment applies the techniques to machine language.

36/How to Write Good Documentation by Kathleen Gill ***(Tutorial)***
Adventure International's documentation writer Gill explains the do's and don'ts of writing program documentation.

40/The Restaurant at the End of the Universe by Douglas Adams ***(Fiction)***
Chapter three excerpted from the second book of the best-selling science fiction trilogy, *The Hitchhiker's Guide to the Galaxy.*

46/Custom Color by Dennis Kitsz ***(Graphics Utility)***
Create a neat, clean, scrolling display for your store, school, home, or just to show off your computer.

60/Sweet Add-A-Line by Richard Ramella ***(Home Management)***
Make itemizing shoebox-stored receipts easier using this personal accounting program.

64/Rectangles by Lynn Davis ***(Graphics)***
Teach your computer to doodle.

68/Color Disassembler by Jake Commander ***(Utility)***
Assembly-language programmers rejoice, here's a disassembler just for you.

DEPARTMENTS

4/PEEK (06,83)

10/INKEY$
Letters from our readers.

74/REVIEW$
Part II of a guide to smart terminals, Sea Dragon, two replacement keyboards, Silly Syntax, and more.

92/NEW:PRODUCT$

96/END OF FILE
Fort Worth, Texas. Come on down.

64/FOR...NEXT (07,83)

Cover
A Cup of Tea, a Heart of Gold, and a Vogon Lemon by William A. Giese.

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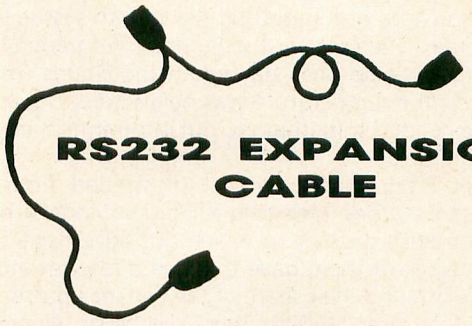

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PEEK(06,83)

We had a lot of fun putting this month's issue together. The idea for the Summer Programming Project came on a day when the clouds were grey, the temperature was below freezing, and we needed something to put our frame of mind ahead to the summer.

The Summer Programming Project blossomed from a winter-depressed attitude idea to a full-blown contest because of the enthusiastic way in which our advertisers responded to it. Most of them gave the idea a few seconds' thought before offering their share of the winner's purse. In all the prizes total over $6,000. There will be six winners. All you have to do to win is come up with an original Color Computer game and send it in to us before the end of the summer — Labor Day, September 5, 1983. GOTO 16 for all the particulars.

New this month is our INKEY$ department. INKEY$ is our Basic language way of saying Letters to the Editor. Boy did we get a lot of mail. Thanks for letting us know how much you've enjoyed **The Color Computer Magazine**. Some of those letters are excerpted in INKEY$'s debut, GOTO 10. When writing to us use the Camden, Maine address found in the small print under the Table of Contents. All letters will be considered okay to publish unless you specifically state otherwise.

It seems that TRS-80 owners band together into Users Groups more than owners of any other microcomputer system. Color Computer Users Groups are springing up all over the place. These groups are good ways to meet other Color Computerists and share ideas on how to better use your computer. They're also a good way for beginners to get help from more experienced users, and for advanced users to meet others on the same level. GOTO 22 for Computer Club Primer where Shawn Jipp, of the Silicon Valley Users Group, explains how to get your Users Group started.

We sent freelance writers Tim and Debra Cole to a meeting of the Color Computer Club of Youngstown, Ohio. Next month they'll report what goes on at this one particular club's meeting.

GOTO 26 where Lynn Davis offers another of his graphic wonders. This time around Lynn uses a small routine to draw random rectangles on your video display. The program is one of those that never end, it'll draw colored rectangles seemingly forever — a nice program to use to show off your Color Computer to your friends.

What's the first thing you did after taking your first Color Computer out of its box? Well power it up of course. But I mean what's the first thing you do after you've done most of the normal first things? What I'm getting at is the lust for more equipment. The first thing I did was try to figure out where the money for a printer, disk drives, a modem, and the long long list of software I wanted would come from.

Keith Baker, like most of us, went through the I-want-everything phase when he first bought his Color Computer. And, like most of us, he learned that amongst the many fine peripheral vendors there are a few bad and unscrupulous people out there. His article, Peripheral Buying (GOTO30), is intended to help keep the new computer owner from also getting burned.

William Barden Jr. finishes his graphic exercises in Color Animation — Part II. GOTO 32 to learn how to apply the Basic techniques Bill showed you in Part I to machine language.

Many people buy their Color Computer hoping to learn programming well enough to make money from writing software. With the computer-boom being so widespread there are a lot of opportunities if you apply yourself to the task. Once you've written that program of programs, the job is only half finished. Now you've got to write its documentation.

You may think that that's the job for the software house. Well that's as right as it is wrong. GOTO 36 for a lesson in writing documentation by a documentation pro. Kathleen Gill is a documentation writer for Adventure International. She explains the importance of good documentation and how to go about writing it. Many of the principles she discusses also apply to magazine articles. So even if your program publishing plans go no further than magazine articles, do give Kathleen's article a good read-through. A program is never any better than its documentation.

The Hitchhiker's Guide to the Galaxy first appeared as a radio play on the BBC in England. Success brought it to public radio in America. Further success made it possible for the book's author, Douglas Adams, to transform the radio scripts into a book. Even more success prompted the writing of more radio plays and then a second book, *The Restaurant at the End of the Universe*. Not long ago the third book of this humorous science fiction trilogy came out called, *Life, the Universe and Everything*.

For a few weeks all three books simultaneously entrenched themselves on *The New York Times* bestseller lists. *Life, the Universe and Everything* enjoyed a few months on the list. The books begin with the destruction of Earth to make way for intergalactic space bypass. You see Earth is in the way and it's just not economical to detour around it. Arthur Dent, because of his friendship to the well-known intergalactic hitchhiker Ford Prefect, is saved from Earth's destruction by thumbing a ride with Ford, on a spaceship.

The story travels the galaxy. The books are such fun reading that we decided to include a chapter in this issue. Our excerpt (GOTO 40) is chapter three from the second book, *The Restaurant at the End of the Universe*. In chapter two Arthur Dent has the computer onboard the Heart of Gold (their improbability drive spaceship) trying to figure out how to make a cup of tea. The computer, who by the way enjoys the challenge, has to search vast amounts of data to get the brew just right. Unfortunately, it is this time that the Vogons (space meanies, probably second cousins to Klingons) decide to attack the Heart of Gold. Zaphod Beeblebrox, the ex-president of the galaxy, can't get the computer to fend off the attack. He doesn't know it's busy making Arthur a cup of tea, and when Arthur figures out why Zaphod can't get the computer's attention he's not sure he should tell Zaphod exactly what it is the computer is busy with. You see, Arthur and Zaphod don't get along very well. If you like this chapter you'll like the whole trilogy.

Sometime last year, Dennis Kitsz was commissioned to write a banner display program on the Color Computer for a museum. The program had to have a top and bottom title line, and a scolling message in between. GOTO 46 where in this month's Custom Color Dennis shares the program with us.

Sweet Add-a-Line (GOTO 60) is a sweet program. Author Richard Ramella wrote this combination data base management/accounting program to help him wade through shoebox after shoebox of receipts and check stubs at taxtime. Although too late for this year's tax compilation, it's nice to know that life will be easier for next year's returns.

GOTO 64 for Math Drill, a program to help make your kids

Please turn to page 8

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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

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64 COLUMNS (AND 85!)

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

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.
Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

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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).

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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.

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...truly a state of the art word processor... outstanding in every respect.
— The RAINBOW, Jan. 1982

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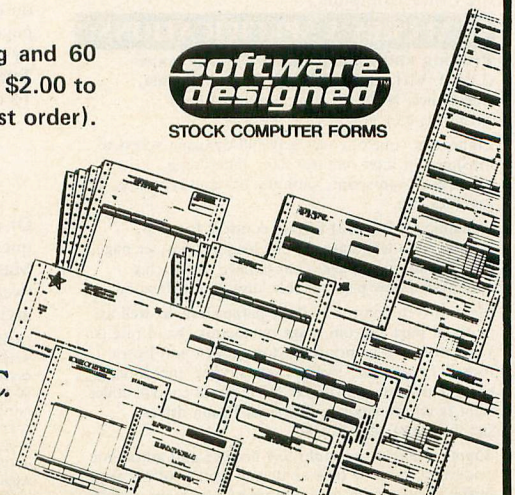

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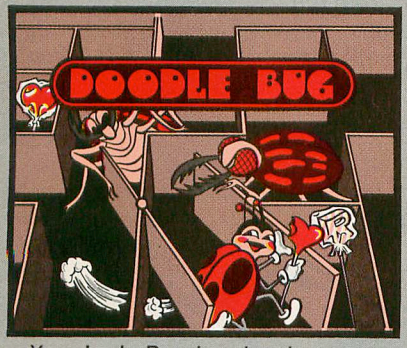

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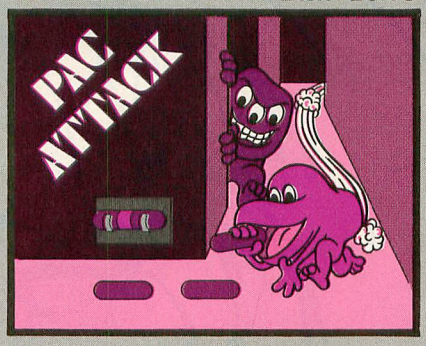

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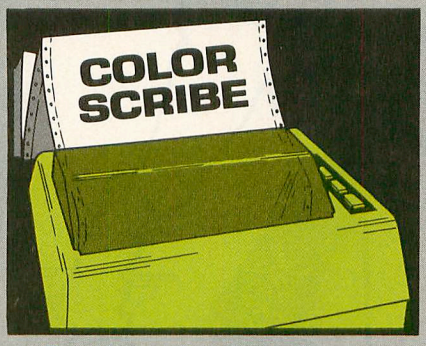

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Continued from page 4

better math students. The program allows for keeping track of students' progress and is difficulty selectable.

In April we published Jake Commander's memory map. GOTO 68 for the logical follow-up to the map, Jake's disassembler. It's a no-frills disassembler specially designed to make working with machine-language programs easier.

REVIEW$ kick off this month with Adventure International's Color Computer Sea Dragon. Also reviewed are a few other games, utilities, two new replacement keyboards, and Part II of the smart terminal review.

Aside from the INKEY$ department and an increasing number of pages, we have another new addition to **The Color Computer Magazine**'s staff. Welcome aboard to Jamie Tietjen. Jamie has many responsibilities here, so many in fact that he hasn't had time yet to unpack and properly move into his new home. One of the first things Jamie did here was take over the load tape program. So beginning with this issue **The Color Computer Magazine** will be available on tape. Thank Jamie for no longer having to type until your fingers bleed. March and April's programs will be available, as an introductory offer, on the same tape. A second tape will feature the programs from the May issue, and the third will have this issue's programs.

That's all for now. Enjoy the issue. — *K.L. Editor*

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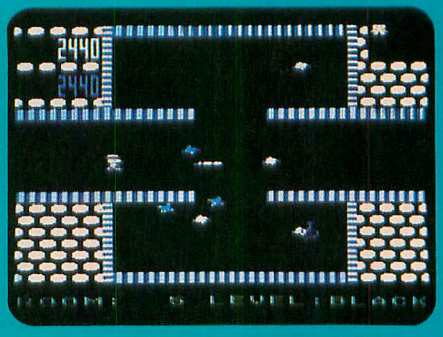

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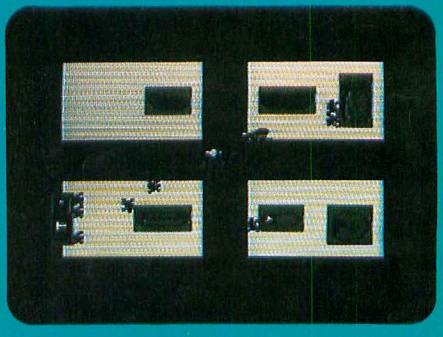

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INKEY$

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INKEY$
The Color Computer Magazine
Highland Mill
Camden, ME 04843

First Our Response

You overwhelmed us. Sure we expected a lot of mail, and sure we expected (hoped) it would be complimentary, and sure we knew that our first INKEY$ section would begin with kudos from our readers. But you overwhelmed us with your kind responses to our efforts. We thank you. — Eds.

Congratulations on the introduction of **Color Computer**. With your lineup of talent it should be a good magazine, and one which has been sorely needed for a long time.

Gregory F. Ludwig
Rice Lake, WI

I bought a copy of your magazine the first day it hit the newsstands. To my enjoyment it was a special magazine for my Color Computer and only my Color Computer. Boy did that swell my head. I enjoyed the feeling so much I mailed a subscription card that same night in Manhatten.

Thomas J. McCaffrey
New Windsor, NY

Thanks for the nicest Valentine I've ever received. Your premiere issue of **The Color Computer Magazine** just arrived. I ran through it and am amazed, delighted, and grateful. Keep up the good work. You started off with flying colors.

Phil Crump
Cloverdale, OR

I just bought your premiere issue and like it very much and have already subscribed. Keep up the great work! We Color Computer owners need it. Thank you.

David Madrick
Kew Gardens, NY

Upon reading your magazine I subscribed within the week! When it was brought to my attention that it was published by New England Publications in Camden, Maine, it surely made me feel proud to be a so-called "back woodsman."

The Reader Service card was an excellent feature in your magazine. I was surprised at the colorful and well thought out advertisements! You are to be commended on the choice of articles and programs. I am anxiously awaiting the April issue. Hope to see you for many years to come.

Susan J. Bouchard
Millinocket, ME

Nothing I have seen in years starts off with such an impressive list of writers. Dennis Kitsz alone would make any magazine.

R.W. Odlin
Sedro-Woolley, WA

Congratulations on your premiere issue. I was suffering from Color Computer blues, tired of searching the latest magazine for articles about my new Color Computer. Your articles are outstanding. I'm happy to know I own an incredible machine. Thank you Jake Commander. I CSAVEd the graphics trip through the Spiral Galaxy—fantastic trip—also Tick Talk by Richard Ramella.

Thank you for curing my Color Computer blues.

Irwin Meyers Jr.
Lakeville, MN 55044

Never in my life have I seen anything like **The Color Computer Magazine**, and to think it all happened in our state of Maine. Your first issue is so beautiful and great, words could never do it justice. Congratulations and a real pat on the back for all involved.

James A. Nyman
Millinocket, ME

Congratulations on your premiere issue. I have been waiting for a publication that offered tips, programs, and projects for the Color Computer without having to sift through useless articles about other machines. This is probably the first magazine I have read cover to cover. Enclosed is my subscription order. I don't plan on missing an issue.

Bill Antoniak
Columbus, OH

Received your magazine today. I took it to work this afternoon and have read it cover to cover twice. The articles are the best written of all the Color Computer magazines I have subscribed to. It seems you know what the majority of Color Computer owners need; simple straightforward articles that are not, and repeat, not over the head of the new owner.

I now understand more about disks from your short article than from 10 other articles I've read. Because of your magazine I know I will finally be able to start learning and using my Color Computer as it was meant to be.

Ted Tizekker
Crestview, FL

I have produced many programs for the Color Computer, but haven't been able to decide which magazine to submit them to for possible publication. Now I am positive that your magazine is the right choice after seeing the first class quality of your premiere issue.

Stephen Lai
Palatine, IL

Your premiere issue nudged out *PC Magazine* for the best first issue I've ever seen. I turned the subscription card right around.

L.W.C. Dye
Bloomingdale, IL

We were excited to find your premiere issue, but were then disappointed to find most programs required Extended Color Basic. We hope future issues will contain programs for the 16K Color Basic unit.

J.R. Hilton
Brashear, MO

Sounds like a challenge to you programmers. — Eds.

We have just purchased your first magazine, and are we thrilled! We are both new to the computer field, having just bought a 32K Color Computer. Thank God for your magazine. We found it interesting, funny, educational, and easy to understand. Thank you!

E. Rice
Niton Junction, Alberta

I had to write to tell you how excited I was when I picked up your first issue. It's a great magazine and just what I wanted! The software sources, the programs, the timely articles are all great! Best of luck to the success of **The Color Computer Magazine**.

Charles Atkins
Bethany, OK

Wow! You perceived a need and filled the gap. I'm looking forward to future issues of **The Color Computer Magazine**. It complements *Byte* much better than any other magazine by specializing on the best small computer made.

Robert M. Worth Jr.
Grand Rapids, MI

Please turn to page 12

SEE WHAT'S NEW THIS MONTH at QUASAR ANIMATIONS

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The Official
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Probably the most incredible arcade game ever is now available for the Color Computer. **NOTE:** this is **the official** ZAXXON, not an imitation!

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16K..... **$9.95**

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Your premiere issue is dynamite. Keep it up.

Bruce W. Goshorn
Alameda, CA

Okay guys, you really know how to make a user happy. **The Color Computer Magazine** is just the magazine I have been looking for. It's about time the Color Computer had a magazine all its own.

George Sprars Jr.
Richmond, CA

I'm afraid you've given me no choice. After reading your premiere issue, especially Dennis Kitsz's Custom Color articles, I feel I must in my position as a Color Computer owner, order a subscription to your magazine. Thank you for one of the best new magazines to ever come out.

Peter E. Durham
Andover, MA

Building Directory

I wish you the best of luck with your new magazine. However I am writing to point out an error in the article Stash a Directory (March '83). The author states that only five sectors are used by the directory. This is not correct. The disk is capable of holding 68 files which would require almost nine sectors of the directory track. The five sectors mentioned in the article would allow only 40 files per disk. Most people will probably have fewer files than this since most of them require more than one granule. Yet your readers should be aware of this before attempting to use the program.

Dee D. Fitz
Waverly, OH

Versatile DMP-100

Your review of Disk Scripsit mentioned that the LP-VII did not have the underline feature. While this is true for the VII, Radio Shack's new version, the DMP-100, does have the underline feature and it can be set up for use with Disk Scripsit. Additionally, it will print at 1200 baud, is faster and quieter than the LP-VII and has a slightly modified lower case character set.

Norman Garrett
Glendale, AZ

Which ROM

One correction for your Custom Color article in the March issue. It states that you have to remove the Extended Basic chip and power up to see the revision number. There is a much easier way, simply EXEC 41175 and the revision number will appear on the screen.

Also, while I'm at it, 13095 is not the most memory you can get out of a 16K Extended Color machine. POKE 25,6:NEW will give you a full 14631 memory count, but you cannot use high-resolution graphic pages. Congratulations on a great magazine.

Eric White
Altamonte Springs, FL

Thanks Eric. That POKE is important for readers to know about. Some programs labeled to run on 16K assume you already know about the POKE. If you buy or key in a program that claims to run on 16K but doesn't, do the POKE and then try loading the program again.
— Eds.

Sorcerer's Mistake

I erred in my April Sorcerer's Puzzles. In the programs Color Stones and Firecracker I used a form of MID$ command which works in Extended Color Basic but not in Color Basic. Labeling the programs Color Basic compatible was a mistake, though they will work in Extended Basic. At the end of this letter are the fix lines which will make the two programs work in Color Basic.

But first: I've had more than 200 programs published, and have erred five times. When I make a mistake, I realize it causes frustration for all who key in the program in good faith. Therefore, to all Color Basic users who tried the two programs, I make this offer: I will send a listing of an unpublished 4K Color Basic game called Race of the Century if you will send me a self-addressed stamped envelope. Further, if you will send me a blank cassette and 60 cents in stamps, I'll CLOAD the program and mail it back to you. Canadians should send 40 cents coin and self-addressed envelope for the listing, and 75 cents coin and cassette for the CLOADed program.

This is for penance, not profit.

Color Stones fix lines:

```
300 D$=LEFT$(D$,3)+G$+
  RIGHT$(D$,LEN(D$)-4)
360 D$=LEFT$(D$,A-1)+F$+
  RIGHT$(D$27-A)
390 D$=LEFT$(D$,A-1)+G$+
  RIGHT$(D$,LEN(D$)-A)
490 N$=MID$(C$,A-3,3)
492 IF N$=A$ THEN C$=LEFT$
  (C$,A-4)+B$+RIGHT$
  (C$,27-A+1) ELSE C$=
  LEFT$(C$,A-4)+A$+RIGHT$
  (C$,27-A+1)
493 N$=MID$(C$,A+1,3)
500 IF N$=A$ THEN C$=LEFT$
  (C$,A)+B$+RIGHT$
  (C$,27-A-3) ELSE C$=LEFT$
  (C$,A)+A$+RIGHT$
  (C$,27-A-3)
```

Firecracker fix lines:

```
460 V$=MID(A$(B),C,1): IF
  V$=" " THEN 530 ELSE S=
  VAL(V$): A$(B)=LEFT$
  (A$(B),C-1)+" "+RIGHT$
  (A$(B),LEN(A$(B))-C)
```

Richard Ramella
1493 Mountain View Avenue
Chico, CA 95926

64K Upgrade

I like your new magazine, especially the article by Dennis Kitsz. One question. Your review by Bob Rosen on the TDP 100 says that the TDP is identical to the newer Color Computers. If this is so what is the procedure to upgrade from 16 to 64K?

Lee Hills
Raleigh, NC

Remove capacitors C58, C60, C62, C64, C66, C68, C70, and C72. Then move two jumpers to the left of U21 and one jumper above U28 down to the 64K position. Solder the two bare staking pins to the left of U17 together. Install 64K chips. *— Eds.*

DBM Errors?

After running Paul Detwiler's DBM program (*March '83*) I have run into two bad subscript errors, one at 6140 and the other at 9090. I checked each DIM statement, but to no avail. Any suggestions on what might correct this?

M.M. Shockley
Wichita, KS

The problem is not a bug, rather an attempt to do more with the program than your system is capable of. Because of the lack of error trapping routines in the program, you have to, by trial and error, try different field and record number configurations.
— Eds.

Extended ROMs

Your Custom Color article is very good. I am having trouble obtaining the Extended Basic ROMs at nearby Computer Centers. The article states that I can obtain the ROM without the kit at Computer or Repairs Centers. This doesn't seem to be so.

Fred Staden
Akron, OH

A number of other readers had similiar problems. Anticipating this Ed Juge sent in the following letter. — Eds.

We just noticed in your first issue, a statement in Dennis Kitsz's article on page 43, which is not true.

Although we do make available through our National Parts Operation component parts for all of our products, a ROM has no replacement component parts.

It is true that the ROM by itself is available to our Repair Departments from National Parts, as a replacement part for a ROM which has gone bad. We are not able to sell the ROM by itself to an individual...it must be purchased as the upgrade kit. The reason is the royalty payable on all original sales of this software. ROMs sold through National Parts do not trigger a royalty payment and therefor can be used only to *replace* a defective part.

I'm sure Dennis had no way of knowing this, and I'm not sure where he got his figures, but I feel certain there will be a number of questions from customers who attempt to follow his advice and are not able to obtain the ROMs.

Ed Juge, Director
Computer Merchandising
Radio Shack

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Setting The Standards

WHAT THEY ARE SAYING ABOUT COLORPEDE

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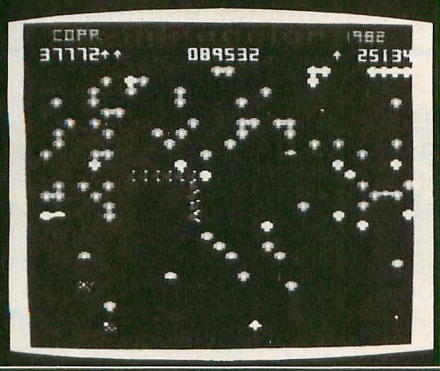

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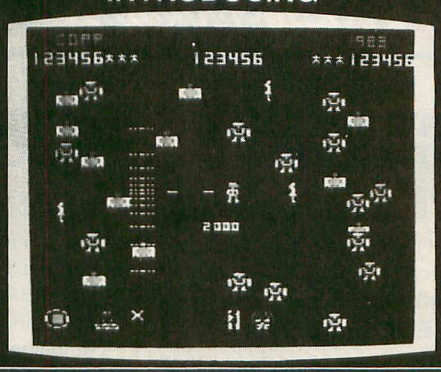

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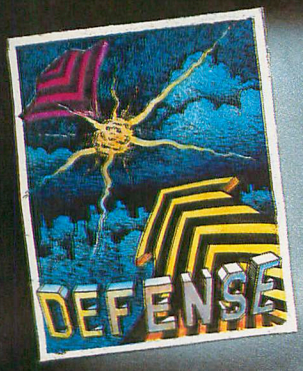

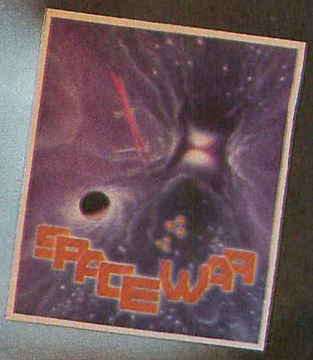

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BOOKS

We decided to to do this summer. . .

. . . write an original game for the Color Computer. It can be an adventure, simulation, arcade, or any type of game imaginable. It can be written in Basic or assembly language. It can be long or short, it's all up to you. Just make sure you get it to us by Labor Day, September 5, 1983.

Don't let this opportunity ooze away like so much cocoa butter on a hot summer day. Who knows, you may find yourself lying on a beach on a 90 degree day thinking to yourself, "Why am I roasting myself like so much flank steak, I could be writing an original game for **The Color Computer Magazine** Summer Programming Project?" Just then a beach ball hits your head, bounces up against a nearby beach umbrella, and lands in the upraised arms of a lifesaver waving someone closer to the shore.

You frantically search your travel bag for paper and pencil and scribble a few notes about the event that just inspired your first (or newest) Color Computer game, Beach Ball Wars. Will it be the next Space Invaders, Pac-Man, Zaxxon, or Eliminator? Maybe not with the title Beach Ball Wars, but then again who knows? Stranger things have happened.

The contest is divided into two categories: Basic and assembly language. As you will notice from looking at the prize list,

give you something

both grand prize winners will come away with an almost identical load of loot. They differ only where the sponsor of the prize specified that they wish a particular winning category be awarded their contribution.

Send as many entries as you like to:

The Color Computer Magazine
Summer Programming Project
Highland Mill Mall
Camden, ME 04843

Entries should be submitted on cassette tape or disk with clearly written instructions for use. All entries will be held until October 1, 1983. For the return of entries not selected for prizes, include a self-addressed stamped envelope with your program. All winners will be announced in December's issue of **The Color Computer Magazine**. Entries will be judged by **The Color Computer Magazine**'s editorial staff. All decisions are final.

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The Color Computer Magazine	(2) paid publication, one-year subscription
Computerware	(2) $100 gift certificates
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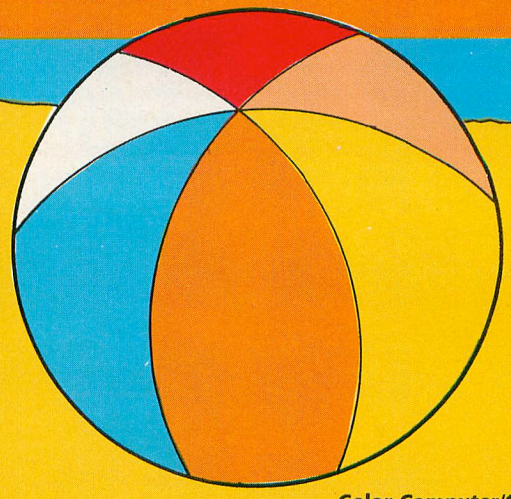
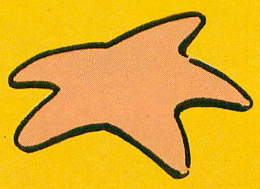
Tom Mix Software	(2) $50 gift certificates
Zeta Software	Wormtube game#

\# Machine language winner only
\+ Basic winner only

1st Runners-up
Paid publication and a one-year subscription to The Color Computer Magazine.
Prickley Pear T-shirt

2nd Runners-up
Paid publication in The Color Computer Magazine.
Prickley Pear T-Shirt





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The AMDISK-III micro-floppy disk system is an engineering breakthrough in disk size, storage capacity, media protection and user convenience. It's fully compatible with your Radio Shack*® Color Computer. Enjoy a full 624 KByte† (formatted) storage capability and the extra convenience of the new 3" hard plastic encased diskettes. They fit into a shirt pocket and are easy to mail, too.

The AMDISK-III drive system is ruggedly constructed for years of trouble-free operation, and is backed with our 90 day warranty on parts and labor.

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*Radio Shack is a registered trademark of Tandy Corporation.
†Requires recording on both sides.

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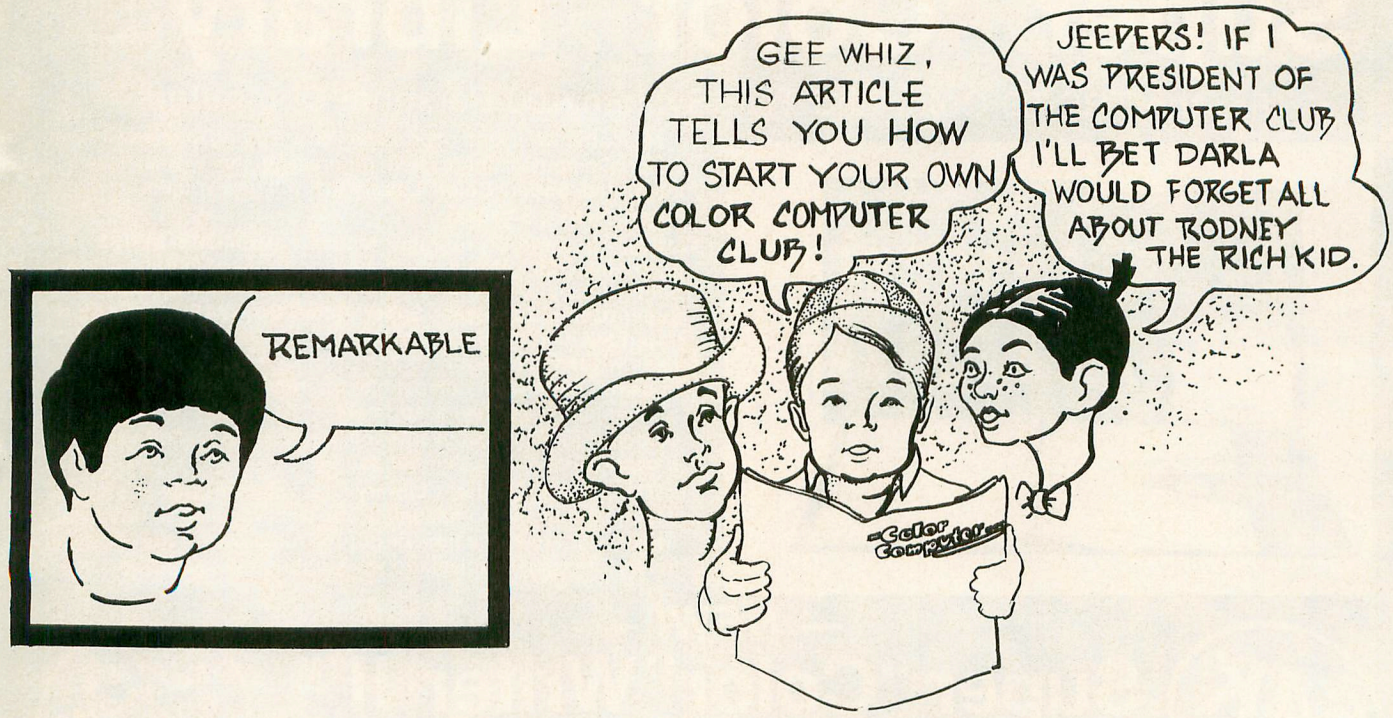


Computer Club Primer

Let experience from the Silicon Valley tell you how.

by Shawn Jipp

SO YOU WANT TO START a Color Computer club? Through all the hard work, frustrations, disappointments and set-backs, always remember that you started the club to have fun. I would be remiss if I were to paint an exceptionally rosy picture, and would feel better throwing the negatives at you before writing about the fun.

Forming a Color Computer club will have many trying moments. But being a member, or an officer, of a functioning club will (most likely), outweigh the troubles you'll go through forming the blasted thing.

My club, The Silicon Valley Color Computer Club, is fairly large. Our 100+-member roster began with only four members. This is not to say that all clubs will or should grow to this size, but that's our club's history. I will use our club as an example repeatedly in this article; not because you should model your club after ours, but because we are a growing club and happy with how our club runs. Use this advice as a starting point for your group. Reject what you don't like, or what will not apply to your surroundings. With that disclaimer, let's get organized.

Why?

The answer to *why* should be as simple as the question. To share information and have fun. Make a list of what you'd like to get out of a Color Computer club. Later, as you meet other computerists, add their ideas to the list. Don't worry about sticking to them, goals should serve to guide your initial steps rather than become hard-and-fast rules.

How to Find Members

As with most things Color Computer, the best place to start is at your local Radio Shack. Tell the manager or computer expert that you want to start a club and ask them to put you in touch with other owners. Ask if you can post a small notice on a bulletin board (the cork or electronic kind), if they have one.

Place a small classified ad in your local newspaper. Write to magazines and ask to have a membership request listed in their Letters To The Editor column.

Where?

Where you meet will depend on the number of members in your club. If you start with only a few, you can use your own home. But be prepared, growth may quickly outpace your living room. (Ever tried squeezing 100 people into your house, let alone your living room?)

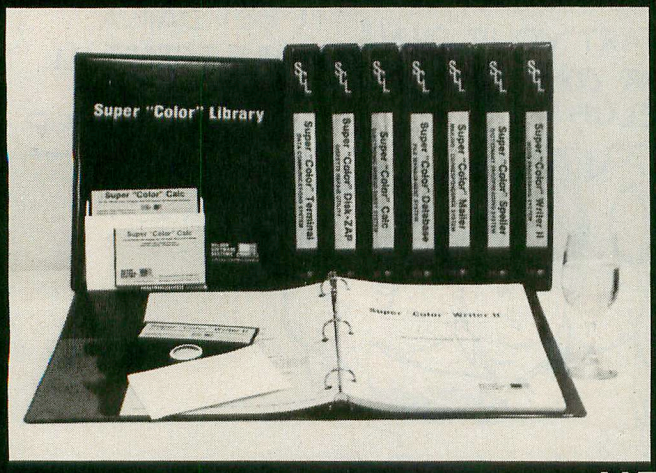
As your club grows, you'll have to find suitable quarters. Try computer stores, computer/electronic manufacturers, banks, and schools as possible meeting sites. Places like these don't usually charge for organizations like yours to use their facilities.

Our club meets at a disk manufacturer's building in a room set aside for users groups. It can accomodate up to 300 people with outlets for computers at almost every seat. Electrical outlets at your meeting place is important so you can participate in demonstrations and other activities.

Please turn to page 22

Super "Color" Library™

For the TRS-80 Color and TDP System 100 Personal Computers



No matter what kind of problem you are trying to solve with the Color Computer, there is a program in the ever-expanding integrated, **Super "Color" Library** that will give you the solution; Faster, Better, Smarter!

Every Library program features **MEMORY-SENSE** to determine your computer's memory, from 16 to 64K, and adjusts automatically to maximize work space. All programs, except the **Super "Color" Speller** and **Super "Color" Disk-ZAP**, feature a true lowercase display with below line descenders. Each program has been written specifically for the Color Computer in fast machine code to be totally compatible for optimum performance — Something a motley assortment of programs from diverse sources or a passel of overpriced, wallet-FLEXing software from a bygone era simply can not achieve.

The **Super "Color" Library** has all the power, speed, dependability and compatibility you will ever need so build your library a volume at a time or put the full power of the complete library of problem solvers to work right away.

— NEW! —

64K Compatible

Super "Color" Writer II™

32x16 & 51-64-85x21&24 WITH REAL LOWERCASE DISPLAY

VERSION 3.0 By Tim Nelson

THE INTELLIGENT WORD PROCESSOR

The **Super "Color" Writer II** is for those who desire the best. It is the most powerful, fastest, most dependable and versatile word processor available for the Color Computer, from 16 to 64K. The **Super "Color" Writer II** has features for the most demanding professional, yet it is easy enough for newcomers to master.

Of course the **Super "Color" Writer II** has all the features you would expect from the highest quality word processor, such as a clear, crisp and readable professional display with your choice of display colors, 9 display formats; standard 32x16 & 51-64-85x21 &24 with real lowercase descenders; full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, seven delete functions, locate and change, wild card locate, a real block move & copy, word wrap-around, programmable tabs, display memory used and left, non-breakable space, multiple headers and footers, dynamic text formatting, comprehensive format parameters, use with ANY printer at any baud rate from 110 to 9600 baud, automatic justification, automatic pagination, automatic centering, automatic flush right, underlining, superscripts, subscripts, pause print, single-sheet pause, optionally print comments, append text files, available in a ROMPAK cartridge for maximum work space, but that's only half of the story. No other program can even begin to compare in features with the **Super "Color" Writer II.**

Check These Exclusive Features

MEMORY-SENSE adjusts to computer's memory (16-64K) for maximum work space; TYPE-AHEAD, TYPAMATIC KEY REPEAT and KEY BEEP for the pros; 3 PROGRAMMABLE FUNCTIONS; AUTO PHRASE INSERT; COLUMN CREATION; TEXT FILE LINKING; HELP MENU; A TRUE EDITING WINDOW IN ALL 9 DISPLAY MODES; TRUE FORMAT WINDOW to display line lengths up to 255 characters, with horizontal and vertical scrolling to replicate the printed page including centered lines, headers, footers, page breaks, page numbers, margins, giving a perfect printed document every time. Also makes hyphenation a snap; **TRUE AUTOMATIC JUSTIFICATION** for neat, even left and right hand margins; Ability to use CHARACTER CODES for printing special characters available with your printer; freedom to embed as many PRINTER CONTROL CODES as desired anywhere in the text, **EVEN WITHIN JUSTIFIED TEXT;** 90-plus page tutorial manual.

ADDITIONAL DISK FEATURES: Read a directory, Display free granules, Save with Automatic Verification, Load and Append ASCII files and BASIC programs, Kill files, and Link files from disk for continuous printing. 54K bytes of workspace available with a 64 K system. Only the best offers all of these features.

TAPE $69.95 **ROMPAK $89.95** **DISK $99.95**

Tutorial only $15.00 (Refundable with purchase)
Tape & Disk require 32K for lowercase display
Previous **Super "Color" Writer II** owners call for upgrade policy

Super "Color" Mailer™

By Tim Nelson

The **Super "Color" Mailer** is a powerful multi-purpose mailing list merging and sorting program including lowercase display that uses files created by the **Super "Color" Writer II.** Combine files, sort and print mailing lists, print "Boilerplate" documents, automatically insert text in standardized forms, address envelopes, the *list is endless.*

TAPE $39.95 **DISK $59.95**
Operators Manual only $10.00 (Refundable with purchase)

NEW

Super "Color" Speller™

By Peter A. Stark

The **Super "Color" Speller** is a fast machine-code proofreading program to correct **Super "Color" Writer** files. Automatically proofreads your documents against a 20,000 word stock dictionary, plus your own customized dictionary and corrects typos or marks them for special attention.

AVAILABLE ON DISK ONLY $69.95
Operators Manual only $10.00 (Refundable with purchase)

NELSON SOFTWARE SYSTEMS **9072 Lyndale Avenue So., Minneapolis, Minnesota 55420** **612/881-2777**

Circle No. 13 on Reader Service Card

32x16 & 51-64-85x21&24 Display With Lowercase Descenders And 16 Thru 64K Too!

NEW Super "Color" Calc™

ELECTRONIC SPREADSHEET By Kevin Herrboldt

Now you can answer those "What if?" financial projection, forecasting, budgeting, engineering and calculating questions with precision, speed and power using the **Super "Color" Calc,** truly the finest electronic worksheet and financial modeling program available for the Color Computer, from 16 to 64K. Now every Color Computer owner has access to a calculating and planning tool rivaling VisiCalc™ containing all its features and commands and then some. You need only change one variable and you instantly see how that change affects your assumptions. You can even use VisiCalc templates freely with **Super "Color" Calc!** Combine spread sheet tables with **Super "Color" Writer II** documents to create ledgers, projections, statistical and financial reports and budgets.

Features include: 9 display formats; standard 32x16 & 51-64-85x21&24 with real lowercase descenders * MEMORY-SENSE to adjust to computer's memory (16-64K) for maximum work space; Full-size 63x256 worksheet * Easy to use * HELP Menus to make learning faster * Machine code speed and high precision * Total flexibility in calculating * Up to FOUR VIDEO DISPLAY WINDOWS to compare and contrast results of changes * Sine and Cosine functions, Averaging, Exponents, Algebraic functions, and base 10 or 16 entry * Multi-layered Column and Row Ascending and Descending sorts * Locate formulas or titles in fields * Easy entry, replication and block moving of frames * Global or Local column width control up to 81 characters each * Create titles of up to 255 characters * Typamatic Key Repeat * Key beep * Type-ahead * Print up to 132 column worksheet * Prints at any baud rate from 110 to 9600 * Print formats savable along with worksheet * Enter control codes for customized printing.

DISK FEATURES: Read a directory; Display free granules; Kill files, Save with Automatic Verification; Load files; Append disk files for complete worksheet printing. 54K bytes of worksheet space available with a 64K system.

Tutorial and sample templates are supplied with the program.

ROMPAK $89.95 **DISK $99.95**

Tutorial only $15.00 (Refundable with purchase)
Disk requires 32K for lowercase display.

