BUSINESS AND FINANCE ISSUE!

Volume II Number 4

October, 1982

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the RAINBOW

The Monthly Magazine for Color Computer Users

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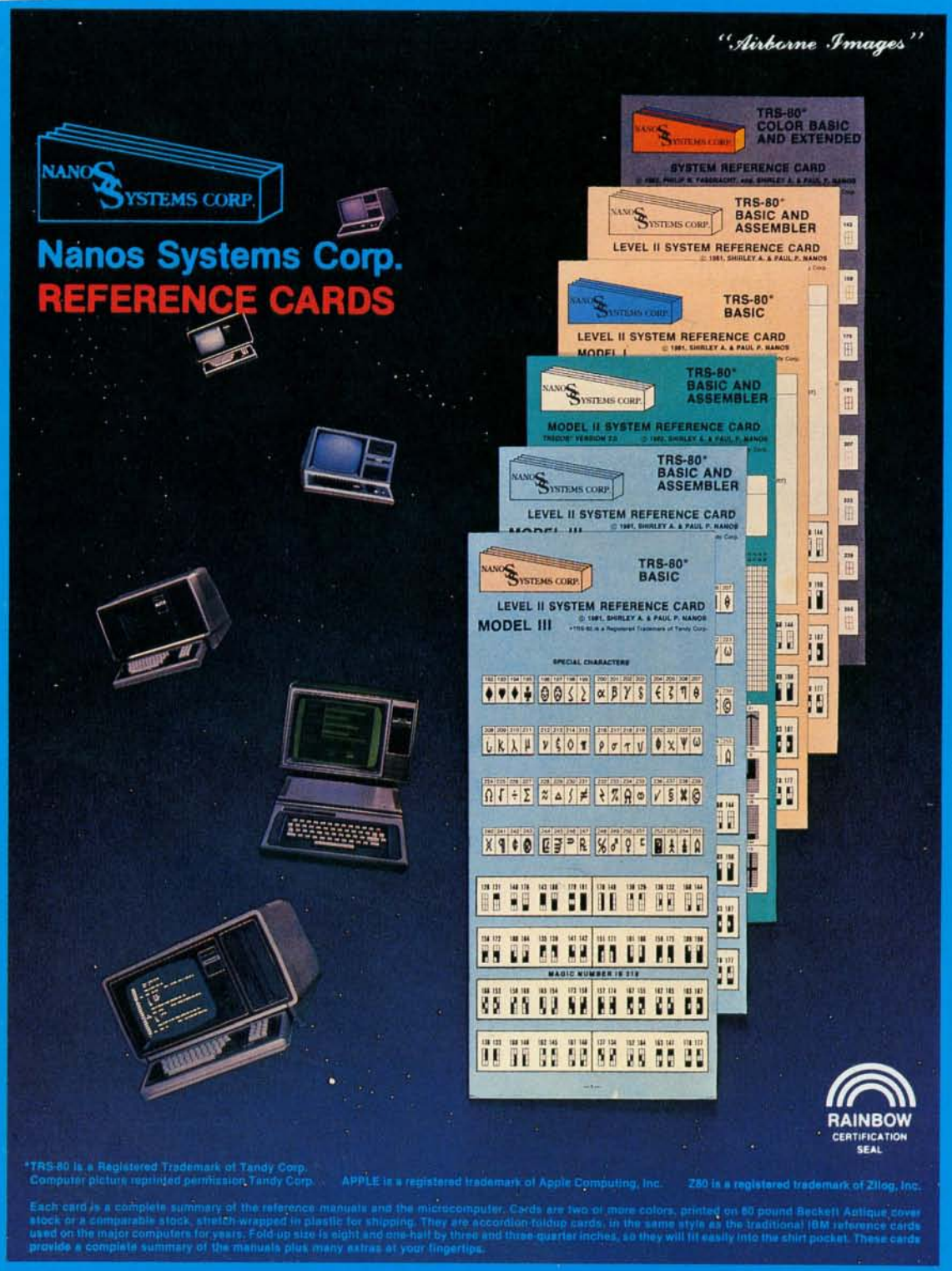

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The RAINBOW is published every month of the year.

LETTERS TO RAINBOW

LIKE A CHILD

Editor:

Please note the enclosed address correction. I have had to move one block up the street
Color Computer.

I even bought it its own phone and TV. It is kind of like a child—it begs for games, books and other treats.

Martin H. Goodman, M.D.
Berkeley, CA

FUTURE ISSUES

Editor:

I see that you are considering a business applications issue for October. Please do it. With 64K modifications, there is a great need for more business applications information.

Your magazine has improved greatly in the seven months since I bought it. Your reviews are very interesting and needed as some of the programs I bought are not very interesting or good.

Ted Harrison
Omak, WA

GRADEBOOK NEEDED

Editor:

Please advise if there is a teacher grade book and student record program available on cassette for the 80C.

Your magazine is outstanding and I wish you and your staff the best for continued growth. As a suggestion, please include more business and education programs in future issues.

Tim Winchester
Virginia Bech, VA

Editor's Note: There was a gradebook program in the September *Education Issue*. Also, please note this is the *Business Issue*. We plan more of these type programs in the future—but are essentially dependent on submissions.

For those interested in a commercial gradebook and student record program, we understand one is in the final development stages by Color Software Services in Greenville, TX.

"AT's A PROBLEM!

Editor:

I am writing in the hope that you can help me solve a problem with my Color Computer. I have a 32K with ECB, but originally purchased the machine as a 16K model and upgraded it myself by piggy-backing the 4116 memory chips. The circuit board is a D model.

When the computer is turned on, it will begin the display with the @ symbol in various locations on the color TV screen. I can clear them with the *CLEAR* key, but as the machine warms up, this no longer works and the @'s cannot be removed.

I have replaced the SAM chip, the memory chips and the 6809E CPU. I even converted back to 16K. If anyone can help with this problem, I would appreciate knowing.

Also, I am looking for some ferrite beads as I would like to put one on the extra lead from the memory chips to the SAM chip to eliminate that as a possible source of my trouble.

I really do enjoy your magazine and my only regret is that I didn't subscribe sooner. I also want you to know that I like the paper your magazine is printed on. It is much easier on the eyes than the glossy paper others use.

William Warren
Hickory, NC

Editor's Note: Thanks for the comment on the paper. That was the reason we went with it in the first place, although it *may* have to be replaced some day by glossy for the simple reason that glossy paper weighs a great deal less and makes binding a larger magazine much easier.

ASSEMBY HARDWARE

Editor:

I'd like to tell you how pleased I am with the Assembly Corner and Dennis Lewandowski. I do need the experience in assembly language with the 6809.

I would like to see a hardware corner for us hardware buffs. There are so many little modifications that can be performed easily to upgrade the machine that it is incredible!

Albert Pinto
Falls Church, VA

Editor's Note: Watch for some new news soon.

UNIDATA FILE UPDATE

Editor:

A couple of weeks ago I wrote requesting some help with the *UNIDATA FILE* program. I said that the program hung up around the fifth or sixth pass.

I found the problem. If you enter *any* blank data entries by themselves, it will cause the sort routine to hang up. My solution was to use *FIND* and answer with *ENTER* only. The blank entry or entries will appear in the beginning and then all the operator has to do is delete via the *D* function and the program will not get hung up.

Gerald Brace
Philadelphia, PA

to get a house

BOUQUETS AND BRICKBATS

Editor:

The world of cottage software is, at best, a little shaky. There is a broad spectrum of quality and some products at each end that are notable for their quality or complete lack of it.

This is like saying it gets hot in August. It is obvious to anyone who, as I do, regularly sends away for software. I expect that the software industry has sprung up around around the 80C will tighten up its act as the industry grows. Occasionally it *does* seem like a good idea to complain when you have purchased a piece of software and find that it is mostly a good idea that has not come to reality.

On the other hand, it seems like a good idea to encourage those who take the time to put out a good product. For the most part I have been happy with my purchases. Recently, I made a couple of purchases which are, in my view, outstanding. They should be mentioned as such.

Microworks' SDS80C editor/assembler/debugger is one and Cer-Comp's CCMD+9 disk operating system is another. Neither of these products is entirely bug-free. Both of them are essentially sound, usable products that do what they promise. They were not rushed into production with unresolved problems. They are both very professional. And I do know professional when I see it, as I purchase software products for my company as well as design in-house software for them.

My feeling is that a piece of software should do what it says it will do or is a rip-off, plain and simple. The aforementioned two products do what they say and more! I applaud their creators for the discipline shown in waiting until their products are a credit to them and their companies before rushing to market.

Jim Schmidt
Wheeling, IL

Editor:

I have recently acquired two programs from Eigen Systems—the *Stripper*, designed to compress BASIC programs by removing remarks, spaces and combining statements; and their *CCEAD* editor, assembler and debugger. I am impressed with both of these products.

James Kriz
Parma, OH

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Editor:

TRS-80 Color Computer Graphics written by Don Inman with Dymax is an outstanding book. Beginning with the first chapter, "Fundamentals of Coloring," the author takes you to and through machine language graphics. The book is very well written and with its examples and self-tests, one can acquire the knowledge needed to get the most out of graphics with the Color Computer.

Robin Saccuzzo
Madison, AL

Editor:

I am writing to express publically my high opinion of Frank Hogg and the folks at his Laboratory for their superb customer support. I bought his FLEX for my 80C and had some trouble getting the DOS to run. As it turned out, it was a hardware fault (upgrading a revision "D" Board has its problems), but I thought it was a bad disk and phoned Hogg Labs.

They mailed out a replacement disk the same day—not waiting to receive the disk I mailed back to them. Some other companies are this good to customers, but +@#%*& few.

Rainbow, keep up your good work. I like your Seal of Certification program. That will help keep your readers (like me) from wasting dollars on Fly-By-Night software.

Lee Snodgrass
Seattle

AUTO CARRIAGE RETURN

Editor:

This is in response to Paul Lee who was wanting to get an auto carriage return with a teletype while doing an *LLIST*.

1. Renumber your program with *RENUM*, each one being incremented by 10. Either do this with your Extended Basic or with *Scripsit* and global search of saved in ASCII.

2. Enter the direct command below after the desired program is *CLOADed into memory:*

FOR X= *(use beginning line number)* **TO** *(use ending line number)* **STEP 10: LLIST X: CHR$ (10): NEXT X**

Also, if anyone knows how to get back into BASIC from *Scripsit* to change Epson printer settings, please let me know. That way I will be able to use several different print styles on the same page without powering up and down every time.

Thank you for a great magazine.

Andy Fischer
Louisville, KY

NICKNAMES

Editor:

I was amused by your letters concerning the variety of nicknames for the Color Computer. In the month or so that I have owned mine, it has made three trips to the repair shop and is about ready to go for number four, so for an appropriate nickname I nominate "The Lemon."

Are there any user groups in the Cleveland area. And, can you use other kinds of tape other than "computer tape?" I would be happy to hear from other users if they will write me at 13833 Cedar Raod, Apt. 105, Cleveland, OH 44118.

Back to nicknames: How does "ColorCom" grab you? That should satisfy both those who think "CoCo" doesn't sound serious enough and those who don't approve of "80C" for a unit that is a 6809 rather than a Z-80.

Neil Edward Parks
Cleveland, OH

Editor's Note: Lemon or no, we've honestly heard of very little complaint about the 80C itself. And, for those of you who have been wondering—or have stopped at this column first—you might note we've relented a bit on nicknames. From now on, *the RAINBOW* will be using 80C and CoCo pretty much interchangably.

After all, "CoCo" does mean "the brain" in Spanish.

LIGHTS ON ANYONE?

Editor:

I did a 64K upgrade of my 80C. Before, it was 16K. I have a home lights/appliance controller with Tandy software. The software with the controller (two cassettes) applies for many different versions of the TRS-80 computers. I can't get any of the software to work with my upgraded 80C.

The applicable software worked fine with the 16K 80C. Has anyone run into this problem and could someone offer a solution?

John Martin
Churchville, MD

Editor's Note: Did you see Sandy Trevor's hint in last month's issue? Perhaps that will help.

PRINTER, PRINTER, PRINTER

Editor:

I have been truly delighted to watch the exponential growth of your publication. How do you manage to keep topping yourself each month?

Your August issue had a tongue-in-cheek letter from a Mr. Dave Hooper about the Line Printer VII. Please help us get it out of the closet!

I think many of us adopted the CoCo as an inexpensive way to learn about and use computers. I noted that even the *Rainbow*, before it achieved its well-deserved success, was printed with the much-maligned VII. I suspect that since Radio Shack has just dropped the price $100 that there will be even more of us unfortunates around.

I wrote to Radio Shack asking for more information on the Line Printer VII. I received a very nice letter from a Mr. Roy Irvine, product line manager-peripherals, who stated they are aware that the manual is very poor and that they are working on a *Printer Book*.

You could do all of us a tremendous favor by encouraging contributions such as Mr. Hooper alluded to, showing we beginners how to use it more intelligently. Your initial columns on printers have been much appreciated, in view of the poorly documented Radio Shack manual.

Ralph Fusco, M.D.
Miami, FL

Editor's Note: See the program by Kathy Goebel in this month's issue. It seems she and Mr. Hooper think much alike about the LP VII. *We* plan to do more of this support and we understand Mrs. Goebel has a new, but very extensive, LP VII program ready to offer someone.

HOW TO TELL

Editor:

One thing I noticed when the top was off my computer was that the Extended Basic ROM chip says that it is version 1.1. Yet, on powerup, my display says that it is version 1.0.

Which do I believe?

Marc Behr
Middletown, PA

Editor's Note: Funny you should ask. All of the ROMs say 1.0 when they are powered up, but you do not have to open the computer to see what one you have. According to Mark Kociscin of Piscataway, N.J., you can type *EXEC 41175* and the version of the ROM you have will appear on the screen.

CLUBS, CLUBS, CLUBS

Editor:

We finally stopped waiting around for someone else to do it. Yes, there is finally a user's group devoted to the best computers around. The Southern California Color Computer User's Group is now meeting in the Pasadena area. Anyone interested should call me at (213) 355-7719.

Mark Randall
Pasadena, CA

Editor:

We have just started a Color Computer user's group in the Toronto area. Anyone who is interested may phone me at (416) 425-1116 any weekday after 6 p.m. or on weekends.

(Mrs.) Patricia Jackson
Toronto, Ont.

Editor:

The TRS-80 User's Group of Cherry Hill, N.J., is operated to further the knowledge of all models of the TRS-80.

We meet the fourth Monday of each month at the Cherry Hill Library, King's Highway, Cherry Hill, N.J. Meetings start at 7:30 p.m. For information, call (609) 893-5120.

Brian McPhee
Cherry Hill, NJ

Editor:

We'd like to hear from Rhode Islanders interested in joining our Color Computer user's group. You can write me at 38 Cooke

St., Providence, RI 02906.

If you have a modem, try calling Syslink-80, the Club's official bulletin board, at (401) 272-1138.

Those who write should include a SASE, since we are not charging dues to keep down costs.

Andy Nulman
Providence, RI

Editor:

The Atlanta Color Computer User's Group meets on the third Tuesday of each month at the Nash Middle School in Smyrna, Ga. at 7:30 p.m.

Those interested can attend or call me for further information at (404) 953-6395.

Roy Green
Atlanta, GA

Editor:

I bought a Color Computer in June and discvered *the RAINBOW* in August. It is difficult to say which I'm happier with. My wife—the computer widow—has another opinion, but she may become a convert yet.

I would like to either join or start a Color Computer user group in the Utica-Mount Clement-New Baltimore area of Michigan. Anyone interested should call me at 949-4842.

John Herbert
Utica, MI

Editor:

A user group for the TRS-80 Color, VIC-20 and Sinclair computers has started in the Lansing area. Those interested may call our bulletin board at (517) 339-3367 or write me at P.O. Box 365, Haslett, MI.

Greg Miller
Lansing, MI

A RECORD

Editor:

My father just recently bought *Color Scarfman* for my sister and I. I am 14 years old and my sister is nine. We both find *Scarfman* very amusing and very difficult as you move up in levels.

On August 31 I hit a lucky streak and broke the current world record of 288,630. My score was 388,060 and I was on level 17.

I was wondering if anyone else has broken the current world record? If someone has, what was the score and level? I would be glad to receive any letters on *Scarfman* at 1764 Kennedy Dr., Milpitas, CA.

Michelle Thompson
Milpitas, CA

NONSENSE?

Editor:

The months of June and July have shown a marked increase in "nonsense" programming. I believe you are doing a disservice to your readership. We are serious, intelligent and, probably, novices to the world of microcomputing.

However, page after page of game and graphics programming is truly beneath our level of intelligence.

Robert Popper
New York City

PRINT #-2,

Perhaps we should dedicate this issue to the brave and valiant customs agents to the North who, for a number of days, "protected" our Canadian subscribers from the perils of *the RAINBOW* in August.

I suppose I should start this off by saying I learn something new every day, and one of the things which I learned a in connection with getting the August issue out is that dealing with customs can be frustrating.

A bit of background is probably necessary. International Postal regulations require that mail sent to Canada must go first class in the United States. It then goes air mail in Canada itself. Besides requiring that each copy of *the RAINBOW* be placed in an envelope, it also means that, in August, each would cost us $1.58 to send. The postage, thus, was more than the subscription cost.

The result was that we were losing a bunch of money on each subscription to Canada, and we had to find a better way. Either that or raise rates—which, in my estimation, are already too high for non-U.S. subscriptions. Yet, we can only estimate the cost of postage when we figure these subscriptions—and *the RAINBOW* has grown so fast (this month's issue is double the size it was in July!) that the weight has far outstripped our estimates of what it would cost to mail.

Thanks to some friends in Canada, we tried sending August's issue by U.P.S. to a nice little town in Montana where a "border broker" would get the magazines across, send them to the friend, and let him mail them internally at internal postage rates. A couple of months work went into the planning, but we failed to figure on the fearless Canadian customs patrol.

Said patrol spent something like 10 days studying *the RAINBOW* befor releasing it (Do they own Color Computers there?). That, plus the slower internal mail delayed delivery of our August issue for some time.

We think that, by the time you read this, all the bugs will be out of the system and we'll be getting *the RAINBOW* to our many Canadian subscribers more quickly. The magazine will never arrive quite as fast as it did by first class mail from the U.S., but the alternate would be to raise rates to a degree that postage for a Canadian subscription would more than double the cost of a subscription. We think that is unacceptable to the majority of you, even though we appreciate the fine comments from many who said that they would pay no matter what the cost.

In case you have not yet sent in your survey form from the September issue, we are revising the rules somewhat. Yes, you can photocopy the page. To date, we have received several hundred responses, and a number of complaints from people who didn't want to tear out the page.

Sorry. It was an idea that probably was neither good nor necessary, anyway.

Please note that there are two new columnists in *the RAINBOW* this month. Please join us and welcome Don Inman and Charlie Roslund as contributing editors.

Neither needs much introduction. Don is the acknowledged master of computer graphics and has turned his atten

—Continued on Page 129

Arnold C. Pouch

We are deeply saddened to report the passing of Arnold C. Pouch, the inventor of *Motion Picture Programming* and president of Superior Graphic Software.

In the short life of the 80C, Arnold Pouch was one of the giants among programmers. His innovative techniques, fresh ideas and enthusiam were evident in rare combination. His gentle good humor, friendliness and understanding of people as well as the machine he knew and loved so well, made him a wonderful person to know and to work with.

We shall all miss him.

Business...

Pope Gregory Would Like This Calendar

16K ECB

By Herbert B. Ridge

On a recent vacation I saw a plaque which displayed this truism: "The Difference Between Men And Boys Is The Price Of Their Toys." When I think of what I fondly refer to as "my computer room" I know the creator of that short saying must be a computer enthusiast.

I am also sure he knows, as you do, our "toys," in addition to entertaining, quickly become essential in all our day-to-day endeavors.

My program will help you keep track of those day-to-day endeavors day-by-day.

The following program listing prints the universally accepted Gregorian Calendar (implemented by Pope Gregory XIII). It is accurate from January, 1981 until the Gregorian calendar must be adjusted. Furthermore, when used with the Color Computer, it works with "all" printers. Once running, all you need do is follow the computer's instructions.

You are asked to enter the paper type (e.g. roll paper, single sheet, or fan-fold), the starting year (e.g. 1982), the starting mongh (e.g. March or Mar), and the number of consecutive months (e.g. 12) for which you need a calendar. Set your paper at top-of-form and stand back.

I k
though small, fills a big hole. I am sure you will be pleased with the unique appearance of its product.

I am a supervisor of computer instructors where scheduling accuracy, on a scale of 1 to 10, rates a 15. My "year-at-a-glance" I keep hanging beside my desk is a real lifesaver. At home it keeps the entire family fully advised. I am absolutely, without a doubt positive, you will come up with uses for your own calendar that I have not mentioned here nor yet thought of.

This BASIC program is easily understood which makes it easily modified. The REM Statements pertain to the line number(s) numerically closest to them and make the program operation understandable. If you keep your *Rainbows* you need only type in the line numbers divisible by ten.

The modification possibilities are endless. You may want to make it wider. You may want to add a printout of holidays and special reminders for relatives' birthdays, anniversaries, etc. You may want to change the asterisks to block graphics characters. I have done all these things to my personalized calendar but I leave your personalization to the best qualified: YOU!

This is a program which is good for several lifetimes. I hope it serves you as well as it does me. Good Luck!

The Listing:

```
10 '********************
20 '*HERBERT B. RIDGE*
30 '*212B TYNDDALL    *
40 '*CO. SPRGS. CO.   *
50 '*            80916*
60 '********************
70 '*    CALENDAR     *
80 '********************
89 REM BECAUSE SOUND WILL BE USE
D TO INDICATE OPERATOR ACTIONS,
SOFTWARE ALLOWS VOLUME TO BE SET
 BY SOUNDING A 6 SECOND TONE
90 CLS:PRINT@38,"YOU HAVE 6 SECO
NDS"
100 PRINT@103,"TO ADJUST VOLUME"
110 SOUND200,100
120 CLS:PRINT@34,"*IF USING ROLL
 PAPER ENTER 1":PRINT@97,"**IF U
SING SINGLE SHEET PAPER     ENTE
R 2
                                --EL
SE JUST ENTER";
130 INPUTRP
140 DIMA$(45)
150 CLS
160 DATA 1,2,3,4,5,6,7,8,9,10,11
,12,13,14,15,16,17,18,19,20,21,2
2,23,24,25,26,27,28,29,30,31,  ,
170 FORX=1TO100
180 CLS0:NEXT
189 REM SOFTWARE REQUESTS NEEDED
 INFORMATION
190 PRINT@8," ENTER: ";
200 SOUND200,5:PRINT@72," 1.YEAR
 ";:INPUTA
210 SOUND200,5:PRINT@104," 2.MON
TH ";:INPUTA$
220 SOUND200,5:PRINT@136," 3.# O
F MONTHS ";:INPUTMM
230 CLS0:SOUND200,5
240 PRINT@6," 1. READY PRINTER "
;
```


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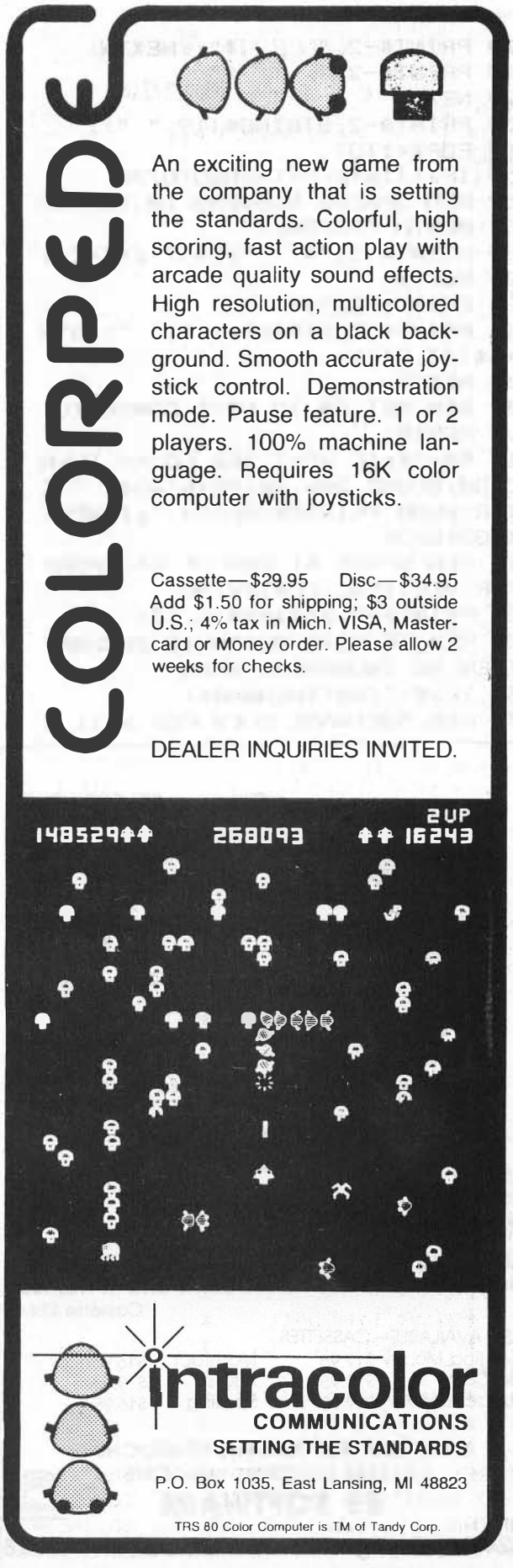
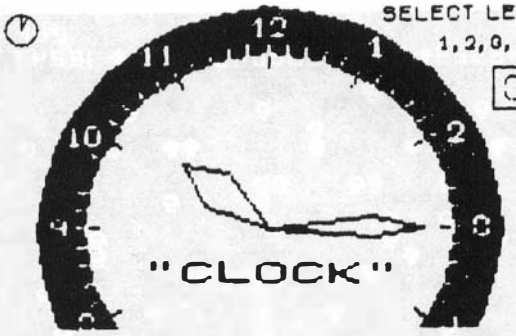
```
250 PRINT@71," 2. POSITION PAPER
 ";
260 PRINT@136," 3. ENTER ";:INPU
TX
269 REM LO WILL CONTROL THE NUMB
ER OF MONTHS TO BE PRINTED
270 FORLO=1TOMM
279 REM SOFTWARE GOES FOR A SUBR
OUTINE THAT SETS UP A$(X) WITH C
ORRECT DATA FOR MONTH TO BE PRIN
TED
280 GOSUB740
290 SOUND190,3:SOUND160,3:CLS0:P
RINT@261," PRINTING ";A$;",";A;
299 REM SOFTWARE SETS UP K SO CA
LENDAR WILL BE CENTERED VERTICAL
LY ON PAGE WHEN USING FANFOLD PA
PER
300 K=13
310 IFE=6ORE=7THENK=10
320 IFA$<>"APR"ANDA$<>"NOV"ANDA$
<>"JUN"ANDA$<>"SEP"THENGOTO340
330 IFE=7THENK=13:F=1
340 IFA$="FEB"THENK=13:J=5
350 IFE=1ANDA$="FEB"ANDD=0THENK=
16:J=4
360 IFRP=1THENK=3
361 REM K=3 IF USING ROLL PAPER.
  THIS WILL SPACE 6 SPACES BETWE
EN CALENDARS IRREGARDLESS OF CAL
ENDAR LENGTH
370 PRINT#-2,STRING$(K,13)
379 REM PRINT MONTH & YEAR BLOCK
380 PRINT#-2,STRING$(34," ");STR
ING$(13,"=")
390 PRINT#-2,STRING$(34," ");"*"
;STRING$(11," ");"*"
400 PRINT#-2,STRING$(34," ");"*
";A$;" ";A;"*"
410 PRINT#-2,STRING$(34," ");"*"
;STRING$(11," ");"*"
420 PRINT#-2,STRING$(34," ");STR
ING$(13,"=")
430 PRINT#-2,""
439 REM PRINT DAYS OF WEEK UNDER
 MONTH YEAR TITLE
440 PRINT#-2,STRING$(21," ");"SU
N   MON   TUE   WED   THU   FRI
  SAT"
449 REM BEGIN PRINTING CALENDAR
BLOCKS AND INSERTING DATA BASE (
1,2,3,ETC.)
450 PRINT#-2,STRING$(19," ");STR
ING$(43,"*")
460 FORY=1TOJ
470 FORX=1TO4
480 PRINT#-2,STRING$(19," ");"*"
;
490 FORW=1TO6
```

```
500 PRINT#-2,"      *";:NEXTW
510 PRINT#-2,"      *"
520 NEXTX
530 PRINT#-2,STRING$(19," ");
540 FORX=1TO7
550 IFZ<(10+E-1)THENGOTO700
559 REM SPACES NUMBERS 10 TO END
 OF MONTH PROPERLY
560 PRINT#-2,"*    ";A$(Z);:Z=Z+1
570 NEXTX
580 PRINT#-2,"*"
590 PRINT#-2,STRING$(19," ");STR
ING$(43,"*")
600 NEXTY
609 REM SET A$ TO NEXT CONSECTUT
IVE MONTH
610 A$=Z$:IF RP=2 AND LO<MM THEN
 CLS0:SOUND 200,20:PRINT@34, " E
NTER WHEN PRINTER READY ";:INPUT
 X:GOTO630
619 REM SPACE AT END OF CALENDAR
 FOR VERTICAL CENTERING
620 PRINT#-2,STRING$(K,13)
629 REM IF NEXT MONTH IS JANUARY
 THEN WE INCREMENT YEAR
630 IFZ$="JAN"THENA=A+1
639 REM SOFTWARE GOES FOR NEXT M
ONTH
640 NEXT LO
649 REM DETERMINE IF ANOTHER PRI
NT SEQUENCE DESIRED
650 CLS:SOUND160,5:SOUND200,5:SO
UND160,2:PRINT@37,"WANT ANOTHER?
 (Y OR N)"
660 PA$=INKEY$
670 IFPA$=""GOTO660
680 IFPA$="Y"GOTO150
690 IFPA$="N"THENENDELSEGOTO660
699 REM SPACES NUMBERS 1-9 PROPE
RLY
700 PRINT#-2,"*     ";A$(Z);:Z=Z+
1
710 :NEXTX
720 PRINT#-2,"*"
730 GOTO590
739 REM DETERMINE HOW MANY DAYS
(R) YOUR CALENDAR YEAR IS FROM 1
980
740 FT=A-1980:LY=INT(FT/4):R=((F
T-1)*365)+LY
750 D=0:A$=LEFT$(A$,3)
760 FT=FT-4:J=5
769 REM IF FT=0 (D=1) THEN YOU A
RE PRINTING CALENDAR FOR A LEAP
YEAR
770 IFFT=0THENGOTO790
780 IFFT<0THENGOTO800ELSEGOTO760
790 D=1
799 REM SOFTWARE DETERMINES HOW
MANY DAYS INTO CALENDAR YEAR CUR
RENT MONTH IS THEN ADDS TO R.  Z
$ BECOMES NEXT CONSECUVIVE MONTH
800 IFA$="JAN"THENZ$="FEB":R=R-D
810 IFA$="FEB"THENR=R-D+31:Z$="M
AR"
820 IFA$="MAR"THENR=R+59:Z$="APR
"
830 IFA$="APR"THENR=R+90:Z$="MAY
"
840 IFA$="MAY"THENR=R+120:Z$="JU
N"
850 IFA$="JUN"THENR=R+151:Z$="JU
L"
860 IFA$="JUL"THENR=R+181:Z$="AU
G"
870 IFA$="AUG"THENR=R+212:Z$="SE
P"
880 IFA$="SEP"THENR=R+243:Z$="OC
T"
890 IFA$="OCT"THENR=R+273:Z$="NO
V"
900 IFA$="NOV"THENR=R+304:Z$="DE
C"
910 IFA$="DEC"THENR=R+334:Z$="JA
N"
919 REM START SUBTRACTING MULTIP
```