Super "Color" Disk-ZAP™

By Tim Nelson

Now the dreamed-of repair of I/O errors is a reality. The **Super "Color" Disk-ZAP™** is the ultimate repair utility for simple and quick repair of all repairable disk errors. Designed with the non-programmer in mind, the **Super "Color" Disk-ZAP™** will let you retrieve all types of bashed files, including BASIC and Machine Code programs.

This high-speed machine code disk utility has a special dual cursor screen display to show HEXIDECIMAL and ASCII displays simultaneously. You are able to: Verify or modify disk sectors at will * Type right onto the disk to change unwanted program names or prompts * Send sector contents to the printer or any other RS-232 device * Search the entire disk for any grouping of characters * Copy sectors * Backup tracks or entire disks * Repair directory tracks and smashed disks * Full prompting to help you every step of the way * 50-plus page Operators Manual which helps you simply and quickly fix the vast majority of disk errors, and teaches the rudiments of disk structure and repair.

AVAILABLE ON DISK ONLY $49.95

Operators Manual only $10.00 (Refundable with purchase)

NELSON SOFTWARE SYSTEMS

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AUTHORS' SUBMISSIONS ARE ENCOURAGED.

Super "Color" Terminal™

THE FINEST TERMINAL PROGRAM ANYWHERE!
Version 3.0 By Dan Nelson

The best has become even better, with many new features including 9 display formats; 32x16 & 51-64-85x21&24 with real lowercase descenders, plus compatibility with the 64K Color Computer. This user-friendly program makes communicating with ANY computer a breeze even for a newcomer. Communicate using your modem with all the popular information services such as Dow Jones, Compuserve, The Source, and local BBS's, clubs, friends, or the main-frame at work. You can also communicate directly with other microcomputers, such as the TRS-80 I/III, II, other Color Computers, Apples, IBM PCs, etc., via RS-232 without using a modem. Save the information or PRINT IT!

FEATURES: MEMORY-SENSE to adjust to computer's memory (16-64K) for maximum work space; Selectively print data at baud rates from 110 to 9600 * 54K of data storage with 64K disk system. 128 character ASCII keyboard * Automatic graphics mode * Word mode (word wrap) for unbroken words * Send & receive **Super "Color" Writer II, Database & Calc** files, ASCII files, Machine Language & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 5 6 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Unique CLONE feature for copying any tape * Lower case masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Files compatible with other Library programs.

ADDITIONAL DISK FEATURES: Works with up to four Disk Drives; Call a directory, Print free space, Kill disk files, Save with Automatic Verication and Load textfiles or BASIC programs; Save and Load KSM'S to the disk.

TAPE $49.95 **ROMPAK $59.95** **DISK $69.95**

Operators Manual only $10.00 (Refundable with purchase)
Previous **Super "Color" Terminal** owners call for upgrade policy.

NEW Super "Color" Database™

This high speed machine language program including true lowercase displays fills all your information management needs, be they for your business or home. Inventory, accounts, mailing, lists, family histories, you name it, the **Super "Color" Database** will keep track of all your data.

The **Super "Color" Database** features MEMORY-SENSE to adjust to computer's memory (16-64K) for maximum work space. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design, each divided into as many fields as you need. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending order. The math package performs arithmetic operations and updates other fields which is especially useful when used as an order entry and invoicing system. You can create reports, or lists for mailings, or whatever. Create files compatible with the **Super "Color" Writer II and Terminal.** Up to five different print formats are available, and control codes may be imbedded for customized printing.

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Continued from page 19

Publicity

As I eluded to before, advertising and publicity are very important to a new and growing club. I know of some clubs with members who want to keep their clubs small, like secretive underground organizations, keeping expansion to an absolute minimum. Beware of such attitudes attaining leadership positions in your club. They won't benefit the club, and may resist increasing membership in the club for fear that new members might eventually seek their office. Sounds like politics, right? If you plan your club correctly from the start, you'll avoid many of these problems.

I'm not saying that the bigger the club the better, but I am endorsing the idea that more people mean more information... and more fun.

Appoint, nominate, or vote on a person to handle publicity. Some of the responsibilties this person would handle are responding to membership inquiries, sending press releases to magazines and bulletin boards, posting fliers, and other related projects. Make sure that person has a durable tongue able to last through long hours of stamp licking; in other words, a real Color Computer zealot. It would also help if he had a modem.

Mailing Addresses

At first, use a member's home address (yours?), as the club's central location. When the club can afford it get a post office box. Get two keys so that two people can alternate retrieving mail if the post office is not on anyone's normal daily route. Make sure that magazines and your local Radio Shack know your address, and keep them informed as to any changes when they occur. You won't get much information if no one knows where you are.

Dues

We voted to charge a $5 one-time membership fee for new members and $12 annual dues for all members. This seems to be in line with what other clubs charge.

How you use the money is something for each club to decide. We have a hard library (books), and a soft library (software), and have used some of the funds to purchase items for these collections. Dues also cover our paper, postage, and newsletter costs. Future plans call for a swap meet and a pizza party with expenses paid by our dues account.

Once you've collected the money, you'll need to open a bank account for its safe keeping. On the account paperwork you should authorize three signatures requiring that no monies can be withdrawn without two of these three signatures.

All expense records should be maintained accurately. At the close of every year the treasurer should present a business report to the club. The account's current balance should be announced at every meeting. Be careful with dues money, it's easy to overspend other people's money.

Organization

Our club started with a volunteer president and secretary. That was fine for the first few months, but is not a workable long-term method of organization. We now have elected officers: president, vice president, secretary, and steering committee. We also have non-elective posts: newsletter editor, librarian, and publicity person.

The steering committee's main purpose is that of checks and balances for the president. It assures that the club's direction is not determined by one person. It also helps the person serving a term as president by easing some of the demands on his time.

Library

We are now in the process of buying every book available about the Color Computer. We allow members to check out books on the provision they are returned at the next meeting. The club librarian is responsible for cataloging each selection and charging for late returns. The fine is 25 cents per day, but the fine cannot exceed the replacement cost of the book.

A special library bookmark is placed in each book to indicate the book's return due date. We rubber stamp the paper edges of the book with the words, *"The property of the Silicon Valley Color Computer Club."*

Software piracy is one of the most controversial problems of the computer industry. There is no easy solution. At first our library had some cassettes that were unquestionably pirate versions. When our club leadership changed and we became more organized, some members wanted to use club funds to purchase more software for the library. It was time to decide how to deal with the piracy issue.

I consulted several other clubs; none of them collected copyrighted software. One club had been threatened with a lawsuit for having a certain vendor's ROMpaks (not Radio Shack's) in their library. That club's president discussed the problems with an attorney who told him the software company would lose if the case ever went to court. The lawyer likened the situation to public libraries and their collection of copyrighted materials. He recommended that the club take out the ROMpaks in question to avoid a costly lawsuit. He further suggested that they obtain written permission from a program's author before including a program in their library. As of this writing, only Radio Shack has agreed to allow ROMpaks in their library.

Our steering committee unanimously adopted this policy. We seek author's permission before placing any *software* in our library with the understanding that the library copy will only be used so that members can examine and try the software to assist them in their purchasing decisions. Our club's official policy is against piracy. The software in our library, aside from any we get permission for, is all in the public domain.

Rules and Regulations

We tried to cover as many situations in our constitution as possible. Everything from impeachment procedures to the time limit permitted for the business portions of each meeting.

Our constitution is four pages long and serves as the basis for our bylaws. The constitution basically states who and why we are. The bylaws, on the other hand, are nine pages long and go into more detail in things such as cost of membership, yearly business meeting times, duties of the newsletter editor, and so on.

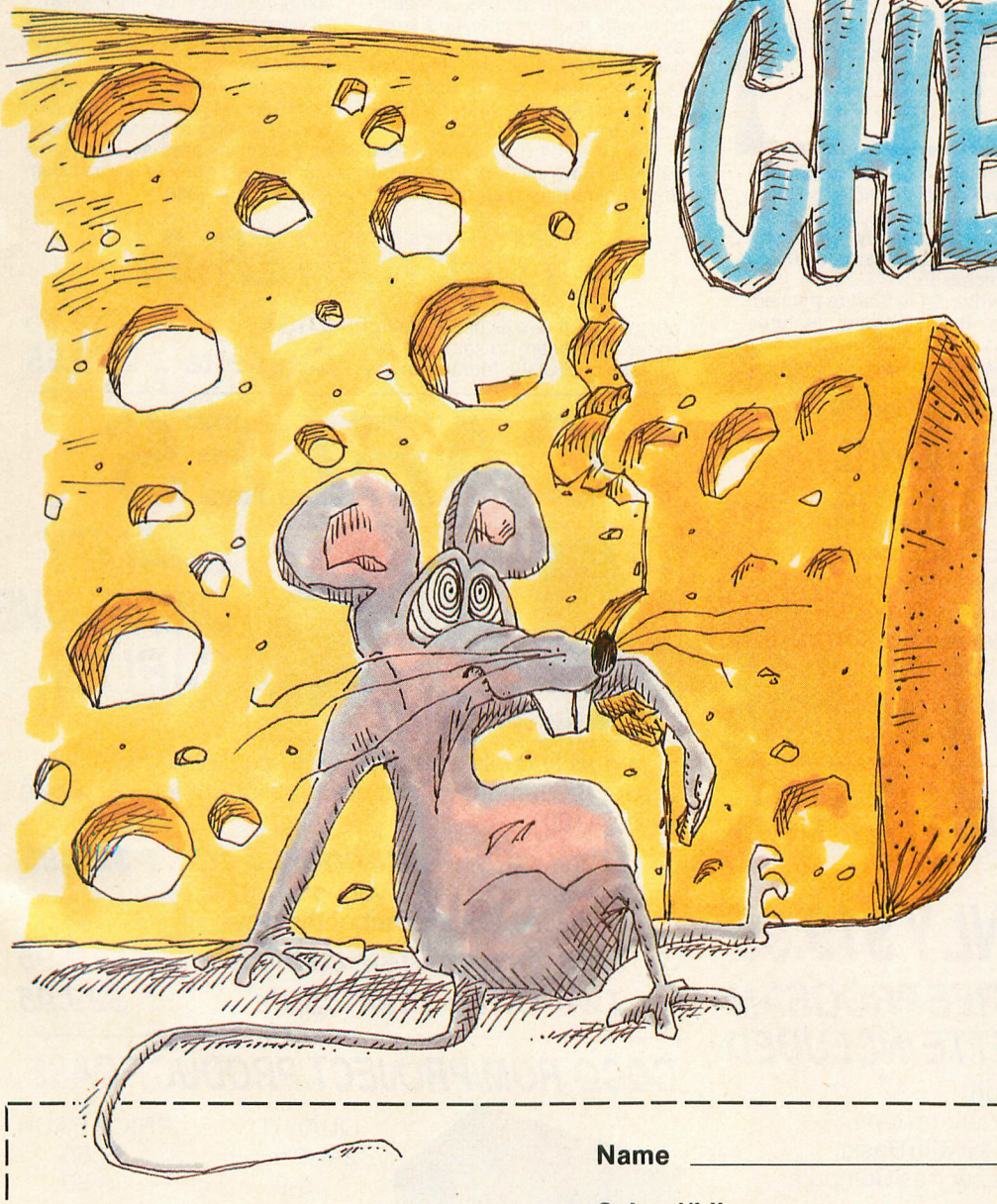
We made it harder to amend the constitution than to change the bylaws. Luckily for us, the person who wrote most of the documents had a background in forming small corporations.

Smaller, less formal groups may not feel such a need for such sophisticated rules and regulations, but should consider implementing them anyway as a form of protection and guidance for the club.

Summary

I hope this has given you a good idea of what you need to consider before you start your own Color Computer users group. It is by no means as simple as it may seem, and will definitely require more time than you anticipate. But... it can be rewarding. ■■■

We're the whole CHEESE



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☐ Yes, send me your micro-computer book brochure.

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☐ a Commodore

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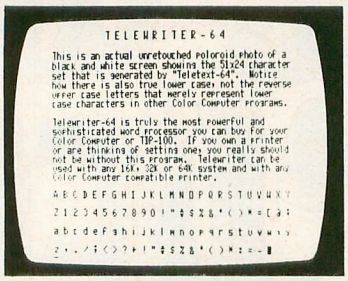
Circle No. 14 on Reader Service Card

THE TOP–RATED COCO WORD PROCESSOR:

Colorware researched the word processors available for the Color Computer. We came to the very same conclusion that so many review articles have! Telewriter-64 is, by far, the superior word processor for the Color Computer.

Why is Telewriter so much better than the others? For one thing, it has overcome the 32x16 character display limitation of the Color Computer. No small feat, Telewriter accomplishes this by generating its own set of characters in software. You select 51x24, 64x24 or 85x24 character displays by merely issuing a format command. If you have ever used a word processing system, you know how important it is to be able to see a good portion of your text on the screen.



Telewriter-64 also generates true lower case characters. This is much preferable to the reverse characters that merely "represent" lower case letters in other co-co word processors.

Telewriter-64 is feature packed. Besides the standard features found in any word processor, Telewriter also includes: user-friendly full-screen editing, rapid cursor and scrolling control, page jump, right justification, menu-driven disk or cassette access, compatability with spelling checkers (such as Spell-and-Fix), and a clever double check that asks the user "Are you sure?" before executing any operation that would kill any sizeable amount of your text.

Telewriter-64 runs on any 16K, 32K, or 64K system (extended Basic not required) and works with any printer. It has all of the control codes necessary to take full advantage of all of the features in any printer. There is even a "typewriter" mode which sends typed lines directly to your printer.

With advanced word processing software such as this, your color computer becomes a truly powerful word processing system, with a price that makes sense for the personal user.

Beyond impressive capability, Telewriter-64 simply makes any kind of writing a pleasure. It is a truly sophisticated system that is marvelously easy to learn and enjoyable to use.

TELEWRITER-64

Disk $59.95
Cassette . $49.95

SUPER-PRO KEYBOARD

REPLACEMENT PROFESSIONAL KEYBOARD KIT...ONLY $69.95

- Contour molded, full travel keys for fast smooth typing.
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- Complete, easy instructions for any CoCo or TDP-100.
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Note: For computers manufactured after Oct. 1982, add $4.95

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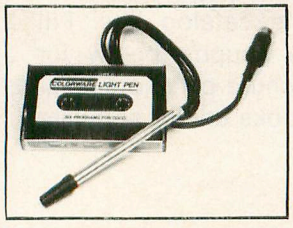

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FREE PROGRAM CASSETTE INCLUDED

- Plugs directly into your joystick port.
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EXTENSION CABLE FOR YOUR MODEM/PRINTER

Place your modem or printer where you want. 15 ft. cable with four-pin male and four-pin female DIN connectors.

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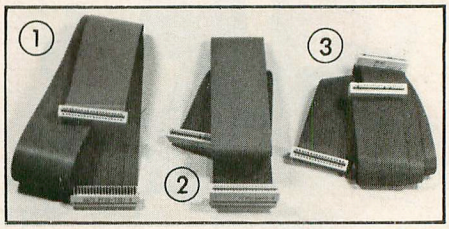
CABLES



QUALITY DISK DRIVE CABLES

High quality cable and high force, gold plated contacts ensure the utmost in connection reliability for your CoCo or TDP-100.

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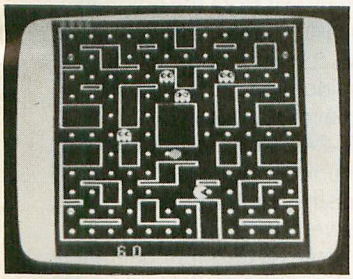
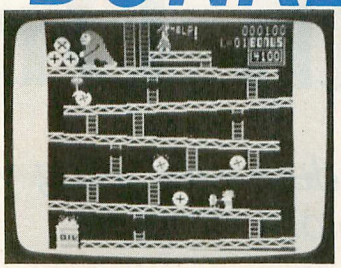


GHOST GOBBLER

From Spectral Associates, this "Pac" theme game is the best of it's type. Brilliant color, action and sound, just like an arcade gobble your way to glory, but watch for those ghosts! Get in on the wild fun of this game craze now. Requires 16K. Tape: $21.95, Disk: $25.95

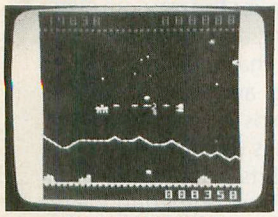
GHOST GOBBLER

DONKEY KING



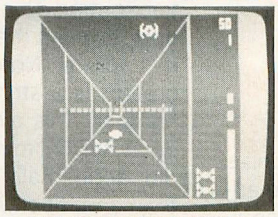
DONKEY KING

You simply can not buy a more impressive game for your color computer than this new wonder from Tom Mix. The graphics, sound, and animation are all just astonishing! There are four different graphic screens and each is endless fun. Requires 32K. Tape: $24.95, Disk: $27.95



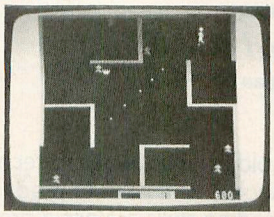
PROTECTORS

There are several good versions of the "Defender" theme available for the CoCo. None, however, rival this one from Tom Mix. No other game matches the detailed graphics and sheer excitement of this top seller. Requires 32K. Tape: $24.95, Disk: $27.95



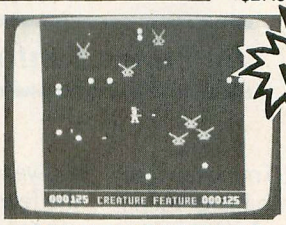
INTERGALACTIC FORCE

Your space fighter roars into the Death Corridor. Lock-on and blast the enemy fighter from the sky. Now try dropping one into Death Star's narrow exhaust vent. It takes skill and guts. Good luck! With "Star Wars" theme song. From Anteco. Requires 16K. Tape: $24.95



ANDROID ATTACK

Spectral Associates' very well done "Berserk" type game with some interesting added features. Each cassette contains both the 16K and 32K version. The 32K version has voice output! Plenty of action. Tape: $21.95



CREATURE FEATURE

From Color Software, comes a lightening swift shoot & dodge the enemy game. It's clever cross between "Robotron" and "Beserk" themes, with bullets flying everywhere. Solid, shoot-em-up-fun. Requires 16K. Tape: $17.95. Disk: $19.95

FROGGER

Just released by The Cornsoft Group, this is the officially licensed version from Sega, the arcade manufacturer. It has it all! 4 lane super highway, snakes, turtles, logs, alligators, etc. Lots of action and laughs! Requires 16K. Tape: $19.95

THE COLORCADE

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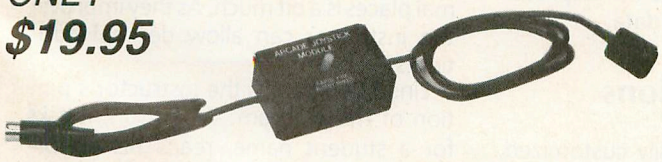

★ It's a Joystick Interface

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★ It's a Rapid Fire Module

Press the fire button on your joystick and get a great burst of fire instead of just a single shot! Adds tremendously to the many shooting type games that do not have repeat fire. With variable burst speed.

★ It's a 6 ft. Extender Cord

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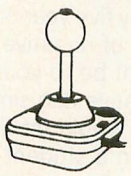
A GREAT BUY!

This one has received outstanding reviews. Its unique design fits the hand beautifully and it has the truly fast and positive response needed for high speed play. Actually out-performs some joysticks that cost $50 or more.

WICO FAMOUS "RED BALL"



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16K Disk Basic

Math Drill

Math made easier using your Color Computer.

by James Sanford

WHEN I REALIZED my kids were picking up math faster than I expected, I decided to write a program to drill them. This is easier said than done. To be useful, the system must be challenging and motivating. Such a program should be easy for the kids and instructor (daddy) to use and should also keep track of their progress.

MATHDRIL was written with these goals in mind. It's a simple program designed to exercise children in basic arithmetic skills. The program is easy to use and keeps track of their progress. It gives the instructor the ability to tailor each student's program, modify that program, and periodically check on each student's progress. I wrote the program for a 32K disk system, but it will easily run on 16K and can be modified for a cassette system.

Using MATHDRIL

When initially setting up the system, load the program, and add

```
5049 N$="<STUDENT'S NAME>"
```

Then type RUN 5049. This lets you set the parameters and establish a file for each student. Then delete line 5049. This may seem cumbersome, but it only has to be done once when you add a new student to the system.

The program is simple to use, especially for the student. You load the program and type RUN. The program asks for the student's name, obtains his parameters from the disk, and starts drilling the student. You can stop the program after each problem. When you do, the disk file is updated with the student's most recent performance. Incidentally, a two year old can be taught to recognize the few words he'll have to read, so advanced reading skills are not a prerequisite.

When the instructor wants to view a student's progress, he loads the program, and types RUN 5000. The program then asks you for the student's name, displays his grades and parameters and asks if you want to make any changes. When all updates are completed, the program stops.

Since nothing is child-proof, I put this program and the data files on a separate disk. I then put backup copies on a regular Basic disk, so that in the event of a system crash, you'll only lose the duplicate program and most recent data.

Modifications

MATHDRIL can be easily customized, and several variations come to mind. Although a disk system is most convenient, the program will run on cassette systems. Program Listing 2 is for cassette systems

My five year old picked up on the concept of negative numbers quickly, but it might be to your advantage to set up a negative flag similar to the integer flag. This would let the instructor determine when a student will see negative numbers. The program contains a reward routine and this section can and should be customized for each student. This is easy to do because it is set aside in specific blocks of the program.

Line By Line

The first three lines of the program find out who the student is and initialize the program based on that student's parameters as decided by the instructor.

Line 10 generates random functions of random variables, goes to the appropriate subroutine, and lets the student make an orderly exit from the program.

Lines 100–140 form the routine for acknowledging correct responses. I used a display of random sounds and colors — something that my kids really like.

Lines 200–240 are the routine that handles incorrect responses. This is something distinctive that makes it obvious their answer is wrong.

Line 500 begins a termination routine that stores the updated data and signs off.

Line 1000 is the beginning of the addition routine. This takes the random numbers, displays them, and looks for a correct answer. Note that the input is interpreted as a string and converted to a number. This avoids having to explain what REDO? means when the two year old accidentally hits something other than a number. After comparing the response with the correct answer, the program calls the appropriate routine to tell the student if he's right or wrong. Three attempts are allowed on each problem. After that, the program moves to a new problem.

Line 1220 does the same for multiplication, line 1100 for subtraction, and lines 1300 and 1400 for division. Note that the division routine lets the instructor decide whether problems with rational but non-integer quotients are allowed. Asking a five year old and a two year old to solve problems to nine decimal places is a bit much. As they improve, the instructor can allow decimal quotients.

Line 5000 begins the instructor's portion of the program. When run, it asks for a student name, reads his performance data, and displays the grades for each type of problem. The instructor can then change the maximum number a student will have to deal with and the integer division flag. The program reinitializes all grades when parameters are changed, writes the new data to disk, and then asks for another student.

Results

The ultimate results of a program like this are how much a student learns, and equally important, how interested he remains. My son loves MATHDRIL and is pleased and excited every time he gets a right answer. Since I wrote the program and started checking his grades, he has consistently improved. Based on these two criteria, I consider the project a success.

Listing begins page 28

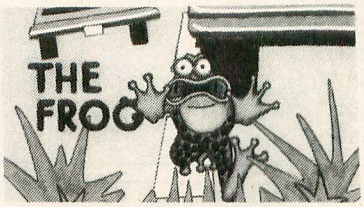
TOM MIX SOFTWARE

•FOR THE COLOR COMPUTER & TDP 100 • 3424 College N.E., Grand Rapids, MI 49505 (616) 364-4791•

NEW

"THE FROG"

(C) 1983



ARCADE ACTION
This one will give you hours of exciting play. . . Cross the busy highway to the safety of the median and rest awhile before you set out across thes swollen river teaming with hidden hazards. Outstanding sound and graphics.

16K MACHINE LANGUAGE
$27.95 TAPE
$30.95 DISK

NEW

SPACE SHUTTLE

1983
32K Ext. Basic

$28.95 TAPE ONLY

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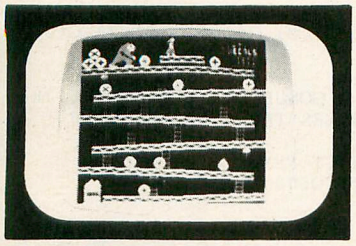


THE KING

1982
32K Machine Language
$26.95 tape
$29.95 disk

ARCADE ACTION - How high can you climb? Four full graphic screens. Exciting Sound - Realistic graphics. Never before has the color computer seen a game like this. Early reviews say: Just like the arcade - Simply outstanding!

NEW

"TRAPFALL"

By KEN KALISH
(C) 1983

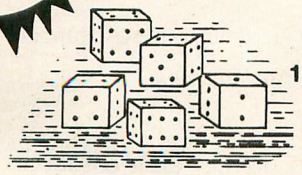
ARCADE ACTION
The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

16K MACHINE LANGUAGE
TAPE $27.95
DISK $30.95

NEW

"YAAZEE"

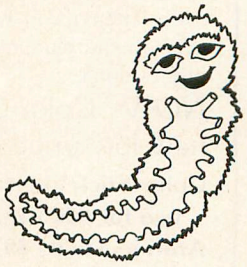
(C) 1983



$19.95
16K MACHINE LANGUAGE
EXT. BASIC

Yaazee is a 2 player game using five dice to get the best poker hand. After game is loaded flashing digit below player number determines which player rolls dice at the start of the game.

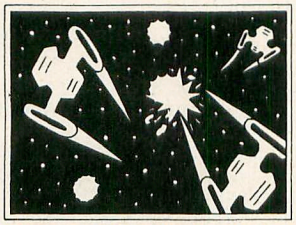
KATERPILLAR ATTACK



Outstanding graphics and sound will end all of those trips to the arcade. So much like the arcade you have to see it to believe it. Requires Ext. Basic.

16K MACHINE LANGUAGE **$21.95**
DISK **$24.95**

PROTECTORS



Exciting fast paced arcade game that looks and plays like the popular arcade game "DEFENDER",
Wave after wave of enemy fighters drop bombs on your city. Destroy them before they destroy your city. Soon the mother ships appear firing laser blasts at you. Watch for the heat seeking mines.

$24.95 TAPE $27.95 DISK 32K MACHINE CODE

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SHIPWRECK-Escape from a desert isle if you can. Great Adventure! Ext. Basic. **$14.95**

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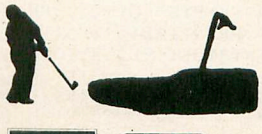

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Add $2.00 per order shipping and handling. Bank cards welcomed (please include expiration date). Orders paid by cashiers check, money orders, bank cards and C.O.D. are shipped within 48 hours. Personal checks please allow 1-2 weeks. C.O.D. orders add $1.50 extra. S.C. residents add 4% sales tax. *TRS-80 is a registered trademark of Tandy Corp. Atari is a registered trademark of Atari, Inc.

Table 1. Variable List

MAXNUM	The maximum number used	2	Subtraction
		3	Multiplication
A,B	Random variables	4	Division
Z$,Z	Answer	**J=**	Grade
EF	Error Flag	0	Grade in percent for that function
FI	Integer flag		
I,J	Counters	1	Number of attempts
G(I,J)	Grade Array:	2	Number of correct responses
I=	Function		
1	Addition		

Program Listing 1.

```
1 CLS:INPUT"WHAT IS YOUR NAME";N$
2 'INITIALIZATION
3 OPEN "I",#1,N$:INPUT#1,MAXNUM,G(1,1),G(1,2),G(2,1),G(2,2),G(3,1
),G(3,2),G(4,1),G(4,2),FI:CLOSE#1
10 F=RND(4)'FUNCTION SELECT
11 A=RND(MAXNUM):B=RND(MAXNUM):EF=0:ON F GOSUB1000,1101,1200,1300
:INPUT"WOULD YOU LIKE TO STOP";Y$:IFY$="YES"THEN500ELSEGOTO10
100 'CORRECT ROUTINE
110 FORI=1TO20:CLS(RND(8)):SOUNDRND(255),1:NEXT
130 CLS0:PRINT@256,"CORRECT!!";N$:FORI=1TO500:NEXT
150 RETURN
200 'INCORRECT ROUTING
210 SOUND 30,10
220 PRINT"TRY AGAIN"
230 EF=EF+1
240 RETURN
500 'TERMINATION ROUTINE
510 OPEN"O",#1,N$:PRINT#1,MAXNUM,G(1,1),G(1,2),G(2,1),G(2,2),G(3,
1),G(3,2),G(4,1),G(4,2),FI:CLOSE#1
520 CLS0:PRINT@240,"GOODBYE ";N$:END
1000 'ADDITION ROUTINE
1010 CLS:PRINT@240,A;"+";B;"=";
1020 INPUTZ$:Z=VAL(Z$):G(1,1)=G(1,1)+1
1030 IFA+B=Z THEN GOSUB 100:G(1,2)=G(1,2)+1:RETURN ELSEGOSUB200
1040 IFEF=3 THEN 1100 ELSE GOTO 1010
1100 CLS:PRINT"WE'LL TRY THIS AGAIN SOMETIME":RETURN
1101 'SUBTRACTION ROUTINE
1110 CLS:PRINT@240,A;"-";B;"=";
1120 INPUTZ$:Z=VAL(Z$):G(2,1)=G(2,1)+1
1130 IFA-B=Z THEN GOSUB100:G(2,2)=G(2,2)+1:RETURN ELSE GOSUB200
1140 IFEF=3 THEN 1100 ELSE GOTO1110
1200 'MULTIPLICATION ROUTINE
1210 CLS:PRINT@240,A;"X";B;"=";
1220 INPUTZ$:Z=VAL(Z$):G(3,1)=G(3,1)+1
1230 IFA*B=Z THEN GOSUB100:G(3,2)=G(3,2)+1:RETURN ELSE GOSUB 200
1240 IF EF=3 THEN 1100 ELSE GO TO 1210
1300 'DIVISION ROUTINE
1310 IFFI=0THEN1330
1320 IFA/B<>INT(A/B) THEN 1400
1330 CLS:PRINT@240,A;"/";B;"=";
1340 INPUTZ$:Z=VAL(Z$):G(4,1)=G(4,1)+1
1350 IFA/B=Z THEN GOSUB 100:G(4,2)=G(4,2)+1:RETURN ELSE GOSUB 200

1360 IF EFG = 3 THEN 1100 ELSE GO TO 1330
1400 A=RND(MAXNUM):B=RND(MAXNUM):GOTO1320
5000 'TEACHER'S ROUTINE
5010 CLEAR:CLS:INPUT"STUDENT NAME";N$:OPEN"I",#1,N$:INPUT#1,MAXNU
M,G(1,1),G(1,2),G(2,1),G(2,2),G(3,1),G(3,2),G(4,1),G(4,2),FI:CLOS
E#1
5015 FORJ=1TO4:IFG(J,1)=0THENG(J,0)=0
5016 IFG(J,1)<>0THENG(J,0)=100*G(J,2)/G(J,1)
5017 NEXTJ
5020 CLS:PRINTN$:PRINT"ADDITION":PRINTTAB(5);"ATTEMPTS",G(1,1):PR
INTTAB(5);"GRADE",G(1,0);"%":PRINT"SUBTRACTION":PRINTTAB(5);"ATTE
MPTS",G(2,1):PRINTTAB(5);"GRADE",G(2,0);"%":PRINT"MULTIPLICATION"
:PRINTTAB(5);"ATTEMPTS",G(3,1)
5021 PRINTTAB(5);"GRADE",G(3,0);"%":PRINT"DIVISION":PRINTTAB(5);"
ATTEMPTS",G(4,1):PRINTTAB(5);"GRADE",G(4,0);"%"
5030 PRINT"MAXNUM = ";MAXNUM:PRINT"INTEGERS ";:IFFI=1THENPRINT"ON
LY"
```

Listing continued

```
5040 INPUT"CHANGE PARAMETERS";ZZ$:IFZZ$="YES"THEN5050
5045 INPUT"ANOTHER STUDENT";ZZ$:IFZZ$="YES"THEN5010ELSE END
5050 CLS:INPUT"MAXNUM";MAXNUM:INPUT"INTEGERS ONLY <1> - YES  <0>
- NO";FI
5060 OPEN"O",#1,N$:PRINT#1,MAXNUM,0,0,0,0,0,0,0,0,FI:CLOSE#1:GOTO
5045
```

Program Listing 2.

```
1 CLS:INPUT"WHAT IS YOUR NAME";N$
2 'INITIALIZATION
3 CLS:PRINT@256,"PRESS <ENTER> WHEN TAPE IS READY TO PLAY";:INPUT
QQ$:OPEN "I",#-1,N$:INPUT#-1,MAXNUM,G(1,1),G(1,2),G(2,1),G(2,2),G
(3,1),G(3,2),G(4,1),G(4,2),FI:CLOSE#-1
10 F=RND(4)'FUNCTION SELECT
11 A=RND(MAXNUM):B=RND(MAXNUM):EF=0:ON F GOSUB1000,1101,1200,1300
:INPUT"WOULD YOU LIKE TO STOP";Y$:IFY$="YES"THEN500ELSEGOTO10
100 'CORRECT ROUTINE
110 FORI=1TO20:CLS(RND(8)):SOUNDRND(255),1:NEXT
130 CLS0:PRINT@256,"CORRECT!!";N$:FORI=1TO500:NEXT
150 RETURN
200 'INCORRECT ROUTING
210 SOUND 30,10
220 PRINT"TRY AGAIN"
230 EF=EF+1
240 RETURN
500 'TERMINATION ROUTINE
505 CLS:PRINT@256,"PRESS ENTER WHEN TAPE IS READY  TO RECORD";:IN
PUTQQ$
510 OPEN"O",#-1,N$:PRINT#-1,MAXNUM,G(1,1),G(1,2),G(2,1),G(2,2),G(
3,1),G(3,2),G(4,1),G(4,2),FI:CLOSE#-1
520 CLS0:PRINT@240,"GOODBYE ";N$:END
1000 'ADDITION ROUTINE
1010 CLS:PRINT@240,A;"+";B;"=";
1020 INPUTZ$:Z=VAL(Z$):G(1,1)=G(1,1)+1
1030 IFA+B=Z THEN GOSUB 100:G(1,2)=G(1,2)+1:RETURN ELSEGOSUB200
1040 IFEF=3 THEN 1100 ELSE GOTO 1010
1100 CLS:PRINT"WE'LL TRY THIS AGAIN SOMETIME":RETURN
1101 'SUBTRACTION ROUTINE
1110 CLS:PRINT@240,A;"-";B;"=";
1120 INPUTZ$:Z=VAL(Z$):G(2,1)=G(2,1)+1
1130 IFA-B=Z THEN GOSUB100:G(2,2)=G(2,2)+1:RETURN ELSE GOSUB200
1140 IFEF=3 THEN 1100 ELSE GOTO1110
1200 'MULTIPLICATION ROUTINE
1210 CLS:PRINT@240,A;"X";B;"=";
1220 INPUTZ$:Z=VAL(Z$):G(3,1)=G(3,1)+1
1230 IFA*B=Z THEN GOSUB100:G(3,2)=G(3,2)+1:RETURN ELSE GOSUB 200
1240 IF EF=3 THEN 1100 ELSE GO TO 1210
1300 'DIVISION ROUTINE
1310 IFFI=0THEN1330
1320 IFA/B<>INT(A/B) THEN 1400
1330 CLS:PRINT@240,A;"/";B;"=";
1340 INPUTZ$:Z=VAL(Z$):G(4,1)=G(4,1)+1
1350 IFA/B=Z THEN GOSUB 100:G(4,2)=G(4,2)+1:RETURN ELSE GOSUB 200

1360 IF EFG = 3 THEN 1100 ELSE GO TO 1330
1400 A=RND(MAXNUM):B=RND(MAXNUM):GOTO1320
5000 'TEACHER'S ROUTINE
5010 CLEAR:CLS:INPUT"STUDENT NAME";N$:CLS:PRINT"PRESS ENTER WHEN
TAPE IS READY  TO PLAY";:INPUTQQ$::OPEN"I",#-1,N$:INPUT#-1,MAXNUM
,G(1,1),G(1,2),G(2,1),G(2,2),G(3,1),G(3,2),G(4,1),G(4,2),FI:CLOSE
#-1
5015 FORJ=1TO4:IFG(J,1)=0THENG(J,0)=0
5016 IFG(J,1)<>0THENG(J,0)=100*G(J,2)/G(J,1)
5017 NEXTJ
5020 CLS:PRINTN$:PRINT"ADDITION":PRINTTAB(5);"ATTEMPTS",G(1,1):PR
INTTAB(5);"GRADE",G(1,0);"%":PRINT"SUBTRACTION":PRINTTAB(5);"ATTE
MPTS",G(2,1):PRINTTAB(5);"GRADE",G(2,0);"%":PRINT"MULTIPLICATION"
:PRINTTAB(5);"ATTEMPTS",G(3,1)
5021 PRINTTAB(5);"GRADE",G(3,0);"%":PRINT"DIVISION":PRINTTAB(5);"
ATTEMPTS",G(4,1):PRINTTAB(5);"GRADE",G(4,0);"%"
5030 PRINT"MAXNUM = ";MAXNUM:PRINT"INTEGERS ";:IFFI=1THENPRINT"ON
LY"
5040 INPUT"CHANGE PARAMETERS";ZZ$:IFZZ$="YES"THEN5050
5045 INPUT"ANOTHER STUDENT";ZZ$:IFZZ$="YES"THEN5010ELSE END
5050 CLS:INPUT"MAXNUM";MAXNUM:INPUT"INTEGERS ONLY <1> - YES  <0>
- NO";FI
5060 CLS:PRINT"PRESS ENTER WHEN TAPE IS READY  TO RECORD";:INPUTQ
Q$:OPEN"O",#-1,N$:PRINT#-1,MAXNUM,0,0,0,0,0,0,0,0,FI:CLOSE#-1:GOT
O5045
```


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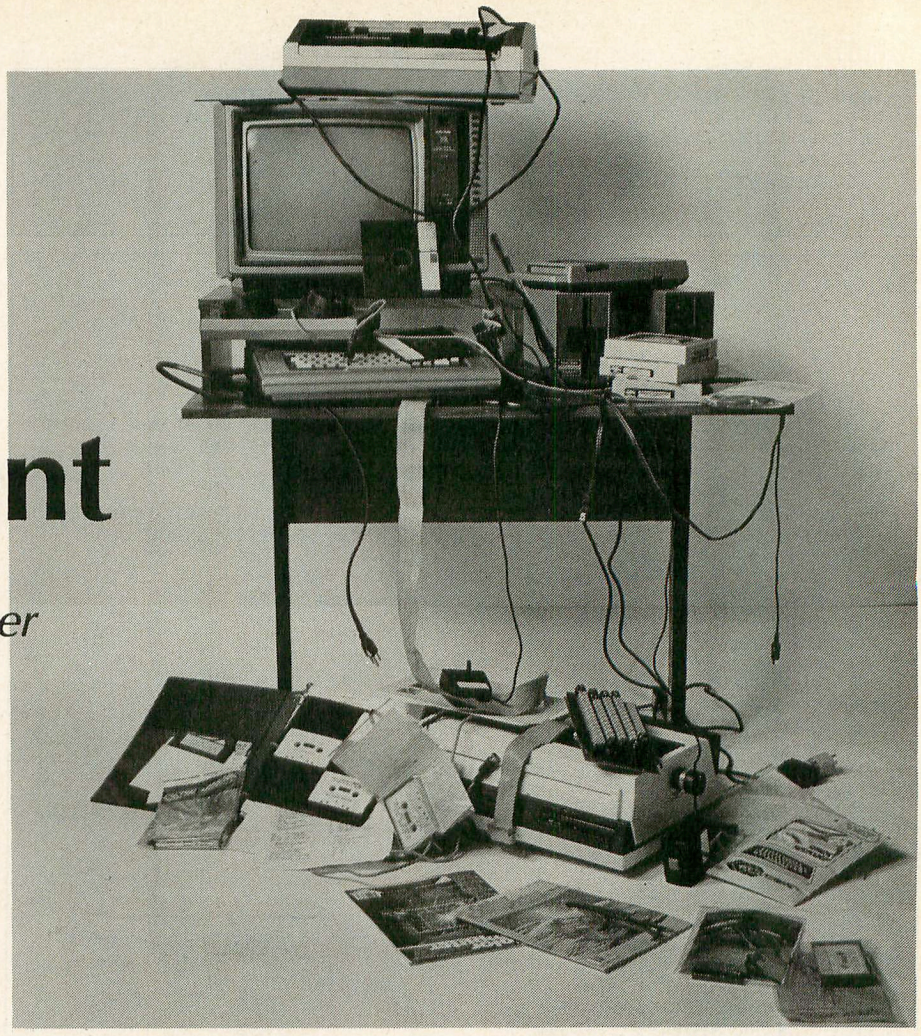
How To Shop For Equipment

Stop! The smart shopper has more fun.

by Keith Baker



WHATEVER YOUR GOALS with the Color Computer, there are peripheral accessories to help you achieve them. Printers by the dozen, plotters, disk drives, and all manner of other peripherals are all just waiting to be bought. How do you decide which is best for you? What items work with what others? Where is the best place to purchase? Can you trust mail order houses?

The first step is to determine what you want to do with your computer. If your desire is hobby only, then bargain shopping may be the way to go. If your desire is for professional applications, set your sights on the best and save your money.

You need to learn as much as possible about the accessories you'll need before you buy. Talking to other users is a good place to start. Find out what accessory devices they use and what benefits they claim for each. Even more important, find out what types of equipment they want to buy and why.

Subscriptions to magazines dedicated to your computer will also prove invaluable, especially during the first year or so. Finally, if your town or neighborhood has a computer club, join it.