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10:15

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```
LES OF 7 FROM R
920 IFR>1456ØTHENR=R-1456Ø:GOTO9
2Ø
930 IFR>1456THENR=R-1456:GOTO930
940 IFR>364THENR=R-364:GOTO940
950 IFR>182THENR=R-182:GOTO950
960 IFR>56THENR=R-56:GOTO960
970 IFR>28THENR=R-28:GOTO970
980 IFR>=7THENR=R-7:GOTO980
981 REM R IS NOW SOMEWHERE BETWE
EN Ø&6.  SET E UP, DEPENDENT ON
R.  E WILL DETERMINE WHERE DAY 1
 GOES IN THE CALENDAR.  E=1-7=SU
N-SAT RESPECTIVELY
990 IFR=ØTHENE=5
1000 IFR=1THENE=6:J=6:IFA$="APR"
ORA$="JUN"ORA$="SEP"ORA$="NOV" T
HEN J=5
1010 IF R=2THENE=7:J=6
1020 IFR=3THENFORX=1TO31:READA$(
X):NEXTX:E=1:GOTO1060
1030 IFR=4THENE=2
1040 IFR=5THENE=3
1050 IFR=6THENE=4
1060 IFA$="SEP"ORA$="APR"ORA$="J
UN"ORA$="NOV"THENC=30ELSEC=31
1061 REM JUST SET UP FOR A 30 OR
 31 DAY MONTH
1070 IFA$="FEB"THENC=28+D
1071 REM JUST SET UP FOR A 28 DA
Y FEBRUARY OR 29 IF A LEAP YEAR
1079 REM NEXT 7 LINES SET UP DAT
A BASE WITH SPACES FOR BLOCKS WH
ERE NO NUMBER GOES
1080 IFE=1THENGOTO1130
1090 FORX=1TO(E-1):A$(X)="  "
1100 NEXTX
1110 FORX=E TO(C+E):READA$(X)
1120 NEXTX
1130 FORX=(C+E)TO45:A$(X)="  "
1140 NEXTX
1150 RESTORE
1160 Z=1:'RESET DATE COUNTER <A$
(Z)>
1170 RETURN
```


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The dealer is chosen by high card. He then deals the first five-card hand to each player. An ante of $5 is required of each player—no matter which level you choose to play in—before cards are dealt. Each player then looks at his hand and bets accordingly. You have four options during the betting: fold, check, call or raise. The computer tends to all accounting, including each player's stake, the amount in the pot and displays the amounts each player must call to stay in.

After the first round of betting, each player not folding may draw up to three cards to better his hand. Another round of betting then occurs and if more than one players remains, a "showdown" takes place where each remaining player reveals his hand and the winner is declared.

The game ends if, after a given hand, you elect to end the game or one player has more than $2000 or less than $1. When the game ends, each player's winnings or losses are displayed by the 80C.

Written in Basic, we feel that this is a very realistic poker game for both those just learning the game and those "advanced" and "experienced" players. We also like the fact that, as in real-life poker, the computer is programmed for "showdowns," "tie hands" and "draws;" you also have the option of replacing the current deck of cards with a new one. The program features full color graphics with extensive sound effects and no joysticks are required.

We were pleased with "CC Poker" and the completeness of the program it offers.

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Let's Learn How To Use Graphics With CoCo

By Don Inman
Rainbow Contributing Editor

In The Beginning

This article is the beginning of a series on the graphics capabilities of the TRS-80 Color Computer using Extended Color BASIC. Some of the material in this article is taken from the book, TRS-80 Color Computer Graphics, Chapter 2, published by Reston Publishing Co., Inc., Reston, Virginia. The series may seem very elementary for some you at first. We are starting with the assumption that you know very little about the Color Computer's graphic capabilities. We'll pick up speed as we go along and eventually demonstrate some complex and fairly sophisticated techniques. The author encourages you to contact him at: Dymax, PO Box 310, Menlo Park, CA 94025.

Details

There is some detailed work that must be done to set up the screen for Extended Color BASIC graphics. Three statements are normally used to do this.

1. Select One Of The Five Graphics Modes

PMODE n,m

n *is an integer from 0 through 4 that selects the mode*

m *is an integer from 0 through 8 that selects the starting page*

2. Clear The Screen

PCLS or PCLS n

n *is an integer from 0 through 8 that selects the background color. If not specified, the current background color is used. Colors are restricted to those of the PMODE being used.*

3. Turn On The Screen.

SCREEN n,m

n *is either 0 (text) or 1 (graphics)*

m *is either 0 (color set 0) or 1 (color set 1)*

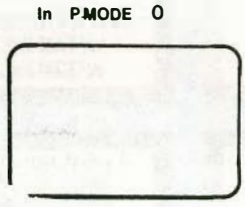
Graphic Modes

The five graphic modes available from BASIC include two 4-color modes and three 2-color modes. Different modes provide different resolution (size and number of elements displayed) as well as the 2 or 4 color options. Table 1 shows these differences using page 1 as the starting graphics page.

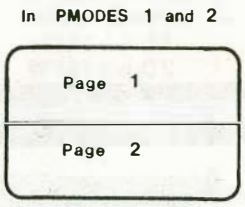
Table 1 Graphic Modes

PMODE Statement	Resolution	# of Color	Element Size	Pages To Fill Screen
PMODE 4,1	256x192	2	□	4
PMODE 3,1	128x192	4	□□	4
PMODE 2,1	128x192	2	□□	2
PMODE 1,1	128x96	4	□□ □□	2
PMODE 0,1	128x96	2	□□ □□	1

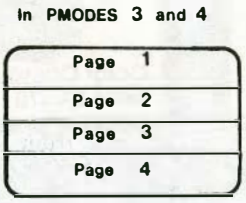
Notice the last column of the table. Four pages of memory are used (1.5K per page) in modes 3 and 4 to fill the graphic screen. The elements in PMODE 4 are one-half the size of those in PMODE 3. Two pages of memory are needed to fill the graphic screen in modes 1 and 2. PMODE 0 uses only one page of memory.



1 Page Fills The Screen



2 Pages Fill The Screen



4 Pages Fill The Screen

Clearing The Screen

This step is necessary to clear any garbage from the graphics pages before drawing your picture. The background colors used are restricted to the mode and color set that you are using. The options are shown in Table 2. The 2-color modes may use one of two pairs (black/green or black/buff) depending on the color set selected by the SCREEN statement. The 4-color modes may use any one of the four colors (green/yellow/blue/red or buff/cyan/magenta/orange) depending on the color set selected.

Turning On The Screen

The screen must be "turned on" if you want to see your graphics. In many programs, however, you may want to fill a screen with graphics before turning on the display. This is quite useful in animation when one screenfull is displayed while you are drawing on the second screen. We'll use this technique in the next article in this series. The SCREEN statements for the five graphic modes are shown in Table 2.

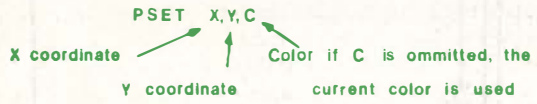
Table 2 Background and Foreground Colors

PMODE Statement	SCREEN Statement	Normal Background	Normal Foreground
PMODE 4,1	SCREEN 1,0	black	green
or PMODE 2,1 or PMODE 0,1	SCREEN 1,1	black	buff
PMODE 3,1	SCREEN 1,0	green	yellow/blue red
or PMODE 1,1	SCREEN 1,1	buff	cyan/orange magenta

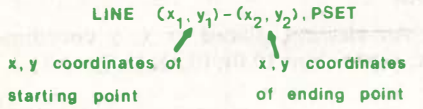
Methods For Drawing Straight Lines

There are three basic ways to draw a straight line with Extended Color BASIC. We'll give a brief description of each method and then give a demonstration using a time clock to compare the speed of each method.

The first way is to PSET each individual point on the line. The PSET statement allows you to specify the coordinates of each point and the color of the points.

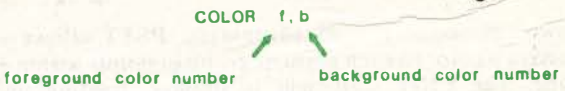


The second method uses the LINE statement in two different forms. A straight line can be drawn by:



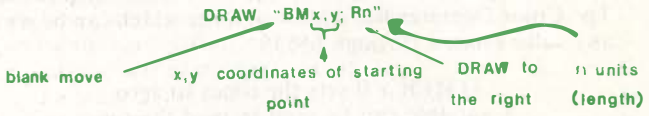
A second line can be drawn from the ending point of the first line by the statement:

The x,y coordinates are integers selected from 0 through 255 for x and 0 through 127 for y. The color of the line is selected by the statement:



The numbers for f and b are integers corresponding to the colors of the currently used color set. The colors selected stay in effect until changed by some future statement.

The third method uses the DRAW string statement that selects a starting point, a direction, and a distance. The format could be in the following form although there are many variations.



The string in quotes defines the line to be drawn. The COLOR statement is again used to define the color of the line. Eight directions are possible:

Three Ways To Go

You might well ask, "If all three methods are capable of doing the same thing, why should Extended Color BASIC include all three?" Well, each of the three methods has its

—Continued on Next Page

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own "personality" and advantages. PSET allows you to assign a color to each point or group of points within a given line. The LINE statement is simpler, needing only the starting and ending points, but the whole line will be the color stated in the COLOR statement. The DRAW statement is more complex, but also has many features lacking in the other two methods.

It would be interesting to see which method is the fastest. This brings up another useful statement in the Color Computer's vocabulary.

The TIMER

You don't need a stop watch to time the three methods. The Color Compter has a built-in timer which can be set to any value from 0 through 65535.

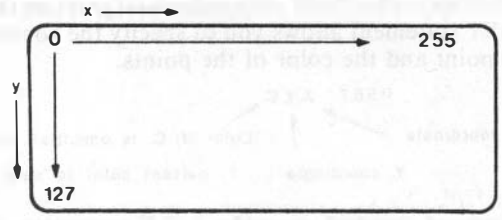
TIMER = 0 sets the timer to zero.
A variable can be used to read the timer
T = TIMER

Therefore, we can time each of our three methods by setting the timer to zero at the start of the program and reading the timer at the end of the program. The timer counts 60 times a second. To convert the timer reading to seconds, divide the reading by 60.

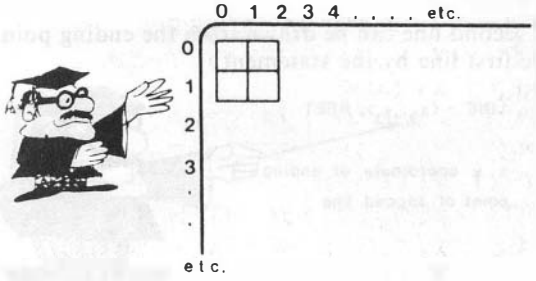
The programs used for comparison all perform the following simple line drawings.

1. A small yellow box in the upper left of the screen
2. A larger blue box in the center of the screen
3. A small red box in the lower right of the screen

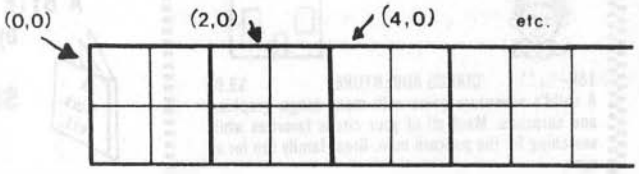
The programs use PMODE 1 with color set 0 (green, yellow, blue, red). The addressable x, y coordinates are 256 (0-255 for x) by 128 (0-127 for y). Since each graphic element in PMODE 1 occupies 4 x, y positions (2 x 2), the resolution for this mode is 128 by 96 elements.



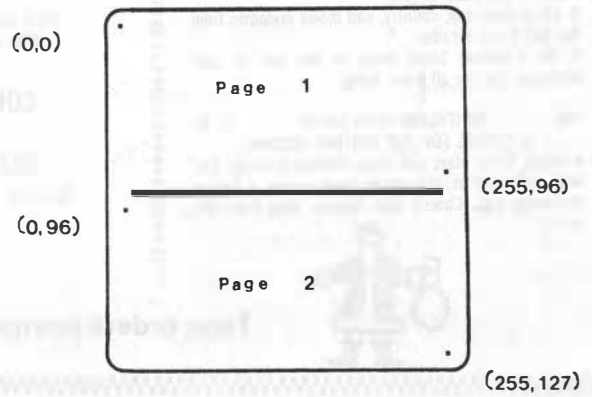
Example: An element placed at x, y coordinates (0, 0) occupies x, y positions (0,0); (0,1); (1,0); (1,1)



To draw a line, either horizontally or vertically, you only set alternate x, y positions for a continuous line.



Two pages of graphic memory are used in PMODE 1. Positions (0,0) through (255,95) are displayed by page 1 (upper half of screen), and positions (0,96) through (255,127) are displayed by page 2 (lower half of screen). This is also true for PMODE 2. We will discuss changing pages in the next article.



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Demonstration Programs

The following three programs demonstrate the three methods for drawing straight lines. The timer is used for comparing execution times of the drawings. The results are printed in seconds. Enter and run the programs. Then compare your run times with ours.

```
100 PMODE 1,1
110 PCLS:SCREEN 1,0
120 TIMER=0
130 X=10
140 FOR Y=10 TO 40 STEP2
150 PSET(X,Y,2):PSET(X+36,Y,2)
160 NEXT Y:Y=Y-1
170 FOR X=10 TO 46 STEP2
180 PSET(X,Y,2):PSET(X,Y-30,2)
190 NEXT X:X=80
200 FOR Y=70 TO 120 STEP2
210 PSET(X,Y,3):PSET(X+76,Y,3)
220 NEXT Y:Y=Y-1
230 FOR X=80 TO 156 STEP2
240 PSET(X,Y,3):PSET(X,Y-50,3)
250 NEXT X:X=200
260 FOR Y=150 TO 180 STEP2
270 PSET(X,Y,4):PSET(X+36 ,Y,4)
280 NEXT Y:Y=Y-1
290 FOR X=200 TO 236 STEP2
300 PSET(X,Y,4):PSET(X,Y-30,4)
310 NEXT X
320 T=TIMER
330 FOR W=1 TO 500:NEXT W
340 PRINT T/60;"SECONDS"
350 END
```

LINE BOXES .167 to .183 seconds

PSET BOXES 2.3 to 2.35 seconds

```
100 PMODE 1,1
110 PCLS:SCREEN 1,0
120 TIMER=0
130 COLOR 2,1
140 LINE(10,10)-(10,40),PSET
150 LINE-(45,40),PSET
160 LINE-(45,10),PSET
170 LINE-(10,10),PSET
180 COLOR 3,1
190 LINE(80,70)-(80,120),PSET
200 LINE-(156,120),PSET
210 LINE-(156,70),PSET
220 LINE-(80,70),PSET
230 COLOR 4,1
240 LINE(200,150)-(200,180),PSET
250 LINE -(236,180),PSET
260 LINE -(236,150),PSET
270 LINE -(200,150),PSET
280 T=TIMER
290 FOR W=1 TO 500:NEXT W
300 PRINT T/60;"SECONDS"
310 END
```

DRAW BOXES .083 seconds

```
100 PMODE 1,1
110 PCLS:SCREEN 1,0
120 TIMER=0
130 COLOR 2,1
140 DRAW"BM10,10;D30R36U30L36"
150 COLOR 3,1
160 DRAW"BM80,70;D50R76U50L76"
170 COLOR 4,1
180 DRAW"BM200,150;D30R36U30L36"
190 T=TIMER
200 FOR W=1 TO 500:NEXT W
210 PRINT T/60;"SECONDS"
220 END
```

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Some Plain Talk About a DOS
or
Why You Should Use STAR-DOS

The Disk Operating System, or DOS for short, is a program which acts as a file manager for a disk. The DOS acts as a buffer between the disk hardware, and the software which uses that disk. Its primary function is to maintain a disk directory on each disk, fetch program or data files from the disk as needed, and store programs or data back on the disk.

When you buy the Radio Shack Disk System for the Color Computer, a Read Only Memory (ROM) integrated circuit inside the disk controller contains those parts of a DOS which change Extended Basic into Disk Extended Basic. Although this Basic allows you to initialize a disk, maintain a disk directory, store and fetch programs and data, and do many other functions of a real DOS, it has one major drawback — it only works with Basic. There is no easy way to integrate it with machine or assembly language programs, and so you are still limited by the speed and power of Basic.

For this reason, many sophisticated Color Computer users are seriously considering switching to another DOS. Some of our competitors are marketing a very flexible DOS, long a favorite among users of larger 6809 systems, which has been adapted to run on the Color Computer. This particular DOS is quite popular among other 6809 users, and there are many available programs which run under it. But it has several disadvantages. It often requires that you void your warranty by opening and modifying the Color Computer. It is completely incompatible with the Radio Shack DOS, and the two cannot read each other's disks. It's also expensive — since you must buy a new Basic to make full use of it (normal Radio Shack Basic disk commands don't work with it), you must pretty much discard all your existing software and start over — new DOS, new Basic, new editor, new text processor, etc. etc.

STAR-DOS is the Solution

STAR-DOS is a real DOS which blends all the best features you want into one DOS. STAR-DOS will run on a standard, unmodified 16K or larger Color Computer using the Radio Shack disk system. Its disk format is fully compatible with Radio Shack Disk Basic — files written by Basic can be read by STAR-DOS and vice versa. Since there is full disk compatibility, you need not throw out your existing programs or files.

But the beauty of STAR-DOS becomes obvious to the serious user. From the programmer's viewpoint, STAR-DOS is just like other standard 6809 Disk Operating Systems. It provides all the standard features you need, such as provisions for multiple 320-byte file control blocks, routines to open, read, write, and close named files, rename or delete files, read or write single sectors, search or modify the directory, and more. STAR-DOS is so powerful that many programs written for other 6809 systems can be run with STAR-DOS just by changing a few addresses.

STAR-DOS is supplied on a disk with a comprehensive user and programmer's manual, which explains all available routines and entry points, along with examples showing how to use them. The manual explains how to convert programs running under another DOS to run with STAR-DOS. It also comes with a number of utilities to make use of your disk system even easier and faster. It costs just $49.90 and is available NOW.

Available NOW for STAR-DOS

ALL-IN-ONE — the super Text Editor/Text Processor/Mailing List/Mailing Label program from AAA Chicago Computer Center which can process your text and even print individually addressed form letters from your mailing list. Adapted for STAR-DOS and available NOW for just $50.

SPELL 'N FIX — the spelling correction program now available in the original Color Computer version or the new, much faster, STAR-DOS version. Finds and fixes spelling and typo errors fast, and costs $69.29.

COMING . . . more software running under STAR-DOS is in the works. Write for details, or see last month's ad for other programs.

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- ★ Checks your text against a 20,000 word dictionary and finds your spelling and typing errors.
- ★ Displays all questionable words, or prints them on your printer for later action.
- ★ Even corrects errors in your text. Wrong words can be highlighted or changed to their correct spelling.
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- ★ Dictionary can be expanded and customized — technical and even foreign words are easily added.
- ★ Available for the Radio Shack disc, cassette, or Flex disk operating system.
- ★ Compatible with all Color Computer Text Processors, including TeleWriter!

SPELL 'N FIX is available off-the-shelf right NOW, and costs $69.29 in the Radio Shack disk or cassette versions (32K RAM required!); $89.29 in the Flex version. (Other versions, including Percom DOS, SSB DOS, and OS-9 versions also available — contact us.)

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HUMBUG is the famous SUPER MONITOR for 6800 and 6809 systems — you can now use it on your Color Computer too.

HUMBUG is a complete machine language monitor and debugging system which allows access to the full power of the 6809E processor in the computer. HUMBUG lets you

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- ★ Test, checksum, and compare memory contents.
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HUMBUG is available right NOW on disk or cassette for $39.95 for 16K or 32K Color Computers. Special version for 64K systems costs $59.29 and is compatible with software for large 6809 systems.

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Business...

Key Checks To Various Accounts With This Program

16K

By Ron Garrett

This 12-"column" ledger program, offered to readers of *the RAINBOW* from the East Texas Color Computer Club, allows you to designate spending areas for a check or payment into different categories for business expenses.

The program is fairly straightforward and easy to use, being self-prompting in nature. Readers who wish to change the names of the accounts may do so simply by editing the DATA statements in Lines 1100-1130.

This program can be used by either a small business or by a private individual who wishes to account for checks by spending category. For the business, this will allow control of spending by item. For the individual, it will be very handy at income tax time.

As an example, let's say that you write a check to the electric company (who doesn't). By designating column seven, you will "post" the check to the utilities account and be able to keep a running record of how much was paid to them.

This program does not automatically carry grand totals for the year forward, but you can enter in the totals from the previous month and obtain new totals next month. Simply keep a record of each month's printouts.

The Listing:

```
1 'THIS PROGRAM WAS CONVERTED FO
R THE
2 'COLOR COMPUTER BY RON GARRETT
 FOR
3 'THE EAST TEXAS COLOR COMPUTER
 CLUB,
4 '2101 EAST MAIN, HENDERSON, TE
XAS
5 '75652.
6 '
7 'THIS PROGRAM IS AVAILABLE ON
8 'TAPE FROM THE CLUB FOR ONLY
9 '$2.00 TO COVER POSTAGE AND HA
NDLING.
10 '
20 CLEAR 300:DIMA$(14)
30 S$="%                % ##,###,###
.##      %              %  ##,###,
###.##"
40 N$="##,###,###.##"
50 A=0:B=0:C=0:D=0:E=0:F=0:G=0:H
=0:I=0:J=0:K=0:L=0:M=0:P=0:R=0:S
=0:W=0:X=0:Y=0
60 S1=0:B1=0:C1=0:D1=0:E1=0:F1=0
:G1=0:H1=0:I1=0:J1=0:K1=0:L1=0
70 S2=0:B2=0:C2=0:D2=0:E2=0:F2=0
:G2=0:H2=0:I2=0:J2=0:K2=0:L2=0
80 POKE 16425,1:REM SETS PRINTER
 LINE COUNTER AT FIRST LINE
90 CLS:PRINT:PRINT"        12 COL
UMN LEDGER":PRINT
100 INPUT"DO YOU WANT INSTRUCTIO
NS";A$
110 IF LEFT$(A$,1)="Y" THEN GOTO
 1350
120 CLS:PRINT"THESE ARE THE HEAD
INGS ENTERED  IN DATA LINES 3060
 TO 3090."
130 PRINT"...CHANGE THEM IF NECE
SSARY.....":FOR LF=1 TO 300:NEXT
 LF:CLS:GOTO 1040
140 CLS:PRINT:PRINT"** TURN ON P
RINTER OR OR THE    ** PROGRAM W
ILL FREEZE UP ***"
150 PRINT:PRINT@230,"";:INPUT"DO
 YOU HAVE PREVIOUS          ****
* GRAND TOTALS *****         ****
*   TO ENTER   *****    ";O$
160 IF LEFT$(O$,1)="Y" THEN GOTO
 1140
170 GOSUB 1290:CLS:PRINT#-2:PRIN
T#-2,"      BEGINS NEW PAGE...":
PRINT#-2
180 A=0:B=0:C=0:D=0:E=0:F=0:G=0:
H=0:I=0:J=0:K=0:L=0:S=0
190 IF LEFT$(R$,1)="Y" THEN S1=0
:B1=0:C1=0:D1=0:E1=0:F1=0
200 IF LEFT$(R$,1)="Y" THEN G1=0
:H1=0:I1=0:J1=0:K1=0:L1=0
210 X=0:Y=0:P=0:M=0:R=0:R$=""
220 PRINT#-2,"DATE";TAB(6);"CHEC
K#";TAB(19);"AMOUNT";TAB(32);"TO
 WHOM AND PURPOSE";TAB(60);"COLU
MN#"
```


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A.B. Trevor, Exec. Vice President

```
230 CLS:PRINTA$(1);TAB(17);A$(7)
240 PRINTA$(2);TAB(17);A$(8)
250 PRINTA$(3);TAB(17);A$(9)
260 PRINTA$(4);TAB(17);A$(10)
270 PRINTA$(5);TAB(17);A$(11)
280 PRINTA$(6);TAB(17);A$(12)
290 PRINT"....FOR PAGE TOTALS:
          TOTAL,0,0     ENTER"
300 PRINT"----------------------
---------"
310 PRINT"LINE #";PEEK(16425)-1;
":";D1$;",";C1$;",";A1;",";W1$;"
...COLUMN";X1
320 GOSUB 1290:PRINT"DATE,CHECK#
,AMOUNT";:INPUTD$,C$,A
330 IFD$="TOTAL" THEN 560
340 PRINT"TO WHOM - PURPOSE ....
.........":INPUTW$
350 INPUT"       COLUMN";X
360 IF X<2 OR X>12 THEN PRINT"CO
LUMN ENTRY ERROR!!              ON
LY 2 TO 12 IS VALID":GOTO 350
370 INPUT"CORRECT? (Y/N)";Z$
380 IF LEFT$(Z$,1)="N" THEN GOTO
 230
390 D1$=D$:C1$=C$:A1=A:W1$=W$:X1
=X
400 S=S+A
410 PRINT#-2,D$;TAB(6);C$;TAB(12
);:PRINT#-2,USING N$;A;:PRINT#-2
,TAB(28);W$;TAB(62);X
420 REM SELECT COLUMN AND ADD TO
 PREVIOUS TOTAL
430 ON X-1 GOTO 440,450,460,470,
480,490,500,510,520,530,540
440 B=B+A:GOTO 550
450 C=C+A:GOTO 550
460 D=D+A:GOTO 550
470 E=E+A:GOTO 550
480 F=F+A:GOTO 550
490 G=G+A:GOTO 550
500 H=H+A:GOTO 550
510 I=I+A:GOTO 550
520 J=J+A:GOTO 550
530 K=K+A:GOTO 550
540 L=L+A
550 GOTO 230
560 GOSUB1290:PRINT:PRINT"* PAGE
 * TOTALS BEING PRINTED..."
570 PRINT#-2:PRINT#-2:PRINT#-2,"
* PAGE TOTALS *":GOTO 600
580 GOSUB 1290:PRINT:PRINT"* MON
TH * TOTALS BEING PRINTED.."
590 PRINT#-2:PRINT#-2:PRINT#-2,"
 ** MONTH TOTALS **"
600 IF M=1 GOTO 740
610 IF P=1 GOTO 680
620 PRINT#-2,USING S$;A$(1);S;A$
(7);G
630 PRINT#-2,USING S$;A$(2);B;A$
```


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SCEPTER OF KZIRGLA

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*Reviewed in the RAINBOW

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```
(8);H
640 PRINT#-2,USING S$;A$(3);C;A$
(9);I
650 PRINT#-2,USING S$;A$(4);D;A$
(10);J
660 PRINT#-2,USING S$;A$(5);E;A$
(11);K
670 PRINT#-2,USING S$;A$(6);F;A$
(12);L:GOTO 800
680 PRINT#-2,USING S$;A$(7);S1;A
$(7);G1
690 PRINT#-2,USING S$;A$(2);B1;A
$(8);H1
700 PRINT#-2,USING S$;A$(3);C1;A
$(9);I1
710 PRINT#-2,USING S$;A$(4);D1;A
$(10);J1
720 PRINT#-2,USING S$;A$(5);E1;A
$(11);K1
730 PRINT#-2,USING S$;A$(6);F1;A
$(12);L1:GOTO 800
740 PRINT#-2,USING S$;A$(1);S2;A
$(7);G2
750 PRINT#-2,USING S$;A$(2);B2;A
$(8);H2
760 PRINT#-2,USING S$;A$(3);C2;A
$(9);I2
770 PRINT#-2,USING S$;A$(4);D2;A
$(10);J2
780 PRINT#-2,USING S$;A$(5);E2;A
$(11);K2
790 PRINT#-2,USING S$;A$(6);F2;A
$(12);L2
800 PRINT:PRINT
810 IF P=1 THEN GOTO 910
820 IF M=1 THEN GOTO 1000
830 PRINT
840 INPUT"DO YOU WANT TO ADD MOR
E ENTRIES ";Y$
850 IF LEFT$(Y$,1)="Y" THEN 220
860 S1=S1+S:B1=B1+B:C1=C1+C:D1=D
1+D:E1=E1+E:F1=F1+F
870 G1=G1+G:H1=H1+H:I1=I1+I:J1=J
1+J:K1=K1+K:L1=L1+L
880 PRINT:INPUT"ADDITIONAL PAGES
 THIS MONTH?    YES OR NO";W$
890 IF LEFT$(W$,1)="Y" GOTO 170
900 P=1:GOTO 580
910 S2=S2+S1:B2=B2+B1:C2=C2+C1:D
2=D2+D1:E2=E2+E1:F2=F2+F1
920 G2=G2+G1:H2=H2+H1:I2=I2+I1:J
2=J2+J1:K2=K2+K1:L2=L2+L1
930 M=1
940 PRINT:INPUT"    ***** GRAND T
OTALS *****                (Y/N)
";A$
950 IF LEFT$(A$,1)="Y" THEN GOTO
 970
960 GOTO 1000
970 GOSUB 1290:PRINT:PRINT"    **
```