One note of caution, don't ask other computerists for copies of their programs. Unless the program is in the public domain, obtaining these copies is illegal. Respect the programmer's right to make a fair wage from his efforts. If you buy non-Radio Shack products, don't expect Radio Shack to service your equipment.

When you have learned as much as possible about the accessories you need, visit the computer dealers in your area. Evaluate their stock and ask to see the accessory you are interested in. Have the dealer demonstrate the equipment for you preferably connected to a Color Computer. If the dealer can't or won't do this for you, find another dealer. Demonstrations will help you evaluate the accessory, determine compatibility, and get to know the dealers who support your computer.

Check your dealer's prices and compare them to the mail order houses who advertise in magazines like **The Color Computer Magazine.** If you find what appears to be a good price, call the mail order house. Make sure the accessory has all the options you want, and that it's the same model as the one you saw on the dealer's shelf. Ask the salesperson if the accessory is compatible with the Color Computer. You'll probably already know the answer, but it's reassuring to know the salesperson does too. Be sure to get the salesperson's name. Find out if there are additional charges for freight and handling. Also, find out what provisions are made for warranty repair or replacement of defective units. If the salesperson cannot or will not answer these questions, find another company.

If the prices you receive from the mail order houses are 15–20% below the price of your local dealer after adding shipping and handling charges, then this will probably be your best buy. When considering mail order purchases over a dealer close to home, be convinced that servicing by mail will be handled quickly. A good buy can become a bad buy if you can't get good service.

I should say one thing about mail order. If you follow their instructions you will most likely get the product you ordered in a timely manner. I have never been cheated yet, and have made quite a few purchases his way.

Unless you know a great deal about computers and their peripherals, or you have a very good friend who doesn't mind reworking a piece of sophisticated electronics, stay away from sidewalk sales and bargain basement ads. Much of the equipment in these locations will be surplus, perhaps vintage, and most likely designed to work with equipment other than your new Color Computer.

Invest a little time and money checking out the equipment you want to buy and the dealer you will be buying from. It may cost a little more this way, but it will be worth it. ■■■

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Color Animation — Part II

Part II. Use assembly language to further your cartoonist leanings.

by William Barden Jr.

LAST MONTH WE CREATED a tireless animated character performing deep knee bends. The two programs used to exercise our blue unisex athlete were written in Basic, and focused on the Basic commands GET and PUT.

Aside from making minor improvements in the code of last month's second program, such as more efficient string manipulation, there is no dramatic new Basic approach to speed up the animation frame rate.

There is, however, a great deal that can be done in assembly language. As a matter of fact, most successful games are written in assembly language.

Is assembly language that difficult to

learn? Yes, it is. I'm not going to tell you that you can learn it in eight hours — you can't. After 100 hours you *may* be able to write useful, high-speed subroutines that can be called from Basic. I'll show you one here.

The Color Computer assembly-language program in Listing 2 performs a GET/PUT to the area we've been using. This is our own GET/PUT, and is similar to a Basic GET/PUT. The program stores the 72 by 76 pixel (picture element) area into RAM memory and retrieves the area from RAM.

In this PMODE there are 128 picture elements horizontally by 192 vertically, for a total of 24,576 pixels. Each element is defined by 2 bits in the RAM memory graphics page, making a total of 49,152 bits to make up the graphics screen, or 6144 bytes.

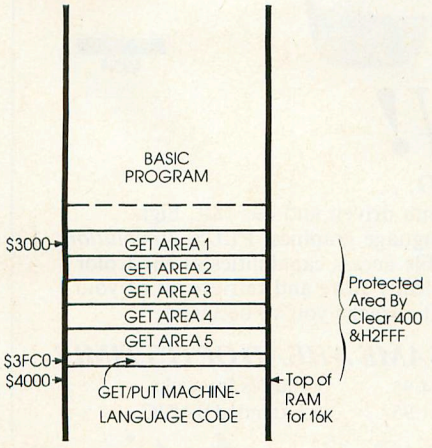
The area we're concerned with is 36 by 76, amounting to 36*76*2=5,184 bits or 648 bytes. (The horizontal portion is 72 pixels wide, but in fact, only 36 PMODE 3 elements wide.)

The GET subroutine takes each of the 36 horizontal elements and stores them to nine bytes in high memory. This is done for 76 rows.

The PUT subroutine does the reverse. The 648 bytes from high memory are stored back into the display area, one row at a time for 76 rows.

The entire code is relocatable; it can be put anywhere in memory and work. We'll use the following scheme for using the assembly-language program, though (see Figure 1).

Figure 1. Assembly-Language program memory map.



We'll put the program itself from $3FC0 on. This is decimal 16,320 (the $ stands for hexadecimal representation). We'll store the GET area in 700 bytes of memory starting at location $3000 (decimal 12,288). There will be room for five separate GETs at $3000 + 0, $3000 + 700, $3000 + 1400, $3000 + 2100, and $3000 + 2800.

Program Listing 1 shows a combination Extended Color Basic/assembly-language program using the GET/PUT assembly-language code. The machine-language code on the left side of Figure 1 has been stored into DATA statement values. If you look at the hexadecimal values in Program Listing 1, you'll see them replicated in the DATA values.

The Basic program first does a CLEAR 400,&H2FFF. This clears 400 bytes for string manipulation, but also protects the memory area used to store the machine-language program and GET data at $3000 on. (The &H is the Basic equivalent of $ for hexadecimal notation.)

The Basic program first READS each DATA value and then moves the code to the $3FC0 area. Next, the PMODE and SCREEN are set up.

Then, the strings are defined, as in the previous two programs.

The DEFUSR statements define the two machine-language subroutines at $3FC0 and $3FDB, respectively. The first is denoted USR subroutine 0 (the GET), and the second, USR subroutine 1 (the PUT).

Next five DRAWs and GETs are done, as in the second program from last month's article, shown here as Program Listing 3. The GET subroutine in assembly stores each figure, as before, but to the $3000 RAM area rather than an array.

The animation portion of the program consists of eight GOSUBs in a loop, as in Listing 3. However, each PUT is a USR call to the PUT subroutine in assembly language.

The entire program is very similar to

Program Listing 1.

```
110 CLEAR 400,&H2FFF
120 DATA &HBD,&HB3,&HED,&H1F,&H01,&HCE,&H0F,&HBC
130 DATA &HC6,&H09,&HA6,&HC0,&HA7,&H80,&H5A,&H26
140 DATA &HF9,&H33,&HC8,&H17,&H11,&H83,&H19,&H0C,&H26,&HEE
150 DATA &H39,&HBD,&HB3,&HED,&H1F,&H01,&HCE,&H0F,&HBC
160 DATA &HC6,&H09,&HA6,&H80,&HA7,&HC0,&H5A
170 DATA &H26,&HF9,&H33,&HC8,&H17,&H11,&H83,&H19,&H0C,&H26
180 DATA &HEE,&H39
190 FOR I=&H3FC0 TO &H3FF5
200 READ A:POKE I,A
210 NEXT I
220 PMODE 3,1
230 SCREEN 1,0
240 PCLS
250 B$="R4;U4;H4;U4;E4;R8;F4;D4;G4;D4;R4;BD4;D16;BL16;U16;BU4;"
260 A1$="BR16;R8;D20;L4;U16;L4;BL16;L4;D16;L4;U20;R8;"
270 A2$="BR16;R8;F12;G3;H10;L7;BL16;L7;G10;H3;E12;R8;"
280 A3$="BR16;R24;D4;L24;BL16;L24;U4;R24;"
290 A4$="BR16;R7;E10;F3;G12;L8;BL16;L8;H12;E3;F10;R7;"
300 A5$="BR16;R4;U16;R4;D20;L8;BL16;L8;U20;R4;D16;R4;"
310 L1$="BD20;BR16;D28;R8;D4;L12;U28;L8;D28;L12;U4;R8;U28;BU20;"
320 L2$="BD20;BR16;F12;G12;R8;D4;L12;U6;E8;H4;L16;G4;F8;D6;L12;U
    4;R8;H12;E12;BU20;"
330 L3$="BD20;BR16;R12;D4;G8;R4;D4;L12;U6;R4;E4;L24;F4;R4;D6;L12
    ;U4;R4;H8;U4;R12;BU20;"
340 DEFUSR0=&H3FC0:DEFUSR1=&H3FDB
350 DRAW "BM124,96;"
360 DRAW B$+A5$+L1$:PAINT (136,106),3,4
370 A=USR0(&H3000)
380 PCLS
390 DRAW B$+A4$+L1$:PAINT (136,106),3,4
400 A=USR0(&H3000+700)
410 PCLS
420 DRAW B$+A3$+L1$:PAINT (136,106),3,4
430 A=USR0(&H3000+1400)
440 PCLS
450 DRAW "BM+0,+4;"+B$+A2$+L2$+"BM+0,-4":PAINT (136,106),3,4
460 A=USR0(&H3000+2100)
470 PCLS
480 DRAW "BM+0,+16;"+B$+A1$+L3$+"BM+0,-16;":PAINT (136,106),3,4
490 A=USR0(&H3000+2800)
500 PCLS
510 GOSUB 600
520 GOSUB 620
530 GOSUB 640
540 GOSUB 660
550 GOSUB 680
560 GOSUB 660
570 GOSUB 640
580 GOSUB 620
590 GOTO 510
600 A=USR1(&H3000)
610 RETURN
620 A=USR1(&H3000+700)
630 RETURN
640 A=USR1(&H3000+1400)
650 RETURN
660 A=USR1(&H3000+2100)
670 RETURN
680 A=USR1(&H3000+2800)
690 RETURN
```

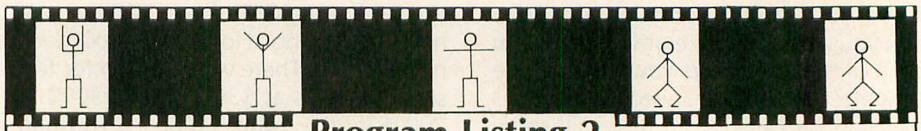
the Basic GET/PUT example, except that we're using our "home-grown" GET/PUT.

How fast is it? (Sounds like a late evening talk show line...) Although I didn't time it exactly, it's somewhere around (uhhh...coronary...help!) 200 deep knee bends per minute (27 frames per second), more than twice as fast as in Listing 3. And that's why assembly-language is used for animation.

You're On Your Own

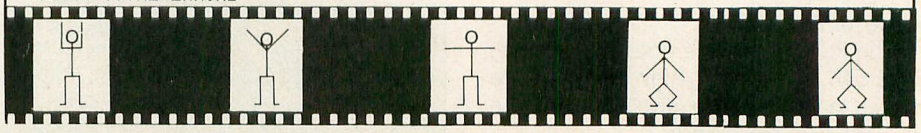
The Color Computer is great for graphics. There's plenty that can be done even if you don't use assembly language. Concentrate on learning how the GET/PUT works, and minimize the GET/PUT area for faster speeds. Use the most efficient code possible for graphics by preprocessing strings, multiple-statement lines, and the like. If you have the time and motivation, try your hand at assembly-language graphics. If graphics is your bag, you won't be disappointed with the investment.

Try hard enough and, you too, can be part of the elite corps of microcomputer game designers. Just keep your deep knee bends down below 100 per minute... ■■■



Program Listing 2.

```
3FC0                    00100          ORG     $3FC0
                        00110 ****************************************
                        00120 * ASSEMBLY LANGUAGE GET/PUT SUBROUTINE    *
                        00130 * CALLED FROM BASIC WITH ADDRESS OF BUFFER *
                        00140 ****************************************
                0F8C    00150 START    EQU     $600+76*32+12 START OF SCREEN AREA
                190C    00160 ENDLOC   EQU     $600+152*32+12 END OF SCREEN AREA
                B3ED    00170 INTCNV   EQU     $B3ED     INTEGER CONVERT
3FC0 BD         B3ED    00180 GET      JSR     INTCNV    FIND BUFFER LOCN
3FC3 1F         01      00190          TFR     D,X       NOW IN X
3FC5 CE         0F8C    00200          LDU     #START    POINT TO SCREEN AREA
3FC8 C6         09      00210 GET010   LDB     #9          SET COLUMN COUNTER
3FCA A6         C0      00220 GET020   LDA     ,U+           GET BYTE FROM SCREEN
3FCC A7         80      00230          STA     ,X+           STORE IN MEMORY
3FCE 5A                 00240          DECB                  DECREMENT COL CNT
3FCF 26         F9      00250          BNE     GET020        GO IF NOT 9 BYTES
3FD1 33         C8 17   00260          LEAU    +23,U     POINT TO NEXT ROW
3FD4 1183 190C          00270          CMPU    #ENDLOC   HAS LAST BEEN DONE?
3FD8 26         EE      00280          BNE     GET010    GO IF NO
3FDA 39                 00290          RTS               RETURN
3FDB BD         B3ED    00300 PUT      JSR     INTCNV    FIND BUFFER LOCN
3FDE 1F         01      00310          TFR     D,X       NOW IN X
3FE0 CE         0F8C    00320          LDU     #START    POINT TO SCREEN AREA
3FE3 C6         09      00330 GET030   LDB     #9          SET COLUMN COUNTER
3FE5 A6         80      00340 GET040   LDA     ,X+           GET BYTE FROM MEMORY
3FE7 A7         C0      00350          STA     ,U+           STORE IN SCREEN
3FE9 5A                 00360          DECB                  DECREMENT COL CNT
3FEA 26         F9      00370          BNE     GET040        GO IF NOT 9 BYTES
3FEC 33         C8 17   00380          LEAU    +23,U     POINT TO NEXT ROW
3FEF 1183 190C          00390          CMPU    #ENDLOC   HAS LAST BEEN DONE?
3FF3 26         EE      00400          BNE     GET030    GO IF NO
3FF5 39                 00410          RTS               RETURN
                0000    00420          END
00000 TOTAL ERRORS
```



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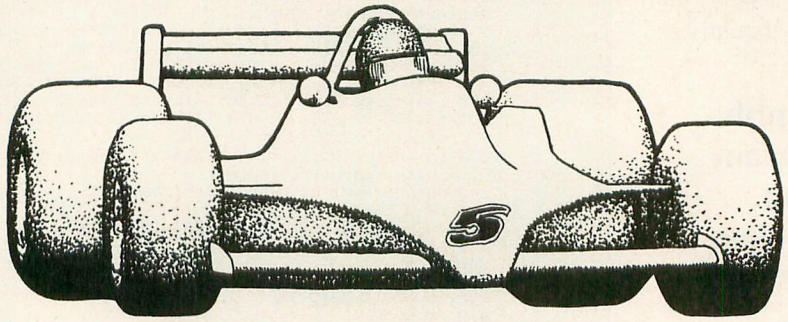

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Program Listing 3.

```
110 CLEAR 400
120 DIM F1(0,160)
130 DIM F2(0,160)
140 DIM F3(0,160)
150 DIM F4(0,160)
160 DIM F5(0,160)
170 PMODE 3,1
180 SCREEN 1,0
190 PCLS
200 B$="R4;U4;H4;U4;E4;R8;F4;D4;G4;D4;R4;BD4;D16;BL16;U16;BU4;"
210 A1$="BR16;R8;D20;L4;U16;L4;BL16;L4;D16;L4;U20;R8;"
220 A2$="BR16;R8;F12;G3;H10;L7;BL16;L7;G10;H3;E12;R8;"
230 A3$="BR16;R24;D4;L24;BL16;L24;U4;R24;"
240 A4$="BR16;R7;E10;F3;G12;L8;BL16;L8;H12;E3;F10;R7;"
250 A5$="BR16;R4;U16;R4;D20;L8;BL16;L8;U20;R4;D16;R4;"
260 L1$="BD20;BR16;D28;R8;D4;L12;U28;L8;D28;L12;U4;R8;U28;BU20;"
270 L2$="BD20;BR16;F12;G12;R8;D4;L12;U6;E8;H4;L16;G4;F8;D6;L12;U
    4;R8;H12;E12;BU20;"
280 L3$="BD20;BR16;R12;D4;G8;R4;D4;L12;U6;R4;E4;L24;F4;R4;D6;L12
    ;U4;R4;H8;U4;R12;BU20;"
290 DRAW "BM128,96;"
300 DRAW B$+A5$+L1$
310 PAINT (136,106),3,4:GET (101,76)-(172,151),F1
320 PCLS
330 DRAW B$+A4$+L1$
340 PAINT (136,106),3,4:GET (101,76)-(172,151),F2
350 PCLS
360 DRAW B$+A3$+L1$
370 PAINT (136,106),3,4:GET (101,76)-(172,151),F3
380 PCLS
390 DRAW "BM+0,+4;"+B$+A2$+L2$+"BM+0,-4"
400 PAINT (136,106),3,4:GET (101,76)-(172,151),F4
410 PCLS
420 DRAW "BM+0,+16;"+B$+A1$+L3$+"BM+0,-16;"
430 PAINT (136,106),3,4:GET (101,76)-(172,151),F5
440 PCLS
450 GOSUB 540
460 GOSUB 560
470 GOSUB 580
480 GOSUB 600
490 GOSUB 620
500 GOSUB 600
510 GOSUB 580
520 GOSUB 560
530 GOTO  450
540 PUT(101,76)-(172,151),F1
550 RETURN
560 PUT(101,76)-(172,151),F2
570 RETURN
580 PUT(101,76)-(172,151),F3
590 RETURN
600 PUT(101,76)-(172,151),F4
610 RETURN
620 PUT(101,76)-(172,151),F5
630 RETURN
```


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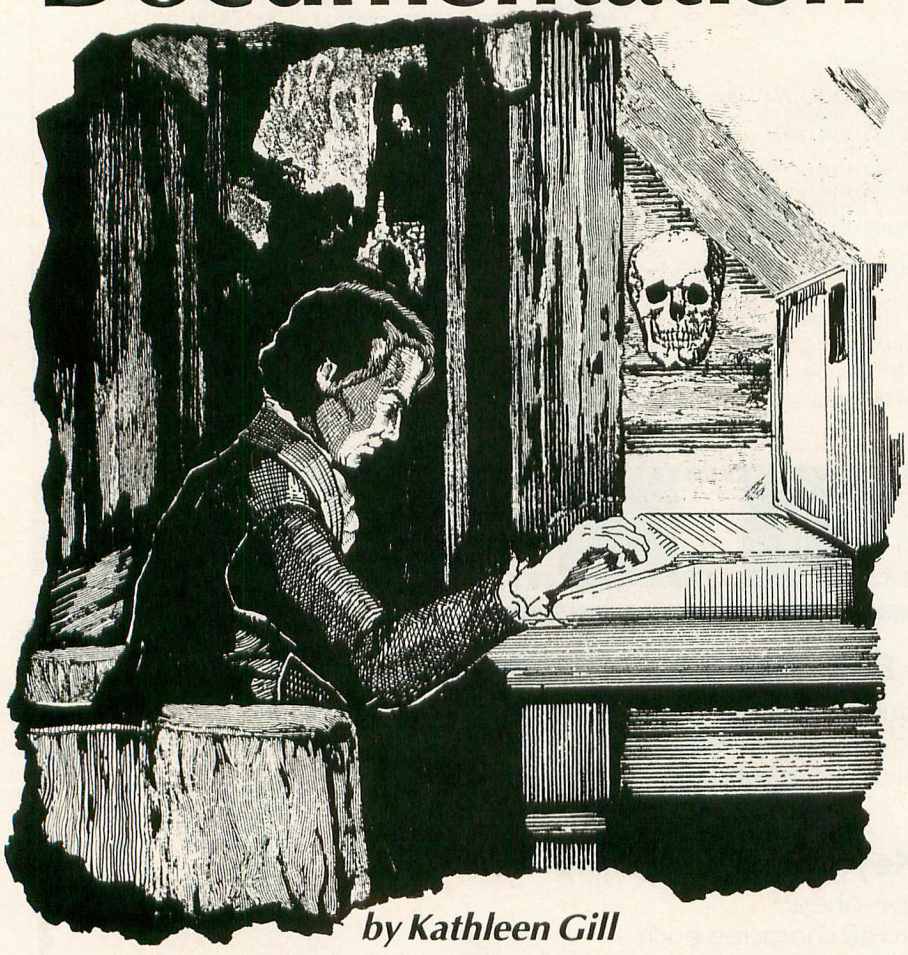
How To Write Good Documentation



by Kathleen Gill

Your program's no good until people can understand how to use it.

HALLELUJAH! You've finally finished your programming masterpiece. Being a conscientious programmer, you've spent the last few weeks thoroughly debugging your program. And, modestly speaking, you believe it to be the best of its kind. Now all you have to do is get it published.

Wait. Didn't you forget something? How about the documentation? "Oh that!" you say with noticeable *relief. Should* be a piece of cake. After all, who knows the program better than you? The fact that you know the program so well is often a problem when you write the instructions. How do you objectively write about something so close to you? You know your program inside and out, but after all that intimacy, you probably take what it does (and how to make it do it) for granted.

Why Write Documentation?

Let's break for a moment to explain why you should be agonizing over the documentation. When the software industry began, there was a dearth of programs to publish. As a result, just about anything that would load and run was assured of publication. Today, the competition for publishing software is fierce — only one or two percent of the programs sent in are accepted for publication. Prerequisites for publishing a program, even a good program, have come a long way from two or three years ago. Most publishers have so many good programs already in the development process that they can afford to reject a new submission on the basis of poor or nonexistent author documentation.

So, even if your program is a class act, good author documentation is no longer a plus — it's a necessity. An editor's first impression of your program will depend on whatever documentation you've included. You can't afford to assume the editor will instinctively know how to load your program and make it do everything it's supposed to when you've provided nothing more than a cover letter heralding your creation's benefits.

Another Reason

Perhaps you are now convinced that providing good author documentation can determine your program's fate. Here is yet another reason why you should take the time to include complete instructions with your submission.

Suppose your program is so great that even though the editor had to spend three days figuring out how to load it, he accepted your program. You signed the contract and in a month or two, a dozen copies of your program will be in every computer store in the country with your first royalty check arriving shortly.

Now, I know we're supposing here, but anyone who has had a program published knows that only two to three months development time is really stretching the imagination. In reality, your program (assuming it was bug-free and is now out of the technical department) is probably sitting in some overworked technical writer's IN basket. Again, this person has no idea what your program does other than what your sketchy cover letter stated. After loading

the program, it may take days (or weeks for a complex program) for the writer to learn the program inside and out. What a waste of time for both of you! If you had taken the time to write the kind of instructions your program deserved, it might have been collecting royalties for you instead of collecting dust on a documentation writer's desk.

"OK, OK" you say, "I believe in the power of good documentation, but where do I begin? What do I do?"

Organize!

The first rule of good documentation writing, or any writing, is organization. Before you begin, you need an outline. You may hate outlines but there's no way around it. You didn't sit down and start programming your masterpiece. You figured out what you wanted the program to do and then drew a flowchart to outline how your program would execute that function. Basically, that's what you need to do with your documentation.

Identifying Your Audience

Before you start, here's an important question for you to ponder. Who is your audience? That answer depends upon your program. Successfully identifying your audience can make the writing easier. If you've written a utility, it's likely that programmers much like yourself will be using the program. So you can then assume they'll know what you mean when you talk about addresses. If your program is a data base manager, your audience will include everyone from housewives to plumbers, and if you mention addresses, they'll most likely think you mean street addresses rather than memory locations. You shouldn't have to explain the basics of bookkeeping for a professional accounting package; you can assume that users of this type of program will already be familiar with rudimentary bookkeeping. Try to anticipate what the majority of your audience will understand without underestimating their intelligence. (No one said this would be easy!)

Begin At The Beginning

Good documentation is actually a series of beginnings, starting with the in-

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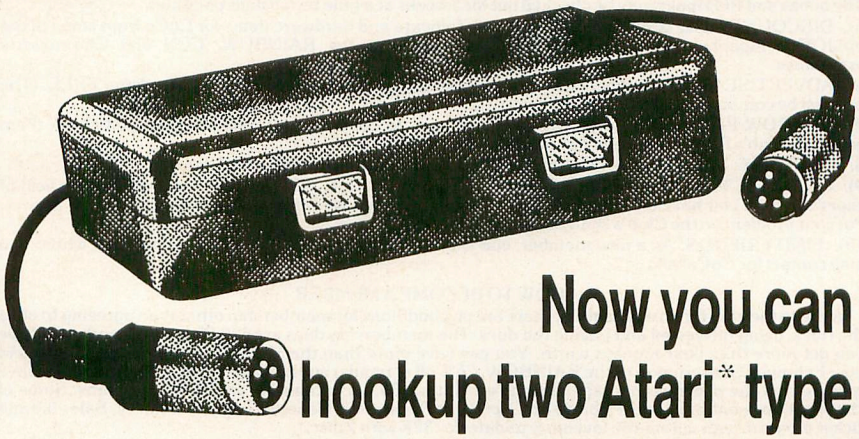

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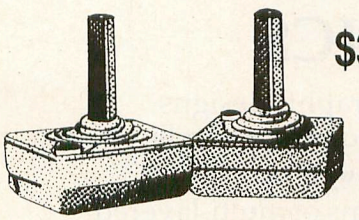

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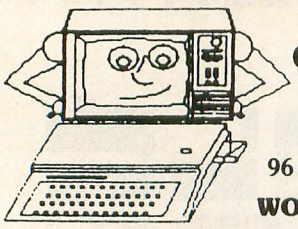

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formation the user needs to run the program. How much memory does the program require? List the peripherals needed: How many disk drives? What kind of printer? Do you need a DOS to load the program? Is the program joystick compatible? Does it have sound? Include *all* the details and don't take any shortcuts. The publisher will find it easier to edit information out than to fill in the gaps. Make sure your manual is legible, neat, and double-spaced with wide margins.

Loading Instructions

This is the most critical part of your author documentation. Though it's likely the software company will use their own program loader once the program has been accepted, they must be able to load your program to review it. The only thing more frustrating than a program that won't load is trying to open one of those child-proof aspirin bottles when you have a splitting headache. At times like these, the author of the non-loading program is not thought too well of, and this annoyance is likely to color the user's attitude toward the entire program.

Using Your Outline

Here's where your outline begins to pay off. Unless you can organize exceptionally well in your head, go no further until you have completed one! Documentation that gives all the needed information is worthless if it isn't given where and when it's needed.

If you were lucky enough to have an English teacher who required you to write an "instructions to make a peanut butter and jelly sandwich," essay, remember how you really had to think to break down the steps necessary in this simple recipe. Hmmm, first you insert the knife in the jelly...no, first you open the jar...uhuh...get out the bread, then.... Remember, first things first! Your program user needs to know how to print the checks only after he knows how to enter the information that will be printed on them.

Your Introduction

Why does this program exist? What is its objective? Your introduction should include the answers to these questions. Even gamesters want to know who the "Stareaters" are, where they came from and what will happen when they've wiped out every last one. Tell your mailing list program users the program's ben-

efits and it's limitations. Summarize here, don't get too lengthy. You'll be telling them *how* to do it later.

Your introduction should pave the way for the next section of the manual, a detailed look at the program elements.

For a game, list the items involved. Identify the types of craft and weapons, their effects and point values. Don't lump your information into paragraphs. Use sections and subsections with clearly marked headings, and charts and tables whenever you can.

In business, application, and utility programs, examples are an absolute necessity and provide an easy teaching method. Anticipate errors and let the user know how to correct them. As you continue through this section, always remember not to get ahead of the user. Your instructions should follow the pattern of the program's use.

Wrapping It Up

When you've included all that you can without repeating yourself, it's time to wrap it up. Your last section should contain any technical instructions for modifying the program, or patches for using it with other programs. Now is a good time to write a table of contents. If your manual is lengthy, you might consider an index or ask the publisher to include one when your program is published.

Remember, even though the software house is publishing your program, you are the author and the creator. Follow the program's development closely, and make your interest clear. It's likely that any documentation editor will be happy to work with you on the final manual if you show you care. At the very least, you should have an opportunity to proof the finished manuscript before it's printed.

In so short a space, it's impossible to cover everything necessary to produce the best in documentation. But, if you realize the importance of good documentation and follow the information given here, you'll find the difference it can make in your program's chances for success is definitely worth the time and effort. ■■■

This article was written with software publication in mind, but the same rules apply for articles submitted to us for magazine publication. Your program stands a better chance of publication if accompanied by complete understandable documentation. See END OF FILE (GOTO 96) for excerpts from ***The Color Computer Magazine****'s writers guidelines.* *— Eds.*

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Restaurant At The End

(Chapter 3, an excerpt from the novel)

A Nutri-Matic vending machine and the Heart of Gold's onboard computer team up to brew Arthur Dent a cup of tea. Meanwhile the Vogons are attacking . . .

by Douglas Adams

From *THE RESTAURANT AT THE END OF THE UNIVERSE* by Douglas Adams. Reprinted by permission of Harmony Books, a division of Crown Publishers, Inc. Published in Canada by Collins Publishers. Copyright © 1980 by Douglas Adams.

Does anyone have a kettle?" Arthur asked as he walked on to the bridge, and instantly began to wonder why Trillian was yelling at the computer to talk to her, Ford was thumping it and Zaphod was kicking it, and also why there was a nasty yellow lump on the vision screen.

He put down the empty cup he was carrying and walked over to them.

"Hello?" he said.

At that moment Zaphod flung himself over to the polished marble surfaces that contained the instruments that controlled the conventional photon drive. They materialized beneath his hands and he flipped over to manual control. He pushed, he pulled, he pressed and he swore. The photon drive gave a sickly shudder and cut out again.

"Something up?" said Arthur.

"Hey, didja hear that?" muttered Zaphod as he leaped now for the manual controls on the Infinite Improbability Drive, "the monkey spoke!"

The Improbability Drive gave two small whines and then also cut out.

"Pure history, man," said Zaphod, kicking the Improbability Drive, "a talking monkey!"

If you're upset about something..." said Arthur.

"Vogons!" snapped Ford. "We're under attack!" Arthur gibbered.

"Well, what are you doing? Let's get out of here!"

"Can't. Computer's jammed."

Jammed?"

"It says all its circuits are occupied. There's no power anywhere in the ship."

Ford moved away from the computer terminal, wiped a sleeve across his forehead and slumped back against the wall.

"Nothing we can do," he said. He glared at nothing and bit his lip.

When Arthur had been a boy at school, long before the Earth had been demolished, he had used to play football. He had not been at all good at it, and his particular speciality had been scoring own goals in important matches. Whenever this happened he used to experience a peculiar tingling round the back of his neck that would slowly creep up across his cheeks and heat his brow. The image of mud and grass and lots of little jeering boys flinging it at him suddenly came vividly to his mind at this moment.

A peculiar tingling sensation at the back of his neck was creeping up across his cheeks and heating his brow.

He started to speak, and stopped.

He started to speak again and stopped again.

Finally he managed to speak.

"Er," he said. He cleared his throat.

"Tell me," he continued, and said it so nervously that the others all turned to stare at him. He glanced at the approaching yellow blob on the vision screen.

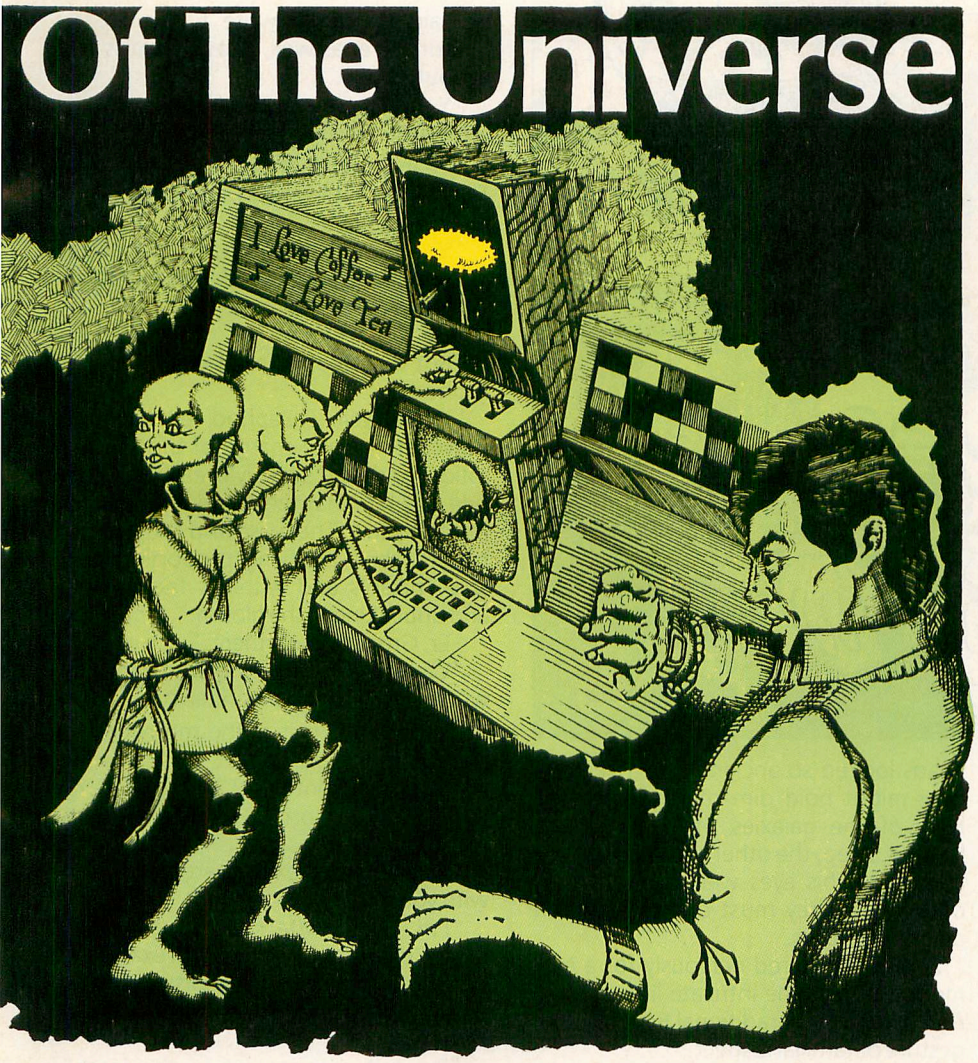
"Tell me," he said again, "did the computer say what was occupying it? I just ask out of interest...."

Their eyes were riveted on him.

"And, er... well, that's it really, just asking."

Zaphod put out a hand and held Arthur by the scruff of the neck.

Of The Universe



"What have you done to it, Monkeyman?" he breathed.

"Well," said Arthur, "nothing in fact. It's just that I think a short while ago it was trying to work out how to..."

"Yes?"

"Make some tea."

"That's right, guys," the computer sang out suddenly, "just coping with that problem right now, and wow, it's a biggy. Be with you in a while." It lapsed back into a silence that was only matched for sheer intensity by the silence of the three people staring at Arthur Dent.

As if to relieve the tension, the Vogons chose that moment to start firing.

The ship shook, the ship thundered. Outside, the inch thick force shield around it blistered, crackled and spat under the barrage of a dozen 30-Megahurt Definit-Kil Photrazon Cannon, and looked as if it wouldn't be around for long. Four minutes is how long Ford Prefect gave it.

"Three minutes and fifty seconds," he said a short while later.

"Forty-five seconds," he added at the appropriate time. He flicked idly at some useless switches, then gave Arthur an unfriendly look.

"Dying for a cup of tea, eh?" he said. "Three minutes and forty seconds."

"Will you stop counting!" snarled Zaphod.

"Yes," said Ford Prefect, "in three minutes and thirty-five seconds."

Aboard the Vogon ship, Prostetnic Vogon Jeltz was puzzled. He had expected a chase, he had expected an exciting grapple with tractor beams, he had expected to have to use the specially installed Sub-Cyclic Normality Asert-i-Tron to counter the *Heart of Gold's* Infinite Improbability Drive, but the Sub-Cyclic Normality Assert-i-Tron lay idle as the *Heart of Gold* just sat there and took it.

A dozen 30-Megahurt Definit-Kil Photrazon Cannon continued to blaze away at the *Heart of Gold,* and still it just sat there and took it.

He tested every sensor at his disposal to see if there was any subtle trickery afoot, but no subtle trickery was to be found.

He didn't know about the tea of course.

Nor did he know exactly how the occupants of the *Heart of Gold* were spending the last three minutes and thirty seconds of life they had left to spend.

Quite how Zaphod Beeblebrox arrived at the idea of holding a seance at this point is something he was never quite clear on.

Obviously the subject of death was in the air, but more as something to be avoided than harped upon.

Possibly the horror that Zaphod experienced at the prospect of being reunited with his deceased relatives led on to the thought that they might just feel the same way about him and, what's more, be able to do something about helping to postpone this reunion.

Or again it might just have been one of the strange promptings that occasionally surfaced from that dark area of his mind that he had inexplicably locked off prior to becoming President of the Galaxy.

"You want to talk to your great-grandfather?" boggled Ford.

"Yeah."

"Does it have to be *now?*"

The ship continued to shake and thunder. The temperature was rising. The light was getting dimmer—all the energy the computer didn't require for thinking about tea was being pumped into the rapidly fading force field.

"Yeah!" insisted Zaphod. "Listen, Ford, I think he may be able to help us."

"Are you sure you mean *think?* Pick your words with care."

"Suggest something else we can do."

"Er, well ..."

"Okay, round the central console. Now. Come on! Trillian, Monkeyman, move."

They clustered round the central console in confusion, sat down and, feeling exceptionally foolish, held hands. With his third hand Zaphod turned off the lights.

Darkness gripped the ship.

Outside, the thunderous roar of the Definit-Kil Cannon continued to rip at the force field.

"Concentrate," hissed Zaphod, "on his name."

"What is it?" asked Arthur.

"Zaphod Beeblebrox the Fourth."

"What?"

"Zaphod Beeblebrox the Fourth. Concentrate!"

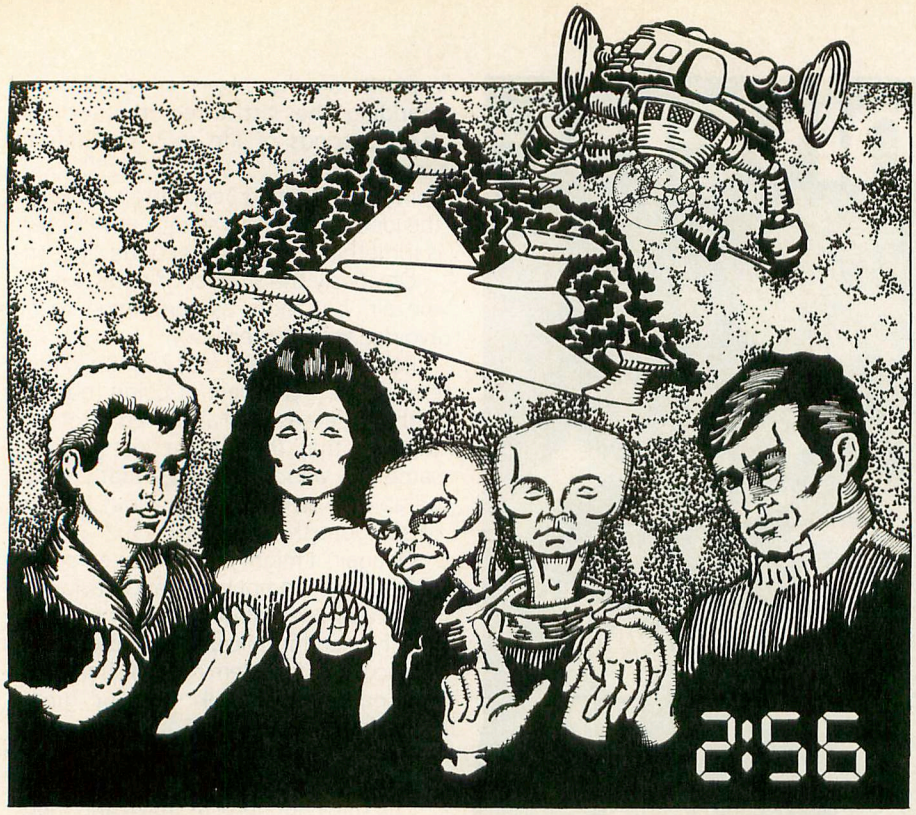
"The Fourth?"

"Yeah. Listen, I'm Zaphod Beeblebrox, my father was Zaphod Beeblebrox the Second, my grandfather Zaphod Beeblebrox the Third ..."

"What?"

"There was an accident with a contraceptive and a time machine. Now concentrate!"

"Three minutes," said Ford Prefect.



"Why," said Arthur Dent, "are we doing this?"

"Shut up," suggested Zaphod Beeblebrox.

Trillian said nothing. What, she thought, was there to say?

The only light on the bridge came from two dim red triangles in a far corner where Marvin the Paranoid Android sat slumped, ignoring all and ignored by all, in a private and rather unpleasant world of his own.

Round the central console four figures hunched in tight concentration trying to blot from their minds the terrifying shuddering of the ship and the fearful roar that echoed through it.

They concentrated.

Still they concentrated.

And still they concentrated.

The seconds ticked by.

On Zaphod's brows stood beads of sweat, first of concentration, then of frustration and finally of embarrassment.

At last he let out a cry of anger, snatched back his hands from Trillian and Ford and stabbed at the light switch.

"Ah, I was beginning to think you'd never turn the lights on," said a voice. "No, not too bright please, my eyes aren't what they once were."

Four figures jolted upright in their seats. Slowly they turned their heads to look, though their scalps showed a distinct propensity to try and stay in the same place.

"Now. Who disturbs me at this time?" said the small, bent, gaunt figure standing by the sprays of fern at the far end of the bridge. His two small wispy-haired heads looked so ancient that it seemed they might hold dim memories of the birth of the galaxies themselves. One lolled in sleep, the other squinted sharply at them. If his eyes weren't what they once were, they must once have been diamond cutters.