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```
*** GRAND TOTALS *****
ARE BEING PRINTED"
980 PRINT:P=0
990 PRINT#-2:PRINT#-2:PRINT#-2,C
HR$(31);TAB(10);"**** GRAND TOTA
LS ****";CHR$(30):GOTO 600
1000 PRINT:INPUT" ANOTHER MONTH
(Y/N)";R$
1010 IF LEFT$(R$,1)="Y" THEN 170
1020 CLS:PRINT:PRINT:PRINT:PRINT
:PRINT"      END OF PROGRAM":PRIN
T:PRINT:PRINT:PRINT
1030 END
1040 REM ENTER COLUMN HEADINGS 1
4 CHARACTERS EACH MAX.
1050 FOR Z=1 TO 12
1060 READ A$(Z):PRINTTAB(10);"CO
LUMN";A$(Z)
1070 NEXT Z
1080 PRINT:INPUT" * PRESS ENTER
TO CONTINUE *";A$
1090 GOTO 140
1100 DATA "1-TOTAL AMOUNT","2-ME
RCHANDISE","3-PARTS/SAMPLES"
1110 DATA "4-PROMOTION","5-DELIV
/POST","6-OFFICE EXPENSE"
1120 DATA "7-UTILITIES","8-TAX/I
NS/LIC","9-PETTY CASH"
1130 DATA "10-NOT USED","11-NOT
USED","12-DRAW"
1140 PRINT:PRINT"          ENTER PR
EVIOUS                **** GRAND T
OTAL ****"
1150 PRINT:
1160 PRINTA$(1);:INPUT" TOTAL";S
2
1170 PRINTA$(2);:INPUT" TOTAL";B
2
1180 PRINTA$(3);:INPUT" TOTAL";C
2
1190 PRINTA$(4);:INPUT" TOTAL";D
2
1200 PRINTA$(5);:INPUT" TOTAL";E
2
1210 PRINTA$(6);:INPUT" TOTAL";F
2
1220 PRINTA$(7);:INPUT" TOTAL";G
2
1230 PRINTA$(8);:INPUT" TOTAL";H
2
1240 PRINTA$(9);:INPUT" TOTAL";I
2
1250 PRINTA$(10);:INPUT" TOTAL";
J2
1260 PRINTA$(11);:INPUT" TOTAL";
K2
1270 PRINTA$(12);:INPUT" TOTAL";
L2
1280 M=1:GOTO 970
1290 REM LINE 5050 ADVANCES PRIN
TER TO NEXT PAGE
1300 REM ASSUMES 66 LINES PER PA
GE
1310 PL=PEEK(16425)

1320 IF PL>58 THEN GOTO 1340
1330 RETURN
1340 FOR PE=1 TO (66-PL):PRINT#-
2:NEXTPE:POKE 16425,1:RETURN
1350 CLS:REM INSTRUCTIONS WHEN R
EQUESTED
1360 PRINT:PRINT"THIS PROGRAM, U
SED WITH YOUR     PRINTER, PRODUC
ES AN INCOME      OR EXPENCE LEDG
ER FOR SMALL      BUSINESS USE.
YOU MUST HAVE     AN 80 COLUMN PR
INTER, BUT NO     DISK IS REQUIRE
D............."
1370 PRINT:PRINT"THE PROGRAM KEE
PS TRACK OF 12    COLUMNS.  COLUM
N 1 IS ALWAYS     THE AMOUNT. COL
UMNS 2 TO 12      ARE THE CATAGOR
IES THIS AMOUNT   MIGHT FALL INTO
.  COLUMN         HEADINGS ARE AS
SIGNED IN DATA    LINES, WHICH YO
U CAN CHANGE."
1380 INPUT"HIT ENTER WHEN READY"
;ZZ$
1390 CLS:PRINT"AS YOU CONFIRM EA
CH BLOCK OF       INFORMATION REQUE
STED BY THE       PROGRAM, A SINGLE
 LINE CONT-       AINING THIS INFOR
MATION IS         PRINTED ON STANDA
RD 8-1/2 BY       11 PAPER. PRINTER
 LINE NUMBERS     ARE SHOWN FOR EAC
H ENTRY SO "
1400 PRINT"YOU KNOW WHERE YOU AR
E ON THE      PRINTED SHEET.  WHEN
YOU           REQUEST TOTALS, EACH
COLUMN        HEADING WILL BE PRINT
ED WITH       THE TOTAL FOR EACH CO
LUMN FOR      THAT PAGE. YOU CAN TH
EN REQUEST ADDITIONAL PAGES."
1410 INPUT"HIT ENTER WHEN READY
";ZZ$
1420 CLS:PRINT"IF NOT, MONTHLY T
OTALS WILL BE     PRINTED. YOU THEN
 CAN DO           ANOTHER MONTH OR
PRINT GRAND       TOTALS.  OR EXIT
THE PROGRAM."
1430 PRINT:PRINT"THE FORMAT ALLO
WS TOTALS UP TO              $ 99,99
9,999.99!!"
1440 PRINT:PRINT" ***** FOR CRAS
H RECOVERY *****  TYPE....GOTO 6
00....AND ENTER.":PRINT
1450 INPUT"HIT ENTER TO CONTINUE
";ZZ$
1460 GOTO 120
```

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RAINBOW CERTIFICATION SEAL

Proper Grammar Important In Educational Programs

16K

By Steve Blyn
RAINBOW Contributing Editor

(Mr. Blyn, who teaches both exceptional and gifted children, holds two Master's degrees in the field of education and has won an award for the design of a computer program to aid handicapped children. He and his wife, Cheryl, own Computer Island.)

The users of our programs learn many things from the programmers. Often, they learn extra, unexpected, unintentional things. This is referred to as "incidental learning." An example of this is that almost all of us have become better typists through using or creating computer software, although this probably was not the intention of any of the programs.

As programmers, or even modifiers of programs, we must be careful that our subjects do not accidentally pick up any bad habits or poor "incidental learnings." One such area with which to be particularly careful is grammar.

It is a shame to ruin a good program with bad grammar. We should make certain that our games and teaching programs set proper standards for their users. Messages such as "You won the game in four move" or "in one moves" silly and makes the computer somewhat less effective as a teaching tool. It is easy to check whether a plural is needed by reading the value of the variable immediately preceding it. A plural (s) is needed except when the value is one.

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Similarly, it is silly to forget to have our articles (A and An) not agree with the nouns to which they are refer. There is no reason to see the words "a eagle" or "an dog." They represent poor examples to set for others and are easily avoidable. Merely check to see if the noun following begins with a vowel and add an "n" to "a" that you already preset if it is needed.

The following program illustrates some principles of good computer grammar. It is a fun program which asks riddles. To make the job of entering the riddles easier, each riddle begins with the word "what," which is programmed on line 80. Each DATA statement contains a different riddle, a comma, and the riddle's answer. Notice that the article is included in the answer, but is not to be input by the subject.

Line 100 prints the letter "a." Next we check to see if a letter "n" is needed. We only will print an "n" if the first letter of the first word in B$ starts with a vowel. This we call C$ on line 110. (We get a little practice in using strings here.) Line 120 checks to see if we need the "n" and line 130 prints in a space between words. Line 140 prints the rest of the answer. The semicolon is very important because it connects the letters from one line to the next.

The plural is checked after your score is written in on line 160. Line 170 will print an "s" after the word riddle if R is any value other than one. If you want to be fancy and use the words "try" and "tries" in a program, you can follow a similar pattern. First, print the letters "tr" and then read the value of the variable. If it is not equal to one, then print "ies" ELSE print "y."

I hope you enjoy the program and can think of and use some riddles of your own. Here is one that we didn't use: "What computer tastes best?" If you can think of any computer riddles, then drop us a line. We will print the answer to our riddle and the best of yours in a future issue.

```
30 CLS RND(8)
40 RESTORE
50 Y=RND(10)
60 FOR X=1 TO Y:READ A$,B$:NEXTX
70 PRINT@12,"RIDDLES";
80 PRINT@64,"WHAT ";A$
90 PRINT@160,"";:INPUT M$
100 PRINT@256,"A";
110 C$=LEFT$(B$,1)
120 IF C$="E" OR C$="A" OR C$="I
" OR C$="O" OR C$="U" THEN PRINT
"N";
130 PRINT" ";
140 PRINTB$
150 IF M$=B$ THENR=R+1 : ' * COR
```

```
RECT ANSWERS
160 PRINT@384,"YOU NOW HAVE";R;"
RIDDLE";
170 IF R<>1 THEN PRINT "S";
180 PRINT" CORRECT.";
190 IF M$=B$ THEN FOR X=1 TO 250
 STEP 5:SOUND X,1:NEXT X
200 IF M$<>B$ THEN FOR X=1 TO 5:
SOUNDX,2:NEXT X
210 LINE INPUT"     PRESS ENTER
TO GO ON    ";G$
220 J=J+1 : ' * THE COUNTER
230 IF J=25 THEN CLS:PRINT " YOU
 MUST KNOW ALL THE ANSWERS! RUN
THE PROGRAM AGAIN TO BE SURE":EN
D
240 GOTO 30
250 DATA HAS 4 LEGS BUT ONLY 1 F
OOT?,BED
260 DATA IS FULL OF HOLES YET HO
LDS WATER?,SPONGE
270 DATA DO YOU CALL ANY BEE BOR
N IN MAY?,MAYBE
280 DATA IS A MIDGET SKUNK CALLE
D?,SHRUNK SKUNK
290 DATA CAN YOU CALL A GRANDFAT
HER CLOCK?,OLD TIMER
300 DATA HAS A HEAD BUT CAN'T TH
INK?,NAIL
310 DATA HAS 6 POCKETS BUT NO CO
AT?,POOL TABLE
320 DATA GOES AROUND THE WORLD-
BUT DOESN'T MOVE?,EQUATOR
330 DATA BIRD IS AT EVERY MEAL?,
SWALLOW
340 DATA KIND OF DOG HAS NO TAIL
?,HOT DOG
```

Hardware Review...

Color Enhancer Does Make Colors More Vivid

It seems that some things are so simple that one wonders why he did not think of it himself. The *Color Enhancer* is a case in point.

This is a piece of plexiglass that fits over the front of your color TV screen with adhesive, somewhat like the "Green Screen" a number of people advertise for the Model III. Only, this screen is an off-brown in color, seems to have some other things imbedded in its surface, and does, indeed, make your colors more vivid.

We can't tell you how it works, but there is an obvious difference when looking at the screen through the *Color Enhancer*. It would be unfair to say that the results are dramatic, but the depth of the colors does change—and for the better.

The *Color Enhancer* comes in a 13x10 size and can be custom made to fit any screen at a small additional charge. It also comes with a money-back guarantee.

(Computer Shack, 1691 Eason, Pontiac, MI 48054, $19.95.)

Book Review...

A Byte Of Color Basic A Must For Beginners

To say I am new to personal computers and what I can do with them—or what they can do for me—is an understatement. Until recently , the closest I had come to a personal computer was looking at one through a store window—in awe.

Well, things have changed and thanks to Steve Blyn's *great* work-text manual for the 80C, I am not only using a personal computer but enjoying it!

Mr. Blyn has given me what I needed most—a manual that is easy enough for me to understand and fun enough for me to continue being enthusiastic. Believe me, that says a lot for this book. He also includes an instruction manual and answer key with his text, which was an invaluable tool for me.

There are 24 chapters in the manual and each chapter taught me a new function by showing me exactly what to do and how to do it. This was accomplished by giving program examples that I keyed in, using my new knowledge of different commands. At the end of the chapter simple exercises are included to sum things up.

For example, in learning how to use the Command ***SET***, Mr. Blyn wrote a program explaining this by creating a happy face on my TV screen. What a painless way to teach a command!

The entire manual is written with the author taking my hand and leading me step-by-step through such things as strings, for-next loops, variables, random numbers and more. If I made a mistake and consequently panicked, Mr. Blyn anticipated this and was always ready with helpful hints or suggestions on what I had done wrong and how to correct it. In many cases I even learned shortcuts that saved me time—not to mention grief.

My thanks to Steve Blyn for writing a manual that was not only easy to work with but took away my fear of personal computers. For those of you out there just starting, take heart: *this manual is for you.*

(Compter Island Publications, 227 Hampton Green, Staten Island, NY 10312, $5.95)

—Holly Beam

Software Review...

Stars Helps You Study The Night Sky

Seeing the night sky on your 80C's screen is an interesting concept that works most of the time.

Stars is made up of two parts: Stars and planets, with maps of the seasons for each segment.

The program does a good job of showing the different stars and where each is located in the heavens at different times of the year. If, for example, you want to locate the "Big Dipper," you need only indicate this constellation and the dots on the high resolution screen blink on and off. This not only gives you an accurate idea of what the constellation looks like, but where it is in relationship to the other stars in the sky.

All the major constellations are displayed on a menu to make indoor stargazing easy.

I wish I could give as much praise to the planet segment of *Stars*. There are four horizon views, each representing the sky approximately an hour after sunset for each season. The planets are indicated by their relative brightness and identified by their number in order from the sun.

I found the planet arrangement somewhat confusing and when the identification numbers were added, my impression

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was that it was visually difficult to understand their exact location and what that location represented.

For those who are interested in astronomy, however, *Stars* is an interesting program which will help identify stars and aid in picking out the constellations.

(Ilume Design, 4653 Jeanne Mance, Montreal, P.Q., H2V 4J5, $15) —Holly Beam

Software Review...

Pumpkin Adventure Is A Halloween Treat

Adventure programs can be simple or complicated, they can make you tear out your hair or have a lot of fun even if you don't win.

Pumpkin Adventure is one of the really friendly adventure games. And, while it is not a tear-your-hair-out type adventure, it is complicated enough that it will not lose its appeal quickly.

Built around a Halloween Trick-Or-Treat excursion, *Pumpkin Adventure* requires that you go through town, get certain things and end up at the pumpkin patch to see the Great Pumpkin. That's not particularly easy. And, along the way you meet good people and bad people—and get to have a little fun in an arcade and a music store, too.

This is a game the kids will love to play all year, but should, of course, hold some special fascination as the end of October nears. For those parents who want to "lure" their children home early—it might be just the "bribe" needed—no playing until the "haunting" is over with. Too, it can be a good fun game for adults as well—perhaps the center of attention at a Halloween party.

It is not so complicated as to be frustrating, but is interesting enough to be enjoyable.

We like adventures and enjoy the complicated ones. Yet, *Pumpkin Adventure* was a great deal of fun and gets a recommendation as a good game to add to your collection.

(Color Software Services, P.O. Box 1708, Greenville, TX 75401, $16.95)

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Software Review...

Here Are Three Assemblers Compared

By Gary Davis

(Mr. Davis is chief programmer for Sugar Software and the author of ***Auto Run****.)*

Writing assembly language programs for he MC6809 microprocessor used by the Color Computer is relatively easy when compared to assembly languages for the various other 8-bit micros such as the 8080, Z80 and 6502. The reason for this include a multitude of addressing modes, 16-bit addressing, flexible stack architecture and even a multiply instruction. If you have not yet programmed in assembly language, you will find it quite different from any other programming language such as Basic, Pascal and others. Initially, it will require reading and studying examples printed in *the Rainbow* and other 6809-related journals.

To aid in writing machine language code, an assembler is quite useful. It is possible to hand-assemble a program, but it is tedious, error-prone and difficult to modify. Some advantages of this method are low cost of the assembler (yourself) and the fact that it is an excellent way to learn the instruction set. This is how I started my machine language programming for the 6809. The first step was to write a disassembler in Basic (easier than writing an assembler). Next, I wrote my ML subroutines and POKEd them into memory. Finally, I disassembled them to verify that my hand-assembly was correct.

Now there are a few assemblers on the market. This is a review of three disk-based assemblers for the Color Computer currently available. With a disk assembler, the assembly source code is created by a text editor, which is a separate program from the assembler. Generally, tape-based assemblers also have a text editor and assembler combined into one program of convenience. The problem in having both programs resident is that extra memory is taken up—memory that is also used to contain your source code.

A disk assembler does not require that the entire source code be loaded into memory like a tape assembler. The reason for this is that assemblers make two passes over the source code. The first pass keeps track of the location counter and builds a symbol table. Each symbol is located and a value is assigned, if possible. The second pass actually does the assembly, translating mnemonic instructions to operation codes, producing object code and the listing. A disk assembler can easily read the source twice, outputting the object to the disk as necessary. A tape assembler would require you to rewind the tape for the second pass and would not be able to output object to tape since the tape is being used for input! All three assemblers described here can assemble a source code file that is larger than memory. To test this, I disassembled half of the Color Basic ROM to disk and used it as the source code file for the assemblers. Assembly time was about one minute with the options set to produce no listing.

What You Get

Cer-Comp

The Cer-Comp disk assembler comes with a disk containing three copies of the assembler, two copies of the editor and a sample source code file. There are 14 pages of documentation for the editor and 12 pages for the assembler. The programs are copy-protected but the BACKUP command can be used to make a non-executable copy of the disk. You may then use the original disk as your working copy. If this disk gets clobbered, you may re-create it by again doing a BACKUP using the copy you made earlier. The cost of the Cer-Comp package is $79.95.

The Micro Works

The Micro Works disk includes an assembler, a text editor, a debugger, a Basic utility for listing an ASCII file and a Basic utility to copy files from an input device (tape or disk) to an output device (tape, disk or printer). There is a HELP file used by the editor and seven sample source code files. There are two documentation booklets, one describes the assembler (59 pages) and one describes the editor and debugger (16 pages). Use BACKUP to create a copy to use. Store the original disk in a safe place. The Micro Works assembler is $99.95.

Computerware

The disk from Computerware contains an assembler, a cross reference and a file utility. There is one sample source code on file on this disk. The Computerware package does not include a text editor, but they do sell one called Color Scribe ($49.95-not reviewed here) which creates compatible source code files, or you can use any other text editor which can create ASCII files. The documentation booklet is 45 pages. Also, Computerware supplies a Motorola MC6809 reference card. For protection, copy the programs to a working disk and store the original. Since there are only three files, the COPY command will be more convenient than BACKUP. To use COPY on single-disk systems, simply type COPY *"filename.ext",ENTER. Basic will prompt you to load the destination disk. This useful feature is not documented in the Radio Shack Color Computer Disk System* manual. The assembler from Computerware is $49.95.

The Assemblers

All three disk assemblers will convert a source code file to object and display or print a listing. The differences between the three are what is supplied, their cost and additional capabilities supported above their ability to assemble source code. The features that give an assembler a personality are the assembler directives and pseudo op codes that have effect during the assembly process but not at execution time.

Assembler Directives

The Cer-Comp assembler supports 12 directives, Computerware supports 37 and Micro Works supports 41. Part of the reason for the greater number of directives in Computerware and Micro Works over Cer-Comp is due to the support of macros and conditional assembly by these two assemblers (more about this later).

The following diretives are supported by all three assemblers: NAM, END, ORG, RMB, EQU, FCC, FCB, FDB, SPC AND PAGE (PAG in Cer-Comp). Most of these are standard and familiar to most of you.

For communicating with the user during the first assembly pass, there are MSG nd ASK in Micro Works, and LPI in Computerware. For the second assembly pass, there are FAIL (Computerware and Micro Works) and LP2 (Computerware).

For macros, most directives are the same: MCR, ENDM, IFEQ, IFNE, IFFGT, IFLT, IFLE, IFC, IFNC, ELSE and ENDC. In addition, Micro Works and Computerware have IFDF (If Defined) and IFND (If Not Defined).

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another disk file within the source code file being assembled. The directive is INCL in Micro Works and LIBS in Computerware. These directives can be nested; that is, the source code being included may itself have an INCL/LIBS directive. Some other unique directives include:

Micro Works: REORG, FCCS (an FCC for the screen codes), CWORD and CLRC (for checksums), LONGVAR (symbol names allowed to be larger than six characters), APSH and APOP (aassembly time stack), PEEK and POKE (at assembly time— use your imagination on these).

Computerware: Supports iteration with RPT and ENDR (not within macro definitions, but may be nested). FDR (position independent FDB), LNC (Line of Characters), OPT (options) and FCS (similar to FCC).

Cer-Comp: ATH allows you to specify the author's name to be printed on the bottom of each page of the listing. OPT allows specification of certain options.

Expressions

Expressions appear in operands and are made up of terms and operators. Terms are numbers (constants) or symbols. Operators are the operations performed on the terms. All assemblers support +, - * and /. In addition, Micro Works and Computerware also support operators for exponentiation, AND, OR, XOR, SHIFT AND ROTATE.

Constants may be specified as decimal numbers, hex (preceded with a $), binary (%) and ASCII (') in the three assemblers. Micro Works also supports octal (@). Parenthetical grouping in expressions is allowed in the Micro Works and Computerware assemblers.

Macros and Conditional Assembly

Both Micro Works and Computerware support macros and conditional assembly. In addition, Computerware supports repeat blocks. These are very powerful capabilities for assemblers though they are not often used. A macro will generate (expand) a sequence of assembler statements by just specifying its name as the instruction op code. You can, in effect, design your own instructions. For example, a macro can decide to generate different statements based on the value of a symbol. Perhaps you are writing a program and for debugging purposes, you have scattered PRINT macros throughout your source code. This macro would expand statements to bring a message so you could monitor its execution. Rather than take these statements out of your source file for your production version, just have your PRINT macro bypass expansion of these statements if the DEBUG has the value of zero. Then, to assemble a production version, have a DEBUG EQU 0 statement near the beginning of your program. To assemble a *test* version, equate DEBUG to 1. The macro might look like this:

```
PRINT MACR
        IFNE DEBUG      Then test version
        PSHS CC,X,A     Save everything
        LEAX \.B,PCR    Set B->string
\.A     LDA  ,X+        Get a byte
        JSR  [$A002]    Print a byte
        CMPA #$0D       Is it a <CR>?
```

```
        BNE  \.A      Branch if not yet
        BRA  \.C      Skip over string
\.B     FCC  /\0/     String (macro operand)
        FCB  $0D      Terminator <CR>
\.C     PULS CC,X,A   Restore everything
        ENDC          End of conditional
        ENDM          End of macro definition
```

To use this macro to print a string, put the string to print as the macro instruction operand enclosed in parentheses. For example:

```
PRINT (SORT SUBROUTINE ENTERED)
```

Macros are often used as interfaces to subroutines. The macro would save registers, set up registers needed by the subroutine, call the subroutine and restore the registers. All this is done in the PRINT macro example above. Both macro assemblers use essentially the same format with a few minor exceptions. This allows macros to be written to be compatible for both, as PRINT above. I would like to see useful general purpose macros written and published. With a large set of these macros, programming in assembly language begins to appear like a higher level language!

Macro definitions are placed in the source code before they are called. They can either be simply inserted as a set of statements or *included* from a disk file. The *include* feature is very handy for macros. You can build a library of macros and for every assembly program that needs to use one or more macros, insert an *include* directive to read the disk file macro library (or libraries) and insert them at the point of the include directive as if they had been inserted. Not only can macro definitions be included, but also any block of statements such as subroutines of a group of symbols (for example, ROM entry points or hardware addresses). The include directive is INCL for Micro Works and LIBS for Computerware.

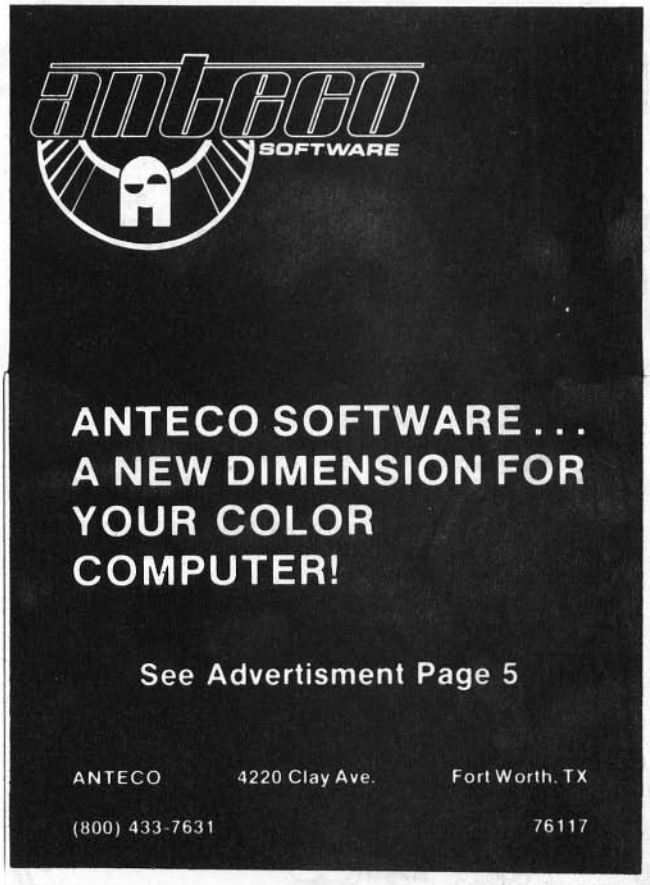
Neither assembler supports macro definitions within macro definitions, a little used feature in some assemblers I've seen.

Conditional assembly directives are most useful in macros, but they may also be used in open code in a similar way. For example, if your program has two versions, one for 16K and an enhanced version for 32K, you could have a single program that uses conditional directives to *assemble-out* subroutines not used in the 16K systems. A symbol defined at the start would indicate which system the program was being assembled for. For example:

```
SYS32K  EQU  1        0=16K, 1=32K
*
*
IFEQ SYS32K-1
*
*       Code for 32K version
*
ELSE
*
*       Code for 16K version
*
ENDC
```

The Computerware assembler includes IFDF (If defined) and IFND (IF Not Defined) directives. They do not work the way I would expect. IFDF SYMBOL is *true* if SYMBOL is defined anywhere in the source code. I would expect it to be *true* only if SYMBOL were defined prior to the macro call.

Repeat blocks (Computerware only) are another type of conditional assembly. A set of statements is bounded by RPT and ENDR directives. The RPT operand specifies how many times the block of statements is to be repeated. Occasionally, the RPT capability can be implemented with a recursive macro (a macro that calls itself). To generate a table of bytes from 0 to 255 could be done in this way:



```
TABLE EQU *        Start of TABLE

      RPT 256      Repeat FCB 256 times

      FCB *-TABLE  A byte relative to TABLE

      ENDR         End of repeat block
```

Repeat blocks cannot be coded in macro definitions, only in open code.

Other Assembler Features

For those of you that have 6800 source code that is to be assembled for the 6809, both Micro Works and Cer-Comp assemblers support 6800 mnemonics. Some 6800 instructrions will generate multiple 6809 instructions. For compatibility reasons, I recommend avoiding use of 6800 op codes in your programs.

All three assemblers will accept standard ASCII source code files. The format of each statement allows either a blank, asterisk or label in the frst column. Asterisk denotes that the statement is a comment. The op code follows and must be preceded by one or more blanks. The operands follow the op code, again separated by one or more blanks. Tab characters (as used by the Radio Shack EDTASM*$* may have unexpected results, depending on the assembler. In addition to this format, Cer-Comp allows line numbered files similar to EDTASM.

All assemblers can print listings at various baud rates. If necessary, just POKE 150 for your baud rate before starting the assembler. For best throughput, I drive my Epson at 4800 baud (POKE 150,6), so this capability is important to me.

Only Micro Works supports local labels. Local labels are a nice feature, though for compatibility, I generally don't use them. Local labels have a limited scope of reference within a program and are often used, instead of normal labels, for fairly short branches. Unique labels work just as well and they appear in your cross-reference listing.

The Micro Works assembler allows you to get a symbol table or cross-reference listing. The cross-reference listing displays each symbol, its value and a list of each statement where it is referenced.

The Computerware assembler has an optional symbol table listing also, but the cross-reference is generated by a separate program (XREF). The XREF program does not expand macros as the assembler does, so it doesn't know about symbol references within macro expansions. The XREF listing shows each symbol, the statement number where it was defined and each reference. In some cases, XREF incorrectly recognizes a character string as a symbol when it really isn't.

Cer-Comp does not support either a symbol table listing or cross-reference listing.

Ease Of Use

The Cer-Comp assembler is started with a LOADM "DISKASMB". This loads the assembler and also starts it executing. A nice feature is the ability to get a disk directory listing while in the assembler. Enter the file name (/DAT is the default file name extension). At this point, a *pass* message is displayed. You can specify which assembly pass is to run (1, 2 or both) and whether or not you desire printer output. You can also specify the output device for the object code. This is the only assembler that allows object output directly to tape. I could not find a way to assemble with no output (used for locating errors or benchmark timing). Also, I found the *pass* message confusing. I think it should be explained more fully since being able to select an assembly pass potentially could be useful.

The RESET button cancels an assembly and returns you to the file name prompt. As the listing scrolls by on the screen, you can't stop it. When assembly completes, you are returned to the file name prompt.

The Micro Works assembler is started by issuing a RUN "AS" to start a small Basic program. AS loads the assembler and asks for the input and output file names (/TXT is the default extension for input file name) and options. The assembler is then started, and these parameters are passed on to it. When assembly completes, it returns to AS which prints the termination message and returns to Basic. You can also RUN 'ASP' for the version that routes the listing to the printer instead of the screen. Being Basic, you can easily modify it to change parameters passed to the assembler and perhaps combine the Basic programs and prompt for the listing destination (printer or screen).

The BREAK key aborts the assembly. The space bar and the shift/@ keys stop the scrolling. The S and F keys slow down and speed up the scrolling. The listing may be sent to a disk file. This would be useful if you didn't have a printer. Take over your disk or dump the listing file to tape with the supplied XFER program.

The Computerware assembler is started with a LOADM 'MAC' and EXEC. You are prompted with MAC: with which you respond by entering the input file name. The default extension is .TXT. If you enter an extension to the file name, don't use the slash (/) separator, use the period. On the same line, you may also specify an output file name

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and options.

The BREAK key terminates assemblies and returns you to the MAC: prompt. A BREAK or ENTER at the MAC: prompt does a hard (power-on) reset. There is no way to stop the scrolling that I could determine, though there is a W option which pauses the scrolling every 10 carriage returns.

The Text Editors

The Cer-Comp and Micro Works assemblers come with text editors. I used both editors to create source code files for all three assemblers with no problem.

The Cer-Comp text editor is line number oriented and very easy to use. Line numbers do not have to exist on the source code file, but are generated while the source code is in memory. Files larger than memory are easily handled. Edit the portion in memory and then *roll* it out to the output file (use a different name than the input file). The buffer is then filled with source code from the input file. When done, the END command transfers any remaining text from the input file to the output file. There are commands for tape as well as disk I/O including append commands. Search and replace are supported. An auto-edit command makes the editor as easy to use as a screen editor. Moving and copying lines of code are easy. Another very useful feature is DIR to get a disk directory while in the editor. The editor can be used to edit and create ASCII Basic programs.

The Micro Works editor is screen-oriented and also easy to use. You start the editor with a RUN "ED" which prompts you for a file name. If you enter a question mark, the disk directory will be displayed. If you enter a file name with an extension, use a slash as the separator, not a period. Files lareger than the text buffer are not supported. Files must be split into two or more smaller files (the assembler can assemble multiple files as if they were one). This editor is for disk only. Tape files may be moved to disk with the supplied XFER program. As with the Cer-Comp editor, there are commands for find and change. There is a move command but to copy a block of statements, you first have to duplicate it and then move one of the copies to the desired location. One handy feature is the HELP key (CLEAR). Pressing the HELP key at any point will display information on what may be done in the mode you are currently in. The source for this help information is on a disk file. If the file cannot be located, the HELP key will have no effect. This editor may also edit ASCII Basic programs, but the line numbers are your responsibility.

Those Extra Goodies

In addition to the assemblers and editors, these additional programs are supplied.

Cer-Comp—There were three versions of the assembler on the disk, DISKASMB, DISKASM1 and DSKASMLF. The first one didn't work, but the second one did. DSKASMLF is a version that prints to those printers that require a line-feed following the carriage return.

The Micro Works—DCBUG is a debugger program that is loaded into memory with the program to debug. It allows examining and modifying memory, setting breakpoints and some other features. This is a disk version of Micro Works' popular CBUG program. A debugger is a very important utility for those assembly language programmers that write programs that don't run the first time.

FILELIST is a Basic program that reads an ASCII file and displays it to the screen.

XFER (not to be confused with XREF from Computerware) is a file transfer utility to copy ASCII files

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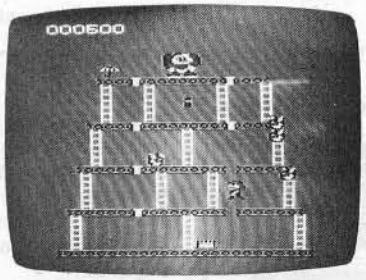

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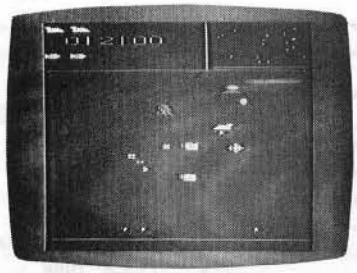

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Computerware—XREF (mentioned above) is used to read a source code file and display or print a cross-reference table.

FIND is an interesting utility that reads an object code file and displays the addresses at which it loads and the entry point. An object file may load at more than one address with a LOADM, unlike the tape CLOADM. This is controlled with the ORG directive. This feature of Disk Basic has many fascinating possibilities, such as an ORG $400 (the display memory) followed by 512 bytes of a title screen, or modifying the low memory Basic variables during the LOADM process. Potentially you could even modify the hardware addresses ($FF00 and above) as long as the value stored is the same when it is read back from the location.

DOCUMENTATION

Cer-Comp documentation covered the text editor commands nicely with several examples. The assembler documentation was not complete enough though. For example, there was no coverage on the format of allowable expressions.

The Micro Works had the nicest looking documentation. There are two manuals included, one for the assembler and the other for the editor and the utilites. Both had a table of contents and the assembler manual also had an index. There are many examples in the text as well as on the disk.

There are sections on Basic ROM routine addresses, the LEA instructions, timing loops, Color Computer I/O, embedding machine language code within Basic Programs and position independent (PIC) code and others.

Computerware has a very good table of contents. Each directive has a paragraph describing it and its format. An appendix explains how to customize the assembler and XREF program for your own configuration.

CONCLUSION

Assemblers are fairly complex programs. In my evaluation, I found that all three programs did assemble source code correctly and quickly. The macro capabilities of Computerware and Micro Works are extremely powerful features, though I'm sure many of you will not need or use the macro features.

I found some minor bugs in all the assemblers, but there were always ways around them. Each of the assemblers has features that are more desirable than the other. It would be nice to have an assembler that combines all the best features of each.

I feel that the best buy is the Computerware assembler at $49.95, assuming you have or can get a good disk text editor and a debugger. If you want the whole package, the Micro Works assembler is just as good at $99.95. The Cer-Comp assembler does not have many of the features of the other two, though the text editor is very good. I think its price is out of line in comparison with the competition, though my latest Cer-Comp catalog has it at a summer special at 37% off ($49.95)

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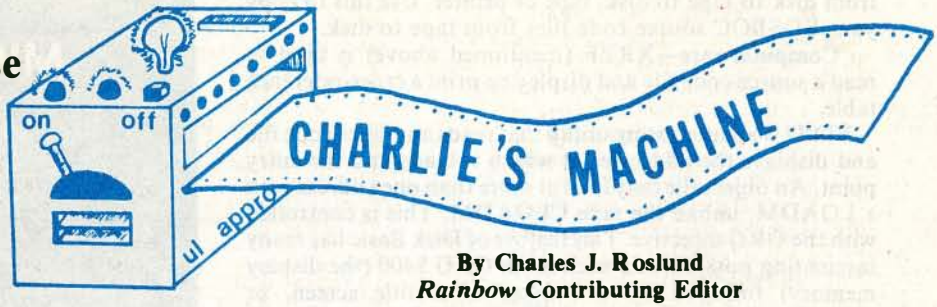

By Charles J. Roslund
***Rainbow* Contributing Editor**

*(Mr. Roslund is the author of **War Kings** and many machine language utilities for the 80C.)*

This is the first of a series of articles that will deal with machine language programs for your Color Computer. Each month I plan to present a short machine language program that should be of interest to you and will also demonstrate new things you can do with your 80C.

For the premier of this column, I am providing a machine language monitor that will make following my future articles much easier. In fact, for some of the techniques I will describe, a monitor that supports the functions this one has will be a necessity.

You may use the same Basic program as was given in the September *Rainbow* in my article on *Auto Key Repeat* to enter this monitor into memory if you don't have an assembler. To enter this program by hand, you must POKE into memory (at the hex address given in the second column) the hex bytes given in the third column of the listing. (Start with POKE &H1000,&H20: POKE &H100,&H0C etc. here.) The Basic program in September's *Rainbow* provides a loop to do this.

This monitor, which I've named *Minimon,* is written in position independent code so you may enter it anywhere in memory. Position independent code is really a must for any utility (such as a monitor) that will be used to develop other programs that must be loaded into RAM along with the monitor. *Minimon* is only approximately 600 bytes long so you can fit it just about anywhere. (The first graphics page is a good place if you're not using it.)

I have located *Monimon* at $1000 ($ indicates a hexadecimal value) arbitrarily to start the listing at an even address. If you have a 4K Color Computer, a good place to locate *Minimon* is $0D00. (You must first enter CLEAR 200,3327). By the way, this listing was produced on The Micro Works Macro 80C disk based Macro Assembler. I've found MACRO 80C to be an excellent, very full-featured utility.

If you do enter *Minimon* by hand, the start, end, and execute addrsses are $1000, $1263, $1000 if you locate it where my listings shows. Following is a summary of *Minimon* commands, and then a description of the major routines in *Minimon.*

```
**********************************
*          MINI-MONITOR          *
* BY C.J. ROSLUND    Rev 8/14/82 *
**********************************

0001 0E00                NAM MINIMON
0002 0E00                ORG $1000
0003 1000 200C   START   BRA MAIN

0004 1002 00     MSASC   FCB 0          ASCI CHARACTER BUFFER (M.S.)
0005 1003 00     LSASC   FCB 0          (L.S. CHARACTER)
0006 1004 00     MSADR   FCB 0          ADDRESS BUFFER (M.S. BYTE)
0007 1005 00     LSADR   FCB 0          (L.S. BYTE)
0008 1006 00     DINDX   FCB 0          DISPLAY COUNTER
0009 1007 00     ERFLG   FCB 0          ERROR FLAG
0010 1008 0000   STRTAD  FDB 0          START ADDRESS FOR MOVE
0011 100A 0000   ENDAD   FDB 0          END ADDRESS FOR MOVE
0012 100C 0000   TOADR   FDB 0          'TO' ADDRESS FOR MOVE

                 * MAIN LOOP *

0013 100E 863E   MAIN    LDA #'>        PROMPT
0014 1010 AD9FA002       JSR [$A002]    DISPLAY PROMPT
0015 1014 AD9FA000 LOOP  JSR [$A000]    POLL KEYBOARD
0016 1018 27FA           BEQ LOOP
0017 101A 6F8CEA         CLR ERFLG,PCR  CLEAR ERROR FLAG
0018 101D 8144           CMPA #'D       DISPLAY COMMAND?
0019 101F 274C           BEQ DISPLY
0020 1021 8153           CMPA #'S       SUBSTITUTE COMMAND?
0021 1023 1027012D       LBEQ SUBST
0022 1027 810A           CMPA #$0A      DOWN ARROW COMMAND?
0023 1029 102701B6       LBEQ NEXTL     DISPLAY NEXT LINE
0024 102D 8147           CMPA #'G       GO BACK TO BASIC COMMAND?
0025 102F 270C           BEQ RTOBAS
0026 1031 814A           CMPA #'J       JUMP TO ADDRESS COMMAND?
0027 1033 270C           BEQ JUMP
0028 1035 814D           CMPA #'M       MOVE BLOCK COMMAND?
0029 1037 102701C3       LBEQ MOVE
0030 103B 20D1           BRA MAIN

0031 103D 6E9FFFFE RTOBAS JMP [$FFFE]   RETURN TO BASIC

                 * JUMP TO ADDRESS COMMAND *

0032 1041 8D05   JUMP    BSR STRCOM
0033 1043 AD9CBE         JSR [MSADR,PCR] JUMP TO SELECTED ADDRESS
0034 1046 20C6           BRA MAIN

                 * START COMMAND *

0035 1048 AD9FA002 STRCOM JSR [$A002]   DISPLAY COMMAND
0036 104C 8620           LDA #$20       SPACE
0037 104E AD9FA002       JSR [$A002]    DISPLAY SPACE
0038 1052 170058         LBSR GETADR    GET ADDRESS FROM KEYBOARD
0039 1055 6D8CAF         TST ERFLG,PCR  ILLEGAL ADDRESS?
0040 1058 2704           BEQ NOERR      NO
0041 105A 3262           LEAS 2,S       ERROR, FORGET RETURN ADDRESS
0042 105C 2001           BRA ERROR      GO REPORT ERROR

0043 105E 39     NOERR   RTS

                 * ERROR REPORT *

0044 105F 863F   ERROR   LDA #'?       DISPLAY '?' AS ERROR MESSAGE
0045 1061 AD9FA002       JSR [$A002]    OUTPUT CHARACTER
0046 1065 860D           LDA #$0D       <CARRIGE RETURN>
0047 1067 AD9FA002       JSR [$A002]    OUTPUT CHARACTER
0048 106B 20A1           BRA MAIN       RETURN TO MAIN LOOP

                 * DISPLAY COMMAND *
```

MINIMON COMMANDS

D — Display Memory. Enter a four-digit hexadecimal address. The contents of the next eight bytes will be displayed on one screen line (in hexadecimal and ASCII).

DOWN ARROW — Display next line. Pushing the ***DOWN ARROW*** key will display the next eight bytes of memory (see ***D*** command).

S — Substitute Memory. Enter a four-digit hexadecimal address. The contents of that address will be displayed. Then enter byte values to be substituted at the current address. An ***ENTER*** alone will leave the current addressed byte intact and jump to the next address, keeping you in the ***S*** command. Entering any illegal character for a byte value will terminate the command; eg. ***/ ENTER***

G — Go back to Basic. Exits the monitor.

J — Jump to address. Enter address to jump to. A "JSR" instruction will be executed with the specified address.

M — Move block of memory. To "M" prompt, enter beginning address of block to move. To "E" prompt, enter ending address of block to be moved. To "T" prompt, enter destination address for block. An example:

M 20E0 ***ENTER***
E 20F6 ***ENTER***
T 3000 ***ENTER***

Would move the block of memory $20E0-$20F6 to the block beginning at $3000. A total of 22 bytes would be moved.

Minimon displays a "greater than" symbol as a prompt for a command. If a

```
0049 106D 6F8C96      DISPLY CLR DINDX,PCR    CLEAR DISPLAY INDEX COUNTER
0050 1070 8DD6               BSR STRCOM       GO GET ADDRESS
0051 1072 10AE8C8E    DISLIN LDY MSADR,PCR    Y=SELECTED ADDRESS
0052 1076 5F                 CLRB             B=DISPLAY INDEX
0053 1077 A6A5        HEXLP  LDA B,Y          A=BYTE TO BE DISPLAYED
0054 1079 170115             LBSR DISBYT      DISPLAY BYTE IN HEX
0055 107C 8620               LDA #$20         <SPACE>
0056 107E AD9FA002           JSR [$A002]      OUTPUT CHARACTER
0057 1082 6C8C81             INC DINDX,PCR    INCREMENT DISPLAY INDEX
0058 1085 E68DFF7D           LDB DINDX,PCR    B=DISPLAY INDEX
0059 1089 C108               CMPB #8          HAVE 8 BYTES BEEN DISPLAYED?
0060 108B 2DEA               BLT HEXLP        NO, GO DO ANOTHER
0061 108D 6F8DFF75           CLR DINDX,PCR    CLEAR DISPLAY INDEX
0062 1091 5F                 CLRB             B=DISPLAY INDEX
0063 1092 A6A5        ASCILP LDA B,Y          A=BYTE TO BE DISPLAYED
0064 1094 811F               CMPA #$1F        IS 'A' AN ASCI CONTROL CODE?
0065 1096 2202               BHI GOTASC       NO
0066 1098 862E               LDA #'.          DEFAULT CHARACTER
0067 109A AD9FA002    GOTASC JSR [$A002]      DISPLAY BYTE IN ASCI
0068 109E 6C8DFF64           INC DINDX,PCR    INCREMENT DISPLAY INDEX
0069 10A2 E68DFF60           LDB DINDX,PCR    B=DISPLAY INDEX
0070 10A6 C108               CMPB #8          HAVE 8 BYTES BEEN DISPLAYED?
0071 10A8 2DE8               BLT ASCILP       NO, GO DO ANOTHER
0072 10AA 16FF61             LBRA MAIN        RETURN TO MAIN LOOP

                      *   GET ADDRESS FROM KEYBOARD    *
                      * RETURN ADDRESS IN MSADR, LSADR *

0073 10AD 4F          GETADR CLRA
0074 10AE 5F                 CLRB
0075 10AF ED8DFF51           STD MSADR,PCR    CLEAR ADDRESS BUFFER
0076 10B3 BDA390             JSR $A390        INPUT A LINE FROM KEYBOARD
0077 10B6 108E02DD           LDY #$02DD       LINE BUFFER ADDRESS
0078 10BA 6DA4               TST 0,Y          0 CHARACTERS ENTERED?
0079 10BC 2710               BEQ RET          YES, RETURN ERROR
0080 10BE 6D21               TST 1,Y          1 CHARACTER ENTERED?
0081 10C0 270C               BEQ RET          YES, RETURN ERROR
0082 10C2 6D22               TST 2,Y          2 CHARACTERS ENTERED?
0083 10C4 2708               BEQ RET          YES, RETURN ERROR
0084 10C6 6D23               TST 3,Y          3 CHARACTERS ENTERED?
0085 10C8 2704               BEQ RET          YES, RETURN ERROR
0086 10CA 6D24               TST 4,Y          4 CHARACTERS ENTERED?
0087 10CC 2705               BEQ DECODE       YES, GO DECODE
0088 10CE 6C8DFF35    RET    INC ERFLG,PCR    SET ERROR FLAG
0089 10D2 39                 RTS              RETURN
0090 10D3 A6A4        DECODE LDA 0,Y          A=FIRST CHAR OF ADDRESS
```


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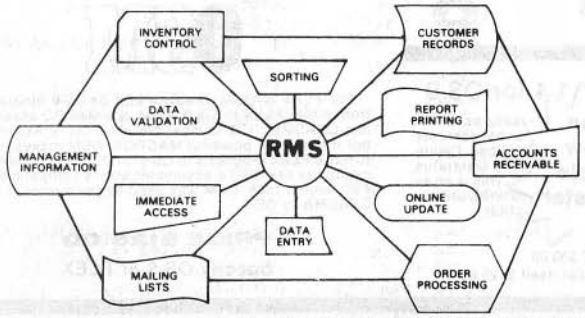

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valid command key is pushed, the command key is displayed. If an illegal command key is pushed, the "greater than"prompt is again displayed. If an illegal address or byte value is entered during a command, a "?" is displayed as an error message and you are returned to the command mode ("greater than" prompt).

NOTE: For all commands, you must enter four hex digits for an address and two hex digits for a byte. To display the line starting at $10019, enter:

D 0019 ***ENTER***

MINIMON OPERATIONS

MAIN LOOP — This loop displays the > prompt and polls the keyboard until any key is pushed. If a key is pushed and it matches one of the command keys, a branch is executed to a routine that handles the command. Otherwise, another "geater than" prompt is displayed, and you stay in the loop waiting for valid command.

RETURN TO BASIC — Returns to Basic by jumping to the address stored at $FFFE. This is the same as pushing the RESET button.

JUMP TO ADDRESS COMMAND — Executes a "JSR" instruction to the specified address.

START COMMAND — This routine is called by all commands that require an address to be input. It displays the command key followed by a space and then calls GETADR (get address). Upon return from GETADR, it tests ERFLG (error flag) to check if an erroneous address was entered. If an error is detected (ERFLG isn't a zero) it adjusts the stack to remove the return addrss (since this routine is called as a subroutine

```
0091 10D5 A78DFF29          STA MSASC,PCR   PUT IN ASCI BUFFER
0092 10D9 A621              LDA 1,Y         SECOND CHAR OF ADDRESS
0093 10DB A78DFF24          STA LSASC,PCR   PUT IN ASCI BUFFER
0094 10DF 8D23              BSR ASCOBJ      CONVERT ASCI BUFFER TO OBJECT
0095 10E1 6D8DFF22          TST ERFLG,PCR   ERROR RETURNED?
0096 10E5 26E7              BNE RET         YES, RETURN ERROR
0097 10E7 E78DFF19          STB MSADR,PCR   PUT OBJECT IN MS ADDRESS BYTE
0098 10EB A622              LDA 2,Y         THIRD CHAR OF ADDRESS
0099 10ED A78DFF11          STA MSASC,PCR   PUT IN ASCI BUFFER
0100 10F1 A623              LDA 3,Y         FOURTH CHAR OF ADDRESS
0101 10F3 A78DFF0C          STA LSASC,PCR   PUT IN ASCI BUFFER
0102 10F7 8D0B              BSR ASCOBJ      CONVERT ASCI BUFFER TO OBJECT
0103 10F9 6D8DFF0A          TST ERFLG,PCR   ERROR RETURNED?
0104 10FD 26CF              BNE RET         YES, RETURN ERROR
0105 10FF E78DFF02          STB LSADR,PCR   PUT OBJECT IN LS ADDRESS BYTE
0106 1103 39          RTRN  RTS             RETURN

                    * ASCI TO OBJECT CONVERSION *
                    *    ASCI IN MSASC, LSASC   *
                    *    RETURN OBJECT IN B     *

0107 1104 A68DFEFB    ASCOBJ LDA LSASC,PCR  GET L.S. ASCI CHAR
0108 1108 8D1F               BSR CONVRT     CONVERT IT TO OBJECT
0109 110A 3404               PSHS B         SAVE CONVERTED VALUE
0110 110C A68DFEF2           LDA MSASC,PCR  GET M.S. ASCI CHAR
0111 1110 8D17               BSR CONVRT     CONVERT IT TO OBJECT
0112 1112 58                 LSLB           * SHIFT M.S. NIBBLE TO
0113 1113 58                 LSLB           * PROPER BIT LOCATION
0114 1114 58                 LSLB           *
0115 1115 58                 LSLB           *
0116 1116 EAE0               ORB ,S+        PUT M.S. & L.S. NIBBLES TOGETHER
0117 1118 39                 RTS            RETURN OBJECT IN B
0118 1119 30313233    ASCTAB FCC "0123"     * ASCI CHARACTER TABLE
0119 111D 34353637           FCC "4567"     *
0120 1121 38394142           FCC "89AB"     *
0121 1125 43444546           FCC "CDEF"     *
0122 1129 308DFFFC    CONVRT LEAX CONVRT,PCR POINT 1 PAST TABLE
0123 112D C60F               LDB #$0F       B=$0F (15 DECIMAL)
0124 112F A182        ASCLP  CMPA ,-X       MATCH IN TABLE?
0125 1131 27D0               BEQ RTRN       YES, RETURN B AS OBJECT
0126 1133 5A                 DECB           NO, DECREMENT B
0127 1134 102BFF96           LBMI RET       IF B<0 THEN ERROR
0128 1138 20F5               BRA ASCLP      GO TRY AGAIN

                    *  OBJECT TO ASCI CONVERSION  *
                    *   A=OBJECT UPON CALLING     *
                    * RETURN ASCI IN MSASC, LSASC *
```


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there is a return address on the stack). It then branches to an error report routine (ERROR). If no error is detected, it just returns.

ERROR REPORT — Displays a "?" as an error message, and then branches back to the main loop.

DISPLAY COMMAND — Displays a line of eight bytes on the screen. First, STRCOM is called to get the selected address. The selected address is used as a starting point, and the routine DISBYT is called eight times in a loop to display the next eight bytes in hex. The next loop (ASCIILP) displays those same bytes in ASCII. Any bytes less than $20 (ASCII control characters) are displayed as periods. Bytes greater than $7F are displayed in the normal SET/RESET graphics mode.

GET ADDRESS FROM KEYBOARD — Does a "JSR" to $A390 which is a routine in the Basic ROM used for inputting a string of characters from the keyboard. This routine is terminated by hitting ***ENTER***. Sounds like Basic's INPUT and LINE INPUT commands, doesn't it?

The input line is in a buffer starting at $02DD. After the line is input, it is checked to make sure it contains exactly four characters (the input line ends with a byte value of 00 in the buffer). If it is not four characters long, ERFLG is set and you return with an error. If exactly four characters were entered, the routine labeled DECODE converts the four bytes of ASCII in the input buffer to a two byte address by calling ASCOBJ (ASCII to OBJECT conversion) two times—once for the most

```
0129 113A 308CDC     OBJASC LEAX ASCTAB,PCR X=START OF ASCI TABLE
0130 113D 3402               PSHS A         SAVE OBJECT
0131 113F 840F               ANDA #$0F      MASK FOR L.S. NIBBLE
0132 1141 E686               LDB A,X        B=ASCI FROM TABLE
0133 1143 E78DFEBC           STB LSASC,PCR  PUT ASCI IN L.S. ASCI BUFFER
0134 1147 3502               PULS A         PULL OBJECT
0135 1149 44                 LSRA           * SHIFT M.S. NIBBLE INTO
0136 114A 44                 LSRA           * L.S. NIBBLE
0137 114B 44                 LSRA           *
0138 114C 44                 LSRA           *
0139 114D E686               LDB A,X        B=ASCI FROM TABLE
0140 114F E78DFEAF           STB MSASC,PCR  PUT ASCI IN M.S. ASCI BUFFER
0141 1153 39                 RTS            RETURN

                       * SUBSTITUTE COMMAND *

0142 1154 17FEF1     SUBST   LBSR STRCOM    GO GET ADDRESS
0143 1157 8D77               BSR DISADR     DISPLAY ADDRESS
0144 1159 10AE8DFEA6         LDY MSADR,PCR  Y=SELECTED ADDRESS
0145 115E A6A4       AGAIN   LDA ,Y         GET CURRENT BYTE
0146 1160 8D2F               BSR DISBYT     DISPLAY BYTE IN HEX
0147 1162 8620               LDA #$20       <SPACE>
0148 1164 AD9FA002           JSR [$A002]    OUTPUT CHARACTER
0149 1168 8D3B               BSR GETBYT     GET BYTE FROM KEYBOARD
0150 116A 6DA4               TST ,Y         BLANK LINE ENTERED?
0151 116C 270F               BEQ SKIPB      YES, GO TO NEXT ADDRESS
0152 116E 6D8DFE95           TST ERFLG,PCR  ERROR IN BYTE ENTRY
0153 1172 1026FEE9           LBNE ERROR     YES, REPORT ERROR
0154 1176 10AE8DFE89         LDY MSADR,PCR  Y=SELECTED ADDRESS
0155 117B A7A4               STA ,Y         SUBSTITUTE BYTE AT ADDRESS
0156 117D 10AE8DFE82 SKIPB   LDY MSADR,PCR
0157 1182 3121               LEAY 1,Y       INCREMENT ADDRESS
0158 1184 10AF8DFE7B         STY MSADR,PCR  SAVE IT
0159 1189 6F8DFE7A           CLR ERFLG,PCR  CLEAR ERROR FLAG
0160 118D 8D41               BSR DISADR     DISPLAY ADDRESS
0161 118F 20CD               BRA AGAIN      REPEAT SUBSTITUTE COMMAND

                       * DISPLAY BYTE IN A *

0162 1191 17FFA6     DISBYT  LBSR OBJASC    CONVERT TO ASCI
0163 1194 A68DFE6A           LDA MSASC,PCR  A=M.S. ASCI CHAR
0164 1198 AD9FA002           JSR [$A002]    OUTPUT CHARACTER
0165 119C A68DFE63           LDA LSASC,PCR  A=L.S. ASCI CHAR
0166 11A0 AD9FA002           JSR [$A002]    OUTPUT CHARACTER
0167 11A4 39                 RTS            RETURN
```


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*TRS-80 is a trademark of Tandy Corp.

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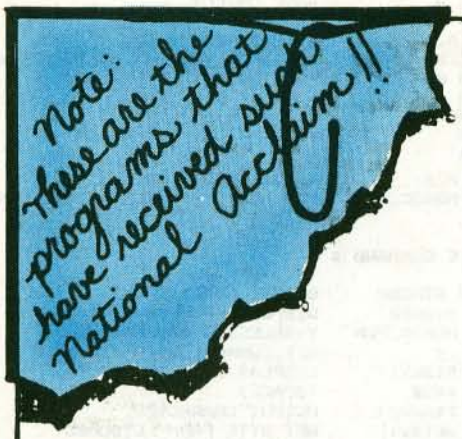

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significant byte and once for the least significant byte. The routine then returns.

ASCII TO OBJECT CONVERSION — (ASCOBJ) converts an ASCII representation of a byte into the actual object value. It does this by comparing each ASCII character to a table (ASCTAB) and counting how many steps through the table it goes before finding a match. This "count" number (0 to $0F) represents one nibble (four bits) of the final object byte. It does this for each ASCII character in the input buffer, and then puts the two nibbles together to make up the final object byte. (It shifts the most significant nibble to the left four times to get it in the correct bit location and then OR's the two nibbles to form the final object byte.

OBJECT TO ASCII CONVERSION — (OBJASC) converts an object byte into a two character ASCII representation. It does this by using the same ASCII table (ASCTAB) as is used by the ASCOBJ routine. However, this routine breaks the object byte into two nibbles and uses each nibble as an offset into the table to find the corresponding ASCII character.

SUBSTITUTE COMMAND — First calls STRCOM to get a starting address. It then displays the current contents of the selected address by calling DISBYT (display byte). GETBYT (get byte) is called next to get a byte from the keyboard. The entered byte (if it is a legal byte) is substituted at the current address, and you stay in the substitute command with the next address. If a blank line is entered, no change is made to the current addressed byte, the address pointer (in Y) is incremented by one, and you stay in the substitute command. If ERFLG was set (an error was made in the byte entry), you return with an error message.

DISPLAY BYTE IN A REGISTER — Converts the object byte (in "A") to ASCII by calling OBJASC. It then displays the most significant (MSASC) and least significant (LSASC) characters on the screen.

GET BYTE FROM KEYBOARD — Functions the same as GETADR except only a byte value is obtained (two characters input from keyboard).

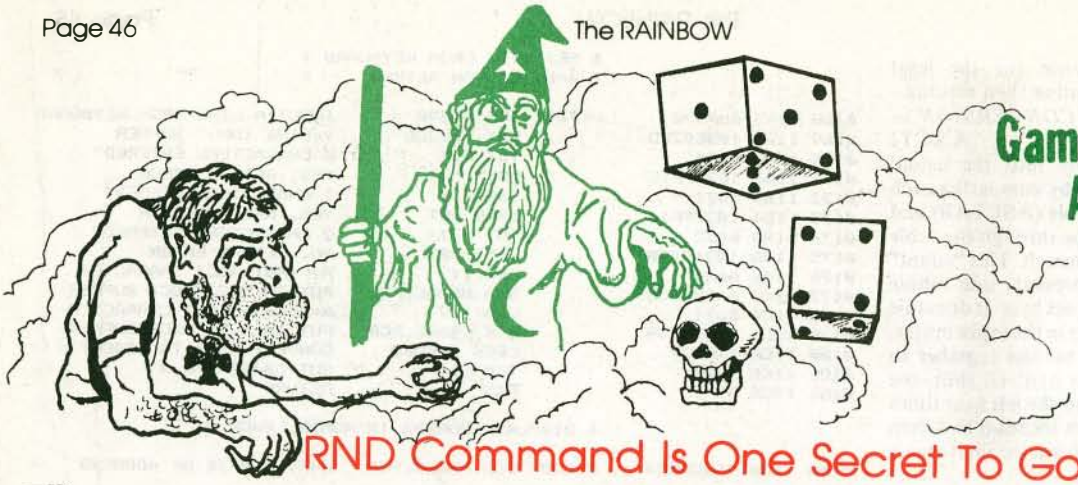
DISPLAY ADDRESS IN MSADR, LSADR LOCATIONS — Calls DISBYT two times to display the address (stored in MSADR, LSADR) in ASCII format on the screen.

DISPLAY NEXT LINE — Adds eight to the current selected address for the display command and displays that address. It then branches to DISLIN (Display Line) in the Display Command to display the next line.

MOVE BLOCK COMMAND — Calls STRCOM three times to get three addresses (STRTAD-start address of block, ENDAD-end address of block and TOADR-destination address of block). If the end address is less than the start address, you get an error message. The routine then checks if you are moving the block up or down in RAM. It branches to the appropriate move loop (either MOVELP or MOVUP/REVMOV) to move the block correctly. You need to move bytes starting at the beginning of the block if you are moving down in RAM, and move bytes starting at the end of the block if you are moving up in RAM. This guards against writing over bytes before they are moved.