Zaphod stuttered nervously for a moment. He gave the intricate little double nod which is the traditional Betelgeusian gesture of familial respect.

"Oh... er, hi Great-granddad...." he breathed.

The little old figure moved closer toward them. He peered through the dim light. He thrust out a bony finger at his great grandson.

"Ah," he snapped, "Zaphod Beeblebrox. The last of our great line. Zaphod Beeblebrox the Nothingth."

"The First."

"The Nothingth," spat the figure. Zaphod hated his voice. It always seemed to him to screech like fingernails across the blackboard of what he liked to think of as his soul.

He shifted awkwardly in his seat.

"Er, yeah," he muttered. "Er, look, I'm really sorry about the flowers, I meant to send them along, but you know, the shop was fresh out of wreaths and...."

"You forgot!" snapped Zaphod Beeblebrox the Fourth.

"Well..."

"Too busy. Never think of other people. The living are all the same."

"Two minutes, Zaphod," whispered Ford in an awed whisper.

Zaphod fidgeted nervously.

"Yeah, but I did mean to send them," he said. "And I'll write to my great-grandmother as well, just as soon as we get out of this...."

"Your great-grandmother," mused the gaunt little figure to himself.

"Yeah," said Zaphod, "er, how is she? Tell you what, I'll go and see her. But first we've just got to..."

"Your *late* great-grandmother and I are very well," rasped Zaphod Beeblebrox the Fourth.

"Ah. Oh."

"But very disappointed in you, young Zaphod...."

"Yeah, well..." Zaphod felt strangely powerless to take charge of this conversation, and Ford's heavy breathing at his side told him that the seconds were ticking away fast. The noise and the shaking had reached terrifying proportions. He saw Trillian's and Arthur's faces white and unblinking in the gloom.

"Er, Great-grandfather..."

"We've been following your progress with considerable despondency..."

"Yeah, look, just at the moment you see..."

"Not to say contempt!"

"Could you sort of listen for a moment...?"

"I mean what exactly are you doing with your life?"

"I'm being attacked by a Vogon fleet!" cried Zaphod. It was an exaggeration, but it was his only opportunity so far of getting the basic point of the exercise across.

"Doesn't surprise me in the least," said the little old figure with a shrug.

"Only it's happening right now, you see," insisted Zaphod feverishly.

The spectral ancestor nodded, picked up the cup Arthur Dent had brought in and looked at it with interest.

"Er... Great-granddad—"

"Did you know," interrupted the ghostly figure, fixing Zaphod with a stern look, "that Betelgeuse Five has now developed a very slight eccentricity in its orbit?"

Zaphod didn't and found the information hard to concentrate on what with all the noise and the imminence of death and so on.

"Er, no... look," he said.

"Me spinning in my grave!" barked the ancestor. He slammed the cup down and pointed a quivering, sticklike see-through finger at Zaphod.

"Your fault!" he screeched.

"One minute thirty," muttered Ford, his head in his hands.

"Yeah, look Great-granddad, can you actually help because..."

"Help?" exclaimed the old man as if

Please turn to page 44

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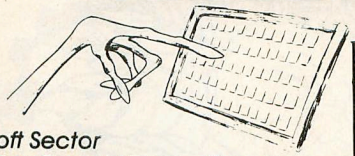

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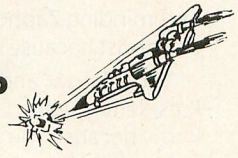

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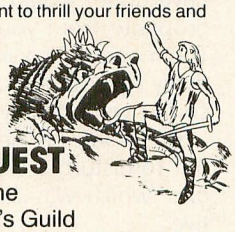

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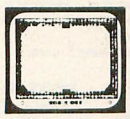

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he'd been asked for a weasel.

"Yeah, help, and like, now, because otherwise..."

"Help!" repeated the old man as if he'd been asked for a lightly grilled weasel in a bun with French fries. He stood amazed.

"You go swanning your way round the Galaxy with your"—the ancestor waved a contemptuous hand—"with your disreputable friends, too busy to put flowers on my grave, plastic ones would have done, would have been quite appropriate from you, but no. Too busy. Too modern. Too skeptical—till you suddenly find yourself in a bit of a fix and come over suddenly all astrally minded!"

He shook his head—carefully, so as not to disturb the slumber of the other one, which was already becoming restive.

"Well, I don't know, young Zaphod," he continued, "I think I'll have to think about this one."

"One minute ten," said Ford hollowly.

Zaphod Beeblebrox the Fourth peered at him curiously.

"Why does that man keep talking in numbers?" he said.

"Those numbers," said Zaphod tersely, "are the time we've got left to live."

"Oh," said his great-grandfather. He grunted to himself. "Doesn't apply to me, of course," he said and moved off to a dimmer recess of the bridge in search of something else to poke around at.

Zaphod felt he was teetering on the edge of madness and wondered if he shouldn't just jump over and have done with it.

"Great-grandfather," he said, "it applies to us! We are still alive, and we are about to lose our lives."

"Good job too."

"What?"

"What use is your life to anyone? When I think of what you've made of it the phrase "pig's ear" comes irresistibly to mind."

"But I was President of the Galaxy, man!"

"Huh," muttered his ancestor. "And what kind of a job is that for a Beeblebrox?"

"Hey, what? Only President you know! Of the whole Galaxy!"

"Conceited little megapuppy."

Zaphod blinked in bewilderment.

"Hey–er, what are you at, man? I mean Greatgrandfather."

The hunched up little figure stalked up to his greatgrandson and tapped him sternly on the knee. This had the effect of reminding Zaphod that he was talking to a ghost because he didn't feel a thing.

"You know and I know what being President means, young Zaphod. You know because you've been it, and I know because I'm dead and it gives one such a wonderfully uncluttered perspective. We have a saying up here. 'Life is wasted on the living.'"

"Yeah," said Zaphod bitterly, "very good. Very deep. Right now I need aphorisms like I need holes in my heads."

"Fifty seconds," grunted Ford Prefect.

"Where was I?" said Zaphod Beeblebrox the Fourth.

"Pontificating," said Zaphod Beeblebrox.

"Oh yes."

"Can this guy," muttered Ford quietly to Zaphod, "actually in fact help us?"

"Nobody else can," whispered Zaphod.

Ford nodded despondently.

"Zaphod!" the ghost was saying, "you became President of the Galaxy for a reason. Have you forgotten?"

"Could we go into this later?"

"Have you forgotten?" insisted the ghost.

"Yeah! Of course I forgot! I had to forget. They screen your brain when you get the job, you know. If they'd found my head full of tricksy ideas I'd have been right out on the streets again with nothing but a fat pension, secretarial staff, a fleet of ships and a couple of slit throats."

"Ah," nodded the ghost in satisfaction, "then you do remember!"

He paused for a moment.

"Good," he said and the noise stopped.

"Forty-eight seconds," said Ford. He looked again at his watch and tapped it. He looked up.

"Hey, the noise has stopped," he said.

A mischievous twinkle gleamed in the ghost's hard little eyes.

"I've slowed down time for a moment," he said, "just for a moment you understand. I would hate you to miss all I have to say."

"No, you listen to me, you see-through old bat," said Zaphod leaping out of his chair, "A—Thanks for stopping time and all that, great, terrific, wonderful, but B—no thanks for the homily, right? I don't know what this great thing I'm meant to be doing is, and it looks to me as if I was supposed not to know. And I resent that, right?

"The old me knew. The old me cared. Fine, so far so good. Except that the old me cared so much that he actually got inside his own brain—my own brain—and locked off the bits that knew and cared, because if I knew and cared I wouldn't be able to do it. I wouldn't be able to go and be President, and I wouldn't be able to steal this ship, which must be the important thing.

"But this former self of mine killed himself off, didn't he, by changing my brain? Okay, that was his choice. This new me has its own choices to make, and by a strange coincidence those choices involve not knowing and not caring about this big number, whatever it is. That's what he wanted, that's what he got.

"Except this old self of mine tried to leave himself in control, leaving orders for me in the bit of my brain he locked off. Well, I don't want to know, and I don't want to hear them. That's my choice. I'm not going to be anybody's puppet, particularly not my own."

Zaphod banged on the console in fury, oblivious of the dumbfounded looks he was attracting.

"The old me is dead!" he raved. "Killed himself! The dead shouldn't hang about trying to interfere with the living!"

"And yet you summon me up to help you out of a scrape," said the ghost.

"Ah," said Zaphod, sitting down again, "well that's different, isn't it?"

He grinned at Trillian weakly.

"Zaphod," rasped the apparition, "I think the only reason I waste my breath on you is that being dead I don't have any other use for it."

"Okay," said Zaphod, "why don't you tell me what the big secret is. Try me."

"Zaphod, you knew when you were President of the Galaxy, as did Yooden Vranx before you, that the President is nothing. A cipher. Somewhere in the shadows behind is another man, being, something, with ultimate power. That man, or being, or something, you must find—the man who controls this Galaxy, and—we suspect—others. Possibly the entire Universe."

"Why?"

"Why?" exclaimed an astonished ghost. "Why? Look around you, lad, does it look to you as if it's in very good hands?"

"It's all right."

The old ghost glowered at him.

"I will not argue with you. You will simply take this ship, this Improbability Drive ship, to where it is needed. You will do it. Don't think you can escape your purpose. The Improbability Field controls you, you are in its grip. What's this?"

He was standing tapping at one of the terminals of Eddie the Shipboard Computer. Zaphod told him.

"What's it doing?"

"It is trying," said Zaphod with wonderful restraint, "to make tea."

"Good," said his great-grandfather, "I approve of that. Now Zaphod," he said, turning and wagging a finger at him, "I don't know if you are really capable of succeeding in your job. I think you will not be able to avoid it. However, I am too long dead and too tired to care as much as I did. The principal reason I am helping you now is that I couldn't bear the thought of you and your modern friends slouching about up here. Understood?"

"Yeah, thanks a bundle."

"Oh, and Zaphod?"

"Er, yeah?"

"If you ever find you need help again, you know, if you're in trouble, need a hand out of a tight corner..."

"Yeah?"

"Please don't hesitate to get lost."

Within the space of one second, a bolt of light flashed from the wizened old ghost's hands to the computer, the ghost vanished, the bridge filled with billowing smoke and the *Heart of Gold* leaped an unknown distance through the dimensions of time and space. ■ ■ ■

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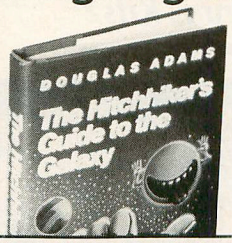

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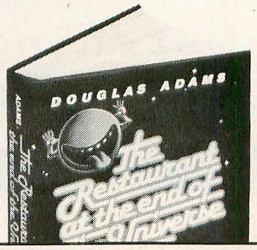

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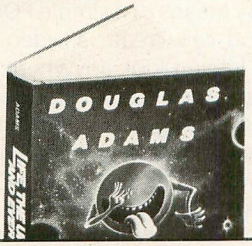

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If your message is worth repetitive display, key these in.

by Dennis Kitsz

32K Extended Color Basic

Photo 1. *The Video Display Scroller in action. Banners stay in place, but text continuously scrolls by and repeats.*

TRY RUNNING THIS one-liner on your Extended Color Basic Color Computer: 10 POKE &HFFC7,0 : GOTO 10. Garbage on the screen? Now tap the Break key: Aha! Back to normal.

What you've just seen is an example of the Color Computer's built-in video power. By means of a simple POKE statement, you can create a video window that will let you look anywhere in memory. If you have used Extended Basic's high-resolution graphics, you know you can move from one window to another by using the PCLEAR and SCREEN commands. Yet, Basic provides only a limited repertoire of viewing choices. Many more are available by directly manipulating the computer's trio of smart chips—the 6809E central processing unit (CPU), the 6883 synchronous address multiplexer (SAM), and the 6847 video display generator (VDG).

This month's Custom Color presents the Video Display Scroller, a program I originally concocted for museum exhibits. It provides true rolling text (like television credits), together with optional top and bottom banners. Working with the machine language display routine is a Basic text editor/display driver.

What It Is

The Video Display Scroller consists of three programs—one in Basic and two in 6809 assembly language—which you can use to enter and edit up to 350 lines of text and banners. You may then display the text and banners in a continuous, slowly rolling and repeating pattern, in true upper- and lowercase form. Banners are optional, displayed in twice-normal-size letters. Among the other features: the space between displayed lines may be varied for dense or loose text; normal or reverse lettering can be selected; text may be saved for later use and revision; and display fonts may be redefined by software. Once the program is running, it is break free, meaning it can be used in a public area without fear of disrupting the display from the keyboard. A finished display can look like those in Photo 1.

The Video Display Scroller system requires a 32K Extended Color Basic Color Computer; the programs are presented in Listings 1–3. The Basic listing is easily typed in and saved on tape (use the name DRIVER). For the assembly listings, you will need Radio Shack's Editor/Assembler, EDTASM+ (available on a plug-in cartridge). Enter, check for errors (A/WE) and save (W SCROLL) the first source code, then assemble the code (A SCROLL/NL/NS) and save it to tape. Do each several times. Enter, check for errors and save (W BANNER) the second source code, and then assemble (A BANNER/NL/NS) that to tape. You will now have copies of the Basic Driver; the Scroll source code; the Scroll object code; the Banner source code; and the Banner object code.

In order to make the best use of the Video Display Scroller, I have set up a series of simple procedures for making sure you have properly arranged copies of the program. Using copies of the Basic Driver program and the Scroll and Banner object codes, follow these steps:

1. CLOAD the Basic program, remove the tape, and insert a fresh tape. CSAVE the program just once: CSAVE"DRIVER". Remove the tape.
2. Load the two scroller object codes one after the other (CLOAD M"SCROLL" and CLOADM"BANNER"). Remove the tape.
3. Replace the same tape used in step 1, set it to record, and enter:
CSAVEM"SCROLL",&H4800,&H4FFF,&H4812.

Repeat Steps 1 to 3 for several complete back-up copies of the system. Performing these steps takes some time, but subsequent uses of the program will be quick and simple.

4. Rewind the tape, turn the computer off and on, and set the tape to play.
5. Enter:PCLEAR8. This step is essential to avoid an error inherent to the organization of Extended Basic's graphics system.
6. Enter CLOAD. The program will load in a few seconds, and respond with an OK message.
7. RUN. The computer will automatically load the next available program—which should be the SCROLL machine language program set—and return with the Functions menu.

You are now ready to use the Video Display Scroller.

How It Works

Before jumping to use the Video Display Scroller, take a few minutes to understand its operation. The Basic Driver

program is very dense; it must operate in a 4.5K environment to leave lots of memory space for the high-resolution display (12,288 bytes), the text (display banners and about 350 32-character lines—12,288 more bytes), the machine language programs and character fonts (2,048 bytes). The regular video screen and Basic operating system use 1,536 bytes.

Because of this limited space, the Basic Driver is packed tight. When you type it in, observe every space and punctuation mark, including the missing final quotation marks in lines 19, 22, 26, 28, 34 and 44.

Line 1 clears the screen, sets available memory, sets the high-resolution pixel mode, loads the machine language driver, and assigns all variables. Lines 2 and 3 create the Function menu and distribute input. Functions are memory clearing (line 4), text entry (lines 5–11), text editing (lines 12–18), tape storage (lines 19–21), tape loading (lines 22–25), scroller display execution (lines 26–27), and system copy (lines 28–29). Text recovery is directed to lines 44–45. Special functions are entered and distributed from lines 30 and 31: normal/reverse lettering (lines 32–33), vertical line spacing (lines 34–35), upper/lower borders (lines 36–38), and banner creation (lines 39–43). Input and cosmetic display subroutines are in lines 47–99.

The heart of the Video Display scroller, however, is the machine-language display rountine. Before turning to the program, I will detail the problem to be solved.

A normal computer screen scroll moves the body of text one full line of characters up the screen; that is, an entire new line of characters becomes visible at the bottom of the screen and the remaining text is bumped upwards. Contrast this all-or-nothing approach with that of TV or movie credits, which *roll* up the screen with parts of the letters appearing until the whole letter is visible. It is a smooth, professional looking process. Achieving the same goal on the typical computer screen is impossible; the memory locations displayed by the hardware and software are fixed at manufacture to require that a complete line of 32 characters be moved into place at one time.

With the Color Computer, however, the high-resolution graphics system can be employed to draw letters or parts of letters on the screen. Each character is made up of individual dots; the dots are created when a moving electron beam turns on brightly or dims as it passes horizontally across the screen. This is convenient; although ordinary text display is created for hardware and software convenience during manufacture, it is still possible to draw any piece of a letter at any place on the screen.

From these hints, it is a short mental step to actually designing a repertoire of letters and symbols which can be placed on the bottom line of the screen, moving the screen contents up a single electron beam line, and drawing additional pieces of letters on the now-blank bottom line.

As it turned out, I wasn't done when I arrived at that point. In fact, I implemented the software I just described, but discovered something disconcerting. Because each letter had to be created from separate "pieces"—byte-sized pieces—a lot of memory was used to store a reference table of letters. *That* I could live with; but a full high-resolution screen of 512 characters actually used 6,144 bytes of letter pieces. I could live with that too—except that the software action which moved the information up the screen one electron beam line turned out to be visible. It wiggled down the screen! Not the professional touch I had envisioned.

Then I remembered the smart VDG. Leafing through the manual, I found I could effectively define the memory window to be displayed. Why not display one screen of letters while updating another, then switch to the updated screen? Updating would always occur on the screen not being displayed. That way each screen memory would move up two lines—alternating odd and even lines—for a very smooth rolling display.

That was the trick; now to the program itself (Listing 2). The housekeeping (setting the direct page register for program speed, and setting a pointer to the display text) is done in lines 250–300 of Listing 2.

Next, the SAM registers (those memory locations used to define where the VDG looks to display information) are prepared. The unusual thing about the SAM registers is this: it's not *what* you write to the SAM's memory registers, but *which* memory register you use that matters! Remember how to get your computer to run in high speed? You POKE 65495,X . . . and X can be anything. For normal speed, POKE 65494,X . . . again, X can be anything.

Lines 320–380 of Listing 2 select a memory block using this method: the most significant portions of the address of the upper left-most display point is given to the seven-bit binary value described by registers $FFC6 through $FFD3; the final bit is always a zero. Using the odd-numbered register locations defines a one for the SAM, and the even-numbered locations define a zero. The value derived by addressing $FFC7, −C9, −CB, −CD, −CE, −D0, and −D2 is 0001111(0), or $1E. $1E00 becomes the starting address for one screen. 'Way down in lines 660 and 670, $FFCA and $FFCC are used, changing two bits of this addressing figure: it becomes binary 0000011(0), or $06. $0600 describes the start of the other screen.

Screen $1E00 therefore is displayed by line 380. Screen $0600 is being used. Lines 400–490 establish screen $0600 and move up two lines of dots. Lines 510–640 put the new dots in place. The screens are switched in lines 660–670, displaying screen $0600. Lines 690–780 work on the undisplayed screen $1E00. Finally, lines 800–970 test for the end of the line, end of text, etc., to continue and complete the scrolling pattern. The motion subroutines follow in lines 1000–1460, and the ASCII dot pattern look-up table comprises the rest of the program.

A similar process is followed for the Banner program (listing 3), except that double-width characters are produced using the unique double-edged shift-and-rotate routine in lines 940–1090.

Using the Video Display Scroller

First and most important: plan your input! The final scrolling display you are creating presents only a 32-character line, and its editor has limited word processing functions. Original text and screen (page) layout should be sketched and typed on paper as any display text would be. Only then should it be entered into the computer.

Remember to PCLEAR8 before loading and running the Video Display Scroller! After initially loading and running the program, the Functions menu will be presented (Fig. 1).

Figure 1. Functions Menu.

```
FUNCTIONS
(1) Enter Text
(2) Edit Text
(3) Make Text Tape
(4) Load Text Tape
(5) Display (Caution!)
(6) Clear Memory
(7) Special Functions
Touch the number of your choice
```

Since this is your first session, clear memory from line 0 (see Selection 6, below).

- To enter text a line at a time, choose Selection 1: Entering Text. Your memory

Please turn to page 50

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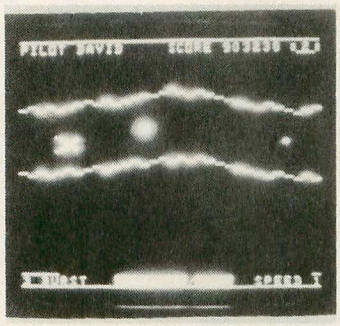

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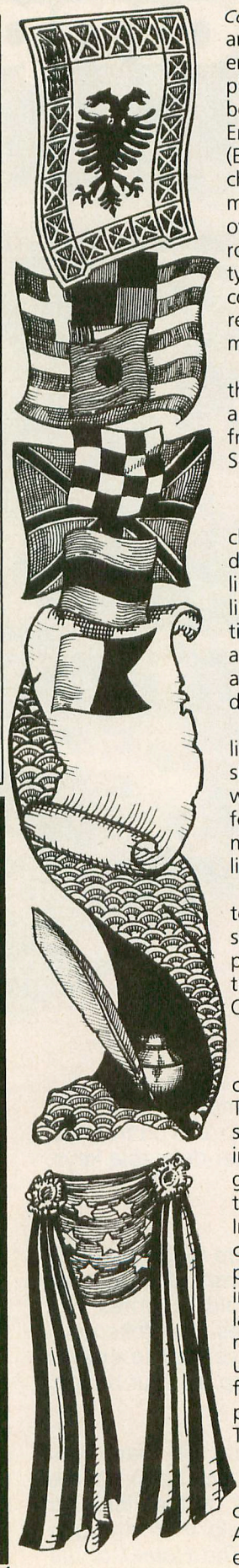

Continued from page 47

area can hold up to 350 lines of text, enough for more than 1500 words. Simply type your text; the current line number is displayed at the top of the screen. End each line with a carriage return (ENTER). Any lines which are exactly 32 characters long will be automatically terminated by the editor, so be sure not to overtype a line. Backspacing corrects errors in the working line. If you do overtype a line, or press the Enter key before correcting an error, continue working; return to the line later using the edit mode (Selection 2).

To exit text entry mode and return to the Functions menu, press the right arrow key. You may re-enter this mode from where you left off; simply choose Selection 1.

• To edit text you have entered, choose Selection 2: Editing Text. Text is displayed for editing in groups of 12 lines, from the beginning of the text. The lines can be paged through, one at a time, by pressing C (continue). The lines are pulled from the video buffer to give a fairly precise picture of the final video display arrangement.

To edit a line, press E (edit). Enter the line number (the working numbers are shown at the top of the screen). The line will be displayed, followed by a prompt for you to type a new line. The new line may be of any length (including a blank line) 32 characters or less.

After a line has been edited and entered, the 12 lines will be displayed showing the edited line in its correct place. You may leave this mode and return to the Functions menu by pressing Q (quit).

• To preserve any text you have created, choose Selection 3: Making a Text Tape. Texts may be stored on cassette and recalled at any time for re-editing or for use by the scrolling display program. A unique name of up to eight letters (all capitals, please) may be assigned. Insert a tape into the player, set it to Record mode, and follow the screen prompts for this selection. The following information will be saved: the text, the last line number, and the banners. Information on banners is provided later, under Selection 7. *Note*—Do not use the following names, which are reserved for program use: BN, PV, SCROLL, DRIVER, TEXT and X.

• To recall text you have saved, choose Selection 4: Loading a Text Tape. Any stored text may be re-loaded for editing or display. If you know the file

name, you may enter it in response to the prompts; the proper file will be searched for and loaded into the machine. If you do not know the name, just press the Enter key; the program will load the next available text file.

The next text file will be added to whatever text you have already entered, and your text entry point will be moved to the next available free line. Banners are automatically overwritten by the loaded file.

• To view the final results of your work, choose Selection 5: Displaying a File. Your banners and scrolling text may be displayed using Selection 5. Touch D for a display, or X to return the Functions menu.

A warning: Use this mode only when a text file has been entered, edited, and saved on tape. Once display has begun, the machine must be reset (by pressing the switch on the back right). You can recover the editor intact by typing:

GOTO2 ENTER

This will return you to the Functions menu.

• To free memory for text entry, choose Selection 6: Clearing Memory. When the computer is first turned on, text memory is filled with random, unwanted characters. To prevent those characters from appearing in your text, you should clear memory. In response to the question "Clear from which line?", enter 0 (zero). It will take approximately three minutes to complete this inititalization process.

There are other times you may wish to use Selection 6, such as if you want to load additional text but need to leave a standard opening intact (such as "Schedule of Events. These events are subject to change...", etc.). To do this, you may clear memory from a specific line; your text entry point will then be moved to the first available free line.

If you accidentally enter the wrong line number (say, 12 instead of 120), immediately press the Break key. Type: GOTO2 ENTER and the Functions menu will be returned. You may have to re-type a few lines (using Selection 2), but your text will be saved.

• To create banners, set borders and line spacing, and reverse letters, choose Selection 7: Special Functions. Details of the Special Functions menu and instructions are presented later.

Following are what I call system functions. Use these with care; they are not displayed on the menu.

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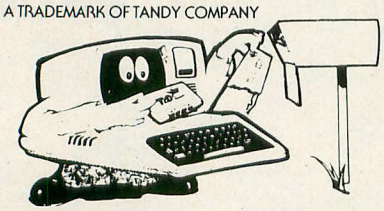

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Program Listing 1

Listing 1. *Type the Basic driver for Video Display Scroller precisely as shown to fit and run in the 4.5K memory environment.*

```
1 CLS:CLEAR90,&H4800:PMODE4,1:PCLS:PMODE4,5:PCLS:CLOADM"SCROLL":
B$=CHR$(8):E=256:F=32:G=&H5000:H=G+F:C$=CHR$(34):D$=CHR$(13):X$=
"X":L=1:S=2:U=0:W=0:B1=&H7F00:B2=&H7F40:T=&H4812:Z=16
2 Z$="FUNCTIONS":GOSUB50:PRINT"(1) Enter Text":PRINT"(2) Edit Te
xt":PRINT"(3) Make Text Tape":PRINT"(4) Load Text Tape":PRINT"(5
) Display (Caution!)":PRINT"(6) Clear Memory":PRINT"(7) Special
Functions":GOSUB54:POKE282,255
3 GOSUB49:ONVAL(A$)+1GOTO3,5,12,19,22,26,4,30,44,28
4 A=G-1:Z$="MEMORY CLEARING":GOSUB50:INPUT"Clear from which line
";O:IFO)383THEN4ELSEPRINT"Please wait...":PRINT@E,"Clearing:";:F
ORX=G+(O*F)TO&H7FFF:PRINT@265,X-A;:POKEX,F:NEXT:PRINT:PRINT"Read
y":GOSUB51:L=0:GOTO2
5 CLS:P=0:PRINT:GOSUB47:GOSUB55:PRINTL:Q=F*L+H:GOSUB47
6 PRINT@P+E," ";:A$=INKEY$:IFA$=""THEN7ELSE8
7 PRINT@P+E,CHR$(140);:A$=INKEY$:IFA$=""THEN6ELSE8
8 IFA$=B$THEN9ELSEIFA$=D$THEN11ELSEIFA$=CHR$(9)THENCLS:GOTO2ELSE
PRINT@P+E,A$;:P=P+1:POKEQ,ASC(A$):Q=Q+1:IFP=F THEN11ELSE6
9 PRINT@P+E," ";:POKEQ,F:P=P-1:IFP(0THENP=0ELSEQ=Q-1
10 PRINT@P+E,"";:GOTO6
11 L=L+1:GOSUB48:GOTO5
12 R=H
13 CLS:GOSUB55:PRINT(R-H)/F+1"to"(R-H)/F+12:GOSUB47:FORX=0TO383:
PRINTCHR$(142)CHR$(141)B$B$CHR$(PEEK(R+X));:NEXT:PRINT@448,"";:G
OSUB47:PRINT"(C)ontinue, (E)dit, (Q)uit";
14 GOSUB49:IFA$="C"ORA$="c"THEN15ELSEIFA$="E"ORA$="e"THEN16ELSEI
FA$="Q"ORA$="q"THEN2ELSE14
15 R=R+384:GOTO13
16 PRINT@480,STRING$(31,F);:PRINT@480,"Edit which line";:INPUTY
17 Z$="LINE EDITING":GOSUB50:PRINT:GOSUB55:PRINTY:GOSUB47:FORX=0
TO31:PRINTCHR$(142)CHR$(141)B$B$CHR$(PEEK(G+X+(Y*F)));:NEXT:PRIN
T:PRINT"Enter new line:":LINEINPUTY$:IFLEN(Y$)>F THENGOSUB52:GOT
O17
18 M=LEN(Y$):Y$=Y$+STRING$(F-M,F):FORX=0TO31:POKEG+X+(Y*F),ASC(M
ID$(Y$,X+1,1)):NEXT:GOTO13
19 Z$="TEXT STORAGE":GOSUB50:PRINT"Insert cassette. Place recor
der";:PRINT"in RECORD position.":PRINT:PRINT"Press ENTER when re
ady.
20 GOSUB49:IFA$=D$THEN21ELSEIFA$=X$THEN2ELSE20
21 PRINT@E+F,"Enter the NAME of the text file":PRINT"(no more th
an 8 letters):":PRINT:INPUTN$:IFLEN(N$)>8THENCLS:GOTO21ELSEPRINT
:PRINT"Now saving "N$:CSAVEM N$,G,L*F+H,T:OPEN"O",#-1,"PV":PRINT
#-1,L:CLOSE#-1:CSAVEM"BN",B1,B2+64,T:GOTO2
22 V=0:Z$="TEXT TAPE LOADING":GOSUB50:PRINT"IMPORTANT:":PRINT:PR
INT"To cancel this function, press":PRINTC$X$C$" now .....
23 A$=INKEY$:IFA$()X$THENV=V+1ELSE2
24 IFV<E THEN23
25 N$="":PRINT:PRINT"Enter text file name (if known).";:PRINT"Pr
ess ENTER to begin.":INPUTN$:PRINT:PRINT"Loading "N$:CLOADM N$,L
*F+F:OPEN"I",#-1,"PV":INPUT#-1,I:CLOSE#-1:L=L+I:CLOADM"BN":GOSUB
48:GOTO2
26 Z$="SCROLLING DISPLAY":GOSUB50:PRINT"Press "C$X$C$" to exit t
his function.":PRINT"Press "C$"D"C$" for Display.
27 GOSUB49:IFA$=X$THEN2ELSEIFA$="D"THENSCREEN1,1:EXECT ELSE27
28 Z$="System Copy":GOSUB50:PRINT:PRINT"Set tape to record & pre
ss ENTER
29 GOSUB49:IFA$()D$THEN29ELSEFORJ=1TO3:CSAVE"DRIVER":GOSUB51:CSA
VEM"SCROLL",T-18,G,T:GOSUB51:CSAVEM"TEXT",G,&H7FFF,T:GOSUB51:NEX
T:GOTO2
30 Z$="SPECIAL FUNCTIONS":GOSUB50:PRINT"(1) Normal, black-on-whi
te":PRINT"(2) Reverse, white-on-black":PRINT"(3) Set Vertical Li
ne Spacing":PRINT"(4) Set Upper Border":PRINT"(5) Set Lower Bord
er":PRINT"(6) Create Banners":PRINT"(7) Quit":GOSUB54
31 GOSUB49:ONVAL(A$)+1GOTO31,32,33,34,36,37,39,2,31,99
32 POKE&H48B1,67:GOTO30
33 POKE&H48B1,18:GOTO30
34 Z$="VERTICAL SPACING":GOSUB50:PRINT"1 to 6 white lines.":PRIN
T"Overlap may be obtained with the";:PRINT"range -8 to 0.":PRINT
:PRINT"Current line spacing is"S;B$".
35 INPUT"Enter new line spacing";SS:IFSS(-8ORSS)6THEN34ELSES=SS:
POKE&H484A,S+9:POKE&H487F,S+9:GOTO30
36 Z$="UPPER BORDER":GOSUB53:PRINT"upper border is"U;B$".":INPUT
"Enter new upper border";UU:IFUU(0ORUU)12THEN36ELSEU=UU:POKE&H48
32,6+U:POKE&H4868,30+U:GOTO38
37 Z$="LOWER BORDER":GOSUB53:PRINT"lower border is"W;B$".":INPUT
"Enter new lower border";WW:IFWW(0ORWW)12THEN37ELSEW=WW:POKE&H48
36,29-W:POKE&H486C,53-W
38 POKE&H4810,PEEK(&H4836)-PEEK(&H4832)+1:GOTO30
39 V=&H4F00:Z$="BANNERS":GOSUB50:PRINT"Banners are 16 letters pe
r line.";:D=1:PRINT:PRINT"(1) Upper or (2) Lower Banner?":GOSUB5
4:GOSUB49:IFA$="1"THEN42ELSEIFA$="2"THEN43ELSE39
40 PRINT@352,STRING$(Z,MID$(STR$(D),2,1));:PRINT@320,"Enter line"
D;B$";":LINEINPUTQ$:N=LEN(Q$):IFN)Z THENGOSUB52:GOTO40
41 Q$=Q$+STRING$(Z-N,F):FORX=0TO15:POKEB+X+(D-1)*Z,ASC(MID$(Q$,X
+1,1)):NEXT:D=D+1:IFD=5THENEXEC&H4F12:GOTO30ELSE40
42 B=B1:POKEV+45,0:POKEV,6:POKEV+2,30:POKEV+5,64:GOTO40
43 B=B2:POKEV+45,64:POKEV,18:POKEV+2,42:POKEV+5,128:GOTO40
44 Z$="TEXT RECOVERY FUNCTION":GOSUB50:PRINT"After a terminal er
ror, forcing":PRINT"RUN or CLOAD, text may be":PRINT"recovered i
f end line is known.":PRINT:PRINT"Use the Edit function to page"
:PRINT"through text to find that line.
45 INPUT"Enter final line number";L:GOSUB48:GOTO2
46 END
47 PRINTSTRING$(F,131);:RETURN
48 POKE&H4804,FIX(L/8)+81:RETURN
49 A$=INKEY$:IFA$=""THEN49ELSERETURN
50 CLS:PRINT:GOSUB47:C=(F-LEN(Z$))/2-1:PRINTTAB(C)Z$:GOSUB47:PRI
NT:RETURN
51 FORN=1TOE:NEXT:RETURN
52 PRINT:PRINT"The line is too long.":GOSUB51:RETURN
53 GOSUB50:PRINT"Border range is 0 to 12 (each":PRINT"half of th
e screen divided into":PRINT"twelfths.":PRINT:PRINT"Current ";:R
ETURN
54 :PRINT:PRINT"Touch the number of your choice":RETURN
55 PRINT"Line Number";:RETURN
99 CSAVEM X$,&H600,&H7FFF,&H4812:GOTO2
```

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• To recover from certain errors, choose Selection 8: Restoring the Line Number. You may occasionally cause an error, delete the program, or otherwise lose the parameters of the running Video Display Scroller program. However, unless you have turned the machine off, chances are your text is still intact. (If you have deleted this program, reload it.) If Selection 1 (Entry Mode) displays line 1, exit this mode (right arrow), and choose Selection 2 (Edit Mode). Using the C key, page through the text until you identify the number of the place your text should end. Exit edit mode by pressing Q. When the Functions menu reappears, press 8.

In response to the query "Enter final line number," enter the number you have determined to be the last line of your text. Everything will be recovered.

Program Listing 2

Listing 2. *Scroll routine is quite short (only 232 bytes), but the 1,536-byte character font is extensive.*

```
4800                    00100          ORG     $4800
                        00110 *
                48      00120          SETDP   $48
                        00130 *
4800  0000       00140 DOTROW  FDB     $0000
4802  5000       00150 TXTTBL  FDB     $5000
4804  8000       00160 MAXTXT  FDB     $8000
4806  0000       00170 DISPLY  FDB     $0000
4808  1DE0       00180 LOWROW  FDB     $1DE0
480A  0000       00190 STORED  FDB     $0000
480C  0000       00200 STOREX  FDB     $0000
480E  0600       00210 HIRES   FDB     $0600
4810  1800       00220 SCREEN  FDB     $1800
      0040       00230 OFFST2  EQU     $40
                 00240 *
4812 86  48      00250 XXXXXX  LDA     #$48
4814 1F  8B      00260         TFR     A,DP
                 00270 *
4816 9E  02      00280 WHERE   LDX     TXTTBL
4818 C6  00      00290         LDB     #$00
481A D7  01      00300         STB     <DOTROW+1
                 00310 *
481C B7  FFC7    00320 BACK    STA     $FFC7
481F B7  FFC9    00330         STA     $FFC9
4822 B7  FFCB    00340         STA     $FFCB
4825 B7  FFCD    00350         STA     $FFCD
4828 B7  FFCE    00360         STA     $FFCE
482B B7  FFD0    00370         STA     $FFD0
482E B7  FFD2    00380         STA     $FFD2
                 00390 *
4831 C6  06      00400         LDB     #$06
4833 D7  0E      00410         STB     <HIRES
4835 C6  1D      00420         LDB     #$1D
4837 D7  08      00430         STB     <LOWROW
4839 C6  C0      00440         LDB     #$C0
483B D7  09      00450         STB     <LOWROW+1
483D 9F  0C      00460         STX     <STOREX
483F 17  0083    00470         LBSR    TWOUP
4842 9E  0C      00480         LDX     <STOREX
4844 8D  54      00490         BSR     AGAIN
                 00500 *
4846 D6  01      00510         LDB     <DOTROW+1
4848 5C          00520         INCB
4849 C1  0B      00530         CMPB    #$0B
484B 27  07      00540         BEQ     JUMP1
484D D7  01      00550         STB     <DOTROW+1
484F 17  008F    00560         LBSR    TRNSFR
4852 20  04      00570         BRA     JUMP2
4854 C6  00      00580 JUMP1   LDB     #$00
4856 D7  01      00590         STB     <DOTROW+1
                 00600 *
4858 C6  E0      00610 JUMP2   LDB     #$E0
485A D7  09      00620         STB     <LOWROW+1
485C 8D  3C      00630         BSR     AGAIN
485E 17  0080    00640         LBSR    TRNSFR
                 00650 *
4861 B7  FFCA    00660         STA     $FFCA
4864 B7  FFCC    00670         STA     $FFCC
                 00680 *
4867 C6  1E      00690         LDB     #$1E
4869 D7  0E      00700         STB     <HIRES
486B C6  35      00710         LDB     #$35
486D D7  08      00720         STB     <LOWROW
486F C6  C0      00730         LDB     #$C0
4871 D7  09      00740         STB     <LOWROW+1
4873 9F  0C      00750         STX     <STOREX
4875 8D  4E      00760         BSR     TWOUP
4877 9E  0C      00770         LDX     <STOREX
4879 8D  1F      00780         BSR     AGAIN
                 00790 *
487B D6  01      00800         LDB     <DOTROW+1
487D 5C          00810         INCB
487E C1  0B      00820         CMPB    #$0B
4880 27  06      00830         BEQ     JUMP3
4882 D7  01      00840         STB     <DOTROW+1
4884 8D  5B      00850         BSR     TRNSFR
4886 20  04      00860         BRA     JUMP4
4888 C6  00      00870 JUMP3   LDB     #$00
488A D7  01      00880         STB     <DOTROW+1
488C 9C  04      00890 JUMP4   CMPX    MAXTXT
488E 27  86      00900         BEQ     WHERE
                 00910 *
4890 C6  E0      00920         LDB     #$E0
4892 D7  09      00930         STB     <LOWROW+1
4894 8D  04      00940         BSR     AGAIN
4896 8D  49      00950         BSR     TRNSFR
                 00960 *
4898 0E  1C      00970         JMP     BACK
                 00980 *
                 00990 *
489A E6  80      01000 AGAIN   LDB     ,X+
489C C0  20      01010         SUBB    #$20
489E 86  00      01020         LDA     #$00
48A0 58          01030         ASLB
48A1 49          01040         ROLA
48A2 58          01050         ASLB
48A3 49          01060         ROLA
48A4 58          01070         ASLB
48A5 49          01080         ROLA
48A6 58          01090         ASLB
48A7 49          01100         ROLA
48A8 D3  00      01110         ADDD    <DOTROW
48AA C3  48E9    01120         ADDD    #ASCII
48AD 1F  02      01130         TFR     D,Y
48AF A6  A4      01140         LDA     ,Y
48B1 43          01150         COMA
48B2 D6  06      01160         LDB     DISPLY
48B4 109E 08     01170         LDY     LOWROW
48B7 A7  A5      01180         STA     B,Y
48B9 5C          01190         INCB
48BA D7  06      01200         STB     DISPLY
48BC C1  20      01210         CMPB    #$20
48BE 26  DA      01220         BNE     AGAIN
48C0 C6  00      01230         LDB     #$00
48C2 D7  06      01240         STB     DISPLY
48C4 39          01250         RTS
                 01260 *
                 01270 *
48C5 9E  0E      01280 TWOUP   LDX     HIRES
48C7 DC  0E      01290         LDD     HIRES
48C9 C3  0040    01300         ADDD    #OFFST2
48CC 1F  02      01310         TFR     D,Y
48CE DC  10      01320         LDD     SCREEN
48D0 83  0040    01330         SUBD    #OFFST2
48D3 DD  0A      01340 LOOPB   STD     <STORED
48D5 E6  A0      01350         LDB     ,Y+
48D7 E7  80      01360         STB     ,X+
48D9 DC  0A      01370         LDD     <STORED
48DB 83  0001    01380         SUBD    #$1
48DE 26  F3      01390         BNE     LOOPB
48E0 39          01400         RTS
                 01410 *
                 01420 *
48E1 1F  10      01430 TRNSFR  TFR     X,D
48E3 83  0020    01440         SUBD    #$20
48E6 1F  01      01450         TFR     D,X
48E8 39          01460         RTS
                 01470 *
                 01480 *
      48E9       01490 ASCII   EQU     *
48E9  0000       01500 SPACE   FDB     $0000
48EB  0000       01510         FDB     $0000
48ED  0000       01520         FDB     $0000
48EF  0000       01530         FDB     $0000
48F1  0000       01540         FDB     $0000
48F3  0000       01550         FDB     $0000
48F5  0000       01560         FDB     $0000
48F7  0000       01570         FDB     $0000
48F9  1010       01580 EXCLAM  FDB     $1010
48FB  1010       01590         FDB     $1010
48FD  1000       01600         FDB     $1000
48FF  1000       01610         FDB     $1000
4901  0000       01620         FDB     $0000
4903  0000       01630         FDB     $0000
4905  0000       01640         FDB     $0000
4907  0000       01650         FDB     $0000
4909  2828       01660 QUOTE   FDB     $2828
490B  2800       01670         FDB     $2800
490D  0000       01680         FDB     $0000
490F  0000       01690         FDB     $0000
4911  0000       01700         FDB     $0000
4913  0000       01710         FDB     $0000
4915  0000       01720         FDB     $0000
4917  0000       01730         FDB     $0000
4919  2828       01740 POUND   FDB     $2828
491B  FE28       01750         FDB     $FE28
491D  FE28       01760         FDB     $FE28
491F  2800       01770         FDB     $2800
4921  0000       01780         FDB     $0000
4923  0000       01790         FDB     $0000
4925  0000       01800         FDB     $0000
4927  0000       01810         FDB     $0000
4929  107E       01820 DOLLAR  FDB     $107E
492B  907C       01830         FDB     $907C
492D  12FC       01840         FDB     $12FC
492F  1000       01850         FDB     $1000
4931  0000       01860         FDB     $0000
4933  0000       01870         FDB     $0000
4935  0000       01880         FDB     $0000
4937  0000       01890         FDB     $0000
4939  42A4       01900 PRCENT  FDB     $42A4
493B  4810       01910         FDB     $4810
493D  244A       01920         FDB     $244A
493F  8400       01930         FDB     $8400
4941  0000       01940         FDB     $0000
4943  0000       01950         FDB     $0000
4945  0000       01960         FDB     $0000
4947  0000       01970         FDB     $0000
4949  3048       01980 AMPER   FDB     $3048
494B  3012       01990         FDB     $3012
494D  2C4C       02000         FDB     $2C4C
494F  7200       02010         FDB     $7200
4951  0000       02020         FDB     $0000
4953  0000       02030         FDB     $0000
4955  0000       02040         FDB     $0000
4957  0000       02050         FDB     $0000
4959  1010       02060 SNGQUO  FDB     $1010
495B  1000       02070         FDB     $1000
```