```
                        * GET BYTE FROM KEYBOARD *
                        * A=BYTE UPON RETURN     *

0168 11A5 BDA390    GETBYT JSR $A390       INPUT A LINE FROM KEYBOARD
0169 11A8 108E02DD         LDY #$02DD      Y=LINE INPUT BUFFER
0170 11AC 6DA4             TST 0,Y         0 CHARACTERS ENTERED?
0171 11AE 1027FF1C         LBEQ RET        YES, RETURN ERROR
0172 11B2 6D21             TST 1,Y         1 CHARACTER ENTERED?
0173 11B4 1027FF16         LBEQ RET        YES, RETURN ERROR
0174 11B8 6D22             TST 2,Y         2 CHARACTERS ENTERED?
0175 11BA 1026FF10         LBNE RET        NO, RETURN ERROR
0176 11BE A6A4             LDA ,Y          A=FIRST ASCI CHARACTER
0177 11C0 A78DFE3E         STA MSASC,PCR   PUT IN M.S. ASCI BUFFER
0178 11C4 A621             LDA 1,Y         A=SECOND ASCI CHARACTER
0179 11C6 A78DFE39         STA LSASC,PCR   PUT IN L.S. ASCI BUFFER
0180 11CA 17FF37           LBSR ASCOBJ     CONVERT ASCI TO OBJECT
0181 11CD 1F98             TFR B,A         PUT OBJECT IN A
0182 11CF 39               RTS             RETURN

                        * DISPLAY ADDRESS IN MSADR,LSADR *

0183 11D0 A68DFE30  DISADR LDA MSADR,PCR   A=M.S. BYTE OF ADDRESS

0184 11D4 8DBB             BSR DISBYT      DISPLAY 'A' IN HEX
0185 11D6 A68DFE2B         LDA LSADR,PCR   A=L.S. BYTE OF ADDRESS
0186 11DA 8DB5             BSR DISBYT      DISPLAY 'A' IN HEX
0187 11DC 8620             LDA #$20        <SPACE>
0188 11DE AD9FA002         JSR [$A002]     OUTPUT CHARACTER
0189 11E2 39               RTS             RETURN

                        * DISPLAY NEXT LINE COMMAND *

0190 11E3 10AE8DFE1C NEXTL LDY MSADR,PCR   Y=SELECTED ADDRESS
0191 11E8 3128             LEAY 8,Y        Y=Y+8
0192 11EA 10AF8DFE15       STY MSADR,PCR   STORE 'Y' IN ADDRESS BUFFER
0193 11EF 8DDF             BSR DISADR      DISPLAY ADDRESS
0194 11F1 860D             LDA #$0D        <CARRIGE RETURN>
0195 11F3 AD9FA002         JSR [$A002]     OUTPUT CHARACTER
0196 11F7 6F8DFE0B         CLR DINDX,PCR   CLEAR DISPLAY INDEX
0197 11FB 16FE74           LBRA DISLIN     GO DISPLAY LINE

                        * MOVE BLOCK COMMAND *

0198 11FE 17FE47    MOVE   LBSR STRCOM     GET START ADDRESS
0199 1201 AE8DFDFF         LDX MSADR,PCR   * PUT START ADDRESS
0200 1205 AF8DFDFF         STX STRTAD,PCR  * IN STRTAD
0201 1209 8645             LDA #'E         'E' PROMPT FOR END ADDRESS
0202 120B 17FE3A           LBSR STRCOM     GET END ADDRESS
0203 120E AE8DFDF2         LDX MSADR,PCR   * PUT END ADDRESS
0204 1212 AF8DFDF4         STX ENDAD,PCR   * IN ENDAD
0205 1216 AC8DFDEE         CMPX STRTAD,PCR IS END<START?
0206 121A 1025FE41         LBLO ERROR      YES, ERROR
0207 121E 8654             LDA #'T         'T' PROMPT FOR 'TO' ADDRESS
0208 1220 17FE25           LBSR STRCOM     GET 'TO' ADDRESS
0209 1223 AE8DFDDD         LDX MSADR,PCR   X='TO' ADDRESS
0210 1227 AC8DFDDD         CMPX STRTAD,PCR 'TO'>'START'?
0211 122B 2213             BHI MOVUP       YES, MOVING UP
0212 122D 10AE8DFDD6       LDY STRTAD,PCR  Y=START ADDRESS
0213 1232 A6A0      MOVELP LDA ,Y+         GET BYTE FROM START
0214 1234 A780             STA ,X+         STORE IN 'TO'
0215 1236 10AC8DFDCF       CMPY ENDAD,PCR  MOVED ENTIRE BLOCK?
0216 123B 23F5             BLS MOVELP      NO, GO BACK
0217 123D 16FDCE           LBRA MAIN       DONE, RETURN TO MAIN LOOP
0218 1240 AF8DFDC8  MOVUP  STX TOADR,PCR   STORE 'TO' ADDRESS
0219 1244 EC8DFDC2         LDD ENDAD,PCR   D=END ADDRESS
0220 1248 A38DFDBC         SUBD STRTAD,PCR D=# OF BYTES TO MOVE
0221 124C 308B             LEAX D,X        X='TO' ADDRESS + LENGTH
0222 124E 10AE8DFDB7       LDY ENDAD,PCR   Y=END ADDRESS
0223 1253 3121             LEAY 1,Y        Y=Y+1
0224 1255 3001             LEAX 1,X        X=X+1
0225 1257 A6A2      REVMOV LDA ,-Y         GET BYTE FROM END OF BLOCK
0226 1259 A782             STA ,-X         STORE IT AT END OF MOVED BLOCK
0227 125B AC8DFDAD         CMPX TOADR,PCR  MOVED ENTIRE BLOCK?
0228 125F 22F6             BHI REVMOV      NO, GO BACK
0229 1261 16FDAA           LBRA MAIN       DONE, RETURN TO MAIN LOOP

0230 1264                  END START

NO ERRORS FOUND
```

Well, that's *Minimon*! It is a bit long, but I wouldn't get too bogged down trying to comprehend everything at once. The important thing is to have the monitor available for use in my future columns.



GameMaster's Apprentice

RND Command Is One Secret To Good Games

4K

By Bob Albrecht and George Firedrake
Rainbow Contributing Editors

The Mysterious & Unpredictable RND

In the world of games, much depends on the whims of Fate, Dame Fortune, the vagaries of chance. Most board games include dice or spinners in the boxed set. These games try to imitate life, which is played with both skill and luck.

Computer games also blend luck with skill. To do so, they depend heavily on the Mysterious and Unpredictable RND function, one of the nicest tools given to us by John Kemeny and Thomas Kurtz, the creators of BASIC.

One of the neatest things about Radio Shack's computers is the way the RND function works. It gives "random numbers" in a way that is easily understood by beginners.

★To get random numbers, 1 or 2:
The CoCo: RND(2)
Most others: INT(2*RND(O)) + 1

★Random numbers: 1, 2, or 3
The CoCo: RND(E)
Most others: INT(3*RND(O)) + 1

★Random numbers: 1, 2, 3, 4, 5, or 6
The CoCo: RND(6)
Most others: INT(6*RND(0)) + 1

★Random numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9
The CoCo: RND(10) -1
Most others: INT(10*RND(0))

Try to explain to a nine year old child what INT(6*RND(O)) + 1 means and you will really appreciate RND(6) on your CoCo.

We assume you know, if N is a positive integer, then RND(N) is a "random number" from 1 to N. Well, at least it serves our purpose — math professors will argue with you about whether it is truly a random number.

So, we call the number produced by RND and "RND number." We propose experiments for you to try so you can learn more about its mysterious and unpredictable behavior. It is what it is; you shall know it by what it does.

RND Experiment No. 1

If you flip a coin, you expect to get HEADS sometimes and TAILS sometimes. Over many flips, you expect to get about the same number of HEADS and TAILS. (If you don't, please apply for a job in our FuturePlay division.)

What happens if you ask the CoCo to compute a bunch of RND(2) numbers and count the number of 1s and 2s? Let's do it.

```
100 REM ** RND EXPERIMENT #1
110 DIM C(2)

200 REM ** TALK TO A PERSON
210 CLS
220 INPUT "HOW MANY RND NUMBERS"; S

300 REM ** SET COUNTS TO ZERO
310 C(1) = 0
320 C(2) = 0

400 REM ** DO S RND NUMBERS, COUNT 1S & 2S
410 FOR K =1 TO S
420 X = RND(2)
430 C(X) = C(X) + 1
440 NEXT S

500 REM ** PRINT RESULTS
510 PRINT
520 PRINT "RND NUMBER", "FREQUENCY"
530 PRINT 1, C(1)
540 PRINT 2, C(2)

600 REM ** TELL HOW TO DO AGAIN
610 PRINT
620 PRINT "FOR ANOTHER RUN, PRESS ANY KEY"
630 IF INKEY$ = "" THEN 630 ELSE 210
```

Enter the program and RUN it. First you see:

```
HOW MANY RND NUMBERS? ■
```

Let's ask for a sample of 1000 numbers. We type 1000 and press ENTER. Several seconds pass — then we see:

```
HOW MANY RND NUMBERS? 1000

RND NUMBER      FREQUENCY
     1             493
     2             507

FOR ANOTHER RUN, PRESS ANY KEY ■
```

YOUR TURN. Press any key (except BREAK or SHIFT) and get another sample. How many RND numbers do you want?

Our program counts the number (frequency) of 1s and 2s when the CoCo computes a bunch of RND(2) numbers. For RND(2), the *possible* values are 1 or 2. These values are *equally likely* to occur. So, you get about the same number of 1s and 2s.

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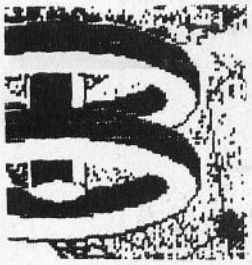
("photo-negative")



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Modify our program so it computes RND(3) numbers and counts the number of 1s, 2s, and 3s. Oh, you prefer RND(4) numbers, or RND(5) numbers, or . . . ? OK, you choose.

Better yet, write one program to do any of the above. It might begin like this:

```
FOR RND(N), WHAT IS N? ■
```

We want RND(3) numbers, so we type 3 and press ENTER.

```
FOR RND(N), WHAT IS N? 3
HOW MANY RND NUMBERS? ■
```

Again, we ask for 1000 numbers. In a few seconds, the CoCo displays the results.

```
FOR RND(N), WHAT IS N?
HOW MANY RANDOM NUMBERS? 3

RND NUMBER      FREQUENCY
  1               337
  2               328
  3               335

FOR ANOTHER RUN, PRESS ANY KEY
```

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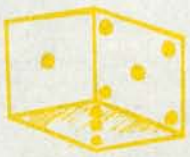
We record these results, then press a key.

```
FOR RND(N), WHAT IS N?
```

Hmmm ... let's ask it to "roll a die" and count the number of 1s, 2s, 3s, 4s, 5s, and 6s.



```
FOR RND(N), WHAT IS N?  6
HOW MANY RANDOM NUMBERS?  600

RND NUMBER      FREQUENCY
1               107
2               96
3               97
4               108
5               98
6               94

FOR ANOTHER RUN, PRESS ANY KEY
```

Next time, we reveal our program. It is similar to our program for RND(2). We change line 110, change and expand the block beginning at line 200, put a FOR-NEXT loop in block 300, change line 420 in block 400, and rewrite block 500.

Please note our use of phrases such as "block 300." Programs in "GameMaster's Apprentice" are written in a way (we hope) you can read and understand. Each block does one thing and begins with a REM that says something about what the block does. We'll use other elements of style to help you understand our programs. When we work with kids, we ask them to write in "good style" so people can read and understand their programs.

Surely, but slowly, we will explore the following things:

★The elusive RND
★GameMaster's Dice
★Looking up stuff in files. First, files of information in DATA statements and arrays. Next, cassette files. Eventually, disk files.
★Whatever else comes to mind, or is suggested to you.

What do you want? If it fits into the general idea of "GameMaster's Apprentice," we might do it. Send your suggestions, complaints, kudos, requests, whatever ... to George & Bob, P.O. Box 310, Menlo Park, CA 94025.

*(Copyright © 1982 by DragonQuest, P.O. Box 310, Menlo Park, CA 94025. Portions of "The GameMaster's Apprentice" are from a book-in-progress called **Adventurer's Handbook: A Beginner's Guide To Role-Playing Games.**)*

NEW! FOR THE COLOR COMPUTER!

Med Systems is proud to announce its first major software releases for the TRS-80 Color Computer. Both games are written in machine-language, feature full-color, high resolution graphics, super sound effects, and incredible playing speed. Both are original games designed and written by Kenneth Kalish, 6809 wizard.

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You are the last space invader. The cursed humans have destroyed all your compatriots. The human ships now prowl the space lanes, and their laser base fires at you with deadly accuracy. Your goal...REVENGE! Wipe out as many of their ships as you can, avoid the photon blasts, and aim for their valuable flagship! Invader's Revenge features multiple difficulty levels and one or two player game selection.

Phantom Slayer

They are the mutant phantoms. You are the Phantom Slayer. Enter the deadly catacombs and destroy the phantoms. Wield your laser pistol, and attend to your proximity detector. One touch by a phantom is fatal, so if your first shot fails, turn and run! Phantom Slayer is a **real-time** game executed with full-screen, **three dimensional** graphics. It features multiple difficulty levels and a training mode.

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Phantom Slayer 16K cassette $19.95

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Printer Graphics...

Line Printer VII: Not So Dumb!

16K

By Kathy Goebel

*(Ms. Goebel is the author of **WordCC7** for the Color Computer and LPVII.)*

Reading "Make Letterheads for Correspondence" (*Rainbow*, April 1982) started me thinking about dots. Drawing a picture on the screen and then using a screen print routine to send it to the printer is a nice solution to the problem of getting hardcopy graphics.

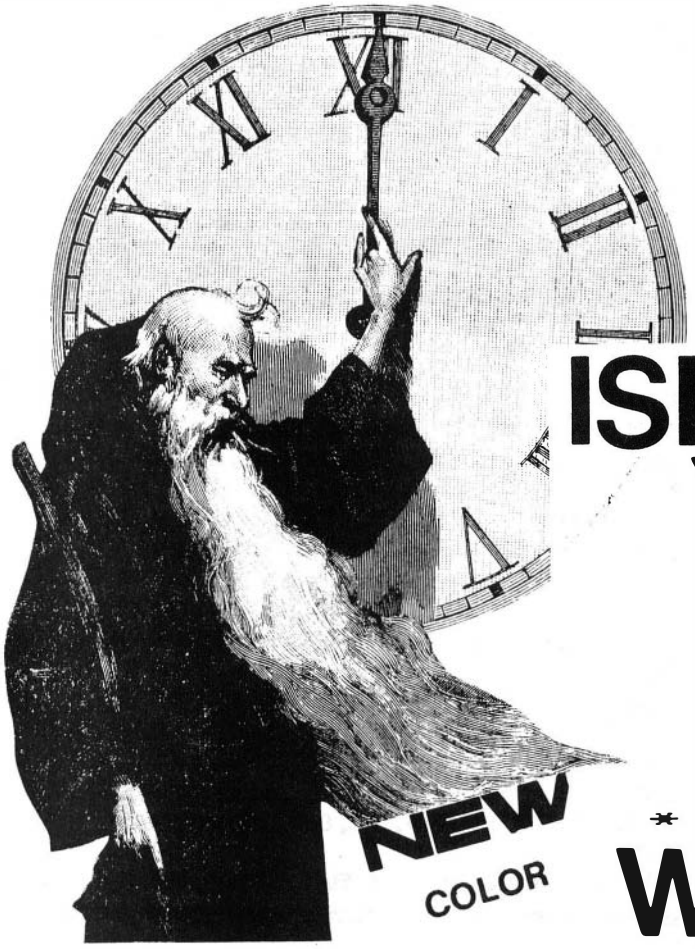
But this method limits the size of the "canvas"—only what's on the screen will go to the printer. Also, as good as the 80C resolution is, you can get smoother, clearer, more resolute graphics from your LPVII (or VIII) than even PMODE 4 offers—and you don't even need Extended Basic! The key is dot addressability.

Some would call my lowly LPVII an "unintelligent" printer. As long as I can control those tiny dots, my printer has all the IQ it needs! The following program prints a high-res logo for our local computer group's newsletter. It's mostly data statements, which contain the graphics codes used to turn "on" or "off" each tiny dot.

Determining these codes is no small feat, however. I developed and utilized a number of "tools" to aid in the process. The first tool was a sheet of graph paper on which I drew the desired design. Then I spent many painful hours punching in 1's and 0's to represent whether or not each block on the graph paper contained a pencil mark. I used a word processor (WORDCC7D) to collect these 1's and 0's and store them in a file. Then I wrote a short program to read this file and translate the binary strings into hexadecimal codes. This program then generated DATA statements containing the codes (lines 10-1400). The result, as you can see, is much better than anything you could draw on your screen. Not bad for a "dumb" printer!

The Listing:

```
5 ' CCOGLOGO
6 ' BY KATHY GOEBEL
10 DATA 80,80,80,80,80,80,80,80,
80,80,80,80,80,80,80,80,80,80,C0
,C0
20 DATA E0,B0,B8,98,98,8C,8C,8E,
86,86,87,87,87,87,87,87,87,87,86
,8E
30 DATA 8E,9E,9E,BC,BC,FC,F8,F8,
F0,FC,80,80,80,80,80,80,80,80,80
,80
40 DATA 80,C0,C0,E0,B0,B8,98,98,
8C,8C,8E,86,86,87,87,87,87,87,87
,87
50 DATA 87,86,8E,8E,9E,9E,BC,BC,
FC,F8,F8,F0,FC,80,80,80,80,80,80
,80
60 DATA 80,80,80,C0,C0,E0,F0,F0,
F8,B8,B8,9C,9C,9E,8E,8E,8E,8F,87
,87
70 DATA 87,87,8F,8F,8F,8F,8F,9E,
9E,9E,9C,BC,B8,F8,F0,F0,E0,E0,C0
,80
80 DATA 80,80,80,80,80,80,80,80,
80,80,80,80,80,80,80,80,C0,A0,B0
,90
90 DATA 88,88,88,8C,8C,8C,8C,8C,
8C,9C,9C,9C,B8,F0,F0,F0,F0,B8,9C
,8F
100 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
110 DATA 80,80,80,80,80,80,80,80
,80,80,80,C0,E0,F0,98,8C,86,87,8
1,81
120 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
130 DATA 80,80,80,80,80,80,81,81
,83,FF,80,80,80,80,C0,E0,F0,98,8
C,86
140 DATA 87,81,81,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
150 DATA 80,80,80,80,80,80,80,80
,80,81,81,83,FF,80,80,80,C0,E0,F
0,B8
160 DATA 8C,86,87,83,83,81,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
170 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,81,81,83,87,8
F,9F
180 DATA FE,FC,F8,E0,C0,80,80,80
,80,80,80,80,F0,FC,9E,87,81,80,8
0,80
190 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,81,87,9F,FF,F
E,F8
200 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
210 DATA 80,80,80,80,80,80,80,C0
,F0,FC,9E,87,81,80,80,80,80,80,8
0,80
220 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
230 DATA 80,80,80,80,80,80,80,80
,80,80,C0,F0,FC,9E,87,81,80,80,8
0,80
240 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
250 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,E0,F8,BE,87,81,8
0,80
260 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
270 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
280 DATA 80,81,83,8F,BF,FE,FC,F0
```



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```
,C0,80,80,BF,FF,FF,E0,80,80,80,8
0,80
290 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,C1,F
F,FF
300 DATA BC,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
310 DATA 80,80,80,80,80,C0,FC,FF
,FF,81,80,80,80,80,80,80,80,80,8
0,80
320 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
330 DATA 80,80,80,80,80,80,80,80
,C0,FC,FF,FF,81,80,80,80,80,80,8
0,80
340 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
350 DATA 80,80,80,80,80,80,80,80
,80,80,C0,FC,FE,FF,83,80,80,80,8
0,80
360 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
370 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
380 DATA 80,80,80,80,80,81,87,FF
,FF,FE,C0,80,81,87,9F,FF,FE,FC,F
8,F0
390 DATA E0,E0,C0,C0,C0,C0,C0,C0
,C0,C0,C0,E0,E0,E0,B0,9C,8E,8F,8
7,81
400 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
410 DATA 80,80,80,80,80,FF,FF,FF
,FF,80,80,80,80,80,80,80,80,80,8
0,80
420 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
430 DATA 80,80,80,80,80,80,80,80
,FF,FF,FF,FF,80,80,80,80,80,80,8
0,80
440 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
450 DATA 80,80,80,80,80,80,80,80
,80,80,9C,FF,FF,FF,80,80,80,80,8
0,80
460 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
470 DATA 80,80,80,80,80,80,80,80
```


™TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter

> There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now. 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

NOTE: This and other interesting and needed articles for the Radio Shack TRS-80 color computer™ are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

68 MICRO JOURNAL

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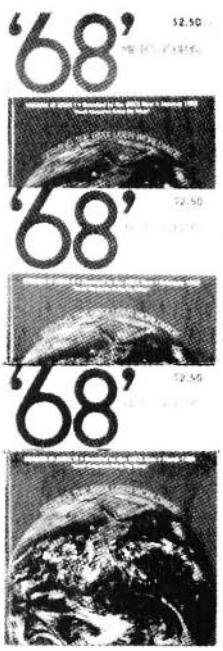

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Currently, and even before the Color Computer™ hit the stores, **68 Micro Journal™** was devoting more space to the TRS-80C Color Computer™ and information concerning the Motorola 6809 (which is the CPU in the Color Computer™) than ANY OTHER Computer Magazine. Examples include:

REVIEWS of the three major Disk Control Systems for the Color Computer™, most of the Monitors, Assemblers, and Disassemblers, Word Processors and Editors, "Terminal" Programs (for use with Modems, Communications with other Computers, etc.), and of course, Games.

HINTS for Expanding Memory, Power Supply Cooling, repairing sticky keyboards, disabling the ROM PAK "Take Over", hooking up to Printers, etc.

DISCUSSIONS of the 6883 Synchronous Address Multiplexer, using the Color Computer™ with 64K and 96K memory (which it is ALREADY capable of handling), thoughts on Programming, etc.

I suggest that you subscribe to **68 Micro Journal™**, SOON, as many back issues are sold-out.

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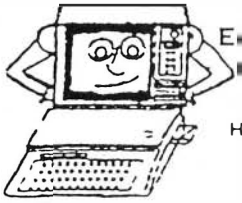
** Sample issue - $3.50

Bob Nay
Color Computer Editor

```
,80,80,80,80,80,80,80,80,80,80,8
0,80
480 DATA 80,80,80,80,80,80,80,81
,FF,FF,87,80,80,80,80,8F,BC,F0,E
1,C1
490 DATA C3,83,87,87,87,87,87,87
,87,87,83,83,81,80,80,80,80,80,8
0,80
500 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
510 DATA 80,80,80,80,80,81,8F,BF
,FF,FE,F0,C0,80,80,80,80,80,80,8
0,80
520 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
530 DATA 80,80,80,80,80,80,80,81
,8F,BF,FF,FE,F0,C0,80,80,80,80,8
0,80
540 DATA 80,E0,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
550 DATA 80,80,80,80,80,80,80,80
,80,80,80,8F,BF,FF,FE,F8,E0,80,8
0,80
560 DATA 80,80,80,80,E0,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
570 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
580 DATA 80,80,80,80,80,80,C0,FE
,8F,83,80,80,80,80,80,80,80,81,8
3,83
590 DATA 87,87,8F,8E,9E,9C,BC,BC
,F8,F8,F8,F8,F0,F0,E0,E0,E0,C0,C
0,80
600 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
610 DATA 80,80,80,80,80,80,80,80
,83,87,9F,BF,FE,F8,F0,E0,C0,80,8
0,80
620 DATA 80,80,80,80,80,80,80,80

,80,80,80,80,80,80,80,80,80,80,8
0,80
630 DATA 80,80,80,80,80,80,80,80
,80,83,87,9F,BF,FE,F8,F0,F0,D8,8
4,83
640 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
650 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,81,87,9F,BF,FF,F
E,FC
660 DATA F0,D0,CC,86,81,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
```

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```
670 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
680 DATA 80,80,C0,F0,B8,8E,83,C0
,E0,A0,90,88,88,84,84,82,82,82,8
2,82
690 DATA 82,83,83,81,81,81,81,82
,82,82,82,85,85,8B,93,F7,E7,CF,8
F,9F
700 DATA BF,FF,FE,FE,FC,F8,F0,E0
,C0,80,80,80,80,80,80,80,80,80,8
0,80
710 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,81,83,83,87,8F,9F,B
E,BC
720 DATA FC,F8,F0,F0,E0,E0,C0,C0
,C0,80,80,80,80,80,80,80,80,80,8
0,80
730 DATA 80,80,80,80,C0,C0,C0,E0
,E0,B0,90,88,88,84,83,83,83,87,8
F,9F
740 DATA BE,BC,FC,F8,F0,F0,E0,E0
,C0,C0,C0,80,80,80,80,80,80,80,8
0,80
750 DATA 80,80,80,80,80,80,C0,C0
,C0,E0,E0,B0,90,88,88,84,82,83,8
3,87
760 DATA 8F,9F,9F,BE,FE,FC,F8,F0
,F0,E0,C0,C0,C0,80,80,80,80,80,8
0,80
770 DATA 80,80,80,80,80,80,80,80
,80,80,80,C0,C0,C0,E0,F0,F0,B8,9
C,8E
780 DATA 86,C3,E1,98,8C,82,81,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
790 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,83,FF,F
E,B0
800 DATA 80,80,81,83,87,8F,9F,BF
,FF,FF,FE,F8,F0,C0,80,80,80,80,8
0,80
810 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
820 DATA 80,81,81,83,83,87,87,87
,8F,8F,8F,8F,8F,8F,8F,8E,8E,8E,8
E,8F
830 DATA 87,87,87,83,83,81,81,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
840 DATA 80,80,80,80,80,81,81,83
,83,87,87,87,8F,8F,8F,8F,8F,8F,8
F,8E
850 DATA 8E,8E,8E,8F,87,87,87,83
,83,81,81,80,80,80,80,80,80,80,8
0,80
860 DATA 80,80,80,80,81,81,81,83
,83,87,87,8F,8F,8F,8F,8F,8E,8E,9
E,9E
870 DATA 9E,9E,9E,9E,8E,8E,8E,8F
,87,87,87,83,81,81,81,80,80,80,F
8,FC
880 DATA FF,83,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
890 DATA 80,80,80,80,80,80,80,80
,80,80,C0,C0,E0,B0,B0,98,8E,87,8
3,80
900 DATA 80,80,80,80,80,80,80,80
,81,87,9F,BF,FF,FF,FE,F0,80,80,8
0,80
910 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
920 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
930 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
940 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
950 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
960 DATA 80,80,80,80,80,80,80,80
```


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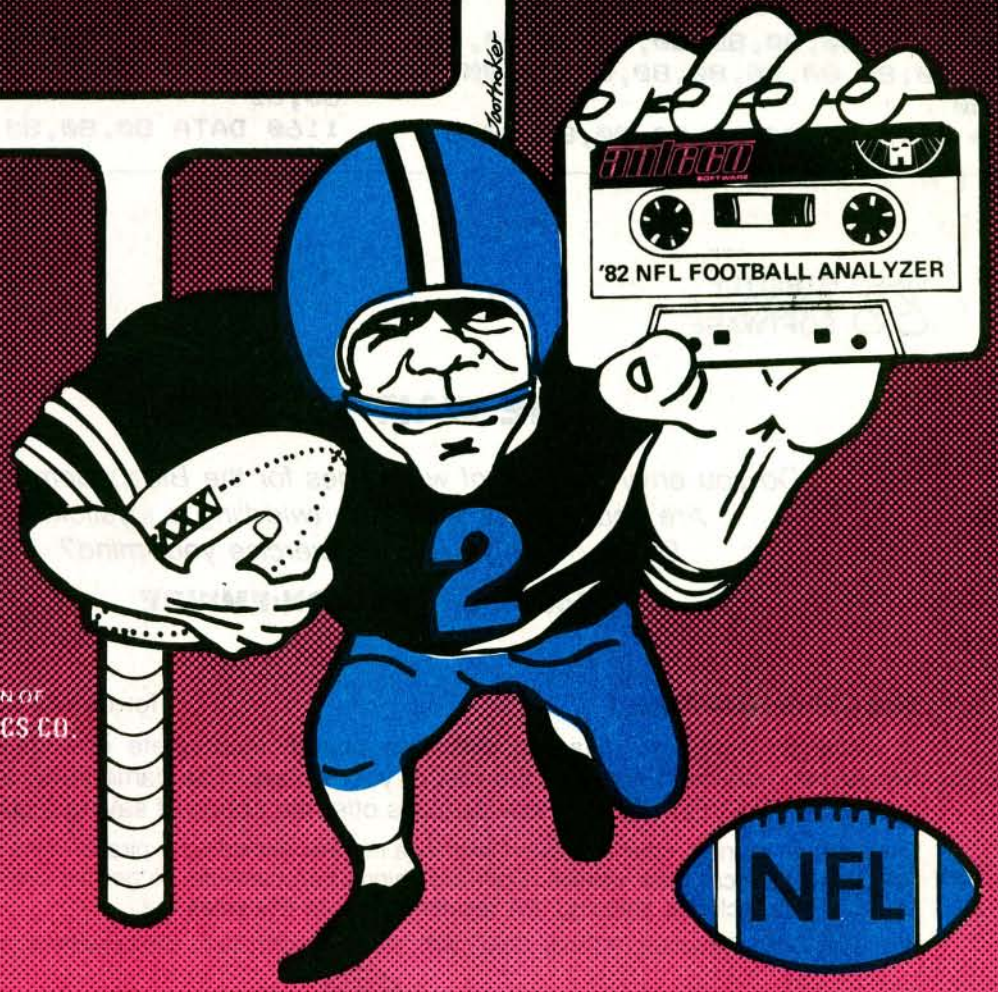

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ANTENNA ELECTRONICS CO.
4220 CLAY AVE
FT. WORTH, TX 76117
(800)433 7631

```
,80,80,80,80,80,80,80,80,80,80,8
0,80
970 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,FF,F
F,FF
980 DATA F8,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
990 DATA 80,80,80,80,80,80,80,80
,80,80,80,80,80,80,80,80,80,80,8
0,80
1000 DATA 80,80,80,80,80,80,80,8
0,80,80,80,81,87,FF,FF,FF,E0,80,
80,80
1010 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1020 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1030 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1040 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1050 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1060 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1070 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,9F,
FF,FF
1080 DATA FE,E0,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1090 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1100 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,C0,FF,FF,FF,87,80,
80,80
1110 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1120 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1130 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1140 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1150 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1160 DATA 80,80,80,80,80,80,80,8
```


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THE WAIT IS OVER!

Do you envy the wall of wargames for the Bleep Computer?
Are your fingers tired from twiddling a joystick?
Do you wish you could exercise your mind?

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A strategic wargame. Starting with one planet, incomplete intelligence and limited resources, you must conquer the rest of your galaxy. The game takes 2-5 hours and is DIFFERENT EVERY TIME! Both versions offer the option of saving a game in progress.

Send check, money order or MasterCard/Visa number (including expiration date and SIGN order). Specify disk or cassette version. Both are shipped on cassette (to get the program on disk add $3.00). Price includes shipping. PA residents include 6% sales tax.

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A Business program for the C.C. Keeps inventory for 125 items in 16K, or 350 in 32K. Both versions $21.88

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Eat dots, avoid the monsters. Super fast graphic arcade fun. Machine language. $16.95

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Perils aplenty in this Adventure. Can you escape? There are even treasures to be found, if you live that long. 16K and up $14.95

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This month only, get the fantastic WORDCC7 (tape version) for only $9.95. Take advantage of this LOW price NOW!

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4-16K	$25.00
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15 Minute Installation

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```
0,80,80,80,80,80,80,80,80,80,80,
80,80
1170 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
83,9F
1180 DATA BF,FF,FE,F8,F0,C0,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1190 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1200 DATA 80,80,80,80,80,80,80,8
0,80,80,C0,F0,FE,9F,87,81,80,80,
80,80
1210 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1220 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1230 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1240 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1250 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1260 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1270 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
```


R. S. COLOR DISK SYSTEM SOFTWARE

DISK EDITOR/ASSEMBLER - This package includes a full featured disk based text editor program and a disk to disk/tape/memory assembler. The text editor is an easy to learn full featured editor which allows files larger than memory to be created and edited with ease. It is compatible with ASCII formatted tape & disk files to allow easy conversion of tape based programs. The assembler supports the full 6809 processor instruction set and will cross assemble 6800 code to 6809 object code. The output object file can be directed to either disk, tape or memory with overwrite protection. The object listing can be output to the screen or printer and versions for printers with or without line feeds are provided. DISK EDITOR & ASSEMBLER $79.95

DISK TERMINAL PACKAGE - A disk based Terminal program for your color computer features full text buffering, baud rates from 300 to 9600 baud, programable word length, parity bits odd/even/none, stop bits. The buffer size is automatically set to the maximum size of your memory. Full control codes can be sent, display word wrap is automatic. The text buffer can be saved or loaded from/to tape or disk. The contents of the buffer can be sent as a file with automatic re-entry to terminal mode, also a file can be sent directly from disk to another user. The contents of the buffer can be displayed on the screen or optionally be output to a printer plugged into the RS 232 port. All file formats are directly compatible with our text editor and word processor programs. DISK TERMINAL PACKAGE $49.95

TEXTPRO I DISK TEXT EDITOR/WORD PROCESSOR - is a complete word processing system designed for easy learning and use. It features a disk based text editor for editing files larger than memory and direct processing of text files from disk or memory. Some of the editor commands include: copy, move, search, replace, delete, line & automatic edit modes allow easy logical commands to add, change, insert, delete, skip up/down line, ignore changes made on last line, skip to begin/end of line all with easy single keystroke commands using arrow keys. The editor can also load, save and append tape or disk files for easy conversion of existing ASCII text files. The Word Processor includes over 29 commands for formatting the output, some of them include: page length, page mode on/off, page numbers on/off, left margin, top/bottom margin, line length, center, double width print, single, multiple & special indent, test lines left on page, skip to top of page, send control codes & ascii data for special printer control, justify on/off, page heading, multiple footnotes per page, word fill mode on/off, send message to screen, display & input from keyboard and more. This is an excellent word processor with many advanced features and one of the easiest to learn and use in just minutes. All commands are logically oriented in easy to remember and associate 2 character commands. DISK TEXTPRO I $49.95

TEXTPRO II TEXT EDITOR/ WORD PROCESSOR - Includes all the features of TEXTPRO I plus: 10 programable tab stops, can be used with horizontal tab to next location, center over tab column, decimal allignment on tab column, right justify to tab column, tab to programed column. Also tab commands can use specific values for tab columns or programmed values. Other additions include: character fill, right justify line, programable footer can be centered/right justified/double width or almost any processor commands can be used with it, 3 programable header lines, expanded footnotes and processable keyboard input data during word processing. DISK TEXTPRO II $79.95

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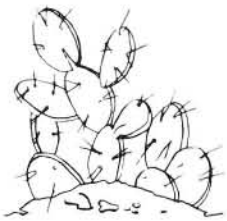
```
1280 DATA 80,81,87,8F,9F,FF,FF,F
E,F8,F0,F0,E0,C0,80,80,80,80,80,
80,80
1290 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1300 DATA 80,80,80,C0,E0,F0,B0,9
C,8E,87,83,81,80,80,80,80,80,80,
80,80
1310 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1320 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1330 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1340 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1350 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1360 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1370 DATA 80,80,80,80,80,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
1380 DATA 80,80,80,80,80,80,81,8
3,87,87,8F,9F,9F,BF,BE,BE,BC,FC,
F8,F8
1390 DATA F0,F0,F0,F0,F0,E0,E0,E
0,E0,F0,F0,F0,F0,B8,B8,B8,BC,9C,
9C,8E
1400 DATA 8E,8E,83,83,81,80,80,8
0,80,80,80,80,80,80,80,80,80,80,
80,80
2000 PRINT#-2,CHR$(18);CHR$(16);
"25";
2010 FOR I=1 TO 14
2020 FOR J=1 TO 200
2030 READ A$: A=VAL("&H"+A$):IF
I=14 THEN A=A OR 129
2035 PRINT#-2,CHR$(A);
2040 NEXTJ
2043 IF I=14 THEN PRINT#-2,CHR$(
28);CHR$(102);CHR$(129) ELSE PRI
NT#-2
2045 IF I=13 THEN PRINT#-2,CHR$(
16);"05";CHR$(28);CHR$(120);CHR$
(129); ELSE PRINT#-2,CHR$(16);"2
5";
2050 NEXT I
2060 PRINT#-2,CHR$(30);"     Col
or Computer Owners Group Newslet
ter     Vol 1 No 4        June, 1
982";CHR$(18)
2070 PRINT#-2,CHR$(16);"05";CHR$
(28);CHR$(210);CHR$(192);CHR$(28
);CHR$(210);CHR$(192);CHR$(30)
```



PRICKLY-PEAR SOFTWARE

QUALITY PROGRAMS FOR YOUR 80C

PROGRAMS REQUIRE 16K EXTENDED BASIC FOR TAPE, AND 32K DISK UNLESS OTHERWISE NOTED.

Astrology

Truly a classic, this program will accurately cast your complete horoscope. You just enter the date, time, and place of birth. The sun sign, rising sign, mid heaven (MC), lunar nodes, and planetary influences including houses and aspects between the planets will all be calculated, and a full chart drawn. You can also do progressed charts and transits. It will even tell you the day of the week you were born. The accompanying book will help you interpret this chart of your horoscope. The extent of the documentation is tremendous, even by our exceptionally high standards, and no previous knowledge of the subject is required. You can share in this wisdom which has been used for thousands of years in many cultures. This program was written by a professional Astrologer. Please specify 16K or 32K system. **$34.95 tape — $39.95 disk**

Gangbusters

If you ever wanted to try a life of crime, this is your chance. You will start out as a Punk, but by using brains, and a little muscle, you can rise to become a Hood, Runner, Bookie, Torpedo, Fence, Kingpin, or win by becoming Syndicate Boss. Indulge yourself. Bribe a judge, or the District Attorney. Pay off the Cops. Take out a contract on another player, but watch out, they may be after you. Buy trucking companies, bootleg operations, houses of ill fame, but remember, if you get caught, you may do some hard time. Do you have what it takes to take over? This game will keep you close to your rod, get you thinking about bulletproof glass in your car, and definitely bring out the worst in you, but you'll love every minute of it. For 2 to 6 players, takes about 2 hours to play. Every game is excitingly different. **$19.95 tape — $24.95 disk**

Fantasy Gamer's Package

Two programs: The first will display your choice of 99 different rooms in Hi-Res graphics at the touch of a key. All standard sizes, plus some with pools, pillars, stairs, odd shapes, etc. Saves lots of game time spent describing room sizes, shapes, and door locations. Includes a super fast dungeon designing system and a completely keyed sample dungeon module — ready to play. The second program in the package generates **COMPLETE** characters including abilities, race, classes, hit points, age, thieving skills, much more, and also generates monsters. This package was developed by an active DM, and has been tested in his campaign. 20 pages of documentation. **$19.95**

Fantasy Gamer's 32K Package

Similar to our popular Fantasy Gamer's Package, but both the Rooms and the Character & Monster Generator are in memory at the same time. You make your selection from a menu. In addition, you can select the **Dice Bag,** which will roll just about any probability you need. **$24.95 tape — $29.95 disk**

NEW THIS MONTH

Disk Software

Almost all of our software is now available on DISK as well as cassette. All of the programs listed are available at $5.00 more than the tape version, on a top quality name brand diskette. 32K FANTASY PACKAGE (menu driven and includes two programs not on the tape) — VIKING! — ASTROLOGY — TAROT — I CHING — NUMEROLOGY — THE ANCIENT WISDOM TRILOGY (menu driven) — PANDORA'S BOX (menu driven) — THE GREAT WORD GAME — GANGBUSTERS — FOOTBALL — MATHPAC I — HOUSEHOLD HELPER — THE SONGBOOK ON DISK (menu driven)

If you are running a disk system, we suggest that you order the disk version, because the cassette version will not run on a disk system without modification or disconnection of the disk controller. The above disk programs require 32K Ram.

Viking!

A simulation for 1 to 4 persons. Each begins as a landowner, and by farming their land, buying and selling land, expanding their fishing fleet, building on to their manufactory, increasing their population, equiping and training more soldiers, and regulating their taxes, each player tries to increase their economic power and rank until one becomes ruler over all. But beware plagues, rats, raiders, revolts, bad weather, and other misfortunes which may lie along the road to success. As you progress, see the map of your holdings increase. Playable in 1 to 2 hours, and different every time, you may have an addiction problem. **$19.95 tape — $24.95 disk**

Ancient Wisdom Trilogy

Three programs, each drawing on the historical wisdom of the ages.

TAROT Ancient Egyptian deck of cards may reveal much. You can read past/present/future, circle of life, or ask a specific question. Lots of documentation. **$19.95 — $24.95 disk**

I CHING A Chinese wisdom so old its very origin is shrouded in the mists of time. The ancient Chinese oracle will give an answer to your question. What will the hexagram reveal? **$19.95 tape — $24.95 disk**

NUMEROLOGY What can be learned from the numbers? Do a character analysis, read your destiny, or chart your monthly cycles. **$19.95 tape — $24.95 disk**

All of these come with ample documentation — ready to be used immediately. ALL THREE for just **$39.95 tape — $44.95 disk.** Save almost $20.00 over separate prices.

ALL Programs in this ad, including disk versions, carry the Rainbow certification seal!

SEND A STAMPED, SELF-ADDRESSED LONG ENVELOPE FOR COMPLETE CATALOGUE

Your Personal check is welcome - no delay. Include $1.50 shipping for each program ordered. (Shipping free on $50.00 or larger orders). Az. residents add 4% sales tax. Orders shipped within two days.

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(602) 886-1505

Business...

Minicalc Will Handle All Your Projections

16K ECB

By Jim Ebbert

Most of you are acquainted with financial projection programs such as Visicalc® and Spectaculator® and what they can do for you.

Here, however, is a similar program that has an advantage over both of those mentioned above: It is included in *the RAINBOW*, so the cost is considerably lower.

Minicalc, however, is a little more limited. It only uses 13 rows and three columns. Still, that is enough for some pretty detailed calculations and financial projections.

When you run the program, the screen will appear. It shows the three columns and 13 rows with an input prompt in the upper left hand corner.

Using *Minicalc*

To start using the program, type G1,1 ***ENTER***. This will start the cursor at column 1, row 1.

Now type 98764 ***ENTER***. This will give position 1,1 the value 98764.

Next, type G1,2 ***ENTER***. This will position the cursor at column 1, row 2. Now type 765.5 ***ENTER***.

This will give position 1,2 the value 765.5. Now type G1,3 ***ENTER***. This will position the cursor at column 1, row 3.

Type eight dashes and ***ENTER*** them. This will put a line at position 1,3 and give a value of zero to that position.

So far, you have learned one command, ***G***. This command tells the 80C where to position the next information. The syntax for the command is:

G x,y

where x is the column and y the row number.

Now type F1,4 ***ENTER***. You will now have an orange prompt at position 1,4 and a blinking prompt in the upper left corner. Next, type [1,1]+[1,2] ***ENTER***. (Note the square brackets are the down arrow and the right arrow in the *shifted* position.)

This time, when you press ***ENTER*** the 80C will add position 1,1 and 1,2 and place the answer in position 1,4.

The ***F*** command tells the computer that you are putting in a formula in position x,y and inputs it into the upper left hand corner. The syntax is:

F x,y

where x is the column and y the row.

Now for the neat stuff. Type G1,2 ***ENTER***. Then type 928 ***ENTER***.

Nothing changed? Type U and ***ENTER***. The U tells the computer to Update the screen.

Other Commands

S will tell the 80C to save the data to tape.

L tells 80C to load the data from tape. You must be sure the recorder is ready for both commands.

More On Formula Mode

When referring to a position, the x,y *must* be in square brackets. When referring to a number, the number *must* be bracketed by a less than and greater than symbol.

If you wish to have the number be a whole number, or integer, place an **I** at the front or the end of the formula. If you want the number to be positive, that is, take an absolute value, put an **A** at the front or the end of the formula.

Functions available are addition, subtraction, multiplication, division and exponential. The program updates from top to bottom, so if you have a formula pointing to a formula above it, you will need to type **U** and ***ENTER*** it two times.

This program is brought to you through Acesoft Software. We hope you will find a number of uses for it and its abilities.

The Listing:

"This program is absolutely excellent" Sept., '81 RAINBOW

TEXT EDITOR

By John Waclo

RAINBOW CERTIFICATION SEAL

WORD PROCESSOR FOR THE COLOR COMPUTER

The bottom-line in Word Processors is printed output flexibility and TEXT EDITOR has it. TEXT EDITOR has **Variable Text**, **Multi-Copy**, and right-side **Justification**! Features that are hard to find in other widely advertised Word Processors. With **Variable Text**, you can repetitively generate the same text with predetermined changes in each output. Merge form letters with mailing lists using **Variable Text**. TEXT EDITOR's **Multi-Copy** command automatically does your letters **and** file copies. 50 copies of your address on mailing labels is a snap with **Multi-Copy**. Give your text that "professional" look with even right-side margins. It's easy, just select **Justification** on the Output Menu.

16K - Special screen display, Save text, Add to text, Find locations of any word. Edit, Insert, Delete, Replace any line of text. Plus Auto Line-Centering! Output to any printer with full control over Left Margin, Right Margin, Line Spacing, Paging, Length of Form, Number of Copies, and right-side Justification. Re-format entered text; Menu driven. Draft of text; full or partial. FREE upgrade to 32K software...and more.

32K - ALL of the above PLUS... More text storage, Auto-Key Repeat, Global word or phrase exchange, and Automatic Letter Headings. Move, Duplicate or Delete blocks of text. User changeable Printer Format menu and text imbeded printer control codes. Plus, Exclusive Variable Text feature...and more.

$49.95 Tape -- $59.95 Disk ‡ Includes Manual ‡ Extended Basic required

ELITE Software Box 11224 Pittsburgh, PA 15238 (412) 795-8492

```
3 '       COMPLIMENTS OF:
4 '      ACESOFT  SOFTWARE
5 '    1680 NORTH PAGE DRIVE
6 '     DELTONA, FL  32725

10 TROFF:PCLEAR1:CLEAR2500:DIML$
(3,13),V(19),I$(3,13)
11 CLS
12 FORT=1088TO1119:POKET,32:NEXT
:POKE1101,50:POKE1111,51:POKE109
1,49:PRINT@96,"";
13 FORT=1TO12:PRINTRIGHT$(STR$(T
),2):NEXT
14 PRINT"13";
15 FORT=1121TO1506STEP32:P=PEEK(
T):IFP>63THENPOKET,P-64
16 NEXT:FORT=1120TO1505STEP32:P=
PEEK(T):IFP>63THENPOKET,P-64
17 NEXT
18 PRINT@0,">":PRINT:P=2:A$="":C
$="":PRINT@P,"";
19 A$=INKEY$:IFA$=""THENPRINT@P,
CHR$(255);:GOTO19
20 PRINT@P,CHR$(32);:IFA$=CHR$(1
3)THEN24
21 IFA$=CHR$(8) AND LEN(C$)>0THE
NP=P-1:C$=LEFT$(C$,P-2):GOTO19
22 C$=C$+A$
23 PRINT@P,A$;:P=P+1:GOTO19
24 L$=LEFT$(C$,1)
25 IFL$="G"THENF=0:GOTO31
26 IFL$="F"THENF=1:GOTO31
27 IFL$="U"THEN72
28 IFL$="S"THEN75
29 IFL$="L"THEN78
30 GOTO18
31 L$="":FORT=2TO LEN(C$):M$=MID
$(C$,T,1):IFM$=","THEN34
32 L$=L$+M$
33 NEXT:GOTO18
34 L$=RIGHT$(L$,1):X=VAL(L$):IFX
>3THEN18
35 L$=RIGHT$(C$,LEN(C$)-T)
36 Y=VAL(L$):IFY>14THEN18
37 P=Y*32+X*10+57:PRINT@P,"
   ";::L$(X,Y)="":IFF=1THENGOSUB
43:GOTO18
38 A$=INKEY$:IFA$=""THENPRINT@P,
CHR$(255);:GOTO38
39 PRINT@P," ";:IFA$=CHR$(13)THE
N42
40 IFA$=CHR$(8) AND LEN(L$(X,Y))
>0THENP=P-1:L$(X,Y)=LEFT$(L$(X,Y
),LEN(L$(X,Y))-1):GOTO38
41 L$(X,Y)=L$(X,Y)+A$:PRINT@P,A$
;:P=P+1:GOTO38
42 GOTO18
43 PRINT@P,CHR$(255);
44 PRINT@0,I$(X,Y)
45 PRINT@0,"";:LINEINPUTI$:GOSUB
84:O=0:I$(X,Y)=I$
```


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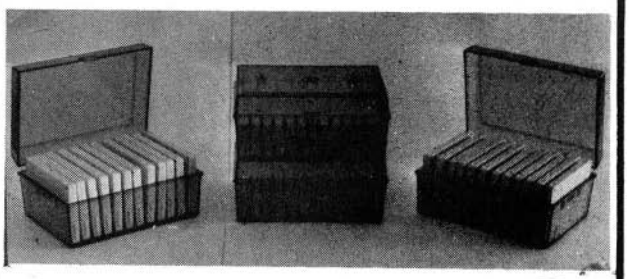