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```
495D 0000 02080       FDB  $0000
495F 0000 02090       FDB  $0000
4961 0000 02100       FDB  $0000
4963 0000 02110       FDB  $0000
4965 0000 02120       FDB  $0000
4967 0000 02130       FDB  $0000
4969 0810 02140 LPAREN FDB $0810
496B 2020 02150       FDB  $2020
496D 2010 02160       FDB  $2010
496F 0800 02170       FDB  $0800
4971 0000 02180       FDB  $0000
4973 0000 02190       FDB  $0000
4975 0000 02200       FDB  $0000
4977 0000 02210       FDB  $0000
4979 2010 02220 RPAREN FDB $2010
497B 0808 02230       FDB  $0808
497D 0810 02240       FDB  $0810
497F 2000 02250       FDB  $2000
4981 0000 02260       FDB  $0000
4983 0000 02270       FDB  $0000
4985 0000 02280       FDB  $0000
4987 0000 02290       FDB  $0000
4989 1054 02300 ASTER FDB  $1054
498B 38FE 02310       FDB  $38FE
498D 3854 02320       FDB  $3854
498F 1000 02330       FDB  $1000
4991 0000 02340       FDB  $0000
4993 0000 02350       FDB  $0000
4995 0000 02360       FDB  $0000
4997 0000 02370       FDB  $0000
4999 1010 02380 PLUS  FDB  $1010
499B 10FE 02390       FDB  $10FE
499D 1010 02400       FDB  $1010
499F 1000 02410       FDB  $1000
49A1 0000 02420       FDB  $0000
49A3 0000 02430       FDB  $0000
49A5 0000 02440       FDB  $0000
49A7 0000 02450       FDB  $0000
49A9 0000 02460 COMMA FDB  $0000
49AB 0000 02470       FDB  $0000
49AD 0018 02480       FDB  $0018
49AF 1808 02490       FDB  $1808
49B1 1000 02500       FDB  $1000
49B3 0000 02510       FDB  $0000
49B5 0000 02520       FDB  $0000
49B7 0000 02530       FDB  $0000
49B9 0000 02540 DASH  FDB  $0000
49BB 007C 02550       FDB  $007C
49BD 0000 02560       FDB  $0000
49BF 0000 02570       FDB  $0000
49C1 0000 02580       FDB  $0000
49C3 0000 02590       FDB  $0000
49C5 0000 02600       FDB  $0000
49C7 0000 02610       FDB  $0000
49C9 0000 02620 PERIOD FDB $0000
49CB 0000 02630       FDB  $0000
49CD 0018 02640       FDB  $0018
49CF 1800 02650       FDB  $1800
49D1 0000 02660       FDB  $0000
49D3 0000 02670       FDB  $0000
49D5 0000 02680       FDB  $0000
49D7 0000 02690       FDB  $0000
49D9 0204 02700 SLASH FDB  $0204
49DB 0810 02710       FDB  $0810
49DD 2040 02720       FDB  $2040
49DF 8000 02730       FDB  $8000
49E1 0000 02740       FDB  $0000
49E3 0000 02750       FDB  $0000
49E5 0000 02760       FDB  $0000
49E7 0000 02770       FDB  $0000
          02780 *
49E9 3844 02790 ZERO  FDB  $3844
49EB 4444 02800       FDB  $4444
49ED 4444 02810       FDB  $4444
49EF 3800 02820       FDB  $3800
49F1 0000 02830       FDB  $0000
49F3 0000 02840       FDB  $0000
49F5 0000 02850       FDB  $0000
49F7 0000 02860       FDB  $0000
49F9 1030 02870 ONE   FDB  $1030
49FB 1010 02880       FDB  $1010
49FD 1010 02890       FDB  $1010
49FF 3800 02900       FDB  $3800
4A01 0000 02910       FDB  $0000
4A03 0000 02920       FDB  $0000
4A05 0000 02930       FDB  $0000
4A07 0000 02940       FDB  $0000
4A09 3844 02950 TWO   FDB  $3844
4A0B 0408 02960       FDB  $0408
4A0D 3040 02970       FDB  $3040
4A0F 7E00 02980       FDB  $7E00
4A11 0000 02990       FDB  $0000
4A13 0000 03000       FDB  $0000
4A15 0000 03010       FDB  $0000
4A17 0000 03020       FDB  $0000
4A19 3844 03030 THREE FDB  $3844
4A1B 0418 03040       FDB  $0418
4A1D 0444 03050       FDB  $0444
4A1F 3800 03060       FDB  $3800
4A21 0000 03070       FDB  $0000
4A23 0000 03080       FDB  $0000
4A25 0000 03090       FDB  $0000
4A27 0000 03100       FDB  $0000
4A29 0818 03110 FOUR  FDB  $0818
4A2B 2848 03120       FDB  $2848
4A2D 48FC 03130       FDB  $48FC
4A2F 0800 03140       FDB  $0800
4A31 0000 03150       FDB  $0000
4A33 0000 03160       FDB  $0000
4A35 0000 03170       FDB  $0000
4A37 0000 03180       FDB  $0000
4A39 7C40 03190 FIVE  FDB  $7C40
4A3B 7844 03200       FDB  $7844
4A3D 0404 03210       FDB  $0404
4A3F 7800 03220       FDB  $7800
4A41 0000 03230       FDB  $0000
4A43 0000 03240       FDB  $0000
4A45 0000 03250       FDB  $0000
4A47 0000 03260       FDB  $0000
4A49 3840 03270 SIX   FDB  $3840
4A4B 4078 03280       FDB  $4078
4A4D 4444 03290       FDB  $4444
4A4F 3800 03300       FDB  $3800
4A51 0000 03310       FDB  $0000
4A53 0000 03320       FDB  $0000
4A55 0000 03330       FDB  $0000
4A57 0000 03340       FDB  $0000
4A59 7C04 03350 SEVEN FDB  $7C04
4A5B 0810 03360       FDB  $0810
4A5D 2040 03370       FDB  $2040
4A5F 4000 03380       FDB  $4000
4A61 0000 03390       FDB  $0000
4A63 0000 03400       FDB  $0000
4A65 0000 03410       FDB  $0000
4A67 0000 03420       FDB  $0000
4A69 3844 03430 EIGHT FDB  $3844
4A6B 4438 03440       FDB  $4438
4A6D 4444 03450       FDB  $4444
4A6F 3800 03460       FDB  $3800
4A71 0000 03470       FDB  $0000
4A73 0000 03480       FDB  $0000
4A75 0000 03490       FDB  $0000
4A77 0000 03500       FDB  $0000
4A79 3844 03510 NINE  FDB  $3844
4A7B 443C 03520       FDB  $443C
4A7D 0444 03530       FDB  $0444
4A7F 3800 03540       FDB  $3800
4A81 0000 03550       FDB  $0000
4A83 0000 03560       FDB  $0000
4A85 0000 03570       FDB  $0000
4A87 0000 03580       FDB  $0000
4A89 0018 03590 COLON FDB  $0018
4A8B 1800 03600       FDB  $1800
4A8D 0018 03610       FDB  $0018
4A8F 1800 03620       FDB  $1800
4A91 0000 03630       FDB  $0000
4A93 0000 03640       FDB  $0000
4A95 0000 03650       FDB  $0000
4A97 0000 03660       FDB  $0000
4A99 0018 03670 SEMICO FDB $0018
4A9B 1800 03680       FDB  $1800
4A9D 0018 03690       FDB  $0018
4A9F 1808 03700       FDB  $1808
4AA1 1000 03710       FDB  $1000
4AA3 0000 03720       FDB  $0000
4AA5 0000 03730       FDB  $0000
4AA7 0000 03740       FDB  $0000
4AA9 0810 03750 LESS  FDB  $0810
4AAB 2040 03760       FDB  $2040
4AAD 2010 03770       FDB  $2010
4AAF 0800 03780       FDB  $0800
4AB1 0000 03790       FDB  $0000
4AB3 0000 03800       FDB  $0000
4AB5 0000 03810       FDB  $0000
4AB7 0000 03820       FDB  $0000
4AB9 0000 03830 EQUAL FDB  $0000
4ABB 7C00 03840       FDB  $7C00
4ABD 007C 03850       FDB  $007C
4ABF 0000 03860       FDB  $0000
4AC1 0000 03870       FDB  $0000
4AC3 0000 03880       FDB  $0000
4AC5 0000 03890       FDB  $0000
4AC7 0000 03900       FDB  $0000
4AC9 2010 03910 GREATR FDB $2010
4ACB 0804 03920       FDB  $0804
4ACD 0810 03930       FDB  $0810
4ACF 2000 03940       FDB  $2000
4AD1 0000 03950       FDB  $0000
4AD3 0000 03960       FDB  $0000
4AD5 0000 03970       FDB  $0000
4AD7 0000 03980       FDB  $0000
4AD9 3844 03990 QUEST FDB  $3844
4ADB 0408 04000       FDB  $0408
4ADD 1000 04010       FDB  $1000
4ADF 1000 04020       FDB  $1000
4AE1 0000 04030       FDB  $0000
4AE3 0000 04040       FDB  $0000
4AE5 0000 04050       FDB  $0000
4AE7 0000 04060       FDB  $0000
          04070 *
4AE9 3852 04080 ATSIGN FDB $3852
4AEB A294 04090       FDB  $A294
4AED 8842 04100       FDB  $8842
4AEF 3C00 04110       FDB  $3C00
4AF1 0000 04120       FDB  $0000
4AF3 0000 04130       FDB  $0000
4AF5 0000 04140       FDB  $0000
4AF7 0000 04150       FDB  $0000
4AF9 1824 04160 CAPA  FDB  $1824
4AFB 4242 04170       FDB  $4242
4AFD 7E42 04180       FDB  $7E42
4AFF 4200 04190       FDB  $4200
4B01 0000 04200       FDB  $0000
4B03 0000 04210       FDB  $0000
4B05 0000 04220       FDB  $0000
4B07 0000 04230       FDB  $0000
4B09 7C22 04240 CAPB  FDB  $7C22
4B0B 223C 04250       FDB  $223C
4B0D 2222 04260       FDB  $2222
4B0F 7C00 04270       FDB  $7C00
4B11 0000 04280       FDB  $0000
4B13 0000 04290       FDB  $0000
4B15 0000 04300       FDB  $0000
4B17 0000 04310       FDB  $0000
4B19 3C42 04320 CAPC  FDB  $3C42
4B1B 4040 04330       FDB  $4040
4B1D 4042 04340       FDB  $4042
4B1F 3C00 04350       FDB  $3C00
4B21 0000 04360       FDB  $0000
4B23 0000 04370       FDB  $0000
4B25 0000 04380       FDB  $0000
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4ED7  0000  09140          FDB   $0000
4ED9  AA55  09150 DELETE   FDB   $AA55
4EDB  AA55  09160          FDB   $AA55
4EDD  AA55  09170          FDB   $AA55
4EDF  AA55  09180          FDB   $AA55
4EE1  AA55  09190          FDB   $AA55
4EE3  0000  09200          FDB   $0000
4EE5  0000  09210          FDB   $0000
4EE7  0000  09220          FDB   $0000
            09230 *
            09240 *
      4812  09250          END   XXXXXX

00000 TOTAL ERRORS

AGAIN  489A
AMPER  4949
ASCII  48E9
ASTER  4989
ATSIGN 4AE9
BACK   481C
BKARRO 4CD9
BSLASH 4CA9
CAPA   4AF9
CAPB   4B09
CAPC   4B19
CAPD   4B29
CAPE   4B39
CAPF   4B49
CAPG   4B59
CAPH   4B69
CAPI   4B79
CAPJ   4B89
CAPK   4B99
CAPL   4BA9
CAPM   4BB9
CAPN   4BC9
CAPO   4BD9
CAPP   4BE9
CAPQ   4BF9
CAPR   4C09
CAPS   4C19
CAPT   4C29
CAPU   4C39
CAPV   4C49
CAPW   4C59
CAPX   4C69
CAPY   4C79
CAPZ   4C89
CARAT  4CC9
COLON  4A89
COMMA  49A9
CURSOR 4CE9
DASH   49B9
DELETE 4ED9
DISPLY 4806
DOLLAR 4929
DOTROW 4800
EIGHT  4A69
EQUAL  4AB9
EXCLAM 48F9
FIVE   4A39
FOUR   4A29
GREATR 4AC9
HIRES  480E
JUMP1  4854
JUMP2  4858
JUMP3  4888
JUMP4  488C
LBRACE 4E99
LBRACK 4C99
LESS   4AA9
LONGLN 4EA9
LOOPB  4BD3
LOWROW 4808
LPAREN 4969
MAXTXT 4804
MINA   4CF9
MINB   4D09
MINC   4D19
MIND   4D29
MINE   4D39
MINF   4D49
MING   4D59
MINH   4D69
MINI   4D79
MINJ   4D89
MINK   4D99
MINL   4DA9
MINM   4DB9
MINN   4DC9
MINP   4DE9
MINQ   4DF9
MINR   4E09
MINS   4E19
MINT   4E29
MINU   4E39
MINV   4E49
MINW   4E59
MINX   4E69
MINY   4E79
MINZ   4E89
NINE   4A79
OFFST2 0040
ONE    49F9
PERIOD 49C9
PLUS   4999
POUND  4919
PRCENT 4939
QUEST  4AD9
QUOTE  4909
RBRACE 4EB9
RBRACK 4CB9
RPAREN 4979
SCREEN 4810
SEMICO 4A99
SEVEN  4A59
SIX    4A49
SLASH  49D9
SNGQUO 4959
SPACE  48E9
STORED 480A
STOREX 480C
THREE  4A19
TILDE  4EC9
TRNSFR 48E1
TWO    4A09
TWOUP  48C5
TXTTBL 4802
WHERE  4B16
XXXXXX 4812
ZERO   49E9
```

Continued from page 53

• To back up your complete system, text block included, choose Selection 9: Making a System Copy. This is a back-up copy of all the programs and text in memory. It is used to make copies of your original tape whenever back-ups are needed. Copies are made of the editor (as a Basic program with the name DRIVER), the scrolling and banner routines (as a machine language file with the name SCROLL), and the entire text and banners (as a machine language file with the name TEXT).

Special Functions

This is the Selection 7 I put off discussing earlier. Attractive displays can be produced by combining text with borders, banners and reverse lettering. Selection 7 provides much display flexibility, and also presents its own menu (Fig. 2).

Figure 2. Special Functions Menu (Selection 7)

Special Functions
(1) Normal, Black-on-white
(2) Reverse, White-on-black
(3) Set Vertical Line Spacing
(4) Set Upper Border
(5) Set Lower Border
(6) Create Banners
(7) Quit

Touch the number of your choice

• To select normal or reverse lettering, choose Special Selections 1 and 2. The scrolling text (not the banners) may be displayed in normal (black letters on white) or reverse (white letters on black). Selection 1 is normal, Selection 2 is reverse. Reverse letters can be used for effect, but require a television or monitor with good contrast and wide bandwidth. Experiment for best effect.

• To change the spacing between lines of text, choose Special Selection 3: Set Vertical Line Spacing. Normal text lines use a small amount of white space for legibility. However, denser or looser text can be obtained by changing the vertical spacing between letters. Special Selection 3 is normally set to display two thin lines of white between each line of text. This can be increased to a maximum of six lines for very widely spaced text, or decreased to one so the descenders of letters g, p, q and y almost touch the tops of capital letters on the lines below.

For special effects, the bottoms of letters can actually be cut off by the subsequent line of text. Values −8 to 0 provide for total illegibility at one extreme (−8), to letters which simply touch each other (0).

Please turn the page

Figure 3. Screen Division

Upper border 1 _____
Upper border 2 _____
Upper border 3 _____
Upper border 4 _____
Upper border 5 _____
Upper border 6 _____
Upper border 7 _____
Upper border 8 _____
Upper border 9 _____
Upper border 10 _____
Upper border 11 _____
Upper border 12 _____
Lower border 12 _____
Lower border 11 _____
Lower border 10 _____
Lower border 9 _____
Lower border 8 _____
Lower border 7 _____
Lower border 6 _____
Lower border 5 _____
Lower border 4 _____
Lower border 3 _____
Lower border 2 _____
Lower border 1 _____

Technical Information

Scrolling Program is located from $4800–$48E8.
Entry point is $4812.
End of text marker MSB is located at $4804.
Screen size MSB is located at $4810.
- Screen size is always defined as NORM1D–NORM06 + 1.

Upper banner is defined at $4832 (NORM06) and $4868 (NORM1E).
- NORM06 is normally $06 and can be up to $12 (half screen).
- NORM1E is normally $1E and can be up to $24 (half screen).
- Both of the above must define the same difference, i.e., NORM1E = NORM06 + $18

Lower banner defined at $4836 (NORM1D) and $486C (NORM35).
- NORM1D is normally $1D and can go to $12 (half screen).
- NORM35 is normally $35 and can go to $24 (half screen).
- Both of the above must define the same difference, i.e., NORM35 = NORM1D + $18

High-resolution screen 1 start MSB found at $4832.
High-resolution screen 1 end MSB found at $4836.
High-resolution screen 2 start MSB found at $4868.
High-resolution screen 2 end MSB found at $486C.
Line spacing is located at $484A and $487F (both the same).
- Line spacing range is $0A to $10 (overlap uses $02–$09).

Reverse lettering is located at $40B1.
- Use $43 for normal (default) and $12 for reverse.

Alphanumeric Font located in ASCII order from $48E9–$4EE8.

Banner Program is located from $4F00–$4FA1.
Entry point is $4F12.
Banner end value LSB found at $4F05.
Banner text start pointer located at $4F2D.
Reverse lettering is located at $4F58.
- Use $53 for normal and $12 for reverse.
- This value is not changed by DRIVER; use command POKEs.

Line spacing is found at $4F75.
- Use $0B for normal (four blanks).
- This value is not changed by DRIVER; use command POKEs.

Text Buffer is located from $5000–$7FFF.
$5000–$501F is always a blank line ($20).

Note: The text editor (Basic driver) of the Video Display Scroller is used most easily with a true lowercase generator installed in your Color Computer, because all prompts are printed in upper- and lowercase and the text editing is displayed in this manner. Although the Video Display Scroller's final display uses true software-generated lowercase characters, Radio Shack's Basic does not. To obtain true lowercase in Basic, you must have a true lowercase generator; one will be presented in Custom Color this fall, but in the meantime the Word Processing Lowerkit can be obtained from World Electronics, 177 27th Street, New York 11232, (212) 499-5400. Call for pricing.

Program Listing 3

Listing 3. *Banner-creation program sits just at the end of the character font; it occupies only 161 bytes.*

```
                4F      00100           SETDP   $4F
                        00110 *
4F00                    00120           ORG     $4F00
                        00130 *
4F00            0600    00140 VIDEX1    FDB     $0600
4F02            1E00    00150 VIDEX2    FDB     $1E00
4F04            7F40    00160 ENDBN1    FDB     $7F40
4F06            7F80    00170 ENDBN2    FDB     $7F80
4F08            7F40    00180 ENDBAN    FDB     $7F40
4F0A            0000    00190 NODOTS    FDB     $0000
4F0C            02      00200 DUBLER    FCB     $02
4F0D            10      00210 NOCHRS    FCB     $10
4F0E            0000    00220 STOREB    FDB     $0000
4F10            0000    00230 STOREY    FDB     $0000
                        00240 *
                7F00    00250 BANTBL    EQU     $7F00
                48E9    00260 ASCII     EQU     $48E9
                        00270 *
4F12 86         4F      00280 ENTRY     LDA     #$4F
4F14 1F         8B      00290           TFR     A,DP
                        00300 *
4F16 109E       04      00310           LDY     <ENDBN1
4F19 109F       08      00320           STY     <ENDBAN
4F1C 109E       00      00330           LDY     <VIDEX1
4F1F 8D         0A      00340           BSR     UBANR
4F21 109E       02      00350           LDY     <VIDEX2
4F24 8D         05      00360           BSR     UBANR
4F26 86         00      00370           LDA     #$00
4F28 1F         8B      00380           TFR     A,DP
4F2A 39                 00390           RTS
                        00400 *
4F2B 8E         7F00    00410 UBANR     LDX     #BANTBL
4F2E 86         00      00420 GETMOR    LDA     #$00
4F30 97         0B      00430           STA     <NODOTS+1
4F32 86         02      00440 GETSET    LDA     #$02
4F34 97         0C      00450           STA     <DUBLER
4F36 86         10      00460 GETPOS    LDA     #$10
4F38 97         0D      00470           STA     <NOCHRS
4F3A E6         80      00480 GETCHR    LDB     ,X+
4F3C C0         20      00490           SUBB    #$20
4F3E 86         00      00500           LDA     #$00
4F40 58                 00510           ASLB
4F41 49                 00520           ROLA
4F42 58                 00530           ASLB
4F43 49                 00540           ROLA
4F44 58                 00550           ASLB
4F45 49                 00560           ROLA
4F46 58                 00570           ASLB
4F47 49                 00580           ROLA
4F48 D3         0A      00590           ADDD    <NODOTS
4F4A C3         48E9    00600           ADDD    #ASCII
4F4D 109F       10      00610           STY     <STOREY
4F50 1F         02      00620           TFR     D,Y
4F52 E6         A4      00630           LDB     ,Y
4F54 109E       10      00640           LDY     <STOREY
4F57 53                 00650           COMB
4F58 D7         0E      00660           STB     <STOREB
4F5A D7         0F      00670           STB     <STOREB+1
4F5C 8D         2B      00680           BSR     EXPAND
4F5E A7         A0      00690           STA     ,Y+
4F60 8D         27      00700           BSR     EXPAND
4F62 A7         A0      00710           STA     ,Y+
4F64 0A         0D      00720           DEC     <NOCHRS
4F66 26         D2      00730           BNE     GETCHR
4F68 0A         0C      00740           DEC     <DUBLER
4F6A 27         04      00750           BEQ     CHKDOT
4F6C 8D         13      00760           BSR     TRNSFR
4F6E 20         C6      00770           BRA     GETPOS
4F70 0C         0B      00780 CHKDOT    INC     <NODOTS+1
4F72 96         0B      00800           LDA     <NODOTS+1
4F74 81         0C      00810           CMPA    #$0C
4F76 27         04      00820           BEQ     CHKEND
4F78 8D         07      00830           BSR     TRNSFR
4F7A 20         B6      00840           BRA     GETSET
4F7C 9C         08      00850 CHKEND    CMPX    <ENDBAN
4F7E 26         AE      00860           BNE     GETMOR
4F80 39                 00870           RTS
                        00880 *
4F81 1F         10      00890 TRNSFR    TFR     X,D
4F83 83         0010    00900           SUBD    #$10
4F86 1F         01      00910           TFR     D,X
```

Please turn the page

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Name _____
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C _____
M _____

Listing continued

```
4F88 39          00920          RTS
                 00930 *
4F89 0B   0E     00940 EXPAND   ASL     <STOREB
4F8B 49          00950          ROLA
4F8C 0B   0F     00960          ASL     <STOREB+1
4F8E 49          00970          ROLA
4F8F 0B   0E     00980          ASL     <STOREB
4F91 49          00990          ROLA
4F92 0B   0F     01000          ASL     <STOREB+1
4F94 49          01010          ROLA
4F95 0B   0E     01020          ASL     <STOREB
4F97 49          01030          ROLA
4F98 0B   0F     01040          ASL     <STOREB+1
4F9A 49          01050          ROLA
4F9B 0B   0E     01060          ASL     <STOREB
4F9D 49          01070          ROLA
4F9E 0B   0F     01080          ASL     <STOREB+1
4FA0 49          01085          ROLA
4FA1 39          01090          RTS
                 01100 *
         4F12    01110          END     ENTRY
00000 TOTAL ERRORS


ASCII   48E9        GETMOR  4F2E
BANTBL  7F00        GETPOS  4F36
CHKDOT  4F70        GETSET  4F32
CHKEND  4F7C        NOCHRS  4F0D
DUBLER  4F0C        NODOTS  4F0A
ENDBAN  4F08        STOREB  4F0E
ENDBN1  4F04        STOREY  4F10
ENDBN2  4F06        TRNSFR  4F81
ENTRY   4F12        UBANR   4F2B
EXPAND  4F89        VIDEX1  4F00
GETCHR  4F3A        VIDEX2  4F02
```

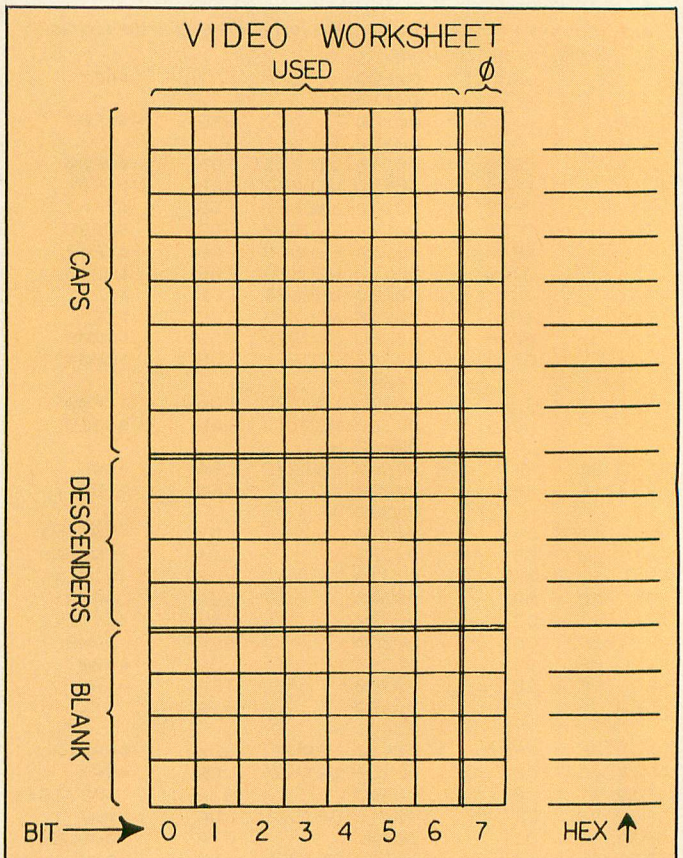

Figure 5. *Video worksheet defines new character fonts for use by the Video Display Scroller. Each slot represents an individual display dot, one bit of memory.*

• To set top and bottom borders, choose Special Selections 4 and 5: Borders. There are several reasons to set borders: to shorten the amount of text displayed, to outline the displayed text in black, to speed the text display, and to make room for banners.

From 12 to 20 lines of text are normally scrolled slowly from the bottom of the screen to the top. It takes slightly less than a minute for a full screen to pass. This is a lot of information, and some viewers may find a full screen difficult to read. To avoid a full screen, upper and lower borders can be set up.

The screen is divided into 24 parts, as shown in Fig. 3. (See page 56.)

Selection 4 sets the upper border, from the top down, and Selection 5 sets the lower border, from the bottom up. When creating banners, allow three border lines for each line of banner text, plus as many extra border lines as necessary to provide a legible image.

• To create banners at the borders of a screen, choose Special Selection 6: Banners. Banners are made of large display letters (double the normal height and width). Each banner line occupies an eighth of the screen, and can contain up to 16 letters.

The arrangement of banner lines is shown in Fig. 4.

Figure 4.
Banner Line Arrangement

Upper Banner Line 1 _____
Upper Banner Line 2 _____
Upper Banner Line 3 _____
Upper Banner Line 4 _____
Lower Banner Line 1 _____
Lower Banner Line 2 _____
Lower Banner Line 3 _____
Lower Banner Line 4 _____

The topmost banner line is Upper Banner Line 1, and the bottommost banner line is Lower Banner Line 4. Keep this in mind when entering banner information. Note also that all four lines of each banner must be filled in (even with only a carriage return) before the Special Functions menu will be returned. As a reminder of the length of the banner line, 16 numbers (corresponding to the numbered banner row) are shown, with the cursor positioned above the first. As usual, backspacing corrects errors.

• To return to the main Functions menu, choose Special Functions Selection 7: Quit. The main functions menu will be returned to permit continued entry of text, editing, saving or loading text, clearing memory, producing a final display, or using the system functions.

There is also a special system function within the special functions menu. It is used to produce a final display-only tape for 32K slave display machines. To create a master display tape, choose Special Selection 9: Display Tape. A tape must already be inserted in a cassette recorder, and the cassette recorder placed in record mode. A tape will be created containing the scrolling and banner programs and the complte text; it is a long process and will take several minutes to complete. To use the completed tape on any TRS-80 32K Color Computer, type:

CLOADM ENTER

The name X will be displayed, and after several minutes the OK prompt will return. Type:

EXEC ENTER

The display program will be enabled and operating.

It is wise to create the final display tape immediately after finishing the entry of text and creation of the banners. ■ ■ ■

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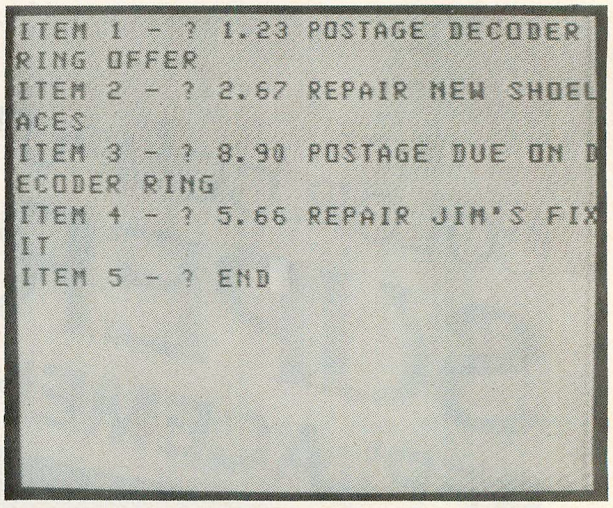
16K
Extended
Color Basic

Sweet Add-A-Line

A technological advance for shoebox bookkeepers.



by Richard Ramella

CHAOS CAN BE TRANSFORMED into clarity and order with this short recordkeeping program that turns a shoebox of money records into a neat, categorized, totaled list. You'll love it at tax time.

Sweet Add-A-Line requires 16K Extended Color Basic and a line printer.

I originally called it the shoebox program because all year long I throw receipts, check records and such into a box with no thought of what lies in wait at tax time. The program was so useful in plowing through this mess, I decided it needed a sibilantly dulcet name. Sweet Add-A-Line says it all.

Take a look at the short Sample Run; to see it is to understand it all.

The program presents a series of numbered prompts, I answered the prompts as shown in Photo 1. I answered the fifth prompt by typing END and pressing Enter; this sets the program to work categorizing, totaling, and listing. It produces the printout in Figure 1.

Figure 1

```
POSTAGE
1.23 Decoder Ring Offer
8.90 Due on Decoder Ring
10.13—Total

REPAIR
2.67 New Shoelaces
5.66 Jim's Fixit
8.33
```

What happened there? Consider that the program regards each entry as having three fields. For example, the information in the photo is divided this way: (1.23) (POSTAGE) (DECODER RING OFFER). The first is an amount to be added into a category. The second is the category. The third is merely a comment. When you ask for a printout, the program searches through the entries you've made and isolates all with the same second field. It then prints and totals all the amounts in the first field.

The program allows up to 100 entries. At the beginning and anytime you ask for it later, you will be shown the menu — a list of commands that help you manage the list. At any item entry prompt, you can type one of the menu words with different results:

- MENU — Displays the menu, which is exited by pressing Enter.
- END — Starts output to the printer. Make sure the printer is on.
- EDIT — It asks *which* item. Enter its number. It displays that item as *old entry* and prints on the line below *new entry* with a prompt. If you decide the old entry is correct, answer the prompt by typing OK and Enter. In this way, no change is made and you return to the regular entry mode.
- LOOK — Asks which item you want to see. Answer by typing the item number and pressing Enter. It then displays the entry you requested, plus the next seven entries. This makes it easy to find an item you want to edit and to doublecheck all entries for mistakes. After the list of eight appears, the program returns to the regular entry mode.

That's all there is to the menu. There are also a few safeguards against mistakes, though not all miscues are caught.

If you press Enter without making an entry, the program notes MORE INFORMATION NEEDED HERE and prints the same numbered prompt again.

If your entry does not contain at least two spaces, you are told SPACING ERROR. EDIT NOW PLEASE. This catches some of the errors and checks to ensure you have provided at least three fields. Without three fields to check, the program may hang up in the printout process and you will lose the data.

If your entry has fewer than 10 characters, the program adds a few dashes to help with string manipulation.

I advise you to make your categories — the second field — three-letter codes. I also advise you to keep the third field — comments — to 30 or fewer characters. In the tests I ran, the program capably handles 100 entries if you follow these guidelines, but if you make long comments, you might run out of memory before producing a printout.

Sweet Add-A-Line is a lifesaver at tax time. I throw in everything: deductions, salary, tax withheld...and get a perfect total for each. You can also use it as a simple bookkeeping system by using only two middle field categories: Debit and Credit. To put a year's months in order, make the first 12 entries 0 JAN BLANK and so on to 0 DEC BLANK. Then enter everything else with the middle field reserved for the three-letter month codes, and the printout will put the months in order. Disregard the zero totals, of course.

Other applications will occur to you: simple inventories, classifying collections, and so on. Sweet Add-A-Line will work for you whenever you need to classify and total records.

Usually, the command PRINT MEM results in the number 8487, which is bytes available when you turn on a 16K Extended Color Basic machine. Because

Sweet Add-A-Line uses no graphics and requires much string space, lines 110 PMODE 0 and 120 PCLEAR 1 make a total of 13095 bytes available for your use.

In writing Sweet Add-A-Line, I made a curious discovery which gives more proof of the Color Computer's power. I first wrote the program on a 16K TRS-80 Model I. It worked but was no good because by the time I got to the 30th entry, the system began to hang up and lag in its responses. The 12 second waits made me realize I'd never finish 100 items.

I knew what the problem was. Basic has a dynamic string allocation feature, and when things get crowded, it takes longer and longer for the strings to reorganize themselves. It seemed to call for a machine language subroutine of which I was incapable.

Sadly, but with hope, I keyed the program into the Color Computer. Lo, it worked! Technically, I don't know why. But, frankly, my dear Sweet Add-A-Line, I don't care as long as you do the job. ■ ■

Listing begins page 62

Figure 2: Sample Run

```
    .20 Pos Letter To Color Computer Magazine
   6.97 Com Radio Shack Tapes
    .20 Pos Letter To Santa Claus
  12.33 Com Lineprinter Ribbons
200.33 Pay Programming For Atlantic Cookie Co.
   5.12 Pos Manuscript To N.E.P.
  37.83 Pay Mortgage Tables For Time Realty
  23.45 Com Radio Shack Diskettes
```

Figure 3: Printed Result

```
—POS—
0.20 Letter To Color Computer Magazine
0.20 Letter to Santa Claus
5.12 Manuscript to N.E.P
5.52—Total

—COM—
 6.97 Radio Shack Tapes
12.33 Lineprinter Ribbons
23.45 Radio Shack Diskettes
42.75—Total

—PAY—
200.53 Programming for Atlantic
          Cookie Co.
 37.83 Mortgage Tables for Time Realty
238.36—Total
```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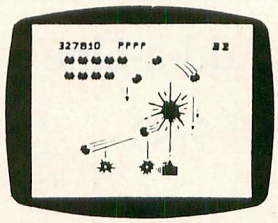

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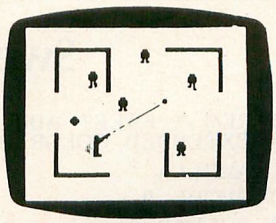

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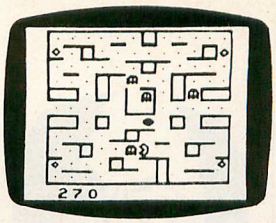

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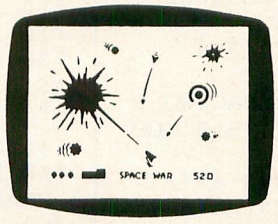

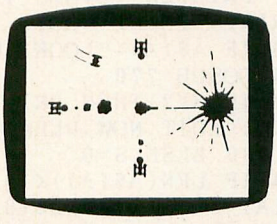

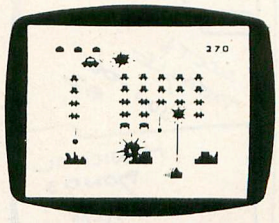

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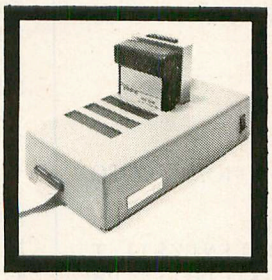

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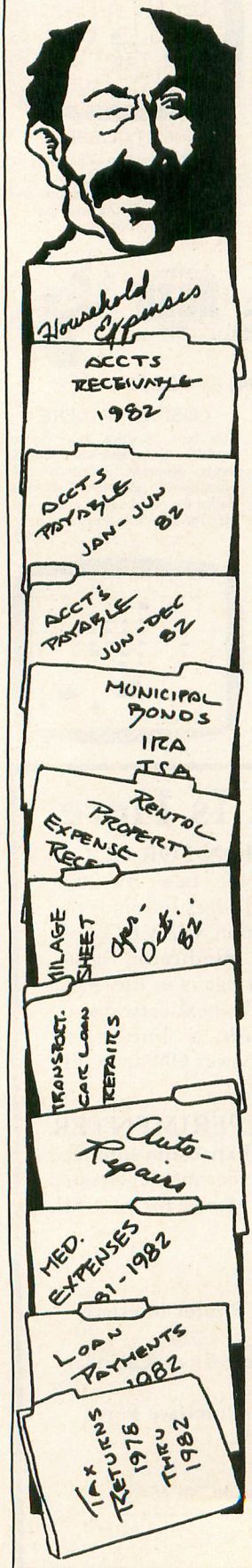
Sweet Add-a-Line