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```
46 O=Ø:V(Ø)=Ø:FORT=1TO LEN(I$)
47 M$=MID$(I$,T,1)
48 IFM$="["THENX$="":Y$="":GOTO6
6
49 IFM$="<"THENX$="":Y$="":GOTO8
Ø
5Ø NEXT
51 I=Ø:V=V(Ø):O=1:FORT=1TO LEN(I
$)
52 M$=MID$(I$,T,1)
53 IFM$="*"THENV=V*V(O):GOTO71
54 IFM$="+"THENV=V+V(O):GOTO71
55 IFM$="/"THENV=V/V(O):GOTO71
56 IFM$="-"THENV=V-V(O):GOTO71
57 IFM$="I"THENI=I+1
58 IFM$="A"THENI=I+2
59 IFM$="^"THENV=V^V(O):GOTO71
6Ø NEXT
61 IFI=1THEN V=INT(V)
62 IFI=2THEN V=ABS(V)
63 IFI=3THEN V=INT(ABS(V))
64 PRINT@P-1,"          ";:PRINT@
P,V;:L$(X,Y)=STR$(V)
65 RETURN
66 T=T+1:M$=MID$(I$,T,1):IFM$=",
"THEN68
67 X$=X$+M$:GOTO66
68 T=T+1:M$=MID$(I$,T,1):IFM$="]
"THEN7Ø
69 Y$=Y$+M$:GOTO68
7Ø X1=VAL(X$):Y1=VAL(Y$):V(O)=VA
L(L$(X1,Y1)):O=O+1:GOTO5Ø
71 O=O+1:NEXT:GOTO18
72 FORY=1TO13:FORX=1TO3:IFI$(X,Y
)=""THEN74
73 P=Y*32+X*1Ø+57:PRINT@P,"";:I$
=I$(X,Y):X$="":Y$="":GOSUB46
74 NEXTX,Y:FORO=98TO48ØSTEP32:PR
INT@O,STRING$(3Ø,32);:NEXT:PRINT
@482,STRING$(29,32);:POKE1535,96
:FORX=1TO3:FORY=1TO13:PRINT@Y*32
+X*1Ø+57,L$(X,Y);:NEXTY,X:GOTO18
75 OPEN "O",#-1,"C"
76 FORT=1TO3:FORY=1TO13:PRINT#-1
,L$(T,Y):PRINT#-1,I$(T,Y):NEXTY,
T
77 CLOSE #-1:GOTO18
78 OPEN "I",#-1,"C"
79 FORT=1TO3:FORY=1TO13:INPUT#-1
,L$(T,Y):INPUT#-1,I$(T,Y):P=Y*32
+T*1Ø+57:PRINT@P,L$(T,Y);:NEXTY,
T:CLOSE #-1:GOTO18
8Ø I1$=""
81 T=T+1:M$=MID$(I$,T,1):IFM$=">
"THEN83
82 I1$=I1$+M$:GOTO81
83 V(O)=VAL(I1$):O=O+1:GOTO5Ø
84 IFI$="N"THEN18
85 RETURN
```

Software Review...

Keys To The Wizard Provides A Real-Time Adventure

There can be a lot more kicks in *Keys of the Wizard* than its creator probably ever dreamed. This latest adventure game from the people who brought us *Madness and the Minotar* and *Alcatraz II* was this reviewer's first glimpse and first go at an adventure game, and I surely did get my kicks in.

After taking three or four minutes to load the game from the cassette, this rank novice at computer anything and tenderfoot adventurer found himself in a little cabin in the woods. A fireplace was on the east wall and two paths led off to adventureland. The "damp" path seemed more interesting, so off we went with all the courage and naive curiosity of a puppy who's found a hole in the backyard fence.

And what a wonderworld of adventure we found—trails twisting in every direction, ponds, caves and mysterious holes in the ground, not to mention canyons and quarries.

But most evil lurks in the depths, doesn't it? So, at the first opportunity, into a cave we went. Not without a bit of trepidation, however, for we knew that there were a whole slew of "getya's" creeping around and we hadn't yet stumbled across any weapons. But, from the assortment of valuables laying around in many cave rooms, we suspected it would be only a matter of time until we uncovered a "dragonsword" or other useful item to start an arsenal.

In the meantime, let's have a "look" about the cave room, and "examine" the skeleton we just discovered and "get" the agate. We kept the (very helpfully supplied) vocabulary sheet nearby and tried all the verbs every chance we got. When we found a "gold key" and tried to "get" it, we got ("There is no fiery.") Same thing with the necklace ("There is no fiery.") Being a computer dummy, we decided to ask what in the blazes a "fiery" was, but kept getting "I do not understand you."

Getting a bit frustrated at having all these goodies laying around and seemingly no way to grab them up and run back to the cabin, we tried a new verb, "kick." Encountering the skeleton again, this time we kicked it. Nothing happened, but it felt good, even though we were chastized with "Don't be ridiculous." When the crypt wouldn't open, we kicked it good. Finding a jug in our path, what else? We kicked it. "Ridiculous, ridiculous, ridiculous". It was wonderful, and we were giggling and snickering and giving everything we came across a good swift kick. It was marvelously therapeutic.

All of this laughter from a guy who was supposed to be fighting monsters soon attracted a nearby veteran adventurer who decided to do a bit of over-the-shoulder investigating. That's when it happened! As we were trying to explain to this adventure vet why we were getting our kicks in, the Orc attacked!

The screen started blinking and turned an emergency pinkish color and, while we were checking to see if maybe we bumped some piece of equipment or had blown a fuse, the veteran started jumping up and down (literally!) and waving his arms and yelling "You're being attacked, you ninny. Do something!"

Having no weapons in our inventory, we ran like a bunny and soon outdistanced the Orc. We were too startled even to kick. Whew! We didn't realize how "into" the game we had gotten until we were under attack. The vet says this is "real-time " action—a bonus in an adventure.

One of the best features of *Keys of the Wizard* is contained in the upper portion of the screen where your strength, that of the monsters, and other items of information is constantly tabulated and displayed. "Protecting" this part of the screen from the actual playing area makes it vastly easier to keep track of what is happening.

Frankly, this tenderfoot still wonders how he managed to score a few points, and, have gotten no licks of our own in, was somewhat distressed to find all of the monsters at full strength all of the time, but we're sure that those who've learned to be the hunters rather than the hunted will find it helpful to know just how much damage you've inflicted upon your adversaries, and vice versa.

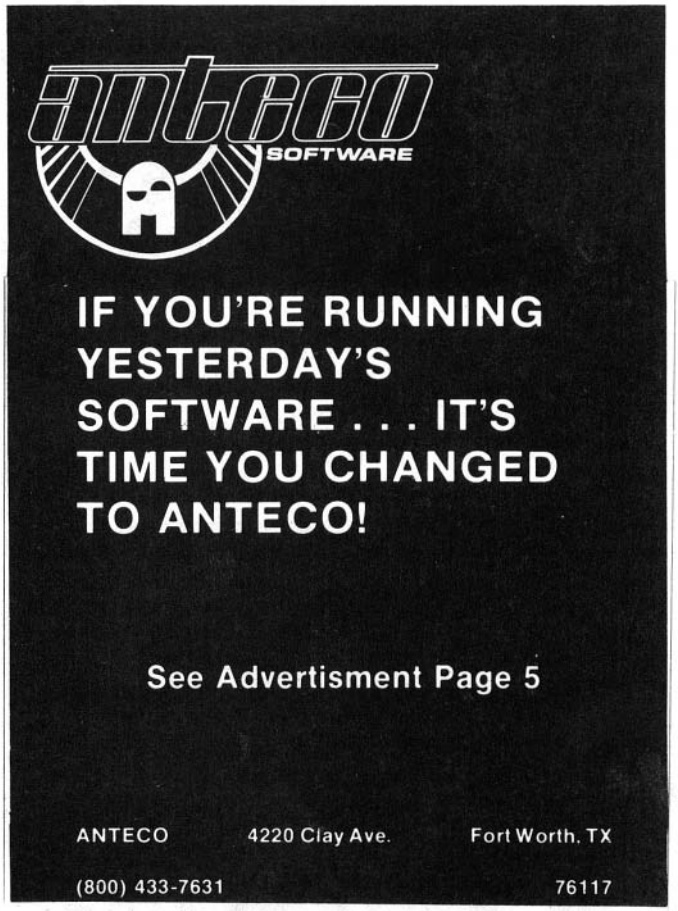
We also found it quite helpful to be able to scroll back one full screen's worth of information at the touch of the up arrow. This kept us from having to "look" all the time to see get a location.

All in all, we found *Keys of the Wizard* to be exciting, even for a rank beginner, and that it had plenty to offer those who know the ropes and when to use them. There are three levels to choose from and, judging from the nail-biting antics or our veteran observer who was going half bananas watching this tenderfoot just dumbing along, there's plenty of excitment for you leathery old warriors, too.

Oh, yes. The "fiery." Had we read the note that came with the instructions, we would have known that "fiery" was simply a misspelling the only one we came across. Actually, at some point early on in the game we figured this little mystery out anyway. It has been corrected in later versions of the game.

(Spectral Associates, 141 Harvard Ave., Tacoma, WA 98466, $19.95)

—Jim Reed



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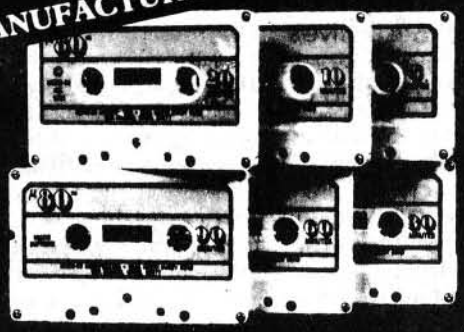

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Software Review...

Hogg FLEX Is A Fine Implementation Package

By Lawrence C. Falk

Having worked with Larry Prebble in his first run-through of the Data-Comp FLEX system, I felt qualified to compare Frank Hogg's version of the FLEX operating system with that one.

Moreover, I wanted to write this review. The reason was, simply, that I consider myself to be a pretty "average" Color Computer owner and, as such, feel my evaluation of this system is, in many ways, more in tune with 80C *Everyman* than someone who has been running a FLEX system on another computer for some years.

I, frankly, view FLEX as a good alternate operating system. There are things you can do with FLEX—business-oriented things, primarily—that are easier than with the Radio Shack DOS. However, you give up a lot, too. The graphics commands, for instance. I suppose that is why I see FLEX as an alternate system, not a replacement system.

This, however, is a software review and not an editorial on FLEX. So, let's dispense with theory and get into the gist of it . . .

My first impression of the Hogg package is the quality of the documentation. It is absolutely excellent. Every piece of information you need is available and it is easy to find. And, the changes Hogg has made to make FLEX run on the Color Computer are not only worthwhile, but presented in such a way that you know these are "special" additions.

The second impression is that it was much, much easier to get Hogg FLEX up and running than it was with the Data-Comp version.

FHL FLEX is a simple case of putting a disk into the Radio Shack drive and typing the command ***RUN FLEX***. And there, lo and behold, was FLEX. Data-Comp required some moving and shifting of disks, transferring files and the like to get it all together and ready to run.

One of the gee-whiz things about Data-Comp has been the use of the graphic screens to give you a wider display. This same package is now available with the Hogg FLEX, too.

We also like the way Hogg divides his documentation: One section is a user's manual and the other is an advanced manual. The "advanced" part is pretty much straight TSC (Technical Systems Consultants, which owns FLEX and licenses it). In the first part, Hogg has taken some great pains to explain how things work.

In addition, there are nine utilities created by Hogg for use with his FLEX. They are fully explained as well.

In short, we found Hogg's FLEX much easier to "get into" and use than the Data-Comp version. My suspicion is that is to a large degree because of the documentation, but documentation is a major part of any system like this. Hogg, of course, also has a number of programs which have been set up to run with his system.

We might add there is still another FLEX implementation for the 80C, available from Spectral Associates. We understand that Spectral and Hogg are working to be sure their systems are compatible—a bonus for all 80C users who will want to own a FLEX system.

(Frank Hogg Laboratory, The Regency Tower, 770 James Street, Syracuse, NY 13203, $99)

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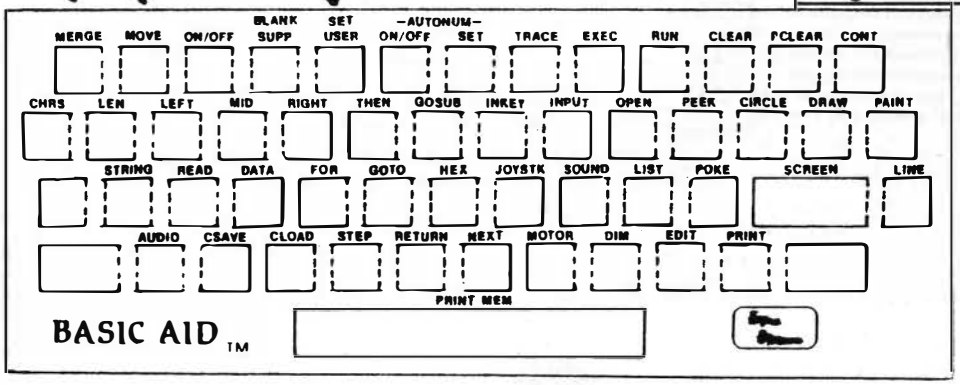

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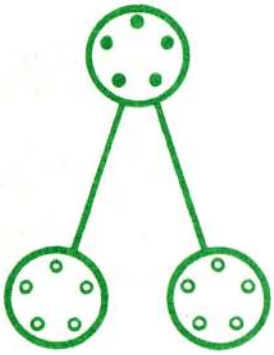

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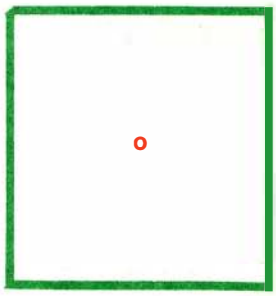

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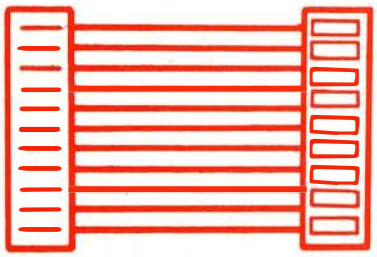

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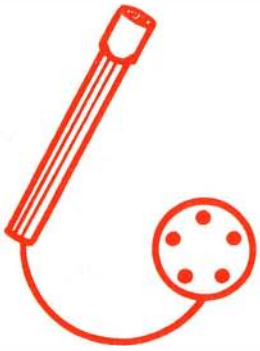

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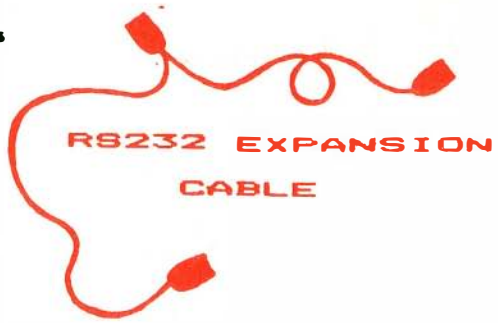

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PIPELINE

***JOINS 80C RANKS* — Walter Cronkite became one of the best known 80C users when he demonstrated some of the computer's graphics capabilities on his *Universe* program recently.**

LAST MONTH WE TOLD you about the new TDP System-100—Radio Shack's "official" look-alike to the Color Computer. This month, thanks to some intelligence from Bob Rosen of Spectrum Projects, Paul Searby of Computerware and others, we have another look-alike to report on—The Dragon 32.

You know, of course, that TRS-80 has its PMC-80 and the LNW. Apple has its Franklin. And, now it looks like CoCo has its own clone, too.

The Dragon-32 is England's answer to the Color Computer. It is made and marketed by Dragon Data Ltd., a subsidiary of the Mettoy Toy Company. It features a 6809 microprocessor, 32K of RAM, 16K of ROM, Microsoft Extended Colour Basic and a 32x16 screen.

There are, we understand, some differences, some of them significant and some of them not. In the latter category is the case color—which is beige. And in the former, the keyboard is much like the Model III. This little Dragon has a Centronics parallel port and an output for an RGB monitor—not the composite video that the 80C has. There is no RS-232 interface.

The power supply is separate and the RF output is on UHF (there are no VHF stations in England). It does have two joystick ports, a cassette port, a reset button and a ROM pack edge connector—on the right-hand side.

Price is £199, or about $350. And you might run into some problems trying to buy it right now: It does not have FCC approval yet, nor does it have the NSTC output needed for American television sets. Rumor has it, though, that Dragon Data will market a U.S. version shortly. So, maybe 1983 will be the "Year of the Dragon."

* * * * * *

IF YOU PICKED UP a copy of the new Radio Shack computer catalog anywhere except in a Computer Center, then there might be something "missing" from it.

What is missing is four pages, which have some special things which are available only through computer centers—things like some of the furniture Radio Shack sells.

SALE! SALE! SALE! Yes, there will be a CoCo sale from Radio Shack in a month or so. It is our understanding that the 16K model will be on sale beginning in November for $299.95; the 16K Extended Basic version will sell for $399.95 and that you will be able to pick up a 32K model for $549.95. That is $100 off on all models.

* * * * * *

THE SCREEN PRINT CAPITAL of the world must be located in Cocoa Beach, Florida, home of Custom Software Engineering. The people there started out by trying to write a better screen print program than was available from Radio Shack—now they have them of so many printers its amazing. New additions this month are for the NEC PC-8023A-C, the Okidata 82A and 83A, the IDS 440 and 445 and, naturally, the DMP 100 from Radio Shack. IDS and Okidata printer must have the "dot option" before they will print high resolution graphics, of course.

* * * * * *

TWO NEW GAMES are coming to market from Computerware. One of them is called *El Diablero*, an adventure which is said to be one of the most interesting yet. Where does it start? In the middle of the desert, where you awake confused and bewildered. Sounds like fun and it will be available on tape and disk.

Computerware's second new offering is called *Rail Runner*. Its an action graphics game somewhat along the lines of the Frogger program you may have seen in the arcades. But the whole design of the game is said to be different and there is, in addition, a real-time clock against which you must compete. It is also available on tape and disk.

WE UNDERSTAND A VERY sophisticated accounting system is in the works and will be brought to market soon. This one comes from Color Software Services. It will be disk-based and, hopefully, should be ready for market by—or right after—the first of the year.

* * * * * *

SMALL BUSINESSES AND OTHER groups wanting a mail list package in addition to having the capability of merging letter text with the addresses will want to investigate a pair of programs from Transformation Technologies. The programs are called *C.C. Mailer* and *C.C. Merger* and are said to be ready to ship. Available on either tape or disk.

* * * * * *

BAD FOLKS, US. WE got the name of the firm which brought you *The Track* last month. Al Hine tells us that the firm is Inter + Action. We forgot the plus sign. Sorry, Al.

* * * * * *

YOU MAY HAVE SEEN the short notice of the passing of Arnold Pouch elsewhere in this issue. Mrs. Pouch tells us that she, with the aid of a programmer who worked with Arnold, will continue to operate Superior Graphic Software.

Arnold invented Motion Picture Programming and then gave it to anyone who wanted to use it by authoring a three-part series which appeared in *the Rainbow*. We have always considered this one of the most unselfish acts of generosity—the sharing of an invention for the benefit of all 80C users.

LOSING BATTLES WITH A GLOOMSTICK?

PUT THE JOY BACK IN COLOR COMPUTING WITH A NEW.....

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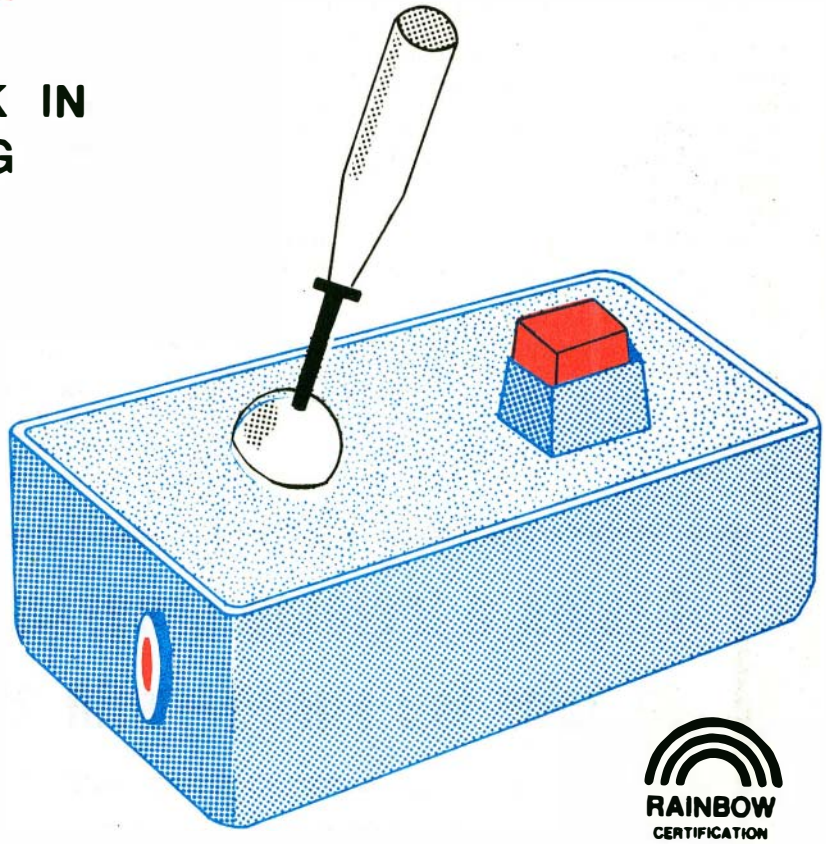

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Business...

How Much Will It Cost To Buy On Time?

16K ECB

By Francis J. Sherwood

I have run the loan amortization program here many times for friends of mine and it may be interesting and useful for readers of *the RAINBOW.*

Loan amortization programs, essentially, can do two things. First of all, they are helpful in determining how much it *actually* costs to buy something on time. As you can see from running this program for a small hypothetical loan, the amount of money that you will pay out in interest can be very high!

A second use of an amortization program is at income tax time. Sure, all those stores and the bank (which owns your car, house, boat and whatever) are supposed to give you figures before the end of January. But a number of them run late. You can find out the amount of money paid to interest (which is tax deductible, of course) simply by running this program.

Another major feature is when you are going shopping for a big ticket item that you will want to finance. The program will allow you to compare interest rates, terms and the like to see what they cost you.

The program runs in two parts. The first is a normal amortization format. The second allows for additional payments and/or somewhat higher payments than calculated in the first section.

I think you might be amazed at the savings on a long term loan you can achieve by increasing your payment by even a small percentage.

To see this demonstrated, run the first part and then run the second part using the monthly payment figure of the first part—plus a small amount. While running the second part, you can press the space bar and have the program pause and ask for an *additional payment.* A few extra bucks inserted a few times a year will make a phenominal difference at the end of a long term loan.

Please note there are *no* printer output commands (PRINT #-2,) in this program. Instead, you should load and run Listing 2, which will open the RS-232 port and allow for a continuous output to the printer.

The RS-232 program can also be useful in a variety of other applications, such as when keying in long programs. That way, you will see everything that you typed on the keyboard as it appeared on the screen.

To make things run more smoothly, load the RS-232 output program before loading the amortization program.

The Listings:

Listing 1

```
10 ' LOAN AMORTIZATION PROGRAM
15 'BY F. L. SHERWOOD--FT. PIERC
E, FL. 33450
20 'U=PAGE COUNT      X=LINE COUN
T     L=LOAN AMOUNT     R=INTERES
T RATE
25 'Y=TERM IN YEARS  B=BALANCE
 T=TOTAL INTEREST   J=LOOP FOR #
 OF PAYMENTS
30 'I1=INTEREST PER PAYMENT   P=
PRINCIPAL   E=EQUITY   Z=ADDITIO
NAL PAYMENT
35 PRINT"TO INSERT ADDITIONAL PA
```

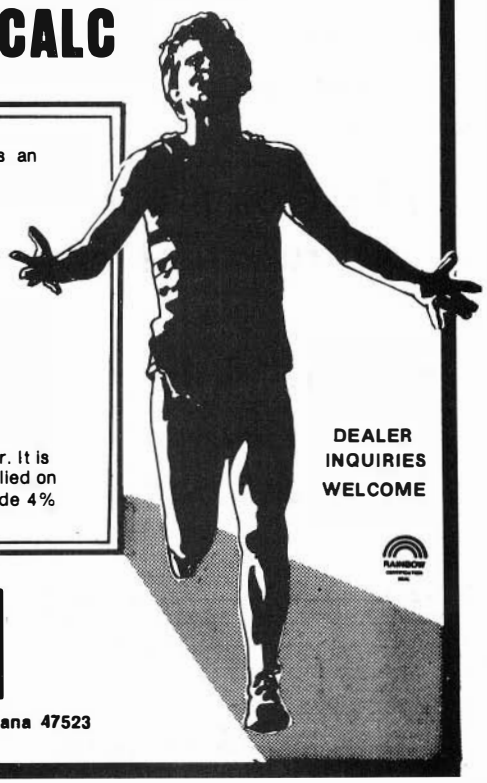

Design a training program to bring you to your top speed– with RUNCALC

Written by Bill Brown, a former coach and 2:47 marathoner, RUNCALC is an invaluable aid to distance runners of all ages and ability levels.

RUNCALC can help you:

- -Evaluate your training quality
- -Compare performances of different lengths
- -Find pace per mile, per quarter-mile, per meter, etc.
- -Find speed in miles/hr., meters/sec., ft/sec.
- -Do metric conversions
- -Generate spilt times for goal distances and times
- -Set meaningful goal times for interval training
- -Calculate calorie usage for a given run.

RUNCALC was designed for the Tandy Radio Shack TRS-80 Color Computer. It is an easy to use menu-driven program requiring 16K Ext. Color Basic and is supplied on cassette with guide for only **$12.95** including postage. Indiana residents include 4% sales tax.



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TELEWRITER™
the Color Computer Word Processor

TELEWRITER

Telewriter is the powerful word processor designed specifically for the Color Computer. It can handle almost any serious writing job and it is extremely easy to use. It has all the advanced features you need to create, edit, store, format and print any kind of text. With Telewriter you can quickly produce perfect, finished copy for letters, reports, term papers, articles, technical documentation, stories, novels, screenplays, newsletters. It is also a flexible and efficient way to take notes or organize ideas and plans.

51 × 24 DISPLAY

The Color Computer is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

Telewriter eliminates these shortcomings with **no hardware modifications required.** By using software alone, Telewriter creates a new character set that has **real lower case letters,** and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the Color Computer's standard display.

FULL SCREEN EDITOR

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, the beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

. . . truly a state of the art word processor, . . outstanding in every respect.

— The RAINBOW, Jan. 1982

The only one with all these features for your TRS-80 Color:

51 column × 24 line screen display
Sophisticated full-screen editor
Real lower case characters
Powerful text formatter
Works with any printer
Special MX-80 driver
Runs in 16K or 32K
Disk & cassette I/O
requires absolutely no hardware modifications

FORMAT FEATURES

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins; line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in the text.

Telewriter will automatically number pages (if you want) and automatically center lines. It can chain print any number of text files from cassette or disk without user intervention. You can tell it to start a new page anywhere in the text, pause at the bottom of the page, and set the Baud rate to any value (so you can run your printer at top speed).

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with any printer (LPVII, LPVIII, MX-80, Okidata, NEC 8023, C. Itoh 8510, Centronics, GE Terminet, Smith Corona TP-1, etc.). There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

CASSETTE AND DISK I/O

Because Telewriter makes using cassette almost painless, you can still have a powerful word processor without the major additional cost of a disk. The advanced cassette handler will search in the forward direction till it finds the first valid file, so there's no need to keep retyping a load command when you are lost in your tape.

The Verify command checks your cassette saves to make sure they're good. You can save all or any part of the text buffer to disk or cassette and you can append pre-existing files from either medium to what you have in the buffer already.

The disk version can be simply customized to the precise number of drives in your system. From the disk menu, you can list any directory (including free space) to the screen or to the printer, rename or delete files, set the default drive and return to BASIC.

ASCII COMPATIBLE

Telewriter turns your Color Computer into the most powerful, lowest cost, word processor in the world today. But that's not all. The simple ASCII conversion program provided with Telewriter (for both cassette and disk) means you can use the full power of the Telewriter editor for creating and editing BASIC and assembly language programs. It means you can use Telewriter to prepare or edit text files used with any data communications program.

Telewriter costs $49.95 on cassette and $59.95 on disk. To order, send check or money order to:

Cognitec
704 Nob Ave.
Del Mar, CA 92014

Or check your local software store. If you have questions about Telewriter, call us at (714) 755-1258 weekdays, 7AM-4PM PST.

And now you can get a complete text processing/communications package direct from Cognitec.

Telemaster-1: gives you Telewriter along with Colorcom/E, the most flexible smart terminal program available for the Color Computer. Package price: $94.95.

Telemaster-2: gives you Telewriter plus Spell 'n Fix—the professional FLEX spelling checker, now available for the Color Computer. Package Price: $109.95.

Telemaster-3: includes Telewriter, Spell 'n Fix, and Colorcom/E—all 3 for $154.95.

Please specify cassette or disk. For disk versions add $10.00 to package price. Mastercard/Visa accepted. Allow 2-3 weeks for personal checks. Add $2.00 for shipping and handling. California residents add 6% state tax. Send SASE for copies of reviews from major Color Computer and TRS-80 magazines.

. . . one of the best programs for the Color Computer I have seen . . .

— Color Computer News, Jan. 1982

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp.; MX-80 is a trademark of Epson America, Inc.

```
YMENT IN PGM 2, HIT SPACE BAR
40 PRINT"FOR FIXED TERM ENTER 1"

45 PRINT"FOR VARIABLE TERM ENTER
 2"
50 U=1
55 X=1
60 A$=INKEY$
65       IF A$="1" THEN 80
70       IF A$="2" THEN 250
75       IF A$="" THEN 60
80 LF$=CHR$(10)
85 PRINT TAB(30) "LOAN AMORTIZAT
ION PROGRAM"TAB(36)"PAGE "U
90       INPUT "DATE";D$
95       INPUT "LOAN AMOUNT";L
100       INPUT "ANNUAL INTEREST
PERCENTAGE";R
105       INPUT "TERM IN YEARS";Y

110 I=R/1200
115 M=Y*12
120 A=(I*L)/(1-(I+1)^-M)
125 PRINT LF$
130 PRINT "THE MONTHLY PAYMENT I
S $";INT(A*100)/100
135 PRINT LF$
140 B=L
145 T=0
150 PRINT"  NUM       INTEREST
  PRINCIPAL       PRIN BAL
TOT INT         EQUITY"
155 PRINT LF$
160       FOR J=1 TO M
165 I1=B*I
170 P=A-I1
175       IF J=M THEN LET P=B
180 B=B-P
185 T=T+I1
190 E=L-B
195 PRINT USING"  ###";J;
200       IF X>1 THEN 210
205 PRINT USING "    $##,###.##"
;I1;P;B;T;E:GOTO 215
210 PRINT USING "      ##,###.##"
;I1;P;B;T;E
215 X=X+1
220       IF U=1 AND X=50 THEN GO
SUB 410 ELSE 225

225       IF X=56 THEN GOSUB 410

230       NEXT J:PRINT LF$
235 PRINT CHR$(12)
240 PRINT CHR$(19):END
245 PRINT LF$
250 PRINT "                    LOA
N AMORTIZATION PROGRAM
       PAGE "U
255       INPUT "DATE";D$
260       INPUT "LOAN AMOUNT";L
265       INPUT "ANNUAL INTEREST
PERCENTAGE";R
270       INPUT "MONTHLY PAYMENT"
;A
275 I=R/1200
280 B=L
285 T=0
```


CZAP

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Copy, merge, and backup your tape based software Works even with popular pre-loader tapes. $9.95

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```
290 PRINT LF$
295 PRINT"  NUM       INTEREST
  PRINCIPAL       PRIN BAL       TO
TAL INT          EQUITY"
300 PRINT LF$
305       FOR J=1 TO 365
310 A$=INKEY$
315       IF A$="" THEN 335
320       IF A$=" " THEN 325
325 INPUT "ADDITIONAL PAYMENT";Z

330 X=X+1
335 I1=B*I
340 P=A-I1
345 B=B-P-Z
350 Z=0
355       IF B=<0 THEN PRINT CHR$
(12):END
360 T=T+I1
365 E=L-B
370 PRINT USING "  ###";J;
375       IF X>1 THEN 385
380 PRINT USING "     $###,###.##"
;I1;P;B;T;E:GOTO 390
385 PRINT USING "      ##,###.##"
;I1;P;B;T;E
390 X=X+1
395       IF U=1 AND X=50 THEN GO
SUB 410
400       IF X=58 THEN GOSUB 410

405 NEXT J:PRINT LF$
410 U=U+1
415 PRINT CHR$(12)
420 PRINT "        LOAN CONTINUED
";TAB(40);:PRINT D$ TAB(36)"PAGE
 "U
425 PRINT LF$:PRINT"  NUM       I
NTEREST      PRINCIPAL       PRIN
BAL        TOT INT        EQUITY"

430 PRINT LF$
435 X=1
440 RETURN
```

Listing 2

```
10 'POWER-UP PROGRAM
15 'OPENS RS232 OUTPUT PORT FOR
20 'CONTINUOUS FEED TO VIDEO
25 'TERMINAL AND/OR PRINTER
30 DATA 52,22,198,254,215,111,19
0,160,2,173,3,15,111,53,150
35 FOR X=0 TO 14
40 READ A
45 POKE 1008+X,A
50 NEXT X
55 POKE 360,3:POKE 361,240
```


– COMPUTER SHACK –

Color Tape Copy $15.95

By Bob Withers

There have been a few copy programs on the market for the Color Computer but none can compare with the Color Tape copy. This program is designed so that you do not lose any of your valuable programs or data bases.

It will make a backup of any Color Computer Tape: Machine language, data, or a basic program.

First load color tape copy into your CC. Then it prompts you to put your original copy into the tape recorder. After it loads the program into memory it tells you to put a blank tape into the recorder and press the record button. It then writes the program to a new tape.

You'll never have to worry about your little kids destroying your $20.00 tapes.

COLOR ENHANCER

Did you ever notice how deep the colors are in a arcade game and how the colors on your TV set are never that deep and dark. Did you ever want deep dark reds and vivid blues and smashing yellows and greens? Well you can with Computer Shacks new color enhancer for the Color Monitor.

This is a special screen manufactured for Computer Shack. It fits over your TV screen and intensifies the colors on your screen. I know it is hard to believe but it really works. We are so sure you will like them, that if you order one, and you don't like it you can send it back for a full refund. (We at Computer Shack will always give you a refund if you don't like something but we normally charge a 10% restocking fee. But not on this item)

The price is $19.95 for a normal 13 X 10. We carry the 13 X 10's in stock and will make any other size on request. Larger one's will cost slightly more and take 2 weeks to make.

GAMES

Our two favorite games here at Computer Shack are StarFire by Intellectronics and Ghost Gobbler.

Starfire is a real exciting game based on the arcade game DEFENDER™ and has excellent color, sound and graphics..... $19.95

Ghost Gobbler is the Color Computers version of PACMAN™ a very good version... $19.95

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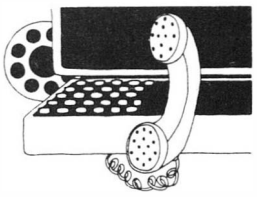
COLOR MASTER CONTROL..... $19.95
COLOR DISASSEMBLER..... $14.95
COLOR BONANZA..... $39.95



COLOR DIRECT FILE TRANSFER

Tape Version $19.95

By Bob Withers

Now a program for the Color Computer that allows you to download basic programs from Bullet-80 systems. It will also send and receive programs from other Color Computers, Model I's and Model III's.

Direct File Transfer (DFT) is a modem program which will handle the direct uploading and downloading of machine language, word processor files, text files, and basic programs directly to tape with no conversion necessary. It is the program you must have to download from any Bullet 80 system. DFT also has a chat mode, and has software controlled half and/or full duplex.

It also has a unique feature which can save you much time. It automatically converts all model I and III tokens. This allows you to run most model I and III basic programs just as they are downloaded on your color Computer. This also allows you to send basic programs to any Model I or III owner who has a copy of DFT. (DFT is very popular with the Model I and III).

Hayes Smart Modem

The very finest modem you can buy for the Color Computer or any other computer. Features include auto dial, auto answer, built it speaker, LED signals, auto redial, etc.

300 Baud..... $329.00 1200 Baud..... $499.00

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COMPUTER SHACK

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Master charge and Visa OK. Please add $3.00 for Shipping in U.S.A. - $5.00 for Canada or Mexico - Proper postage outside of U.S. -Canada- Mexico.

DEALERS: We are distributors for all items in this ad. Write for our catalog and price list.

Graphics...

Uammalu Provide Lovely Graphics Patterns For 80C 16K ECB

These excruciatingly beautiful patterns were discovered by the mathematicia Stanislaw Ulam.

A "cellular automaton" is PSET at center screen. In the second generation, new automata appear in every cell that has exactly one automaton as an orthogonal neighbor (up or down, left or right):

```
   7
 7 6 7
   7
```

In the third generation, automata of color 8 appear, and then the first generation (the 6 in the middle) disappears:

```
   8                 8
   7                 7
 8 7 6 7 8         8 7 7 8
   7                 7
   8                 8
```

In the fourth generation, each 8 gets a cluster of three 6s; then the 7s disappear, and so on.

The vulgar, gaudy colors of the Color Computer are just right for this program, which becomes a display of jewels on black velvet if you add:

50 PMODE4
80 PMODE3
260 PMODE4:SCREEN1,1
and change **300 PMODE3**

Program Notes

Lines 130-190 pick the cells to be PSET. Line 170 eliminates the cells with no automaton-occupied neighbors (5 is a vacancy, and four 5s are 20). Line 180 eliminates the cells with two or more automaton-occupied neighbors (three cells can only add up to 15 if they are unoccupied).

COMPUTER PROGRAMS
TRS-80 MODEL 1/3 16K LEVEL II
TRS-80 16K COLOR

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DUO-PAKS ARE $10 EACH.

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DUO-PAK-4	TANK ATTACK	/	ASSOCIATION
DUO-PAK-5	NUMBER GUESS	/	DICE ROLL
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DUO-PAK-7	SAFARI	/	STARSHIP-2
DUO-PAK-8	MORTAR BATTLE	/	PUZZLE
DUO-PAK-9	TEASERS	/	MOUSE
DUO-PAK-10	PT BOAT	/	TURTLE RACE
DUO-PAK-11	CHEK-CHES	/	STARSHIP-3
DUO-PAK-12	THINK	/	LUCK & LOGIC
DUO-PAK-13	TREASURE ISLAND	/	RESCUE
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DUO-PAK-501	IC-TIMER-1	/	IC-TIMER 2

SYSTEM PROGRAMS $10 EACH

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CHICAGO, IL. 60611

The IF Line 190 eliminates the cells that are already occupied. And Lines 130-160 keep the computer from confusing cells it has just PSET with cells that are real automaton-occupied neighbors.