```
100 REM * SWEET ADD-A-LINE * TRS
-80 EXTENDED COLOR BASIC / RICHA
RD RAMELLA
110 PMODE 0
120 PCLEAR 1
130 CLS
140 CLEAR 9000
150 DIM A$(100),B$(100),C(100)
160 G$="######.##"
170 L$=STRING$(31,"-")
180 GOSUB 820
190 A=1
200 PRINT "ITEM"A"- ";
210 INPUT A$(A)
220 IF A=100 THEN A$(A)="END"
230 IF A$(A)="" THEN PRINT "MORE
 INFORMATION NEEDED HERE.": GOTO
 200
240 IF A$(A)="MENU" GOSUB 820: G
OTO 200
250 IF A$(A)="EDIT" GOTO 650
260 IF A$(A)="END" THEN CLS: PRI
NT "PRINTED TOTALS IN PROGRESS":
 PRINT: PRINT: GOTO 360
270 IF A$(A)="LOOK" GOTO 560
280 GOSUB 770
290 IF S<2 THEN PRINT "SPACING E
RROR. EDIT NOW PLEASE.": S=0: GO
TO 200 ELSE S=0
300 IF LEN(A$(A))<10 THEN A$(A)=
A$(A)+"  "+STRING$(9-LEN(A$(A)),
"-")
310 FOR B=2 TO LEN(A$(A))
320 IF MID$(A$(A),B,1)=" " THEN
C(A)=VAL(LEFT$(A$(A),B-1)): B$(A
)=RIGHT$(A$(A),LEN(A$(A))-B): GO
TO 340
330 NEXT
340 A=A+1
350 GOTO 200
360 FOR B=1 TO A-1
370 IF A$(B)="" THEN N=N+1: GOTO
 410
380 IF Z$="" GOSUB 530
390 IF Z$=LEFT$(B$(B),LEN(Z$)) T
HEN PRINT #-2,USING G$;C(B);: PR
INT #-2,"  "RIGHT$(B$(B),LEN(B$(
B))-LEN(Z$)): H=H+C(B): N=N+1: A
$(B)=""
400 IF B=A-1 GOTO 420
410 NEXT B
420 PRINT #-2,STRING$(30,"-")
430 PRINT #-2,USING G$;H;
440 PRINT #-2,"----- TOTAL"
450 PRINT #-2," "
460 PRINT #-2," "
470 PRINT #-2," "
480 IF N=A-1 THEN PRINT "SWEET A
DD-A-LINE DID ITS JOB.   END OF
RUN": END
490 N=0
500 H=0
510 Z$=""
520 GOTO 360
530 FOR D=2 TO LEN(B$(B))
540 IF MID$(B$(B),D,1)=" " THEN
Z$=LEFT$(B$(B),D-1): PRINT #-2,"
---"Z$"---": PRINT #-2," ": RETU
RN
550 NEXT
560 INPUT "WHICH";J
570 J=INT(J)
580 IF J<1 OR J>A-1 GOSUB 750: G
OTO 200
590 IF J+9>A-1 THEN K=A-1 ELSE K
=J+7
600 CLS
610 FOR L=J TO K
620 PRINT L"-"A$(L)
630 NEXT
640 GOTO 200
650 INPUT "WHICH";J
660 J=INT(J)
670 IF J>A-1 GOSUB 750: GOTO 200

680 IF J<1 GOSUB 750: GOTO 200
690 T$=A$(J)
700 PRINT "OLD ENTRY: "A$(J)
710 INPUT "NEW ENTRY";A$(J)
720 IF A$(J)="OK" THEN A$(J)=T$
730 IF LEN(A$(J))<10 THEN A$(J)=
A$(J)+" "+STRING$(9-LEN(A$(J)),"
-")
740 GOTO 200
750 PRINT "THAT NUMBER YET TO BE
 REACHED."
760 RETURN
770 FOR U=1 TO LEN(A$(A))
780 IF MID$(A$(A),U,1)=" " THEN
S=S+1
790 NEXT
800 RETURN
810 END
820 CLS
830 PRINT "SWEET ADD-A-LINE MENU
"
840 PRINT STRING$(21,"*")
850 PRINT
860 PRINT "END -  OUTPUTS TO PRI
NTER"
870 PRINT L$
880 PRINT "MENU - SHOWS MENU"
890 PRINT L$
900 PRINT "EDIT - ASKS WHICH LIN
E TO EDIT"
910 PRINT "        THEN PRESENTS
LINE"
920 PRINT "        FOR NEW VERSIO
N."
930 PRINT L$
940 PRINT "LOOK - ASKS FIRST ITE
M, PRINTS"
950 PRINT "        IT PLUS NEXT 7
 ITEMS"
960 PRINT L$
970 PRINT
980 PRINT "PRESS ANY KEY TO EXIT
";
990 IF INKEY$<>"" THEN CLS: RETU
RN ELSE 990
1000 END
```

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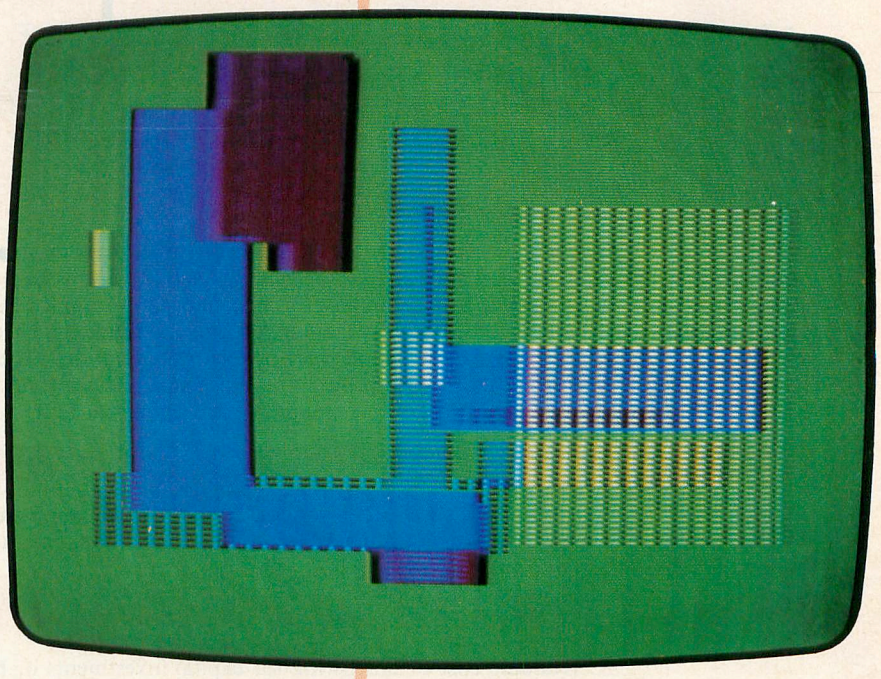
Rectangles

Pretty pictures for your viewing pleasure.

16K Extended Color Basic



by Lynn Davis

I HAVE ALWAYS been interested in short graphics programs — they're easy to type in, pack together many techniques, and are just plain fun to watch.

This program was originally written for the TRS-80 Models I and III, and appeared in the July 1981 issue of Creative Computing. I have modified the program to run on a 16K Extended Color Basic computer.

The Program Listing produces rectangles of random size and colors, and constructs them at random positions on the CRT. The rectangles will either be a solid color, or made up of a series of lines. This produces a spectacular effect.

Line By Line

Line 90 seeds the random number generator with a truly random number.

Line 100 selects the resolution of the graphics, clears the screen to a green background color, and establishes the color set used.

Line 110 sets certain variables to zero.

The random numbers generated in lines 120 and 130 are the horizontal and vertical coordinates of the rectangle to be constructed.

The random numbers produced in line 140 will be used in lines 170 and 180 to help calculate the size of a loop step.

Line 145 randomly determines a rectangle's color. With a green background, the rectangle colors can be yellow (number 2), blue (3), or red (4).

Line 150 contains a counter that clears the screen after 100 rectangles have been drawn.

Line 160 uses the counter number from line 150. If the counter number (Z) is even, then ZZ has a value of 1. If Z is an odd number, then ZZ has a value of 0 (zero).

This value for ZZ (either a zero or a one), is later used in line 190 in the branch ON ZZ GOTO 200. If you have ever wanted a program branch that went in one direction on even numbers and went in another direction on odd numbers, this is one technique to use.

Lines 170 and 180 are loops that establish the direction of the construction and how close to construct the graphics blocks.

Look at the formula used to calculate the STEP, especially the (A>B) section. This is not a misprint! The Color Computer interprets a greater than symbol, when used in a formula, as follows:

If A>B then the (A>B) part of the formula equals −1.

If A<B then the (A>B) part of the formula equals 0.

When these numbers are calculated into the rest of the STEP formula, the resulting step values are between +3 and −3, but not zero.

A step of 1 results in graphic blocks drawn next to each other, or a solid colored rectangle. A step of 2 or 3 results in the graphic blocks being drawn with one or two spaces between them, and will appear as lines.

The positive or negative values of the step determines whether the blocks are constructed up or down the screen; and also determines whether the blocks are constructed from left to right across the screen.

Line 190 utilizes the 1 or 0 value for ZZ as determined in line 160. If ZZ=1 then the program will GOTO line 200 and PSET the appropriate graphic block. If ZZ=0 then the first statement in line 190 defaults and the computer PRESETs the graphic block and will GOTO line 210.

Line 210 completes the rectangle's construction by looping through the various FOR...NEXT statements. When complete, the program will GOTO line 120 and start construction of another rectangle.

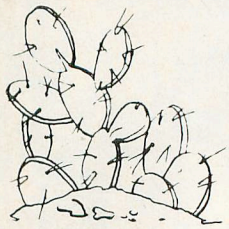
Modifications

This program is easy to modify. If you change the SCREEN command in line 100 to SCREEN 1,1 you'll get cyan, magenta, and orange rectangles on a buff colored background.

If you change the PMODE 3,1 to PMODE 4,1 you can construct rectangles in the highest resolution. Before you try PMODE 4, change line 145 to read 145 C=1. This line change is necessary because PMODE 4 is only supposed to give two-color combinations, and the only necessary color designation for the rectangles is color number one.

Using PMODE 4,1 and SCREEN 1,0 re-

Please turn to page 67



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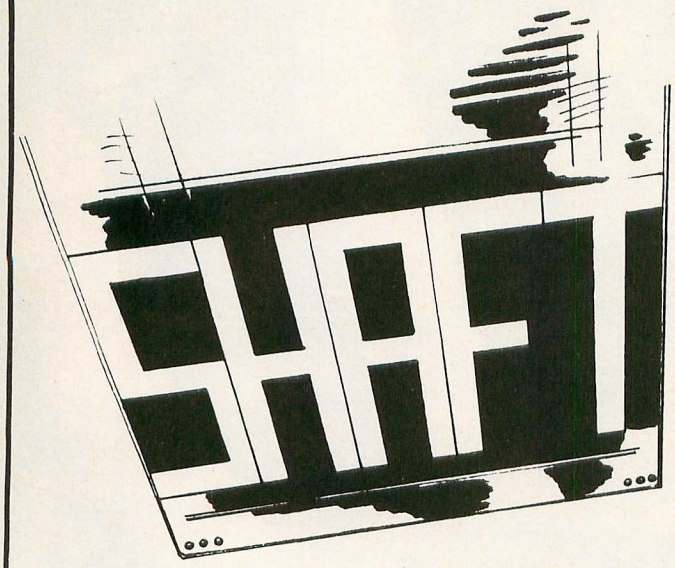


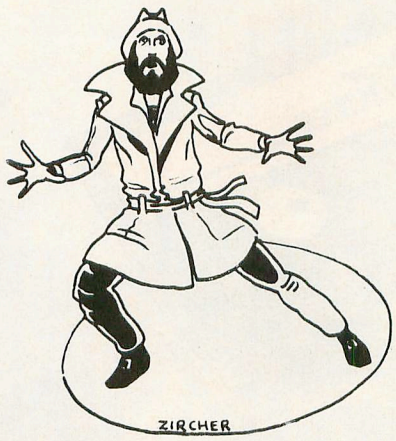
Shaft

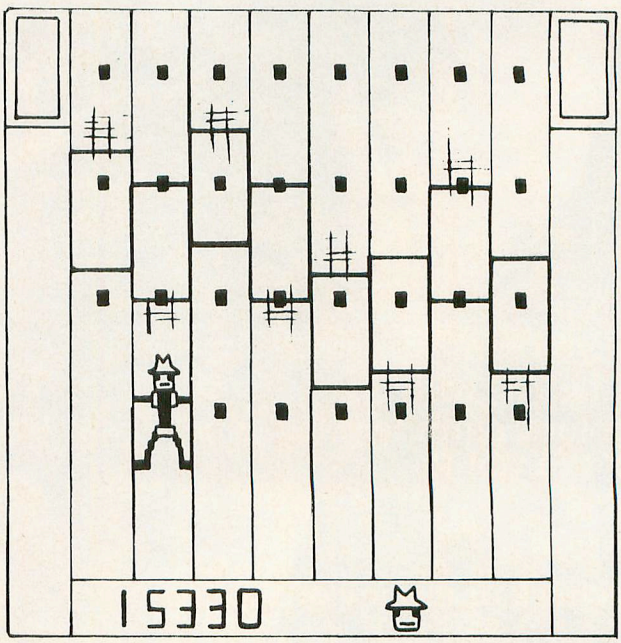
It took a long time, but we finally found a 100% machine language arcade game that met our standards. It had to be good, with outstanding graphics and animation. It had to be tough at high levels of play, to challenge an expert, but still have an easier level of play for the beginner or younger child. Maybe hardest of all, we didn't want another copy of some arcade game!!

If you are tired of your friends telling you that the Pac-Mac running on their whatever brand video game or computer is better/more like the arcade than your Color Computer version, here's your chance. Show them **SHAFT.** It's new and **ORIGINAL,** and nobody has anything like it on **ANY** other computer (or in the arcades, either).

It starts with one of the most impressive title screens we've ever seen. Yes, there's full animation and sound even on the title screen!!! Then you select your level of play (on a second hi-resolution title screen) and get down to fun.

The animation is smooth and fast (it gets faster as you go along), the sound effects are great, and your man is very detailed. The whole game is done in hi-resolution, multi-color graphics, and while the game looks easy enough, it is very definitely not. In fact, we will send a gift certificate for the purchase price to the first 5 people who send us a picture of the screen showing a score over 50,000, and we will publish their names in a future ad hall of fame section!!! You have to be fast with the joystick and play several moves ahead at the same time if you expect to do well. Are you up to the challenge? **16K — $24.95 TAPE — $29.95 DISK**





The drawing to the right is a representation of the screen during play. The eight elevators in the center shafts move up and down in one of several random patterns. Your man starts out at the bottom left. You must maneuver him across the screen to the other side while avoiding the crushing elevators. When you reach the other side the elevator in the top right corner will come down and pick you up. It takes you up one floor, where you must repeat the process going the other way. If you make it all the way across the top floor you get a new, faster screen. The on screen scoring is across the bottom, (15,330 would be a new record for us) and next to it is a row of heads indicating how many men you have left. You start with four men, but they may not last long.

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sults in green rectangles on a black background. A SCREEN command of 1,1 however, results in colors other than buff on black. The colors produced result in part from the horizontal starting point of the rectangle, and in part from the signal drift from the computer to the CRT.

If your computer can handle the speed-up POKE, enter line 95 to read: 95 POKE 65495,0. Don't forget to type in POKE 65494,1 to set the speed low again. *Caution — this will not work with all Color Computers.*

Conclusion

I consider this a typical short and sweet graphics program. It's easy to enter, and presents some new techniques to incorporate into other programs. ■■■

Program Listing. Rectangles

```
5 REM ************************
**************
10 REM    ORIGINAL PROGRAM FROM
BILL STEWART
15 REM    ZOFTWARE INC., HOUSTON
, TEXAS
20 REM    CREATIVE COMPUTING, JU
LY, 1981
25 REM ************************
**************
30 REM MODIFIED FOR THE TRS-80 C
OLOR COMPUTER
35 REM              16K EXTENDED BA
SIC
40 REM ************************
**************
45 REM       BY  MR. LYNN DAVIS
60 REM ************************
**************
90 R=RND(-TIMER)
100 PMODE 3,1:PCLS:SCREEN 1,0
110 J=0:K=0:ZZ=0
120 A=RND(256)-1:AA=RND(192)-1
130 B=RND(256)-1:BB=RND(192)-1
140 X=RND(3):Y=RND(2)
145 C=RND(3)+1
150 Z=Z+1:IF Z>100 THEN Z=0:PCLS

160 ZZ=Z-INT(Z/2)*2
170 FOR J=A TO B STEP ((A>B)*2+1
)*X
180 FOR K=AA TO BB STEP ((AA>BB)
*2+1)*Y
190 ON ZZ GOTO 200:PRESET (J,K,C
):GOTO 210
200 PSET(J,K,C)
210 NEXT K,J:GOTO 120
```

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Stagecoach

Enter the Wild West Days as you try to carry gold across the desert in a stagecoach. Hot in pursuit are the James Gang and of course, Indians!! To make matters worse you are responsible for the safe journey of Annabelle, the judge's daughter. Hi-Res graphic screen plots your progress. Lots of fun surprises await you in this game -shootouts, kidnappings and more. Don't miss the fun!
16 K Extended $19.95

Inspector CLUEseau

Sherlock Holmes/Agatha Christie fans-It's finally here—A murder mystery game for the 80-C! Mr. Goodbody has been killed in his mansion and you must solve the mystery. WHO committed the murder, WHERE did it occur and HOW was it done! Question suspects, find the secret passage, and break the code to get clues. Hi-Res graphics enhances this excellent game. The computer records the clues you obtain on a clue inventory screen and also provides suspect descriptions at the touch of a finger. A fast, fun game that will sharpen your deductive skills. Every game is different!
32K Extended $19.95

Stress Evaluator

Assess your present level of stress and how it affects your potential for illness. Evaluate the amount of life change you can effectively handle in the future. The Stress Evaluator is a valuable tool for recognizing, measuring and managing stress. The program also provides a Coping Ability Test which shows your ability to handle stress in general. Provides goal setting exercises and meditation graphic screens to help achieve stress-alleviating goals. All results output to printer.
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Weather Watch

If you **really** care about the weather, this program is for you. Three programs provide you with National Weather Service approved statistics in a monthly report format. Input of daily high and low temp. and rainfall outputs a report of monthly average temps. and range; high and low averages; high and low temp. for month; total rainfall; days rain > .1 in.; heating and cooling degree days; days high > 90; days low < 32; days low temp. < 32 and > 0; days low < 0; day of highest range. Also retrieves a single day from data file for review. All data outputs to printer. Well documented.
16K Extended $24.95

Forecaster & Weather Watch (Disk)

Forecast general weather conditions with 80% accuracy with this fun, simple to use program. Although not meant to replace National Weather Service forecasts, this program is informative and enjoyable to use. You can even create your own weather by setting the variables!! Provides general forecast including precipitation probabilities. Includes Weather Watch program also all on one easy to use disk.
32K Extended Disk $49.95

Include $1.50 for handling for each program.
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PROGRAM DEVELOPMENT: Computer Software Documentation / Graphics / Consultation

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16K Color Basic

Color Disassembler

More for the serious computerist's software library.

by Jake Commander

HERE'S A GOODIE for the Color Computer software toolbox. It's a disassembler that will patiently trudge through bytes and bytes of apparently meaningless machine code and reveal their true meaning. A machine-code programmer's life would be oh so easy if that could be taken literally. Unfortunately, in this context, the true meaning simply means displaying the machine code mnemonics as they would have been entered into a 6809 assembler. Some brain cell activity will still be required after this program has done its work. Naturally, a disassembler can only do so much; the rest is up to you, the clever human master of the machine.

With this utility, the task of unravelling another programmer's logic flow (assuming they were on form that day) is made vastly easier. If you're faced with what seems like half a million bytes of code, you're going to need some help. If you don't have a disassembler at your disposal, the *only* way to make sense of whatever code lies in memory is to look up each individual byte and cross-reference it with the 6809 manual. This is likely to drive you half-crazy — ask anyone who knows me. It's not just the risk to sanity that's the problem — the task takes forever, and the accuracy (to say the least), is very low. I've burnt the midnight oil poring over interminable memory dumps attempting it. It doesn't take long before I see reason. Too many hours can be wasted in hand-disassembling programs and (depending on the complexity of the microprocessor involved), you can save time by asking your computer's help and finish the job automatically. This fact usually dawns on me after the first half hour of drudgery by which *time I'm likely* to have two or three sheets of scrawled opcodes and addresses in front of me. When I realize how many more of those gruelling half hours are ahead, I'm easily convinced. It makes more sense to swallow some of those half hours writing a disassembler. It's the result of just such a flash of inspiration that you have in front of you now. So now you can save some midnight oil.

For those of you wondering about this curious obsession with machine code, let me elucidate. Don't forget, the only thing your microprocessor can do is execute machine code. By understanding that same machine code, you have a greater understanding of the CPU — in this case, the 6809. Don't let Basic fool you; your 6809 doesn't understand Basic at all. It merely executes a machine-code program called a Basic interpreter whose function is to interpret text using machine code. If you want to understand how such an interpreter works, you have to disassemble it and work your way through the code making notes as you discern the logic. This is not an easy task with something as large as an interpreter, but can be fairly simple for a small routine such as a printer driver. (For those of you interested in the Color Computer's Extended Basic, a complete disassembly is scheduled for future issues.)

If, like me, you insist on being a hero and disassembling large programs, here are a couple of tips worth following. Try looking for breaks in the code. These usually occur at jump or return instructions. Draw a line at these points to give yourself a visual indication of where one piece of code stops and the next starts. Whenever you see a short jump, draw an arrow to the destination — this helps tie together pieces of code that appear less structured than they are. Look out for "compare" opcodes — especially CMPA and CMPB. Wherever such an instruction occurs, you can usually learn something important about the code. For instance, if you see a CMPB #$41, you know that the program at that point is dealing with the uppercase letter A. Knowing that kind of thing gets your foot in the door as regards a complete understanding of the code. By appreciating small facts such as these, you build your understanding of the code, and then the rest avalanches until you suddenly find you're an expert.

Don't let the sheer volume and anonymity of the code bamboozle you. It was almost certainly written by another human being so it can be understood by one. If you've never learned to brainstorm, now's your chance. Don't spend ages trying to be deadly accurate with your assessment as you note and document the function of a particular opcode. Nearly every time where a piece of code is unclear, it becomes clear by context later in the program. If you spend too much time nitpicking, you'll never get to that later point.

As for the disassembler published here, it's extremely simple to use. Enter the start and end addresses of the area you want to disassemble; the program asks if you want a printout so respond as appropriate and the process will begin. You'll get the 6809 mnemonics generated line by line. These are the mnemonics as defined by Motorola when the 6809's instruction set was designed. All addresses will be absolute as they appear in the pure machine code. Some disassemblers are capable of generating "pseudo labels" in the code to make it more like assembly language text. The value of this depends on your point of view. Myself, I prefer an unlabeled disassembly — I find unfamiliar code easier to grasp when I see numeric addresses and operands rather than labels.

Finally, bear in mind the old computer term GIGO — garbage in, garbage out. If you ask this program to disassemble something that's not machine code (such as text or data within the program), you'll see what that data would look like if it were executed by the 6809 as machine code, but it will be garbage as far as deciphering any program flow.

```
00FF00FF00FF00FF00FF00FF00FF00FF00FF00
FF00FF00FF00FF00FF00FF00FF00FF00FF00FF
```

Program Listing

```
0 CLEAR500:CLS
20 INPUT"HEX START ADDRESS";AD$:
GOSUB990:IFT=-1THEN20ELSESA=T:OA
=T
30 INPUT"HEX END ADDRESS";AD$:GO
SUB990:IFT=-1THEN30ELSEEA=T
40 INPUT"LINE PRINT REQUIRED";Q$
:IFLEFT$(Q$,1)="Y"THENLP=1
50 DIMO1$(3),R$(11),P$(7)
60 R$(0)="D":R$(1)="X":R$(2)="Y"
:R$(3)="U":R$(4)="S":R$(5)="PC":
R$(8)="A":R$(9)="B":R$(10)="CCR"
:R$(11)="DPR"
70 P$(0)="CCR":P$(1)="A":P$(2)="
B":P$(3)="DPR":P$(4)="X":P$(5)="
Y":P$(7)="PC"
80 O0$="NEG      COMLSR   RORASR
ASLROLDEC   INCTSTJMPCLR"
90 O1$(1)="         NOP SYNC
   LBRALBSR    DAA ORCC    NDCCS
EX EXG TFR "
100 O1$(2)="LBRALBRNLBHILBLSLBHS
LBLOLBNELBEQLBVCLBVSLBPLLBMILBGE
LBLTLBGTLBLE"
110 O1$(3)="LEAXLEAYLEASLEAUPSHS
PULSPSHUPULU    RTS ABX RTI CWAI
MUL     SWI "
120 O2$="SUBCMPSBC333ANDBITLD ST
 EORADCOR ADD333JSR222222"
130 PN=1
140 IFOA>EA THENENDELSELN$="":AD
$="":CM$="":O$="":DC=OA:GOSUB810
:LN$=HX$+" "
150 GOSUB950:B1=PK
160 IFPN=1THEN200ELSEX=B1 AND207
:IFPN=3THENIFB1=47THENOP$="SWI3"
:GOTO880ELSEIFX=131THENOP$="CMPU
":GOTO700ELSEIFX=140THENOP$="CMP
S":GOTO700ELSE870
170 IFB1=63THENOP$="SWI2":GOTO88
0ELSEIFB1>32ANDB1<48THEN220
180 IFB1=143ORB1=207THEN870ELSEI
FX=131THENOP$="CMPD"ELSEIFX=140T
HENOP$="CMPY"ELSEIFX=142THENOP$=
"LDY"ELSEIFX=143THENOP$="STY"ELS
EIFX=206THENOP$="LDS"ELSEIFX=207
THENOP$="STS"ELSE870
190 GOTO700
200 IFB1>127THEN650
210 IFB1=16ORB1=17THENPN=B1-14:G
OTO150
```

```
FF00FF00FF00FF00FF00FF00FF00FF00FF00
00FF00FF00FF00FF00FF00FF00FF00FF00FF
```

Listing continued

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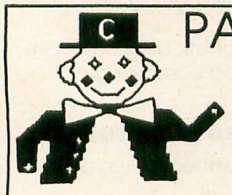

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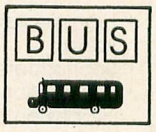

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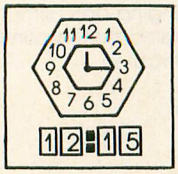

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```
F00FF00FF00FF00FF00FF00FF00FF00FF0
0FF00FF00FF00FF00FF00FF00FF00FF00F
  220 LN$=LN$+" ":IFB1<16ORB1>63TH
ENOP$=MID$(O0$,(B1 AND15)*3+1,3)
ELSEX=(B1 AND48)/16:OP$=MID$(O1$
(X),(B1 AND15)*4+1,4)
  230 IFB1>127THEN650ELSEIFB1>63TH
EN610ELSEIFB1>47THEN600ELSEIFB1>
31THEN310ELSEIFB1>15THEN260
  240 IFOP$="   "THEN870
  250 GOSUB940:GOSUB750:AD$="<"+HX
$:GOTO880
  260 ONB1-17GOTO880,880,870,870,3
30,330,870,880,270,870,270,880,3
60,360
  270 IFB1=28THENOP$="ANDCC"
  280 GOSUB940:GOTO300
  290 GOSUB920:GOSUB800
  300 GOSUB750:AD$="#"+HX$:GOTO880

  310 IFPN=2THEN330ELSEOP$=RIGHT$(
OP$,3):GOSUB940:GOSUB1020
  320 X=ABS(B2):GOSUB790:GOSUB750:
AD$=O$+HX$:GOSUB810:CM$=HX$:GOTO
880
  330 GOSUB800:GOSUB1030
  340 DC=ABS(B2):GOSUB810:GOSUB760
:AD$=O$+HX$:DC=OA+B2
  350 GOSUB810:CM$=HX$:GOTO880
  360 GOSUB970:GOTO880
  370 GOSUB940:B1=PK:R=(PK AND96)/
32+1:IFPK>127THEN390ELSEX=PK AND
31:X=X+(X>15)*32:IFX<0THENO$="-
  380 X=ABS(X):GOSUB790:GOSUB750:A
D$=O$+HX$+",":+R$(R):GOTO880
  390 T=PK AND15:IFT=7ORT=10ORT=14
THEN870ELSEIFT=12ORT=13THENR=5
  400 ONT+1GOTO410,420,430,440,450
,460,470,20,480,490,20,510,520,5
30,20,540
  410 AD$=",":+R$(R)+"+":GOTO880
  420 AD$=",":+R$(R)+"++":GOTO550
  430 AD$=",":+"-"+R$(R):GOTO880
  440 AD$=",":+"--"+R$(R):GOTO550
  450 AD$=",":+R$(R):GOTO550
  460 AD$="B,":+R$(R):GOTO550
  470 AD$="A,":+R$(R):GOTO550
  480 GOSUB950:GOSUB1020:X=ABS(B2)
:GOSUB790:GOTO500
  490 GOSUB800:GOSUB1030:DC=ABS(B2
):GOSUB810
  500 GOSUB750:AD$=O$+HX$+",":+R$(R
):GOTO550
  510 AD$="D,":+R$(R):GOTO550
  520 R=5:GOTO480
00FF00FF00FF00FF00FF00FF00FF00FF00
FF00FF00FF00FF00FF00FF00FF00FF00FF
```

```
FF00FF00FF00FF00FF00FF00FF00FF00FF00FF00FF
00FF00FF00FF00FF00FF00FF00FF00FF00FF00FF00
 530 R=5:GOTO490
 540 GOSUB800:AD$="("+HX$+")":GOT
O880
 550 IF(B1 AND16)=0THEN880ELSEAD$
="("+AD$+")":GOTO880
 560 IFRIGHT$(OP$,1)="S"THENP$(6)
="U"ELSEP$(6)="S
 570 GOSUB940:FORY=0TO7:PK=INT(PK
)/2:IFPK=INT(PK)THENNEXTELSEAD$=
AD$+P$(Y)+",":NEXT
 580 IFLEN(AD$)<>0THENAD$=LEFT$(A
D$,LEN(AD$)-1)
 590 GOTO880
 600 IFB1<52THEN370ELSEIFB1<56THE
N560ELSEONB1-55GOTO870,880,880,8
80,280,880,870,880
 610 X=(B1 AND48)/16:IFOP$="   "O
ROP$="JMP"ANDX<2THEN870ELSEONX+1
GOTO630,640,370
 620 GOSUB920:GOSUB800:GOSUB760:A
D$=HX$:GOTO880
 630 OP$=OP$+"A":GOTO880
 640 OP$=OP$+"B":GOTO880
 650 IFB1=135ORB1=143ORB1=199ORB1
=205ORB1=207THEN870ELSEX=B1 AND1
43-128:OP$=MID$(O2$,X*3+1,3):IFR
IGHT$(OP$,1)=" "THENOP$=LEFT$(OP
$,2)
660 X=B1 AND15:IFX<12ANDX<>3
THENIFB1>191THENOP$=OP$+"B":GOTO
700ELSEOP$=OP$+"A":GOTO700
670 IFB1>191THEN690ELSEIFX=3THEN
OP$="SUBD"ELSEIFX=12THENOP$="CMP
X"ELSEIFX=14THENOP$="LDX"ELSEIFX
=15THENOP$="STX"ELSEIFB1=141THEN
OP$="BSR":GOTO310
680 GOTO700
690 IFX=3THENOP$="ADDD"ELSEIFX=1
2THENOP$="LDD"ELSEIFX=13THENOP$=
"STD"ELSEIFX=14THENOP$="LDU"ELSE
IFX=15THENOP$="STU"
700 X=(PK AND48)/16:ON4-X GOTO62
0,370,250
710 X=PK AND15:IFX=3ORX>11THEN29
0ELSE280
720 LN$=LN$+HX$:IFB1<63THEN730EL
SEIFB1=63THENOP$="SWI2"ELSEX=B1A
ND79:IFX=3THENOP$="CMPD"ELSEIFX=
12THENOP$="CMPY"ELSEIFX=14THENOP
$="LDY"ELSEIFX=15THENOP$="STY"EL
SEIFX=78THENOP$="LDS"ELSEIFX=79T
HENOP$="STS"ELSE880
730 IFX<17ORX>47ORX=52ORX=53THEN
F00FF00FF00FF00FF00FF00FF00FF00FF00FF0
0FF00FF00FF00FF00FF00FF00FF00FF00FF00F
```

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Auto Run is a utility program for the TRS-80* Extended Basic Color Computer. It is used to add convenience and professionalism to your software.

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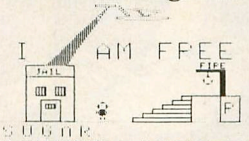
Basic programs can be set to load anywhere in memory above $600 (the PCLEAR 0 page).

Software authors: The Auto Run prefix may be appended to your software products.

Auto Run is **$14.95** and includes complete documentation and an assembly source listing. Requires 16K Extended Basic.

Galactic Hangman



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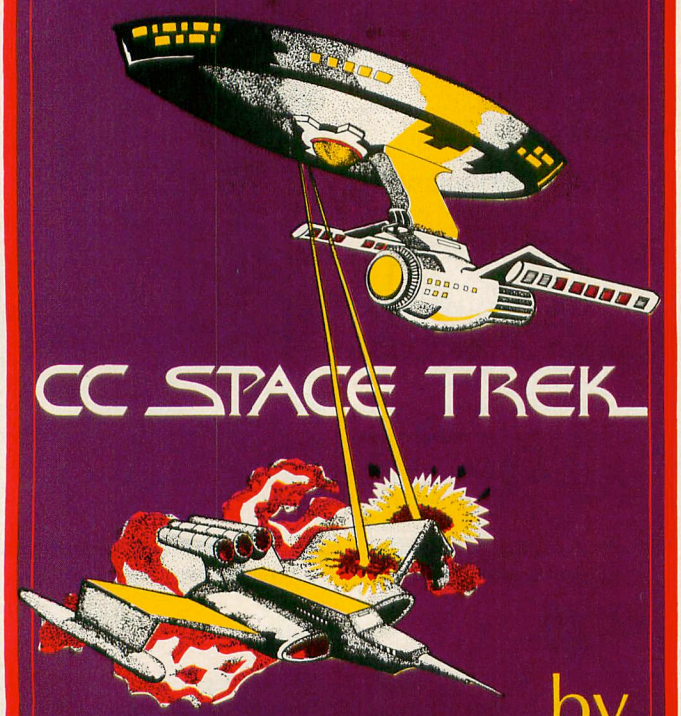

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by Jake Commander

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```
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FF00FF00FF00FF00FF00FF00FF00FF00FF00FF
```

Listing continued

```
OP$="":GOTO880ELSEOP$="L"+OP$
740 LN$=LN$+HX$:IFB1=63THENOP$="
SWI3"ELSEX=B1AND79:IFX=3THENOP$=
"CMPU"ELSEIFX=12THENOP$="CMPS"EL
SE880
750 IFLEN(HX$)=2THENIFHX$<"0A"TH
EN780ELSE770
760 IFHX$<"000A"THEN780
770 HX$="$"+HX$:RETURN
780 HX$=RIGHT$(HX$,1):RETURN
790 HX$="":GOTO830
800 GOSUB950:B2=PK:GOSUB950:DC=B
2*256+PK
810 HX$="":HB=INT(DC/256):LB=DC-
HB*256
820 X=HB:GOSUB830:X=LB
830 Y=INT(X/16):IFY>9THENY=Y+7
840 HX$=HX$+CHR$(Y+48)
850 X=X-INT(X/16)*16:IFX>9THENX=
X+7
860 HX$=HX$+CHR$(X+48):RETURN
870 OP$="":AD$=""
880 LN$=LN$+STRING$(15-LEN(LN$),
32)+OP$
890 LN$=LN$+STRING$(20-LEN(LN$),
32)+AD$
900 IFCM$<>""THENLN$=LN$+STRING$
(27-LEN(LN$),32)+CM$
910 IFLP=1THENPRINT#-2,LN$:GOTO1
30ELSEPRINTLN$:GOTO130
920 L=LEN(LN$):IFL<9THENL=8
930 LN$=LN$+STRING$(L-LEN(LN$),3
2):RETURN
940 GOSUB920
950 GOSUB960:X=PK:GOSUB790:LN$=L
N$+HX$:RETURN
960 PK=PEEK(OA):OA=OA+1:RETURN
970 GOSUB940:X=(PK AND240)/16:GO
SUB980:AD$=AD$+",":X=PK AND15
980 IFX>11THEN870ELSEIFR$(X)=""T
HEN870ELSEAD$=AD$+R$(X):RETURN
990 T=0:FORX=1TOLEN(AD$):Y=ASC(M
ID$(AD$,X,1)):IFY<48ORY>70OR(Y<6
5ANDY>57)THENT=-1:RETURN
1000 Y=Y-48:IFY>9THENY=Y-7
1010 T=T*16+Y:NEXT:RETURN
1020 B2=PK+(PK>127)*256:DC=OA+B2
:GOTO1040
1030 B2=DC+(DC>32767)*65536
1040 IFB2<0THENO$="-":RETURNELSE
RETURN
```

```
0FF00FF00FF00FF00FF00FF00FF00FF00FF0F
F00FF00FF00FF00FF00FF00FF00FF00FF00FF0
```

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The colors shown in photo, unfortunately, are reversed.

Sea Dragon

by Jim Hurd
Adventure International
Box 3435
Longwood, FL 32750 ***$34.95 cassette***

I COULD MAKE THIS REVIEW short, simple, and to the point without spewing out a lot of words by just writing: Get this game. But that wouldn't compliment Jim Hurd enough on his fine effort.

Sea Dragon was originally written for the TRS-80 Models I and III. Versions are also available for Apple and Atari computers. Although it sometimes takes software producers longer to put out Color Computer versions of their products, the good stuff is always worth waiting for.

Let's get the explanation of the premise to Sea Dragon out of the way so that we can spend some time on its many outstanding features.

You are the pilot of a submarine and are engaged in underwater combat against all sorts of dangers. Your goal is destroy a reactor located at the end of an underwater cave. On your way you must destroy and dodge floating and anchored mines, cannons, depth charges deployed from battleships, and blasts from laser cannons.

Before I go any further, let me explain that I have made it to the reactor at the end, but have not yet been able to survive long enough to destroy it. So if anything happens beyond the reactor, I don't know about it yet. In the Model I and III version, after you destroy the reactor you go back to the beginning with all the action speeded up. Color Computer Sea Dragon is much more challenging than the Model I and III version, but I assume that a successful trip to the reactor will also bring you back to start.

Play Begins

The opening screen asks if you prefer to play Real Man's Sea Dragon or Quiche Eater's Sea Dragon. I recommend that you swallow a huge slice of humble pie and start off with the latter selection. Regardless of which selection you make there are seven difficulty levels to choose from.

Author Hurd and Adventure International pulled out all stops in their presentation. The game opens with a voice welcoming you aboard followed by a melody of nautical music played in four-part harmony. They didn't stop there. As the music plays, a graphic of a sailor pumps an accordian and taps his foot. Both the accordian and tapping foot move in perfect time to the music. And they didn't stop there. Before you launch your sub you are treated to another four-part harmony, this time it's a few bars of *Popeye the Sailor*. If you get blown up, you get a few more bars of the same music played slower depicting the sadness of a downed member of the fleet. Realizing that in the heat of battle you may not want to be musically entertained, you are given the option of shutting the music off.

You have the option of joystick or keyboard control, freezing the action, and using the reset button on your computer to correct the screen colors.

Sea Dragon is not really suitable for young children. Successful maneuvering of the sub takes a good amount of coordination. If the program has any faults it's the high degree of difficulty in making a successful voyage. It's probably for that reason a practice mode is available. That's how I made it to the reactor. I must have had 50 subs shot out from under me on the way, but I did finally make it.

There is only one way to end this review, and that's by saying get this game.

— *K.L. Color Staff*

Softrol LSS-2

Lemons Tech.
325 N. Hwy 65
P.O. Drawer 0429
Buffalo, MO 65622
(417) 345–7643
$19.95

I ALWAYS FORGET TO PUSH the stop button on my tape recorder after loading a program. Sometimes I don't notice the play button is still down until the next day.

At first I thought nothing of it. Then I noticed that some of my older tapes weren't working reliably. Sometimes the cassette motor wouldn't turn off, other times the programs failed to load. I thought the problem was due to worn out tapes, but I was wrong.

The average tape recorder uses a small rubber pinch-roller, pressed against a metal post, to pull the magnetic tape past the recorder's play/record head. This pinch-roller/post combination is located between the playback head and the takeup reel. The takeup reel of the recorder is connected, by a pulley, to the drive motor. This system lets the takeup reel turn quickly when the tape is close to its hub, and slowly as the tape fills up the wheel, while maintaining the same non-varying speed across the tape playback head.

The disadvantage to this system, with respect to computer systems, is that when the computer turns off the tape motor, it doesn't release the play button, which also releases the pinch roller. Since the computer turns off the motor immediately after the last bit of information is read in, and since the pinch-roller is located behind the tape head, the last portion of your program gets trapped between the pinch-roller and the metal post.

Normally, this doesn't matter because the pinch-roller is pulled back from the tape when you press the stop button. If you forget, the tape is left there until you remember. The result of such an action (or would it be inaction?), is a small impression on the tape, where it's been pressed into the rubber pinch-roller by the metal post. The next time you try to load that tape, the pinch in the tape won't make good contact with the tape head. If you forget to press the stop button enough times, the tape develops a crease directly over part of your program. If you're unfortunate enough, your program stops loading properly.

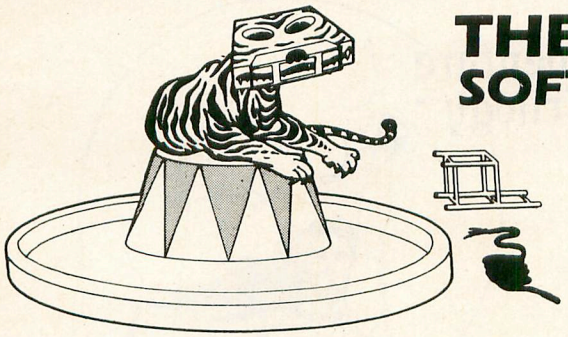
Lemons Tech. has produced a small device, called Softrol, that corrects this problem. To use it, plug the remote control jack from your computer into the Softrol box, and plug the box's plug into the remote jack of your tape recorder. Softrol now controls your tape recorder's motor. When the computer turns off the motor, Softrol takes over and lets the motor turn another few seconds, enough time for the last bit of your program to clear the pinch-roller, and escape a pinch-hit.

To help you use the box efficiently, it includes two controls: one is a slide switch that lets you choose whether you or the computer control the tape recorder; the other is a pushbutton switch to temporarily override the computer's control. In addition to these, an LED lights up whenever you press down the play button on the recorder (to remind you to press the stop button).

Besides saving your programs from accidental pinch-hits, Softrol automatically puts gaps between programs when you save them to tape.

The only difficulty I had with Softrol

Please turn to page 78



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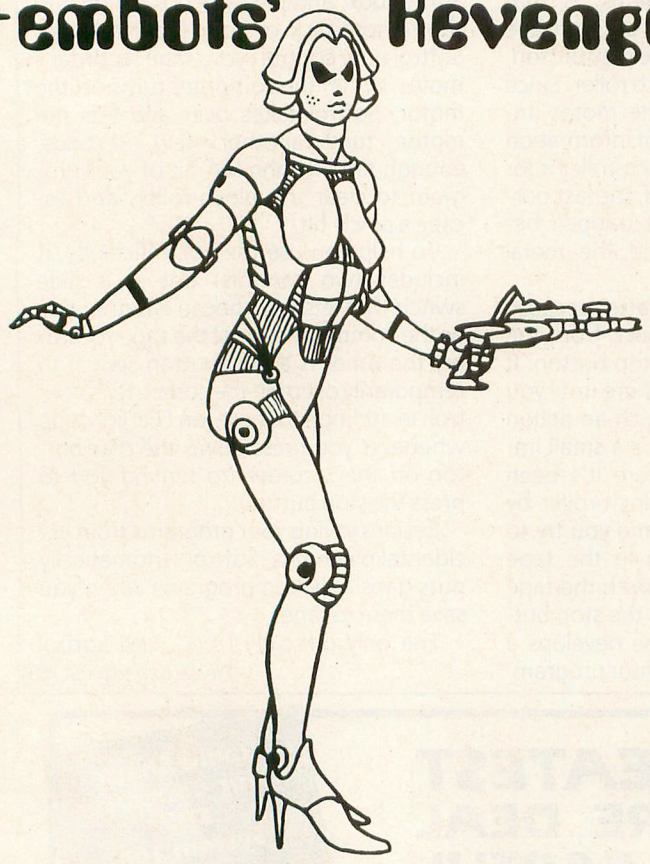

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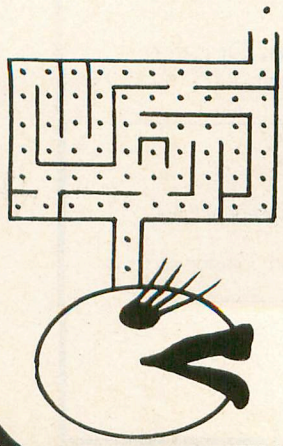

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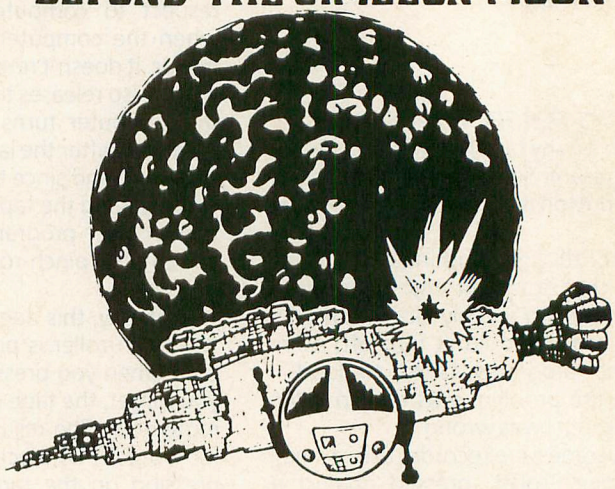

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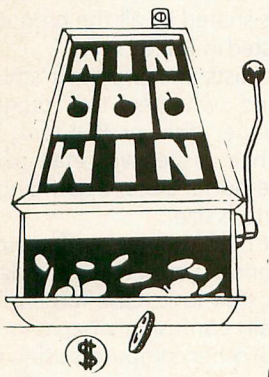

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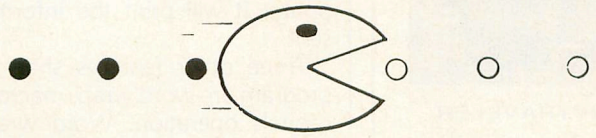

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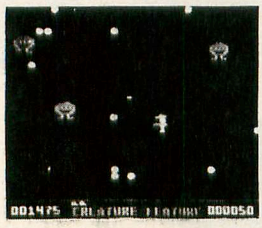
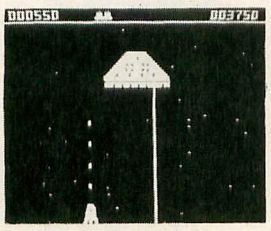


CREATURE FEATURE



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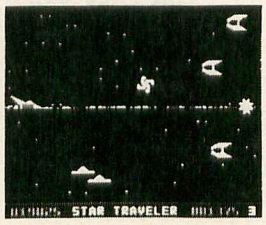

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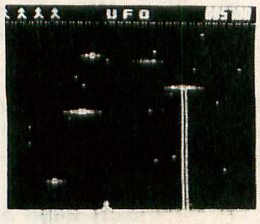

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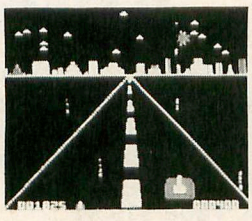
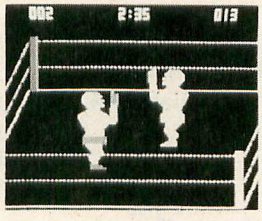


COLOR BLAST



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REVIEW$

Continued from page 75

was when I tried to use it when saving a Basic program to tape in ASCII format (with a terminal program I had used to receive the Basic program from another computer). For some reason, I could never load the program into Color Basic without an I/O ERROR message. Turning off the Softrol during the ASCII save and load solved that problem.

— by Terry Kepner

LAST MONTH WE COVERED four terminal programs for the Color Computer, this month we finish with two other programs.

Common Features and Definitions

Before describing the programs, I'm going to define and summarize some of the features shared by all the programs, which are listed in Table 1.

The table lists the program storage medium and whether the program comes on tape, disk, or ROMpak, followed by their respective retail prices. Next are the buffer sizes, depending on your computer's size.

On the Color Computer, lowercase letters are printed as reverse characters rather than true lowercase letters. This can be visually confusing when communicating with other computers using normal upper/lowercase characters. Two of the terminal programs convert any received lowercase characters to uppercase, for the video display only. So, while you'll see only uppercase letters, the buffer actually stores both sets of characters so when you send the buffer to your printer it will print the information as sent.

Three other features shared by the program are word wrap, macros, and all capitals operation. Word wrap is the software feature that prevents words at the end of a display line from being split in half. If the word length is greater than the room left on that line, the entire word drops to the next display line. Macros are another convenience feature. Any special prompts (such as the answer to the log-on questions asked by CompuServe) can be typed in ahead of time to save you money and time when you establish contact (since the phone call costs money, every second counts). This message, if used frequently, can be saved for future use. Another feature to consider is buffer/file use. All the programs will receive and transmit, and CLOAD and CSAVE Basic programs in

ASCII format, but not all of them can process machine-language programs.

Buffer control lets you stop and start data storage in your memory buffer while receiving data from the other computer, and to manipulate that data once received. When closed, incoming information appears on the screen but is not stored for printing or saving to tape or disk.

All the programs give you control over the RS-232 parameters: baud rate, parity, word size, stop bits, and duplex or half-duplex operation. Unlike parallel interfaces, which use eight data lines to transmit and receive information, the RS-232 uses only one data line. Hence, each character sent must be broken up into a series of individual bits, which the receiving computer puts back together again as a character. The baud rate is a measure of the speed with which the character is sent or received by your computer. As a crude approximation, dividing the baud rate by 10 will give you the number of characters per second being sent or received. Parity is a software method of verifying the information received and determining if the character received is actually the character that was sent (information can be distorted by the phone lines, adding or skipping bits of data). Parity can be set to odd, even, or off. If you are sending and receiving text information only, you need seven bits per character, but graphics information requires eight bits.

Stop bits are the number of bits after the word itself. You usually use only one or two stop bits. Duplex operation sends each character you type to the RS-232 and waits for the other computer to echo the character back before it displays on the video. Half-duplex operation sends each character you type to the RS-232 but doesn't check to see if the receiving computer echoes the character. Echo sends the character to the RS-232 and your video simultaneously.

DataPack and DiskPack

Cer Comp
5566 Ricochet Ave.
Las Vegas, NV 89110
(702) 452–0632

THESE TWO PROGRAMS use a special command mode to control them rather than a menu. When you're in the command mode, pressing Enter brings up a help list of the available commands.

Unlike the other program discussed this month, DataPack and DiskPack don't have an explicit command for transmitting macros, but by loading your message before going on-line with the other computer, you can use your text buffer as a macro.

The buffer is available for your perusal at anytime, starting at the beginning and using a continuous scrolling action to display the buffer. You can stop the scroll, continue, or abort, and return to the terminal mode at any time.

As you can see from Table 1, these two programs save and load data and programs in ASCII format only. Machine-language programs cannot be loaded to, or saved from the buffer.

You can control the printer and the RS-232 baud rates. While the printer is restricted to baud rates below 9600 it does operate at 110, which the RS-232 can't.

When operating at 600 baud or faster in the terminal mode, all incoming characters are stored in a buffer and displayed on the screen when there is time to do so. At 300 baud, the information arrives slowly enough for the program to display each character as it arrives.

In addition to baud rates, you can also control the duplex operation, word length, stop bits, and parity used with the RS-232.

The disk version supports saving and loading information to and from the disk. It also supports the KILL file and DIR commands. One good feature is the ability to send a file directly from the disk to another computer, without worrying if there's enough room in memory for the entire file.

The manual is short, but adequate.

Table 1 — Features

	DATAPACK	DISKPACK	COLOR CONNECTION	
Tape/Disk/ROMpak	T	D	T	D
Retail	$24.95	$49.95	$29.95	$39.95
Buffer size				
16K	14,000	10,000	7,000	??????
32K	30,000	26,000	3,000	??????
64K	n.a.	n.a.	n.a.	n.a.
Video Display	32x16	32x16	32x16	32x16
Word Wrap	Y	Y	Y	Y
Macros	N	N	Y	Y
All Caps	Y	Y	N	N
Buffer Control	Y	Y	Y	Y
File Save Load				
BASIC (ASCII)	Y	Y	Y	Y
Mach. Lan.	N	N	N	N
Data	Y	Y	Y	Y
Baud Rates Used				
110	N*	N*	N	N
300	Y	Y	Y	Y
600	Y	Y	N	N
1200	Y	Y	N	N
2400	Y	Y	N	N
4800	Y	Y	N	N
9600	Y	Y*	N	N
19200	N	N	N	N

Terminal Program features. (n.a. means not available)
N* = –> The RS232 doesn't operate at 110 Baud, but the printer does.
Y* = –> Only the RS232, not the printer, can operate at 9600 Baud.

The Color Connection

Computerware
Box 668
Encinitas, CA 92024 ***$29.95 cassette***
(619) 436–3512 ***$39.95 disk***

COLOR CONNECTION IS the only terminal program that operates at only one baud rate, 300. It doesn't have a printer output mode either, although you can save ASCII files into your computer's memory and save to tape (or disk with the disk version). Once saved, the information can be loaded by Basic and sent to the printer.

Color Connection uses a series of menus to direct you through the program's operation. The main menu directs you to submenus that let you set the RS-232 parameters, load files, go to terminal (communication) mode, manipulate the buffer, or return to Basic. It also displays the amount of room left in the buffer for data storage. The RS-232 submenu, in addition to letting you set the word length, parity, and duplex operation, al-

Please turn the page

lows you to control line feed operation, to define up to four macros, put in a phone number for automatic dialing (if your modem has an autodial feature), and save these settings to tape or disk.

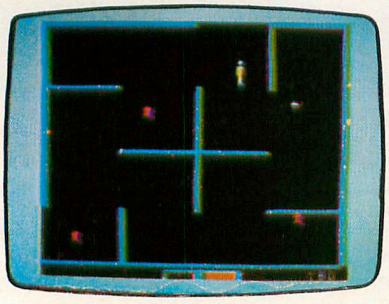
The buffer menu displays the buffer, saves and loads the buffer to and from tape (or disk), or types directly from the keyboard into the buffer.

Other features supplied with Color Connection are automatic repeating keys if the key is held down for more than a moment, and the use of a control key to send out all 26 control codes.

The documentation is also short, but effective.

Summary

As I said last month, the program you buy depends upon your needs more than any other single factor. No matter which one you choose, have a good time with telecommunications.



Android Attack

Spectral Associates
141 Harvard Avenue — ***$21.95 cassette***
Tacoma, WA 98466 — ***$25.95 disk***

SPECTRAL ASSOCIATES obviously knows that if a new version of an old game is going to sell it had better have some new twists to it. Android Attack has a number of new features added to the game Berserk.

For those of you not familiar with Berserk, here's the setup. You are in a maze of rooms. In the rooms are a few alien androids and a treasure. You have to destroy the androids, gather the treasure, and go to the next room. The next room also has androids and treasure. The game continues until the androids get the best of you.

Your movement is controlled by the joystick. You fire at the androids by facing the direction you want to shoot at and pressing the fire button. The walls in the rooms are deadly to you, so stay clear.

With that as the common denominator for all Berserk-type games, Android Attack expands the scenario to make for more action. First of all, if you have a 32K Color Computer, Android Attack offers you android speech. When you enter a room an android voice announces to its fellow androids, "Intruder alert, intruder alert." After the announcement the androids show up and the shooting begins. "Human beware," and "Coward," are few of the other pithy sayings the android lookout voice utters. The words are not all that clearly spoken, but are clear enough for you to understand what is being said. If you don't like the voice, the 16K version on the flip side of the tape is identical to the 32K version minus the voice.

Android Attack dresses your android hunter character in a protected suit. It can withstand a bit of abuse before wearing thin and exposing you to the alien atmosphere. The documentation even suggests sacrificing one layer of suit protection (there are three) if the situation warrants. Not a bad idea if you find yourself cornered.

A third extra feature, and I think the best, is the ability to make your little fellow jump and duck. By positioning your joystick just above the center of its pivot and pressing the fire button, the little guy tucks his legs and appears to jump. Place the joystick a bit below center, press the fire button, and he ducks. This is useful when trying to avoid what would otherwise be a direct hit by an android defender.

You are also awarded extra points for clearing a room of androids and making off with the treasure in extra-short time. There is a bonus-point amount posted at the bottom-right of the screen. If you successfully get out of the room you are awarded how ever many points are left on the indicator.

As with all other Berserk games, the better you do the harder the game becomes. Also, you have 16 difficulty levels to choose from (all levels get progressively more difficult as you get better) making this game a challenge for all ages.

—*K.L. Color Staff*

64K Disk Utilities

Spectrum Projects
93-15 86th Drive
Woodhaven, NY 11421
(212) 441–2807
$21.95

SPECTRUM PROJECTS has produced a number of useful hardware and software items in recent months. Their new disk utilities package continues the trend. Intended for machines modified to permit access to the *other* 32K in a bank of 64K RAMs, the disk contains three programs in four files:

- ROMcrack, for copying ROM cartridge programs onto disk;
- 40K, which makes an additional 8K of RAM available to Basic or machine language programs; and,
- Spool64, for utilizing the additional 32K as a text buffer for printing.

These may be the first programs that allow people who don't own FLEX to use the additional memory.

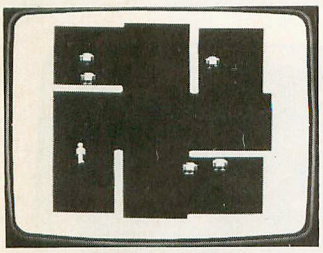
ROMcrack

The relocation of ROMpak programs is a popular topic among operators of disk-based systems. It's inconvenient, and potentially damaging to the computer, to frequently switch between the disk controller and other cartridges. With ROMcrack, you can make disk copies of ROM-based programs up to 8K long, without finding the start, finish, and transfer addresses associated with the code. The utility takes care of such details, and others.

This is not a trivial matter. Many ROMpak programs are written in position-dependent code, so it isn't enough to save a copy and reload it with the offset needed to put it into RAM. Some of the instructions must be changed to avoid calls to the ROMpak portion of memory between &HC000 and &HDFFF.

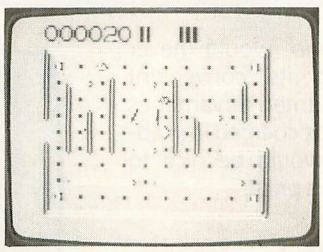
ROMcrack does all this, relocating the ROM code to the high bank of memory. The process requires a cassette recorder to make an intermediate copy, and goes as follows:

- Cover the leftmost finger on the card edge connector (as viewed from the end that plugs into the computer), with tape before inserting the pak. This keeps the ROM program from taking control of the machine when you apply the power. Alternatively, you can turn on the computer without the pak, defeat the "takeover" with POKE 65315,54, and carefully insert the pack while the power is on. I prefer this method, as it avoids the possibility of gunking up the cartridge connector with tape residue.
- The contents of cartridge ROM are then saved to tape with CSAVEM "ROM", &HC000, &HDFFF, &HC000. Note that the tape filename is always ROM, and an entire 8K of ROM address space is copied; in fact, some of the cartridge programs only occupy the lower 4K of this space.
- Turn off the computer and replace the



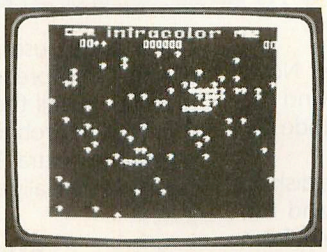
HAYWIRE

This is Mark Data's version of Beserk.™ Super Colors and dynamite sound effects in this fast paced arcade game for one or two players. The exciting combination of angry robots and the Indestructible Menace will provide hours of action filled fun.
Tape $24.95



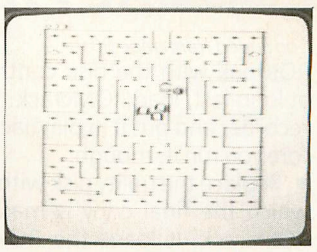
PACDROIDS

With its space theme, the Super Saucer lays destructomines and the Super Bomb that disintegrates everything in your path, right up to the wall. The maze changes every 10,000 points as the difficulty escalates. 1-4 players. 16K extended basic.
Tape $19.95



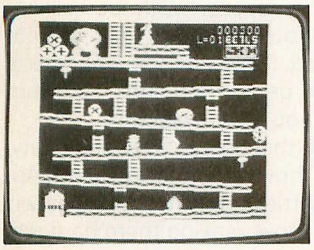
COLORPEDE

Colorpede has a variety of bugs ranging from a tiny beetle to the gigantic colorpede. Colorpede has better graphics than Katerpillar but the sound is not as good. Colorpede also has a more varied and complicated play routine. 16K.
Tape $29.95



GHOST GOBBLER

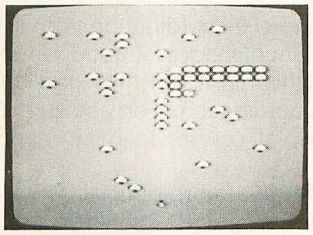
Ghost Gobbler is an excellent version of Pac-Man.™ You must gobble all the food dots while avoiding the ghosts. There are four energizer dots which will make the ghosts turn blue and become scared. This is the best copy of the arcade game. 16K.
Tape $21.95



DONKEY KING

Using the four stages from the original arcade game, with your joystick in hand try to jump the barrels, collect the pins, manuever your way past the falling jacks, and figure out the crazy conveyor belts. Written by Tom Mix, this one's sure to become a classic! 32K.
Tape...$24.95 Disk...$27.95

Now you can deduct up to 20% on the price of games: buy any 2 games deduct 10%, buy any 3 games deduct 15%, buy any 4 games deduct 20% from games prices.



Katterpillar Attack

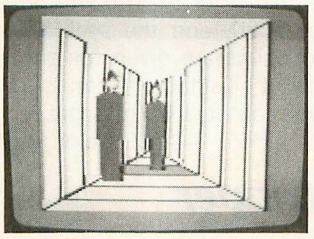
Modeled after the popular arcade game, Centipede. This is a well written game. It has slightly larger graphics and better sound than Colorpede. It is also simpler to play than Colorpede. 16K.
Tape...$24.95 Disk...$27.95

ZAXXON

The official DATASOFT version of the number one seller on the Softsel HOT LIST. This arcade duplicate has excellent three dimensional graphics. guide a fighter plane around your enemy's missile defenses and gun batteries. Fire forward to destroy enemy positions and fuel reserves. Pilot your ship through a hole in the giant block wall but watch out for the force field!! **TAPE ... 39.95**

ROBOTTACK

From the same people who brought you COLORPEDE comes ROBOTTACK. Very good graphics with this fast action machine language program challenges even advanced players. You must fight attacking robots to defend the rest of humanity. Features firing power in all directions; full screen mobility with joystick control.Playable by 1 or 2 players. 16K. **TAPE 24.95**



PHANTOM SLAYER

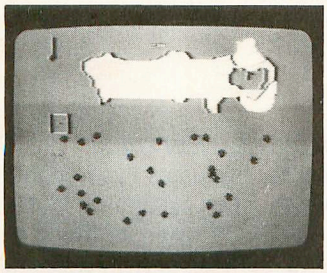
You must chase the phantoms and kill them with your assortment of weapons. This is a graphics type maze/adventure game with full screen three dimensional graphics. You are armed with a laser pistol, and proximity detector. 16K.
Tape $19.95

VENTURER

Fantastic arcade game comes to life on your Color Computer screen. Upon entering each room you'll find new treasures and new challenges. Using your joystick, get the treasure while fending off the attacking creatures. This great new adaptation by Aardvark will put excitement back into your Color Computer. 16K.
Tape $19.95

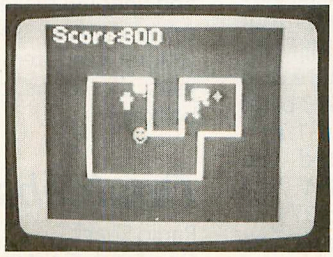
CAVE HUNTER

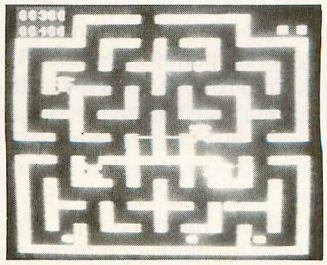
With skill and technique, you must guide your hunter robot through the maze of caverns in search of treasure. But watch out, the cave is possessed with spooky cratures that'll feast upon your robot. You can destroy them by supercharging your robot with energy or just try to outrun them. Written by Mark Data. Uses Joysticks. 16K.
Tape $24.95



GOLF

Aardvark has brought this age old game to your Color Computer. With sandtraps, trees, water holes, and a great sound track you just might mistake it for the real thing. Choose your club and select a swing, if you make it to the green, you can even putt. 16K extended color basic.
Tape $9.95





COMPUTER SHACK

1691 Eason • Pontiac, Michigan 48054
Info: (313) 673-8700 • Orders: CALL TOLL FREE (800) 392-8881

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Circle No. 60 on Reader Service Card

Continued from page 80

ROMpak with the disk controller. Now, at long last, load ROMcrack. Rewind the recorder and put it in playback mode before you run it, though.

- Replace the utility disk with the disk on which the final copy is made, and run ROMcrack. It loads the ROM file from tape, asks for a new name for the disk file, and makes the recording.

The new disk program can be used with the conventional LOADM and EXEC commands, without offsets. I can vouch for ROMcrack's effectiveness in creating a disk copy of the Project Nebula game, which is known to have position-dependent code. Things went without a hitch. Likewise for Color File, which seems to be written in position-dependent fashion. I suspect that most Radio Shack cartridges can be copied, although Frank Hogg has cautioned that some of them may have self-modifying code which will make any RAM copy crash.

ROMcrack works well; the cartridge swapping required to make disk copies of your favorite ROMpak programs may be the last maneuvering you ever have to do.

It shouldn't be necessary to say that the programs you copy had better be your own! But consider it said.

40K

In its normal configuration, a 64K Color Computer uses 32K of address space for RAM and 24K for the three ROMs: Standard, Extended and Color Disk Basic. The 8K hole in the 64K address range of the eight-bit microprocessor simply isn't available. The 40K utility rectifies this situation, provided the computer has been modified to permit software access to the other 32K.

40K is a machine language program that copies the Extended Color Basic ROM to higher memory. Its original location, &H8000–&H9FFF, is subsequently decoded as belonging to RAM. The nicest part is that this memory is available to the Basic programmer! With four graphics pages reserved, PRINT MEM returns 31015, a full 8192 bytes more than normal. (Just for the record, 35623 bytes are available following a PCLEAR 1.) If a PCLEAR 0 command is simulated with the sequence POKE 25,6: NEW, the available memory tops out at 37159. These numbers compare favorably with the 33778 bytes available in Random Basic, a non-graphics dialect that runs under FLEX.

40K will be of great value to anyone who pushes the Color Computer's storage capacity. Even the most dedicated Color Basic user, who would never dream of foregoing its convenient graphics for all the vaunted advantages of FLEX, will probably be coerced into admitting an extra 8K would be nice to have — especially at this price.

Spool64

If you do much word processing, or have another application that ties up your computer while the printer is running, you can appreciate the value of a spooler; that is, a program that dumps your text to a buffer memory to free the computer for other chores. It is a high-speed dump, and the buffer takes over feeding the printer from that point. Many products with separate memories are available for this task, but Spool64 does the job with that versatile extra bank of 32K in a modified Color Computer.

There are a couple of hitches; the printer must accept data at 1200 baud or faster, and the spooler routine will only work with Basic or machine language programs that use the output character routine already present in ROM.

To start, you enter RUN "SPOOL64" and sit back. A one-line Basic program loads and runs; it reserves some memory and calls and executes a machine-language routine which is the heart of the spooler. The OK prompt returns, and you can now enter and run your applications program. Any PRINT # −2 commands route output through the spooler. Spool64 robs you of 168 bytes of RAM when putting its hooks into the ROM routines.

Summary

This package offers something for everybody. Judicious use of ROMcrack will save wear and tear on your computer's ROM port, 40K makes life 25% more pleasant for the loquacious programmer, and Spool64 makes intelligent use of the extra memory so readily available to Color Computer users. Spectrum Projects should be congratulated for this package. *— by Scott Norman.*

Doubleback

Radio Shack
One Tandy Center
Fort Worth
TX 76102

$24.95 ROMpak
$24.95 Data Pack
$49.95 Disk Pack

DOUBLEBACK is a treasure hunt sort of game for one or two players.

Using your joystick, you patrol the screen waiting for objects to appear on the screen's black background. Your joystick movement leaves a green trail. The trail fades away quickly behind you, like the trail of light from Fourth of July sparklers. The idea is to encircle the various objects as they appear without colliding into them. You score points for each object encircled. If you encircle two objects at once you get extra points. Your turn ends when you hit an object.

Some of the objects are stationary, and others move around the screen. Apples and cherries stay put, while sneakers and yo-yos move making them harder to encircle. Each object has its own point value.

Good hand-eye coordination will win everytime. Doubleback is a good family game. For children it will help develop hand-eye coordination. For adults the challenge is, of course, to bank many points.

The game gets more difficult as you begin to pile on points. The yo-yo only appears after you've reached 2560 points, the pear after 5120 points, the spider after 7680, and the skull after 10,240. No points are given for encircling the skull, it's just there to harass you and make you earn such a high score.

— K.L. Color Staff

The Stripper

Spectrum Projects
93-15 86th Drive
Woodhaven, NY 11421
(212)441-2807
$7.95

OF ALL THE NON-GAME Color Computer programs I've bought, The Stripper by Eigen Systems is by far the best! And, it only cost $7.95! This machine language utility quickly modifies your Basic programs by deleting all REMarks, removing all extraneous spaces, and efficiently packing *many* program lines into *fewer* program lines. To get an idea of what this is all about, take a look at Figure 1.

```
10 REM SHORT TEST PROGRAM
20 CLS
30 PRINT"THIS IS A TEST OF
THE STRIPPER"
40 FOR N=1 TO 2000
50 NEXT N
60 CLS
70 PRINT"TEST IS COMPLETE"
80 END
```

The Stripper modifies this short program as follows: line 10 will be deleted, saving 15 bytes of memory. Next, the spaces in lines 30–70 will be removed, saving four more bytes. Finally, the remaining seven lines will be packed into one long line. The finished program will look like this:

```
20 CLS:PRINT"THIS IS A TEST OF THE
STRIPPER":FORN=1TO2000:NEXTN:CLS:
PRINT"TEST IS COMPLETE":END
```

An eight line program has been reduced to a one liner. In this experiment, total memory savings add up to 53 bytes, a program reduction of about 40%. Another program of mine, five kilobytes long, was reduced by 20%. A note of interest: spaces you would probably not want deleted, as in STRING$ of text, or in DATA statements, for instance, are left as is.

You can use The Stripper to perform one or two of the functions mentioned, or you can invoke all three of the main menu selections during the utility's execution. These selections are: delete REMarks, pack lines, and remove spaces. The more you modify a program, the greater the memory savings. A fourth menu selection is EXIT, which returns you to your Basic program.

Let's look at the benefits of compressing and packing Basic programs. Is there any reason besides the memory saving advantage that initially comes to mind? Yes, five or six other things happen when you shorten and condense a program. Shorter programs load faster, especially when you are using a tape system. Shorter programs mean that you can store more programs (or more SAVEs of a particular program) on one tape or disk. This is important when using the Color Computer Disk System, as it stores programs *in chunks of* 2,304 bytes. It's not unusual to find that reducing a program's size by just a few bytes results in savings of an entire granule (2,304 bytes) of disk space.

Compressed programs run faster. Not much faster, but every little bit helps. If you don't like it when other people modify your Basic programs, The Stripper's line packing feature is just the thing for you. Packed programs are hard to edit or fool around with. It even becomes difficult to figure out what the program author had in mind, logic-wise, when he wrote the program. If you have a long program that won't fit into your available memory, be it 4K, 16K, or whatever; you can compress sections of the program and end up with one program that will fit into your computer's memory. Or perhaps you can take the program to a friend with more memory in his computer than you have, and compress the program down to a useable size on his machine.

The Stripper is an assembly-language program that you load from tape into a protected area of memory. If you have Color Basic, load The Stripper into high memory, toward the top of your RAM (Random Access Memory). Then protect The Stripper by using the Clear command, as described in *Getting Started With Color Basic.* If you have Extended Basic, load The Stripper into high or low memory. In this case, low memory would be at graphics page one, RAM locations 1536–3071 (decimal).

The Stripper comes in a handy form to load into low memory as its machine code is exactly one graphics page long (1536 bytes). Note to disk users: Your first graphics page is at RAM locations 3584–5119. That's where you'll want to load The Stripper. Graphics page one is always a protected memory area unless you run a program that uses graphics. You will never run a Basic program and The Stripper at the same time so "always protected" is a valid statement. (OK, I know that you can PCLEAR ZERO and remove graphics page one protection with a few POKEs, but don't do that while using The Stripper.) Eigen Systems provides complete loading instructions covering all contingencies.

Once you load The Stripper, forget about it until you need it. Then, type EXEC and press Enter. Whatever was on the screen disappears and The Stripper's menu appears. The menu presents you with the four options: Delete REMarks; Pack lines; Remove spaces, and; Exit. Everytime I use The Stripper I invoke all the options. Use them in the following order: 1 — 3 — 2. Everything occurs rapidly but long programs take a minute or so to process. I have never had anything take longer than a minute and a half for a complete delete/remove/pack sequence.

When you are finished with your stripping job, press 4 and The Stripper will go away. Except for the OK prompt, the screen will be blank. Do a LIST and your modified Basic program will scroll past. You can now SAVE the modified program. The Stripper is still lurking in memory, waiting to be called with your next EXEC command.

The only trouble I have had using this program was as a result of my programming error. In the past, I have been careless about trailing quotes as used with STRING$. As you may have discovered, trailing quotes are not always necessary. An example:

```
10 PRINT "PRESS ANY KEY NOW
20 GOSUB 200
```

These lines will run just fine in a Basic program even though there are no quotes after NOW in line 10. The program won't run correctly when those lines are packed into this configuration:

```
10 PRINT "PRESS ANY KEY NOW:GOSUB 200
```

You may have to go through your programs and correct them if they have the missing quotes. It's easy to find them; just Run the packed program and note where it crashes! Every line that lacks quotes in pairs causes a program crash.

Another thing to keep in mind: you can't pack programs and then SAVE those programs in ASCII format as in — CSAVE "program",A — it just won't work.

Most people keep more than one copy of a program; this backup is your protection should something go wrong with your work copy. Because programs modified with The Stripper are so hard to edit, keep your backups in their original unmodified form, for future reworking.

The Stripper comes on tape. You can make as many backups as you need from the supplied master tape. To do this, load The Stripper, but don't EXECute it. Locate the START, END, and TRANSFER points by using the following keyboard commands:

```
PRINT PEEK (487)*256+PEEK (488) ENTER
PRINT PEEK (126)*256+PEEK (127)-1 ENTER
PRINT PEEK (157)*256+PEEK (158) ENTER
```

The numbers that result from following these instructions give you the memory locations you need to CSAVE copies of The Stripper or any other machine language program on tape for which START, END, and TRANSFER points are needed. — *by Tom Garcia.*

Please turn the page

Silly Syntax

Sugar Software
2153 Leah Lane — ***$19.95 cassette***
Reynoldsburg, Ohio — ***$24.95 disk***
43068 — ***$49.95 disk with 62 stories***

REMEMBER THE PARTY game Ad Libs? Sugar Software has brought it into the computer age. For those of you not familiar with the game, here's how it works.

Ad Libs are sold as a pad of games with each game being a story with words left out. In place of each missing word is a blank line. Under the line is a description of what type of word should be inserted: noun, verb, adjective, name of country, number, and so on. One person holds the game page, and without letting anyone see the story, ask each person to supply a noun, verb, or whatever. The people supplying the answers don't know the context their responses are put into. After all the blanks are filled, the person reads the complete story with the implanted words. The resulting story is usually pretty hilarious.

A typical sentence: At 5:00 I usually walk my (noun). A person is asked to supply a noun and replies "rock." The completed sentence then reads, "At 5:00 I usually walk my rock."

Silly Syntax comes complete with two stories on tape. You load them and the computer asks the questions. The number of people who can play depends upon the number of people present. If the number is less than 10, you can enter the names into the computer.

After loading the game, the computer asks parts of speech questions. The player types in the answer and presses Enter; then the next player goes, and so on down the line until the story is complete. The computer then displays the story with your responses entered in the text at the proper locations.

I played with my wife and three kids: Janis Joplin (cat), Ernie Hemmingway (cat), and Dora the dog (guess). We had to help the animals answer as they don't know a noun from a person, place, or thing. By the way, the documentation gives a quick explanation on the various parts of speech used for those who forget the difference between an adverb and an adjective.

I won't reprint the full story, but here are a couple of sentences that turned up in the games we played. "When you open the washing machine lid you will say, 'Meow.'" At the prompt we asked Janis to supply an exclamation. Later, Dora responded, "Dog dish" to the computer's request for a noun. Here's how the sentence turned out, "As an added bonus you will find a prize dog dish in your very next box."

Besides the two stories that come with Silly Syntax, you can create your own by typing a story into the computer and leaving prompt spaces for the machine to solicit responses. A sentence like: "At 5:00 I walk my (n)," tells the computer to ask for a noun at that spot.

The instructions for creating your own stories are easy to follow. If that sounds like too much work, Sugar Software sells additional story tapes with topics such as Fairy Tales, Sing Along, X-Rated, Current Events, Gothic Romance, and Adventure/Sci-Fi.

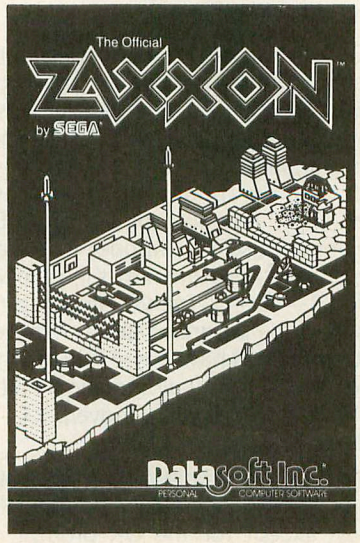
Silly Syntax is a good party game. It's also a good one or two player game, provided the players aren't familiar with the story they are being prompted to write. My only real problem with it is that now whenever we come back from the grocery store, Dora rips open all the boxes looking for her prize dog dish.

—*K.L. Color Staff.*

Zaxxon

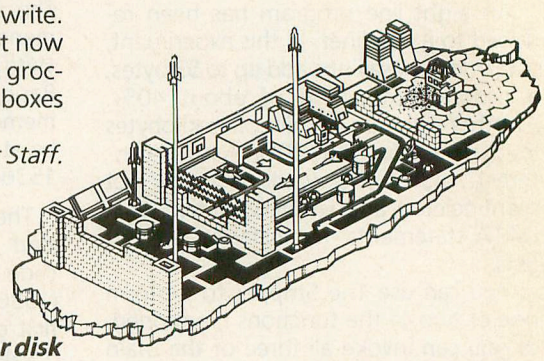
by Steve Bjork
Data Soft
9421 Winnetka Avenue
Chatsworth, CA 91311
$39.95 tape or disk

PUT AWAY YOUR QUARTERS. If you own a 32K Color Computer you no longer have to go to the video arcade to play Zaxxon. Steve Bjork, author of Radio Shack's graphic masterpiece Sands of Egypt, has written another outstanding program. Data Soft's Zaxxon is the official version, licensed to Data Soft by the Sega Enterprises, the distributors of the arcade game.



Available on cassette and disk, Zaxxon's high-resolution graphics are truly a delightful gaming experience. You are the pilot of a fighter spacecraft on a mission to destroy the deadly Zaxxon Robot. Your mission takes you across a space fortress which is guarded by enemy planes, base missiles, firing gun emplacements, radar towers, and finally, Outer Space, where you are faced with a squadron of enemy planes. Outer Space requires fast and skillful joystick reaction on your part.

You get three chances in in the form of three spacecraft in Zaxxon. You are awarded an extra ship after winning your first 10,000 points. Not an easy task. You accrue points by destroying radar towers, fuel tanks, gun emplacements, base missiles, enemy planes, robot missiles, and the evil Zaxxon Robot.



Besides the many obstacles and enemy fighters, your fuel gauge also demands your attention. If you run out of fuel, you crash. A fuel indicator at the bottom of the screen will help you keep track of your supply.

Perhaps the most frustrating aspect of Zaxxon is trying to fly through the force fields. You have to fly at the proper altitude which is a real challenge, especially during the second round when you need to make adjustments at each field.

The second space fortress is more difficult than the first. But once you succeed you've made it to your mission objective, an encounter with the Zaxxon Robot. To destroy it, you must score six direct hits on its homing missile. After destroying the robot you begin the mission again, but this time encounters with the enemy are more difficult.

Zaxxon is a real hit. Data Soft has performed a real service for Color Computer owners. The game is guaranteed to provide many hours of fun — and frustration. Zaxxon is a must for your Color Computer game library.

— *Paul Kimmelman*

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CATCHEM

Aardvark Software
2352 S. Commerce
Walled Lake, MI 48088
(313) 669–3110 **$19.95 Cassette**

CATCHEM IS AN INTERESTING game from Aardvark software. It's not a blockbuster, but is one of those quietly excellent games that give good service with a minimum of fuss and bother.

The similarity between CATCHEM and Tandy's Popcorn is startling. Both games have parallel paddles in stacks moving left to right in a horizontal plane, catching things that fall in waves from the sky. Popcorn drops only a single shape, whereas CATCHEM is a riot of shapes, colors, and odd dropping patterns.

CATCHEM grows on you as you play it. As you complete the first few waves you begin to notice the paddles are getting closer to the top of the screen, making it more difficult to catch the falling objects — a different approach to escalating difficulty. Also, the objects seem to move faster in the later portions of the game. Or maybe that's an illusion.

CATCHEM is not a 10, but it retains many of the elements essential to a perfect game. Flickerless animation and an organized game plan are featured with imaginative use of color and shape rounding out the game. It's a good game for those moments when lasers and bug-eyed monsters won't do the trick.

CATCHEM, you're a good catch yourself. — *by Bob Liddil.*

Super-Pro Keyboard

Mark Data Products
24001 Alicia Pkwy, #226
Mission Viejo, CA 92691 **$69.95**

IF YOU ARE a touch typist, or have had problems with sticking or inoperative keys on your Color Computer keyboard, you're in for a fairly inexpensive treat.

I can recall having dumped 53 small copper contacts all over the floor during my first attempt to fix a bad key on my original keyboard. I said a couple of nasty things to myself, gathered up the pieces, and hoped that someday someone would remedy what I consider to be the major flaw in an otherwise excellent computer.

Now, to the rescue, the Super-Pro Keyboard. The installation procedure is well detailed and quite simple. It took me no more than five minutes to install. The only exception to the simplicity of it all is the cutting off of the fifth post of the Color Computer's cabinet. It requires some brute force and careful handling so as not to damage the computer's case.

The keyboard has a professional feel, reacts well to the touch, and has held up to some purposeful pounding. There is no alteration of the placement or functioning of the keys. It doesn't use a three-color scheme as does the original, but that's the only difference.

The Super-Pro keyboard represents quite an improvement to my Color Computer.— *P.D. Color Staff*

Replacement Keyboard

Spectrum Projects
93-86th Drive
Woodhaven, NY
and
Micronix Systems
St. Charles, MO **$89.95**

I AM TIRED OF HEARING "The Color Computer is sort of like a toy, isn't it?" or, "That keyboard looks like a cheap calculator." A real typewriter-style key-

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NEW!

MACRO-80C

The Micro Works is pleased to announce the release of its **disk-based editor, macro assembler and monitor**, written for Color Computer by Andy Phelps. THIS IS IT — The ultimate programming tool!

The powerful 2-pass macro assembler features conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. There are no changes, constraints or shortcuts in the source language definition. Incorporating all of the features of our Rompack-based assembler (SDS80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility.

The screen-oriented text editor is designed for efficient and easy editing of assembly language programs. The "Help Key" feature makes it simple and fun to learn to use the editor. As the editor requires no line numbers, you can use the arrow keys to position the cursor anywhere in the file. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which are longer than 32 characters.

DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

The editor, assembler and monitor — as well as sample programs — come on one Radio Shack compatible disk. Extensive documentation included. MACRO-80C **Price: $99.95**

SDS80C — Our famous editor, assembler and monitor in Rompack. Complete manual included. **Price: $89.95**

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•Forth executes in less time than Basic

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Color Forth consists of the standard FORTH Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. Color Forth also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. Color Forth contains 10K of ROM, leaving *your* RAM for *your* programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound. The 112-page manual includes a glossary of the system-specific words, a full standard FIG glossary and complete source listing. COLOR FORTH ... THE BEST! From the leader in Forth, Talbot Microsystems. **Price: $109.95**

GAMES

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Pac Attack — Try your hand at this challenging game by Computerware, with fantastic graphics, sound and action! Cassette requires 16K. **Price: $24.95**
Berserk — Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. **Price: $24.95**
Adventure — *Black Sanctum* and *Calixto Island* by Mark Data Products. Each cassette requires 16K. **Price: $19.95** each.
Cave Hunter — Experience vivid colors, bizarre sounds and errie creatures in hot pursuit as you wind your way through a cave maze in search of gold treasures. This exciting Hi-Res game by Mark Data Products requires 16K for cassette version. **Price: $24.95**

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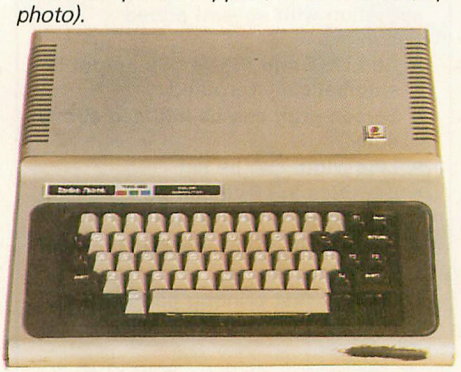
board is now available for the Color Computer; just the thing for you touch-typists. Do you want a typewriter-style keyboard? After two years I became rather fond of the stock keyboard and was quick to defend it. I use an IBM at work, an Apple at school, and I like the Color Computer the best. Still, when I heard about the new replacement keyboard available from Spectrum Projects (and other vendors), I couldn't get my order off fast enough.

I have not seen this keyboard on any other computer. It isn't marked with any brand name nor is there a place of manufacture inscribed. I'm told it comes from Taiwan. The only markings on the assembly are BT and BT8203K; the latter alphanumeric may be the part number. The stock Color Computer, by the way, has "Made in Japan" on an inner surface. The new keyboard's US importer is The Macrotron Company of St. Louis, MO.

About 31 trace holes on the circiut board are unused, leading me to believe the board is a replacement item. The keys are nicely contoured, clearly marked, and feel smooth to the touch.

IBM keys they aren't. After trying out the board for feel , I went to a local computer store and looked at several other computers. The keyboard on a VIC-20 feels most similar to this replacement board. There are two major styles of keyboard design. One is a sculptured arrangement, with a sort of dished design. On the bottom row, the keys are inclined at an angle that dishes toward the center two rows of kys, and the entire top row has an extra downward tilt. If you have difficulty visualizing this, look at the TRS-80 Model I, Model III, or an IBM Selectric II typewriter. These have a sculptured effect. So do the Tandy Model 12 and the Apple computers. On the other hand, the TRS-80 Model II, Model 16, and the Atari have a stairstep arrangement with none of the key rows tilted relative to the adjacent row or rows. This is the new keyboard's arrangement.

Total key travel of the replacement keyboard is the same as that of a Model I and less than that of a Model III. Key pressure required seems the same. The space bar does feel a little on the stiff side. These new keys have about twice the total of the stock keys. Total travel of an individual key is about 1/16 of an inch; electrical contact occurs after about 30% of total travel; i.e., you don't have to bottom the key to enter a character. Most of the keys are a dark gray color, and the rest are black.



Micronix keyboard (bottom photo) with added red plastic support, and installed (top photo).

Installation

If you can change a fluorescent light fixture (just a little bit more tricky than a regular bulb), or put a new watch band on your wrist watch, you are talented

Please turn the page

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REVIEW$

Continued from page 87

enough to do this job. In fact, you may be overqualified! The job requires no new wiring, and no soldering either. Step by step, here's what to do: unplug the computer's power cord and take the machine to your work bench. Turn the computer upside-down and put a towel or something soft under it. You'll need a medium sized Phillips screwdriver to remove the seven screws. One screw is under the warranty sticker so you might want to wait 90 days before you make this conversion. After loosening the screws, turn the computer right-side up and shake the screws from their holes. Or, before turning the machine over you could cover each screw hole with a small piece of masking tape to keep the screws in their proper place.

Lift the top half of the computer case straight up and move to the side. No wires connect the top half to the rest of the inner workings unless you have modified the computer in some way. If you have never seen the inside of the Color Computer before, you're in for an interesting experience.

It's now time to remove the stock keyboard. The unit rests on two plastic pegs, and is not screwed down in any way. The only connection to the electronics of the computer is a short 16 wire flat ribbon cable, which is only an inch or so long. This cable has a white plastic female connector at each end; one end connects to the keyboard, leave this connected. The other end of the cable plugs into a red 16 pin male connector that fastens to the center front edge of the main circuit board. Lift up the keyboard and move it around a bit, so you can get a feel for the "lay of the land," so to speak. You're now going to remove the end of the flat cable that goes to the red connector. The best way to do this is to use a small screwdriver and pry a little at a time, working on first one end of the white cable connector and then the other end. Take your time and the old keyboard will lift off in a minute or two.

Set the new keyboard onto the computer, it will rest on the same two pins that supported the stock board. Once you are satisfied that it does fit, lift it a little and bend the cable (provided with the new keyboard), so that it duplicates the original arrangement. The new cable is longer than the stock item so it's easier to hook up than the old one. Plug in the new cable, and then put everything back together in reverse order of the above instructions.

The new keyboard didn't seem to be supported as well at the bottom center as I thought it should be. It gave a little when I pressed the space bar. I solved this problem by taking a small plastic rod (from one of my children's toys), and cutting it to the proper length with a coping saw. Then I attached it to the bottom case half with epoxy glue (see Photo).

One last piece of mechanical advice. If you have completely removed the screws from the bottom case half, pay attention to the fact that they are not all the same size. Two are shorter than the others. These two shorter screws go in the two holes closest to the front of the computer; that is, closest to the keyboard space bar. If you use the long screws in the front end of your computer, you may do some internal damage.

When I sat down to try out the new keyboard, I noticed that the contour, color, and texture of the new keys resulted in less glare than the flat stock keys. The stock keys had a shiny surface, and I consider the replacement keys a great improvement.

The keyboard slant was changed because the lower rows of keys protrude above the surface of the board to a greater degree than the back rows. This makes the overall slant of the keyboard a little flatter in its presentation to the user than the slant of the stock unit. I am not a touch-typist, but I found my speed of character entry faster with the new keyboard.

One feature of the new board that will slow you down a bit is the relocation of some of the control keys. The Clear key's new location is to the left of the space bar. The Enter key has become the Return key, and although it is still at the far right side, it has moved up one row.

Another thing you will immediately notice is the addition of four new keys labeled F-1 through F-4. Table 1 lists the CHR$ ouptut of these new keys. If you want to see the CHR$ number generated by any key on the keyboard, here is a one line program you can use:

10 PRINT PEEK(135): GOTO 10

The replacement keyboard will fit all Color Computers with series B through E boards. It will not fit the new series F models nor the TDP-100 computers.

Table 1.

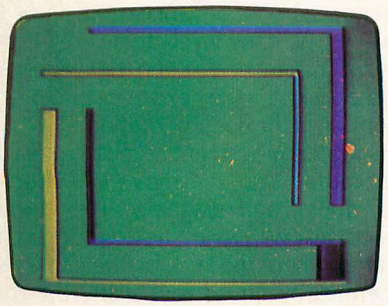
ASCII CODES

KEY	UNSHIFTED	SHIFTED
F-1	64	freeze
F-2	189	1
F-3	103	52
F-4	4	214

My keyboard came with a short set of installation instructions that were adequate, but no other documentation. I'm told more information will be provided in the future. Perhaps some hints as to uses for the new keys (I'm sure some of you already have thoughts as to the possibilities here).

All in all, it was worth the money and I would never return to the stock keyboard.

— by Tom Garcia



Eight Games

Programs by Mr. Bob
P.O. Box 94
Montrose, CA 91020

$9.95–$14.95 cassettes

EIGHT LEARNING PROGRAMS for children three to eight come from Programs by Mr. Bob; he of the title being Bob Van Ness, a child care center owner. The programs come on cassette and require 16K Extended Color Basic and joysticks. All the programs have easy to understand documentation.

After spending 12 hours with four children and these activities over a period of two weeks, I can say that Mr. Bob has turned out some material that charms, entertains, and teaches. *Create* costs $9.95, and *Hand/Eye Coordination, Perception, Number Concepts, Dot to Dot, Addition Concepts,* and *Alphabet* all cost $14.95. Several of the programs include Mr. Bob's recorded voice telling you how to play.

A ninth program, *Computer Literacy,* is intended to explain a bit about computing to adults; it's $14.95.

In order of delight in my test group, the winners were clearly *Create, Dot to Dot,* and *Hand/Eye Coordination. Create* is the kind of thing a beginning programmer will come up with after learning a few things about Extended Color Basic. It's a no-win, no-lose chaotic kind of event where joysticks are used to draw screen patterns and paint them. After several games with precise instructions, the kids loved the unfettered feeling of doing as they wished with this program. *Dot to Dot* offers numbered dots to connect by maneuvering the joystick. It adds colors and at times enhancements to such figures as a butterfly, a bird, and a fish.

Hand/Eye Coordination is the champ. It has 13 levels of play and involves using a joystick to guide a spaceship along a path to a hangar. Upper levels are quite challenging as the paths to travel become complex mazes. If you touch the side four times you must repeat that level.

All the other programs use the "guide the spaceship" concept to let the learner select answers. The program names describe what they teach, except for *Perception,* which teaches antonyms, and *Recognition,* which presents problems in identifying identical figures and missing parts of figures.

We found no bugs in Mr. Bob's programs and can happily report he delivers what he advertises with apparent affection for his audience.

What didn't we like? Two things.

One, in most programs a correct answer gets a reward of a colorful graphics display. Sometimes these rewards can continue up to 25 seconds. That's too much eye candy and bores the kids.

Two, Mr. Bob's recorded voice tends to be effusive as he speaks to children. Kids are leery of such gushiness and feel they're being set up for something unpleasant. "He talks like he's going to make it Christmas every five seconds," a seven year old girl said. She's rather sophisticated, so I didn't take it into great consideration.

The voice also bothered the smaller children. A three year old pointed to the screen as Mr. Bob spoke and said "No more."

"No more what?" I asked him.

"No more *him*!" said the child in a rising voice. We turned down the sound and had fun with the game.

Mr. Bob, forgive me for telling you this, and know that we liked your programs...

...with one exception. I can't recommend *Computer Literacy.* It's an audio-visual mix: Mr. Bob tells all about computers while the program displays well-done pictures of the monitor, computer, recorder, and joystick. We don't need pictures because we're close enough to the real items to reach out and touch them. It's art imitating readily evident reality, and the information given could be on paper. I don't think the program is viable.

But the others are.

— by Richard Ramella.

Please turn the page

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Circle No. 67 on Reader Service Card

Intracolor's Colorpede is shown above, and Computerware's Megapede top right.

WE'VE ALL HEARD of the devastation to trees and shrubs due to the merciless munching of gypsy moth caterpillars. Three software producers offer you an opportunity at revenge in the form of Computerware's Megapede, Intracolor's Colorpede, and Tom Mix's Katerpillar Attack. The three games are all Color Computer adaptations of the arcade game Caterpillar. They vary slightly, but have one thing in common—they allow you to zap away at those blasted tree-eating varmints.

Proceeding in alphabetical order, we'll first take a look at Computerware's Megapede.

Megapede

Computerware
Box 668 ***$21.95 cassette***
Encinitas, CA 92024 ***$26.95 disk***

Quoting from the documentation: "You are caught in a jungle of algae. There are vicious centipedes attacking you from all sides. Killer fleas are dropping from the sky. And to top things off, a nasty spider hunts you without trying to kill you. You are armed with only your trusty laser cannon..." The only additional set-up information the excerpt doesn't mention is depicted in the packaging's graphic; you are a human in a land of giant insects.

Megapede is a one-player game with four difficulty levels: nice, ruff, foul, and mean. Mean is truly mean. In that level it seems as though the algae-dwelling nasties are having a how-fast-can-you-eat-the-human contest. Pretty fast.

You are not restricted to moving horizontally across the bottom of the screen. You have the ability to move vertically and diagonally as well. One problem with the game is that joystick reaction is slow if the stick is not in the proper position. For example, if you are trying to move horizontally but the joystick is also in the downward position reaction will be sluggish. But if the stick is true in the center of the pivot, reaction is swift.

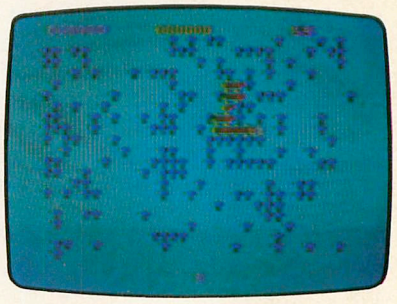
The program uses different colors for the various objects in the game. The background color is buff. Sound is constant but not overdone.

Colorpede

Intracolor Communications
P.O. Box 1035 ***$29.95 cassette***
East Lansing, MI 48823 ***$34.95 disk***

Colorpede offers the option of one- or two-player action. In two-player mode each player uses his own joystick, making quick switches unnecessary. You have five individual scoring opportunities. Toad stools are worth one point and take four shots to destroy. Poison toad stools are worth five points. The bouncing bug is worth 300, 600, or 900 points depending how how close he is to your shooter. The colorpede's head piece is worth 100 points, while body sections will only get you 10. The beetle (250 points) and the stinger (1000 points) are not common critters. The beetle appears in the second and other more advanced levels, and the stinger first appears in the fourth level.

The playing field is a black background



with various colored enemies. Colors change as you advance from level to level. How many levels there are I don't know. I haven't even seen the stinger yet, and only know they exist because of the mention in the documentation.

Shooter movement is not limited to horizontal. You can move you shooter up, down, and diagnally. The shooter reacts very well to joystick movement no matter where the stick is. The game also operates by arrow keys using the shift key as the firing method, and features a pause ability by pressing the spacebar during play.

Katerpillar Attack

Tom Mix Software
3424 College N.E. ***$21.95 cassette***
Grand Rapids, MI 49505 ***$24.95 disk***

Tom Mix's bug shootout is also a one-player game that uses only joystick controls. Shooter movement is more restricted than in the two previously reviewed programs. Your shooter can only move one step vertically. This was probably done to more closely resemble the arcade version of the game.

The screen is set up on a green background. Once again, sound and colors are not overdone. The graphics are a bit clearer in the Mix version.

How to Decide

Which of the three is best for you will be a difficult choice. All three games are well done. Each game offers slightly different and interesting variations on the original arcade game. The easy, but more expensive way out, is to get all three. The practical way is to get one, have a friend get another, and have a third friend get the last. That way if you're at friend one's house you can play the version he has, if you're at the other friend's house you get to play his version, and when everyone's at your house you play your version. Then you can sit around and argue which game is better. You would all be right.

—*K.L. Color Staff.*

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NEW:PRODUCT$

Descriptions of new products are written from information supplied in the form of press releases and should not be taken as evaluations or recommendations of the products described. For additional information contact the manufacturer either by circling the proper number on the readers service card, or writing or calling the address provided.

Manufacturers wishing to publish an announcement are invited to send any appropriate information in The Color Computer Magazine, New Products editor. Announcements will be edited. — Eds.

Nerble Force

Computerware
Box 668
4403 Manchester Avenue,
Suite 102
Encinitas, CA 92024
(619) 436-3512

Nerble Force is not just another "defenders" game. Brilliant graphics screens show you wide angle and close-up views of the city you must protect. The object is to save the people of the city from the attacking space creatures. Your ship has forward and reverse thrusters, long-range phasers, and quick maneuverability. Requires only one joystick and 16K. Available on cassette or disk.

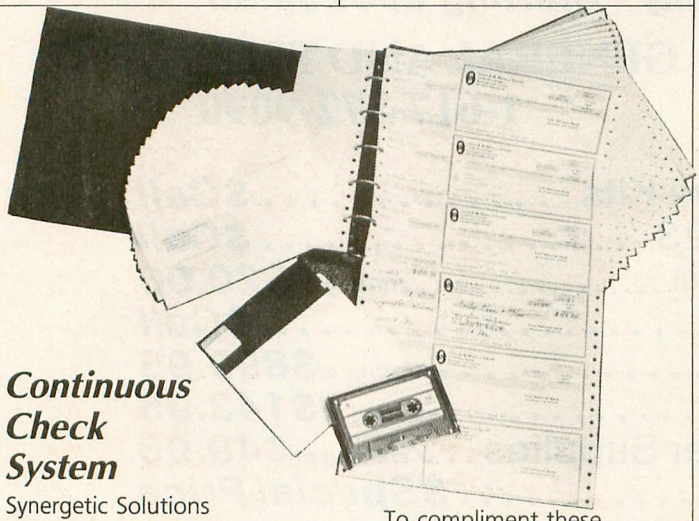
Circle No. 75 on Reader Service Card

Datafile

Ilume Design
4653 Jeanne Mance Street
Montreal, Quebec
H2V 4J5
Canada

Datafile is a sophisticated, multi-purpose data storage system flexible enough to handle any format. It can be used on 16, 32, and 64K Color Computers. It will load keyboard, tape, or disk data, and allows you to delete, sort, and print in various formats. Datafile performs string search and, in in the disk version, loads data larger than your computer's RAM. Available on cassette and disk.

Circle No. 76 on Reader Service Card



Continuous Check System

Synergetic Solutions
4715 Shepherd Road
Mulberry, FL 33860
(813) 646-6557

Synergetic Solutions offers a line of continuous fan-fold checks and accessories designed especially for home or small business use. The checks come in the universal 9 1/2 inch computer-form width, three to a page, and can be used on any 80-column printer.

To compliment these checks, Synergetic Solutions also offers a complete line of check accesories which include a data-ring checkbook and dual-windowed envelopes. Also available is Checkbook-Checkwriter II, a program which allows for the printing of single or multiple checks. The items are available either separately or as a package.

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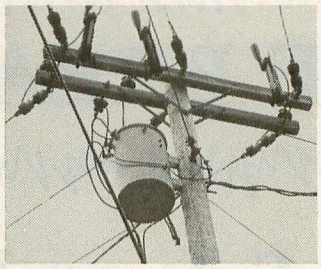


Electricity Consumption Monitor

CoCoData Enterprises
1215 Emeralds Drive
Orlando, FL 32808

ECM uses text and graphic screen presentations to display Kilowatt and dollar consumption on a daily basis. High-low-average days, 20-day trend percentage analysis, and bill prediction assist the user in designing an effective energy management program.

Circle No. 78 on Reader Service Card

FILMASTR

The Computer House
Box 1051
Dubois, PA 15801
(814) 371-4658

FILMASTR is a data management system for the Color Computer. Features include custom screens with up to 20 user-definable fields, fast form fill-in with no garbage collection delays, copy fields from a previous record, full-screen editing, create sub-files, append files, user formatted printouts, and field totals.

File capacity is about 9000 characters in a 16K machine, and about 24000 characters in a 32K machine. Extended Basic is required. Available on cassette or disk.

Circle No. 79 on Reader Service Card

Modems

Universal Data Research Inc.
2457 Wehrle Drive
Buffalo, NY 14221
(716) 631-3011

Universal data announces a new complete line of modems designed to connect to any RS-232 computer. The new modems are designed to be easy to use and reliable. The 300-baud modems provide full-and half-duplex operation in originate, answer, and auto-answer modes. The 1200-baud modems provide full-duplex operation with switch selectable local echo. The digital design is based on two LSI integrated circuits and is crystal controlled for superior performance.

Circle No. 80 on Reader Service Card

TRS-80 Color Authoring System

Radio Shack
One Tandy Center
Fort Worth, TX 76102

TRS-80 Color Authoring System (catalog #26-2714) allows educators to create instructional materials for delivery of a Color Computer without requiring the instructor to have any previous experience. The system is menu-driven, with options listed to guide the user through the lesson-creating process. Lessons consist of a series of frames which may contain tutorial text, questions, and graphics. The instructor creates these frames one at a time by filling in a form that is displayed on the screen.

Special display features of Color Author include normal and double-sized text, reverse video, underlining, bold-face and special graphics charaters. Graphics can be created for frames by using joysticks and feedback messages, and hints can be set to appear after correct and incorrect responses. Available in ROMpak.

Circle No. 81 on Reader Service Card

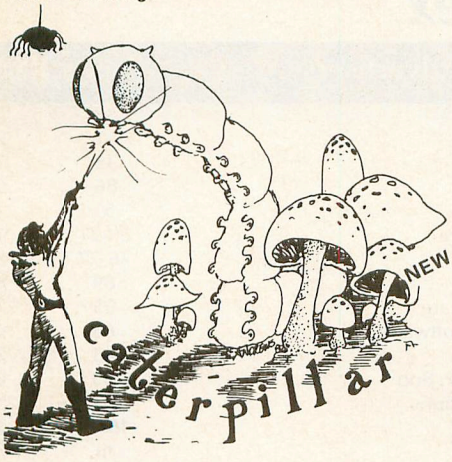
AARDVARK

TRS-80 COLOR COMMODORE 64 VIC-20 SINCLAIR/TIMEX TI99

QUEST – A NEW IDEA IN ADVENTURE GAMES! Different from all the others. Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time. 16k TI99, TRS-80 Color, and Sinclair, 13K VIC-20. $14.95 each.

32K TRS 80 COLOR Version $24.95.

Adds a second level with dungeons and more Questing.



CATERPILLAR

O.K., the Caterpillar does look a lot like a Centipede. We have spiders, falling fleas, monsters traipsing across the screen, poison mushrooms, and a lot of other familiar stuff. COLOR 80 requires 16k and Joysticks. This is Edson's best game to date. $19.95 for TRS 80 COLOR.

ADVENTURES!!!

The Adventures below are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are interactive fantasies. It's like reading a book except that you are the main character as you give the computer, commands like "Look in the Coffin" and "Light the torch.")

Adventuring requires 16k on Sinclair, TRS-80, and TRS-80 Color. They require 8k on OSI and 13k on VIC-20. Sinclair requires extended BASIC. Now available for TI99. Any Commodore 64.

$14.95 Tape – $19.95 Disk.

ESCAPE FROM MARS
(by Rodger Olsen)

This ADVENTURE takes place on the RED PLANET. You'll have to explore a Martian city and deal with possibly hostile aliens to survive this one. A good first adventure.

PYRAMID (by Rodger Olsen)

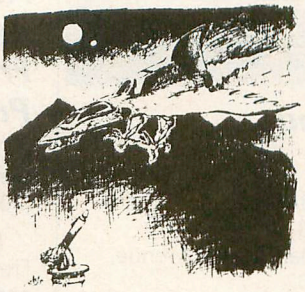
This is our most challenging ADVENTURE. It is a treasure hunt in a pyramid full of problems. Exciting and tough!

DERELICT
(by Rodger Olsen & Bob Anderson)

New winner in the toughest adventure from Aardvark sweepstakes. This one takes place on an alien ship that has been deserted for a thousand years – and is still dangerous!

Dungeons of Death – Just for the 16k TRS-80 COLOR, this is the first D&D type game good enough to qualify at Aardvark. This is serious D&D that allows 1 to 6 players to go on a Dragon Hunting, Monster Killing, Dungeon Exploring Quest. Played on an on-screen map, you get a choice of race and character (Human, Dwarf, Soldier, Wizard, etc.), a chance to grow from game to game, and a 15 page manual. At the normal price for an Adventure ($14.95 tape, $19.95 disk), this is a giveaway.

WIZARDS TOWER – This is very similar to Quest (see above). We added wizards, magic, dragons, and dungeons to come up with a Quest with a D&D flavor. It requires 16k extended color BASIC. $14.95 Tape, $19.95 Disk. VIC 20 Commodore 64.



NEW

PLANET RAIDERS – Not just another defenders copy, this is an original program good in its own right. You pilot a one man ship across a planetary surface dogfighting with alien ships and blasting ground installations while you rescue stranded troopers. Rescue all the troopers and be transported to another harder, faster battle. Joysticks required. ALL MACHINE CODE! EDSONS BEST! 16K Tape TRS80COLOR $19.95 – 32K Disk $21.95.

BASIC THAT ZOOOMMS!!
AT LAST AN AFFORDABLE COMPILER!

The compiler allows you to write your programs in easy BASIC and then automatically generates a machine code equivalent that runs 50 to 150 times faster.

It does have some limitations. It takes at least 8k of RAM to run the compiler and it does only support a subset of BASIC– about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP, USR (X), PEEK, POKE, *, /, +, -, >, <, =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and INTEGER NUMBERS FORM 0-64K.

TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20-page manual and can be modified or augmented by the user. $24.95 on tape or disk for OSI, TRS-80 Color, VIC 20, or Commodore 64.

SEAWOLFE – ALL MACHINE CODE In this high speed arcade game, you lay out patterns of torpedoes ahead of the attacking PT boats. Requires Joysticks, at least 13k RAM, and fast reflexes. Lots of Color and Sound. A fun game. Tape or Disk for Vic20, Commodore 64, and TRS-80 Color.

$14.95 Tape - $19.95 Disk.

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ALSO FROM AARDVARK – This is only a partial list of what we carry. We have a lot of other games (particularly for the TRS-80 Color and OSI), business programs, blank tapes and disks and hardware. Send $1.00 for our complete catalog.

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NEW:PRODUCT$

Grand Prix

Computerware
Box 668
4404 Manchester Avenue,
Suite 102
Encinitas, CA 92024
(619) 436-3512

Speed, skill, and total concentration descibe the super action of Grand Prix. You race against the clock using your joystick to control steering and speed, as you compete in the Morocco Grand Prix. This game's colorful graphics, realistic action, and great sounds provide non-violent fun to challenge the Mario Andretti in your soul. Requires 32 K and is available on cassette or disk.

Circle No. 82 on Reader Service Card

National Association of Freelance Programmers

P.O. Box 813
Vienna, VA 22180
(703) 938-1203

The National Association of Freelance Programmers announces the introduction of *Software Market Newsletter*, a monthly newsletter for NAFLP members. The newsletter provides help with software marketing information and advice. Topics include: what kind of software is in demand how and where to sell programs, and how to get freelance programming contracts.

A special features of each newsletter is a complete directory of software buyers. The directory is updates monthly and includes information about what kinds of software the buyers seek, fees offered, terms and conditions, and how to contact the buyers.

Circle No. 83 on Reader Service Card

Introduction to Data Communications

Computerware
Box 668
4403 Manchester Avenue,
Suite 102
Encinitas, CA 92024
(619) 436-3512

Computerware's Introduction to Data Communications is a tutorial for beginners and hobbyists. It will familiarize you with the fundamental concepts and technical jargon of microcomputer data communications (using Color Computer examples). The lessons are organized into four parts, and includes a test at the end. Some of the topics covered include: RS-232, analog and digital, the DB-25 connector, full and half duplex, baud and BPS, synchronous and asynchronous data, types of modulation, telephone line frequencies and levels, direct-connect modems and acoustic couplers. This introdution will explain these terms, diagram them with graphics, and also includes a glossary. Requires 16K and is available on cassette or disk.

Circle No. 84 on Reader Service Card

Geography Pac

Spectral Associates
141 Harvard Avenue
Tacoma, WA 98466
(206) 565-8453

Geography Pac is an enjoyable way to learn world or U.S. geography. It is a collection of five 16K Extended Basic programs using sounds and colors with machine-language subroutines designed to teach the topological location of countries (or states), their capitals, largest non-capital city, major industry, and currency (or statehood date). A four-color high-resolution map is used, and answer study sheets are included.

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Available on disk or cassette.
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Bloc Head

Computerware
Box 668
4403 Manchester Avenue,
Suite 102
Encinitas, CA 92024
(619) 436-3512

The pyramids of brightly colored cubes would be a simple challenge for your little Bloc Head if it weren't for the despicable characters after him, who try to push him off the cubes before he can change their colored surfaces. Bloc Head must dodge the sinister springs, bad eggs, and other evils. Bloc Head features brillant graphics, delightful sounds, and different levels of difficulty, offering non-violent fun for all. Requires 16K. Available on cassette or disk.

Circle No. 86 on Reader Service Card

Bulletin Board Service

A new BBS for the Color Computer, located in Georgia, is now in operation. The BBS, called Kaleidoscope, operates 24 hours a day. Sysop is Willie Bethay. The phone number is (912) 923-4679.

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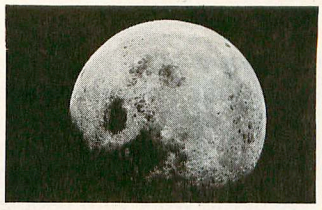

Moon Hopper

Computerware
Box 668
4403 Manchester Avenue,
Suite 102
Encinitas, CA 92024
(619) 436-3512

You were out on test maneuvers in the new exploration vehicle (Moon Hopper) when a swarm of traglons attacked. You (in your Moon Hopper) must reach the Moon Base. Your Moon Hopper can roll over the surface, hop over obstacles, and is equipped with the latest phaser equipment. High scores are recorded on a 3-D graphics display. Moon Hopper requires 32K and is available on cassette or disk.

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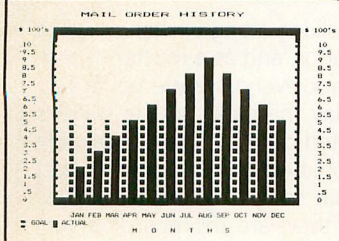

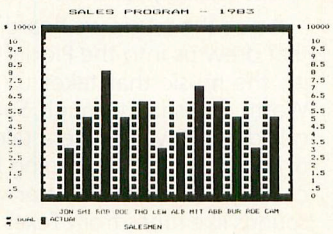

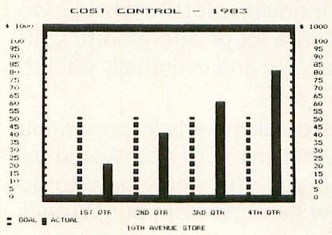

KWIKGRAF

West Bay Company
Route 1, Box 666
White Stone, VA 22578

KWIKGRAF, a second generation program, integrates the Color Computer and Epson MX-80 printer to produce superb camera ready bargraphs in approximately three minutes time. The program is modular in nature, giving screened instructions and permitting rapid keyboard changes of data and design. The listing can be altered for even more extensive changes. Available on cassette.

Circle No. 88 on Reader Service Card

"It should have been incorporated into the original MICROSOFT programming..." Color Computer News

COLOR COMPUTER* **UPGRADE**

The Platinum Worksaver©
...Programming Made Easy

With the Platinum Worksaver©, programming time and hassle can be cut by 50%.

FULL SCREEN EDITING OF BASIC PROGRAMS
With the PLATINUM WORKSAVER'S editor, there's no more counting the numbers of characters to delete or change, or wondering if you deleted too many or too few. You see the whole line as it's edited. Changes, deletes and inserts are automatic and the cursor can be moved anywhere on the screen.

FULL SCREEN EDITING OF NUMERIC AND STRING ARRAYS
But that's only the beginning! The editor (Written in machine language) also comes with a short, two line BASIC subroutine that will allow you to use the full screen editor on your numeric and string arrays. This is the springboard you need for developing your own VisiCalc™ or word processor.

NUMERIC KEYPAD
We've solved another Color Computer weakness. Press a control key and letters J, K, L, U, I, O, P become number keys 1-7. Numbers 8-0 remain in their normal positions. The key pad numbers are clearly labeled on the overlay.

SINGLE KEY ENTRIES OF BASIC WORDS
So, the PLATINUM WORKSAVER makes it easier to write useful programs and edit them, but that's not all! Entering programs is a breeze with single entry of over 80 basic words, on a beautifully designed KEYBOARD OVERLAY, color-keyed to function. No need to memorize or consult a conversion chart to find a word.

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Now you can write, enter and change programs easily, but what about debugging? This is the frustrating, time consuming aspect of programming and frankly, the Color Computer doesn't help you much . . . you have to start the program over each time you make a change. But not with the PLATINUM WORKSAVER!! With it you can change, delete, add and rearrange or join lines. The special reserved key is excellent for copying or moving parts of lines to other lines . . . plus, you can even LOAD A WHOLE NEW PROGRAM without disturbing the data you've created.

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platinum software

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OVER 100 PROGRAMMABLE KEYS **LOADS TO DISK** **16K MIN. REQ.**

Circle No. 70 on Reader Service Card

END OF FILE

More than 90 percent of the articles in **The Color Computer Magazine** are sent in by our readers. Most of you are not professional writers, or even aspire to become writers. That is where the fun of creating this magazine each month comes in. We get to work with people sharing a common interest in the advent of personal high technology. **The Color Computer Magazine** is a forum for users to share their programming creations and other Color Computer information.

I guide the magazine as a Sysop guides his bulletin board, or as a Users Group president presides over his organization. The trick is to not only listen to what users want and provide it, but also to anticipate wants and needs.

We get many manuscripts each week. Choosing which to publish is never easy. You're an innovative lot. But choose we must, and choose we do. We pay a lot of attention to your letters when deciding what to accept and eventually publish in the magazine.

Prompted by Kathleen Gill's excellent article on writing documentation, and realizing that many of you would indeed try to publish an article if you only knew how to go about it, what follows are a few excerpts from our Writer's Guidelines.

You've just developed a new application for your Color Computer. The first step in converting that new program into a magazine article is to determine if there is a need for it. Have you done a good job debugging it? Is your program different from, or an improvement on, others already published? If you answered "yes" to both questions you probably have something we'd be interested in considering.

As Kathleen wrote in her article, consider your article to be your program's, or project's, documentation. You spend days, weeks, and sometimes months developing a program. Don't sell yourself short by cranking out its documentation in only two hours. Think back on some of your own frustrating moments of trying to run a program from a manual that read like it was produced using a random word generator program. Take your time, look at articles published in previous issues, and then just sit down and write.

Prepare your article double-spaced on non-erasable bond. With fanfold paper, separate the pages and tear off the tractor feed edges.

Never submit your manuscript to more than one magazine at a time. That bears repeating. Never submit your manuscript to more than one magazine at a time.

Always keep a copy of your manuscript in your files. Don't send us your only copy. We are as careful with your work as we are with our own, but we are not perfect (yet). All manuscripts should be accompanied by a SASE (self-addressed stamped envelope) with enough postage for us to return your manuscript if we decide not to buy it. Additionally, it's best to paper clip your return postage to the enclosed envelope because if we don't need to send the manuscript back your postage stamps will be returned. Always send a tape or disk of your program with the manuscript.

That's all there is to it. Of course some of you published pros know most of that already. We hope some new "pros" will now be encouraged to give article writing a try.

Now to another subject: Fort Worth, Texas. There are some awfully nice people there, and I don't just mean the folks at One Tandy Center. Fort Worth is a nice city. There are many old west historical sites to see, museums, rodeos, and other charms to the place.

Since the birth of **The Color Computer Magazine** we have gone to Fort Worth a few times. Each time we find something we missed the previous time out. But one place we visit everytime we're in town is a place called the Pickin' Parlor.

The Pickin' Parlor is located in a section of the city called the Stockyards. It's the preserved old west area. The Pickin' Parlor is large for a bar, small for a nightclub, and just right as a cross between the two. There's room enough on the dancefloor to accommodate at least 25 two-stepping couples. The band sets up on a stage so all can see and hear them, and they can see the people.

It was the music we heard walking along Exchange Street that drew us into the Pickin' Parlor, and as a matter of fact, it's the music that takes us back everytime we go to Fort Worth. Tuesday through Sunday the band on the stage is called Hill City. They're a talented group of people capable of handling a music ranging from hard driving rock to sweet country ballads. No matter what song they're playing it all sounds like tunes from Texas. If there are any record producers among our readers take note.

Last time we were in Fort Worth, James Povec and I came up with an idea — to show you Fort Worth, Hill City Band and all. We talked to Tandy and they liked the idea, we spoke with the band and they liked the idea. We even spoke to Mayor of the Stockyards, Steve Murrin, who also liked it. So what we're going to do is (since we can't bring Fort Worth to you) give you a good reason to go to Fort Worth.

Although the event is early in its planning stages we want to tell you now so that you will have plenty of time to make vacation plans. Sometime next spring **The Color Computer Magazine** will host the TRS-80 Color Expo. You'll get to meet some of the people at Tandy, visit the sites of Fort Worth, and since we all wouldn't fit inside the Pickin' Parlor we'll bring the Hill City Band to our convention.

It would be tough to come up with a better vacation for Color Computerists; a visit to the birthplace of your computer, good sightseeing, and some good ol' Texas fun (how's some hot Texas chili sound?). — *K.L. Editor*

FOR NEXT (07,83)

DENNIS KITSZ'S article telling you how to build a 128K bubble memory kit will be a hard act to follow. So we gathered the heartiest group of writers we could and told them to give it their best shot.

New computerists will benefit from Franklyn Miller's article explaining Color Disk Basic. One particular article that we're looking forward to publishing is how to build a Color Computer cart. This is a hardware construction article in the truest sense, using wood, nails, and varnish.

Amongst the other articles to look forward to is Richard Ramella's continuing saga of Poke and Sunflower in the second installment of The Sorcerer's Puzzles. And there's more, including Bill Barden on sound, and Jake Commander who begins a series of articles commenting the Color Computer's ROMs.

See you next month.

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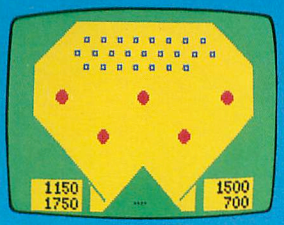

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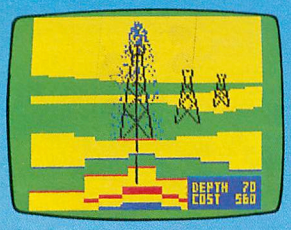

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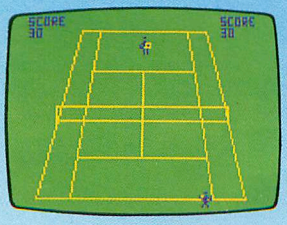

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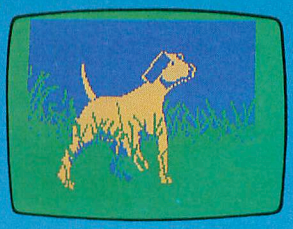

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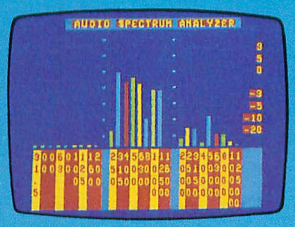

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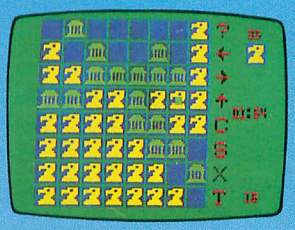

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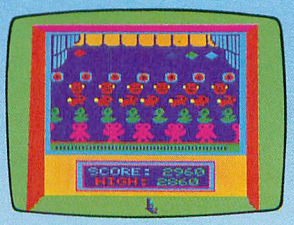

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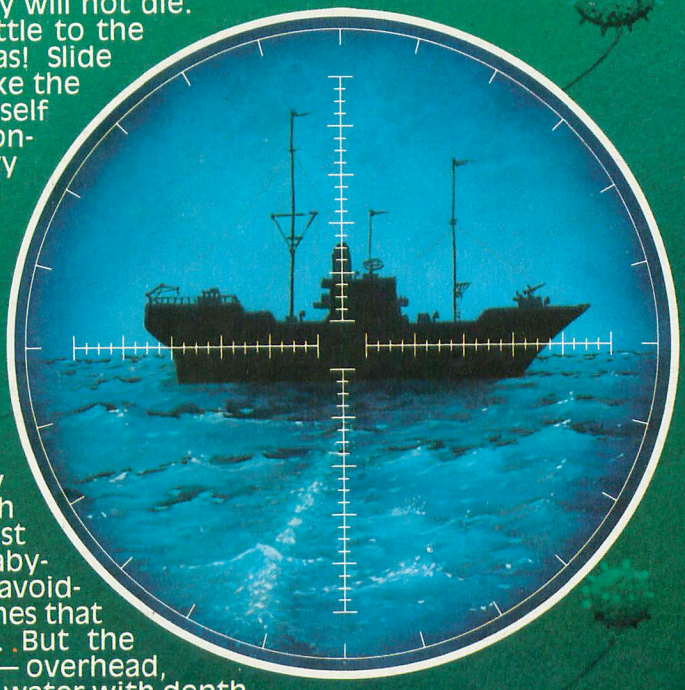

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