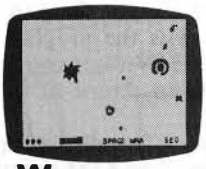
IF/THEN lines run slowly in BASIC. A program that inspected every cell on the screen would take hours. It would still take hours to inspect the expanding square that contains the potential cells. You don't need the whole square, however, but only the diamond that can be inscribed in it, and the 90-minute diamond program can be shortened by three-quarters because the patterns are symmetrical up, down, and diagonally. Only an eighth of the diamond has to be inspected (lines 100-110); each cell PSET is immediately matched with seven others (line 190). The automata of two generations ago are also PRESET eight at a time (line 240).

(Copyright 1982 by Chris Reid)

```
10 POKE65495,0 'IF THIS SPEEDUP
WORKS ON YOUR COMPUTER
20 PMODE3:PCLS5
30 C=7:D=6:E=8
40 PSET(128,96,6)
60 SCREEN1,1
70 FORZ=1TO2000:NEXT
80 '
90 Q=Q+2:IFQ>94THEN300
100 FORY=96TO96-Q STEP-2
110 FORX=128TO128-Q/2+ABS(96-Q/2
-Y)STEP-2
120 J=PPOINT(X+2,Y):K=PPOINT(X,Y
+2):L=PPOINT(X-2,Y):M=PPOINT(X,Y
-2)
130 IFJ=C THENJ=5
140 IFK=C THENK=5
150 IFL=C THENL=5
160 IFM=C THENM=5
170 IFJ+K+L+M=20THEN200
180 IFJ+K+L<>15ANDJ+K+M<>15ANDJ+
L+M<>15ANDK+L+M<>15THEN200
190 IFPPOINT(X,Y)=5THENPSET(X,Y,
C):PSET(256-X,Y,C):PSET(X,192-Y,
C):PSET(256-X,192-Y,C):PSET(32+Y
,X-32,C):PSET(224-Y,X-32,C):PSET
(32+Y,224-X,C):PSET(224-Y,224-X,
C)
200 NEXTX
210 NEXTY
220 FORY=100-Q TO96STEP2
230 FORX=130-Q/2+ABS(98-Q/2-Y)TO
128STEP2
240 IFPPOINT(X,Y)=E THENPRESET(X
,Y):PRESET(256-X,Y):PRESET(X,192
-Y):PRESET(256-X,192-Y):PRESET(3
2+Y,X-32):PRESET(224-Y,X-32):PRE
SET(32+Y,224-X):PRESET(224-Y,224
-X)
250 NEXTX,Y
270 E=D:D=C:C=C+1:IFC=9THENC=6
280 FORZ=1TO2000:NEXT
290 GOTO80
300 PMODE4
310 SCREEN1,1
320 GOTO320
```

Fall Software Favorites
For the TRS-80 Color Computer

Invader's Revenge
By Ken Kalish from Med Systems.
You are the *last* space invader—humans have destroyed all the others—and you're out for REVENGE! Wipe out as many as you can, avoiding their lasers and photon blasts. Multiple skill levels; 1 or 2 players; extended BASIC not required. Machine language, hi-res graphics, great sound.
16K Tape, $19.95



Color Space War
From Spectral Associates
You command the last combat Viper, and must break through the defenses of the Death Star while avoiding the pull of gravity of the Black Hole. Watch out for space mines and enemy ships. Extended BASIC not required. Joysticks.
16K Tape, $21.95

Madness and the Minotaur
From Spectral Associates
Classic adventure game with 200 rooms, assorted friendly and dangerous creatures, 8 magic spells and —of course—treasures. The computer obeys two-word commands such as "get lamp" to move you through your journey. You must enter the castle of King Minos, descend into the labyrinth and collect all the treasures you can.
16K Tape, $19.95

Phantom Slayer
By Ken Kalish from Med Systems.
You are the Phantom Slayer, assigned to enter the deadly Catacombs and destroy the mutant Phantoms. You're armed with a laser pistol and proximity detector, but be careful—the Phantoms' touch is *fatal!* Real-time machine language game with hi-res 3-D graphics and sound. Multiple skill levels; extended BASIC not required.
16K Tape, $19.95

Scepter of Kzirgla
From Rainbow Connection Software
Real-time graphics adventure game with arcade sound for the color computer. 13 floors of dungeon with monsters, treasure chests, hidden trap doors . . . even a flying magic carpet! All in your quest to find the Scepter of Kzirgla. Whatever you do, don't get caught in the poisonous gas cloud! Extended BASIC required.
16K Tape, $16.95,
16K Disk, $21.95

TRS-80 Color Basic
By Bob Albrecht from John Wiley & Sons
Step-by-step guide to the unique color, sound and graphic capabilities of your new Color Computer. No previous experience is required. Teach yourself BASIC—there's a whole chapter on typical programming problems and solutions.
Softcover, $9.95

Color Bonanza
From Soft Sector Marketing.
Six tapes, filled with programs to delight every color computer user! You'll find games that are fun, fascinating, challenging. Learning programs to interest the whole family. Utilities to help organize your home or office, and learn more about programming your computer. Truly a BONANZA, for hours and hours of home entertainment—**50** programs in one package!
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Moon Lander

By Greg Zumwalt from American Small Business Computers
Pilot your spacecraft over the moon's landscape and try to land it amid the mountains and craters. While carefully controlling your fuel consumption, use your joysticks to maneuver your craft and control your velocity against the forces of gravity. Be careful to avoid the asteroids drifting through space.
16K Tape, $14.95

Ghost Gobbler

From Spectral Associates
In this new and exciting version of the popular arcade game, use your joysticks to move your Ghost Gobbler through the maze, eating dots and power pills to score points. 8 bonus shapes, super sound, and 16 skill levels. Extended BASIC required; joysticks.
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Feature Game...

Go Sailing With The *Sailor*

16K ECB

By John Fraysse

As a sailboat cruiser and club racer on Chesapeake Bay, I am often told, "Gee, this (sailing) is neat! How does it work? Will you teach me?"

Since most interested folks are generally of technical backgrounds, a few hours with pen and paper and a good reference book will usually lay the groundwork. However, there still seems to be a gap between the "book sense" of sailing and actual application.

Sailor was written to assist in bridging this gap by allowing the student sailor the opportunity to operate a video display/real-time simulation. By numerically solving the sailboat equations of motion with the student in-the-loop (at the controls) one is able to see, "feel" and anticipate true sailboat response which is consistent with book-wise instruction. In addition, an instrument display similar to those on board sophisticated racers provides a continuous readout of the critical parameters governing performance, giving the student an indication of how well he is doing. To date, *Sailor* has helped several folks acquire the dry, warm, inexpensive practice necessary to develop a "second nature" understanding of the world's finest pasttime!

Besides all this noble sounding justification, it's just plain *fun* to fiddle with!

Sailor Program Objectives

A. Program must be in BASIC. I hate machine language and don't have time to fool with it.

B. High Resolution Graphics are necessary. Boat heading, instrument displays and sail positions are critical in learning to "feel" or visualize the wind. (You can't see it on the TV screen either!)

C. Adequately Fast Execution is important. Relatively quick response time to control inputs is necessary (approximately one second or less).

D. Program must have a race course with a Challenge option. Getting from point A to point B whether racing or cruising always requires sailing to objects or away from danger. Variations in wind conditions and current flows always complicate the issue.

E. Keyboard control should be simplistic. Joysticks are not needed and I personally feel they give undesirable control characteristics.

F. Program must fit on 16K machines. This would provide a broad base of appeal and use.

Of these six objectives, the last was by far the most difficult given A through E. I had to resort to reading a previously created data tape because the coding for the data generator (SAILDAT below) resulted in a 600 bit overrun. The current program on my 32K machine requires a peak memory of 16200. That's close!

Description of Video Display

Text Displays

1. Introductory Displays — Credits Chris Cross (and myself) and plays a few bars of his award winning song "Sailing." ***ENTER***

2. Control Instructions — Control of the boat's heading and sail plan is accomplished via the keyboard. To steer right press ***RIGHT ARROW***. To steer left press ***LEFT ARROW***. Initial sail plan is the "standard" indicated by one vertical line and is also the minimum plan.

Additional sail area increments are available up to four times (four lines) the standard. To add sail press ***UP ARROW***. To reduce sail press ***DOWN ARROW***. Pressing ***R*** at any time during the sailing portions of the program causes a return to the game option menu.

3. Cassette Instructions — Data created from SAILDAT read in. Press ***PLAY*** on the recorder and ***ENTER*** when ready. Instructions will remain until the sequence is complete even though the cassette starts and stops a lot. When SAILOR reads an EOF, the cassette will stop and the computer will BEE—BOOP you just in case you were asleep. The screen will now display the game option menu. *Do not turn the recorder off until you see (or hear) this menu.*

4. Game Option Menu — Allows selection of game options and allows a proper exit. Option "A" provides a constant ten knot wind with no currents. Option "B" provides a ten knot breeze with a four knot gust and up to 2.8 knots of randomized current in both magnitude and direction. "S" stops or exits the program and slows the computer down, (POKE 65494,0). If you accidently hit "S" just type CONT ***ENTER*** to return to the Game Option Menu.

5. Timed Finish Display - This display appears after you have finished a timed run around the course. Your elapsed time is displayed. ***ENTER*** transfers control back to the game option menu.

Hi Resolution Displays

The figure below is a diagram of *Sailor's* High resolution video display. Note the one and two letter label descriptors with the following explaination:

1. Instrument Displays

Locate the two circles, a dot and a series of vertical lines in the upper left of the screen. These are the instrument displays and are described as follows:

"S"— instantaneous boat speed. 180 degree arc to the right is 15 knots. Maximum speed is approximately 13 knots.

"A"— velocity trend or acceleration. Vertical line is approximately zero acceleration. 45 degree line to the left is at least .2 knots per second deceleration. 45 degree line to the right is at least .2 knots per second acceleration.

"H"— heel angle indicator. Vertical line is no heel. 90 degree arc to the left is 90 degree heel to port; 90 degree arc to the right is 90 degree heel to starboard. Note: Heel angles in excess of 65 degrees cause the boat to go out of control.

"RW"— relative wind indicator. 180 degree arc to the right is 30 knots of relative wind (wind speed as measured on the boat).

"O"— indicates in which option the game is set. If the dot is on, option "B" (wind gusts and random currents). If the dot is gone, option "A" (constant wind/no current).

"SA"— sail area indicator. A series of vertical lines (1 to 4) which indicates multiples of the standard sail plan. Game allows the addition of sail area at any time. Sail is "blown away" to the standard plan if an out of control condition occurs.

2. Boat and Course Displays

"RL"- restrictive limits of game. These invisible limits keep the boat from sailing off the screen or into the

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instrument area. When a limit is hit only the boat position is limited. The normal integration continues to update the instruments as if a limit never occurred.

"B"- sailboat image with sail at proper trim. Sail position indicates the optimum trim for the boat heading, wind speed and direction.

"M1, M2, M3, M4, T"- four bouy markers and a timer running indicator. Course around bouys may be either counter-clockwise or clockwise. Automatic timing starts when the center of the boat first crosses the start/finish line at M1. The letter "T" in the center of the course indicates that the timer is running. A second crossing stops the clock, clears the video and displays the elapsed time. Hitting a bouy results in a high-low tone and a time penalty.

"WD"- wind direction indicator. Indicates that the wind is blowing from right to left at ten knots except during the wind gusts when it is 14 knots. Gusts are indicated by a series of low tones.

Description of Program Function

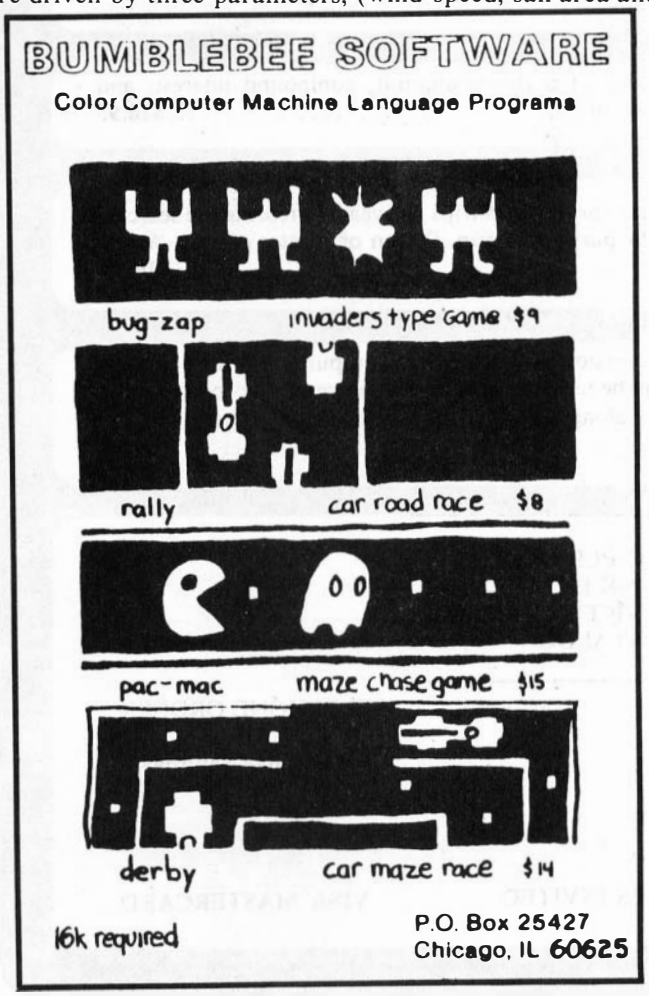
A. Program is all BASIC.

B. Program requires a maximum memory of approximately 16200.

C. Once initiated the display screen is never cleared. Instead boat animation and instrument updates quickly blink due to PUTting blanks or PRESETting on top of old data or boat positions. This allows the program to update quickly (relatively speaking) and use minimal memory (PCLEAR 5). The game uses high speed (POKE 65495,0).

D. The program runs with an update rate of approximately one second. The equations of motion come from Newton's laws. That is, forces and moments cause accelerations which when integrated give velocities which in turn when integrated yield new positions. These equations are driven by three parameters, (wind speed, sail area and heading). Two of these are controlled by the player, (sail area and heading). The steering rate is limited to 22.5 degrees per second and the sail area rate to one multiple of the stardard plan per second. This gives the boat a relatively smooth and realistic response to control. The dynamics are very similar to a 2000 pound olympic class hull (or a J-24). The boat has a hull speed of six knots but is capable of planing to 13 knots with enough sail area or during wind gusts (higher winds).

E. Rapid pressing of the control keys will not greatly increase the effectiveness of control due to the limited heading rates and the inertia of the boat itself. Remember sailboats are graceful!



Game Difficulties and Penalties

A. Boat Speed/Sail Area Control/Loss of Control

When racing around the course, the objective is to round all four bouys in the shortest possible time. Put up more sail area, right? Yes and No! Upwind courses (beating) cannot tolerate the same sail area as cross wind (reaching) or downwind (running) headings. This is due to the relative wind. Upwind the boat speed adds (vectorally) to the true wind speed. Downwind they subtract. The forces and moments generated by the sails are proportional to the Square of the relative wind speed and directly proportional to sail area. Extra sail area upwind will help to a point until heel angles cause increased hull drag and slows the boat. Additional sail area beyond this point will cause excessive and uncontrolled heeling which causes loss of rudder control. In this condition the boat rounds into the wind and stalls. This is just like the real thing! A single High tone will signal you as to what has happened. Watch out for those gusts in option "B"!

B. Inertia

Remember that the boat has inertia. That is, you don't speed up immediately or slow down immediately. The program is initialized with zero boat speed, headed into the wind. The player must maneuver onto port or starboard track to begin to accelerate. Otherwise you will just sit there! Be careful of option "B". The currents may drift you into a bouy if you do not have adequate boat speed to steer away. Try maneuvering to a bouy so that you arrive with zero velocity. This is a basic maneuver, but not an easy one (neither here nor out on the clear blue waters!).

C. Bouy Contact

Hitting a bouy adds five seconds to your elapsed time for each second your boat is in contact. A "kiss" on the bouy is five seconds. If you are moving slowly and "centerline" the boat on the bouy, you may receive 15 seconds. A single high-low tone indicates each time you acquire this unwanted time.

D. Wind Gusts/Currents

Option "B" only. *Sailor* will sail safely (in control) at all points of sail during a wind gust with the standard plus one sail plan or lower. However, the objective is to go FAST around the course! Try adding sail during the lulls and reducing it quickly during the gusts when going Upwind. Sailing downwind—*Go For It!* Put it all up! But be careful of your potentially oversailed condition when changing course to wind or you may lost it all temporarily.

Once again, currents can be a boon or a bane. They may help you to a bouy, run you into it or set you away from it. Each "B" game results in a random current speed (0 to 2.8 knots) and direction. To observe the current, leave the boat pointing into the wind at the beginning of a new game and see which way and how fast you drift. Then adjust the way you steer. Oh, by the way, if you ever draw the 2.8 knot

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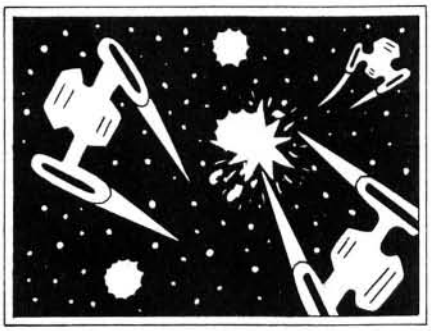

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"Sailor" Program Line Flow Chart

Line Description/Function

1-3 PCLEAR bug killer
10 Credits
20-30 Page clearing (5 pages)
40 Dimension arrays
50-70 Introductory display
80-90 Sailboat and program control instructions
100-220 Read and graphically store (page 1) setup data from tape
230-240 Main menu (options and exit)
250-320 Setup instrument displays; initialize equations of motion; set standard sail plan
330 Program time step or update loop begins
330 Strobe keyboard for heading, sail plan or reset commands
340-350 Limit commanded headings
360-440 Check time for wind gust
450-480 Calculate present boat speed, relative wind and sine/cosines of wind angle
490-500 Limit commanded sail plan
510-520 Calculate sail total force derivative
530 Calculate heel force, angle and instrument settings
540-600 Check heel angle; declare boat in or out of control; high tone if out of control
610-620 Calculate hull drag due to heel angle
630-640 Calculate sail drive force and sum with hull drag and hull drag due to heel
650-670 Calculate boat acceleration; integrate and limit peak velocity
680-710 Calculate instrument settings for boat speed and relative wind
720 Store previous boat position
730-860 Check for buoy contact; high-low tone; add penalty time
870 Integrate boat and current velocities; calculate new boat position
880-920 Limit boat position to screen and away from instrument area
930-1010 Check for start/finish line crossings; start or stop automatic timer
1020-1120 Update instrument and sail plan displays
1130-1140 Switch to page 1; get a "blank" boat
1150-1160 Switch to display pages (2-5); put a blank on the old boat position
1170-1190 Switch to page 1; get current boat configuration
1200-1210 Switch to display pages; put current boat configuration at current boat coordinates
1220-1230 Graphically refresh starting line, wind indicator and buoys
1240 End time step or update loop (GOTO 330)
1250-1270 Slow computer down; stop program/exit
1280 PCLEAR bug killer

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87 or less—America's cup potential
90-99—Expert level
100-109—You know what you are doing
110-119—Beginner level
120 or greater—Total landlubber

```
1 P=5
2 XP=(256*PEEK(25)+PEEK(26)-1537
)/1536
3 IF P=XP THEN1ØELSEIF P<XP THEN
```


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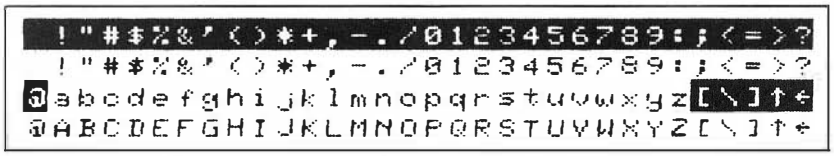

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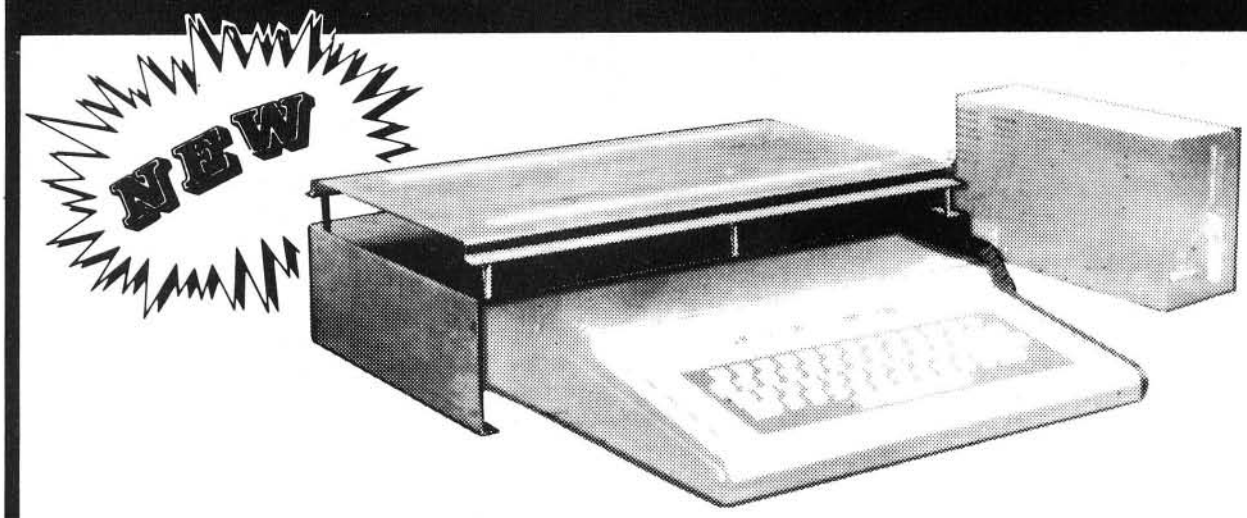

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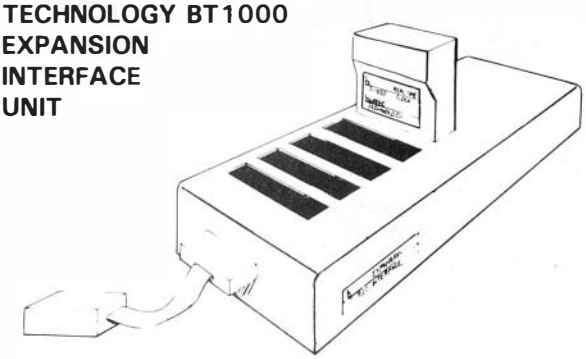

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```
1280ELSEPCLEAR P:GOTO1
10 'SAILING BY JOHN FRAYSSE
20 CLEAR200:PMODE 4,1:PCLS:CLS
30 PMODE 4,2:PCLS
40 DIM PR(29),CH(15),SH(15),B(20
,20),V(2,2),ST(15),CT(15)
50 PRINT@164,"* * * S A I L I N
G * * * ":PRINT@207,"BY":PRINT@2
33,"CHRIS CROSS AND":PRINT@265,"
JOHN FRAYSSE":PRINT@357,"<ENTER>
 TO CONTINUE"
60 PLAY"V15T203L3DDL8DL8C02L8B03
L4D"
70 INPUT Z$:CLS
80 PRINT@165,"CONTROL INSTRUCTIO
NS":PRINT@224,"USE 'LEFT ARROW'
TO STEER LEFT":PRINT"USE 'RIGHT
ARROW' TO STEER RIGHT";:PRINT"US
E 'UP ARROW' TO ADD SAIL":PRINT"
USE 'DOWN ARROW' TO REDUCE SAIL"
:PRINT"HIT <R> TO RESET OR EXIT"
90 PRINT@420,"<ENTER> TO START T
HE GAME":INPUT Z$:CLS
100 PRINT@257,"PRESS <PLAY> ON T
HE RECORDER.   PROGRAM TAKES APP
ROX. 60 SEC    TO READ. <ENTER>
WHEN READY."
110 INPUT Z$
120 PMODE4,1:POKE65494,0
130 OPEN "I",#-1,"DATA"
140 IF EOF(-1) THEN 210
150 FOR I=0 TO 15
160 INPUT#-1,SH(I),CH(I),ST(I),C
T(I)
170 FOR J=0 TO 29 STEP 2:INPUT#-
1,PR(J),PR(J+1):NEXTJ:INPUT#-1,X
M,YM
180 FOR J=0 TO 27 STEP 4:LINE(PR
(J),PR(J+1))-(PR(J+2),PR(J+3)),P
SET:NEXTJ:LINE(PR(28),PR(29))-(X
M,YM),PSET
190 NEXT I
200 CIRCLE(200,40),2,5,1:GET(199
,39)-(201,41),V,G:GOTO140
210 CLOSE #-1
220 PLAY"T302L3A01L2A"
230 CLS:PRINT@168,"GAME OPTIONS"
:PRINT@193,"(A) NO WIND GUSTS/NO
 CURRENT":PRINT@225,"(B) REAL SA
ILING (BOTH)":PRINT@257,"(S) STO
P"
240 A$=INKEY$:IFA$="S"THEN1250EL
SEIFA$="B"THEN260ELSEIFA$="A"THE
N250ELSE240
250 XC=0:YC=0:WG=0:GOTO270
260 XC=RND(4)-2:YC=RND(4)-2:WG=1
270 PMODE 4,2:PCLS:SCREEN 1,1
280 CIRCLE(12,12),12,5,1:CIRCLE(
40,12),12,5,1
290 IF A$="B" THEN PSET(55,12,5)
```

```
300 LINE(0,12)-(24,12),PSET:LINE
(28,12)-(52,12),PSET:LINE(40,12)
-(40,4),PSET
310 X=20:Y=174:J=1:POKE65495,0:E
T=0
320 K=3:D0=8:HW=1.57:VW=10:M=260
:KH=.13:V=.5:I=4:WT=10
330 A$=INKEY$:IFA$=CHR$(8)THENI=
I-1ELSEIFA$=CHR$(9)THENI=I+1ELSE
IFA$=CHR$(10)THENK=K-1ELSEIFA$=C
HR$(94)THENK=K+1ELSEIFA$="R"THEN
230
340 IF I<0 THEN I=16+I
350 IF I>15 THEN I=I-16
360 VW=10
370 IF WG=1 THEN 390
380 GOTO 450
390 IF ET>WT THEN 410
400 GOTO 450
410 IF ET>(WT+10) THEN 440
420 VW=14:SOUND 1,1
430 GOTO 450
440 WT=WT+30
450 V1=V*V:V2=VW*VW:V3=V1+V2+2*V
*VW*CH(I)
460 VR=SQR(V3):SW=VW*SH(I)/VR
470 C=-(V2-V1-V3)/(2*V*VR)
480 CW=ABS(C):W=SGN(SW/CW)
490 IF K<3 THEN K=3
500 IF K>6 THEN K=6
510 L=K*V3
520 IF I=4 THEN L=0
530 H=KH*L*W*CW/M:BH=.74-.25*H/1
.57:EH=.75:AH=ABS(H)
540 IF ABS(BH)>ABS(EH) THEN 560
550 GOTO 570
560 SX=BH:BH=EH:EH=SX+.05
570 IF AH>1.10 THEN GOTO 590
580 GOTO 610
590 SOUND 128,1
600 GOTO 320
610 DH=5.08*AH
620 IF AH>.39 THEN DH=9.8-20*AH
630 F=L*ABS(SW)+DH-D0*V1
640 IF I>9 AND I<15 THEN F=F+.5*
L*CW*K
650 VD=F/M:V=V+VD
660 IF V<13 THEN 680
670 V=13:VD=0
680 BR=.5-.5*VR/30
690 IF BR<0 THEN 590
700 EB=.5+.5*V/15
710 IF V<.5 THEN V=.5
720 XO=X:YO=Y
730 FOR SI=1 TO 2
740 ON SI GOTO 750,800
750 SS=ABS(215-X)
760 IF SS<=4 THEN 780
770 GOTO 840
780 IF ABS(40-Y)<=4 OR ABS(162-Y
)<=4 THEN 860
790 GOTO 840
800 SS=ABS(60-X)
810 IF SS<=4 THEN 830
820 GOTO 840
830 IF ABS(162-Y)<=4 OR ABS(60-Y
)<=4 THEN 860
840 NEXT SI
850 GOTO 870
860 SOUND 128,1:SOUND 100,1:ET=E
T+5
870 X=X+INT(V*ST(I)+XC):Y=Y-INT(
V*CT(I)+YC)
880 IFX<15 THEN X=15
890 IFX>242 THEN X=242
900 IF Y<35 AND X<85 THEN Y=35
910 IFY<14 THEN Y=14
920 IFY>178 THEN Y=178
930 IF X>60 AND X<70 AND Y>162 T
HEN 950
940 GOTO 970
950 J=J+1
960 IF J>2 AND ET<20 THEN J=2
970 ON J GOTO 1020,980,1000
980 ET=ET+1:DRAW"BM137,111;U6;L3
;R6"
990 GOTO 1020
1000 CLS:PRINT@167,"YOU FINISHED
```


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★ The Enchanted Forest

The BIG adventure in hi-res graphics is here! Move through more than 50 scenes on a quest to rescue the captive princess. Decisions are made according to visual clues, not text. There are many inhabitants in the Enchanted Forest — some are friendly, some are not. This is a sophisticated computer adventure — a real challenge. A must for your adventure library. Requires 32K extended basic.

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Tape cassette (postage paid).....$19.95

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P.O. Box 936
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```
1000 CLS:PRINT@167,"YOU FINISHED
!":PRINT@199,"ELAPSED TIME= ";ET
:PRINT@231,"<ENTER> WHEN READY"
1010 INPUT Z$:GOTO 230
1020 CIRCLE(12,12),9,0,1,.5,1:CI
RCLE(12,12),9,5,1,.5,EB:CIRCLE(4
0,12),9,0,1:CIRCLE(40,12),9,5,1,
BR,.5:LINE(12,12)-(12,22),PRESET
:LINE(12,12)-(19,19),PRESET:LINE
(12,12)-(5,19),PRESET
1030 IF ABS(VD)<.2 THEN LINE(12,
12)-(12,22),PSET
1040 IF VD>.2 THEN LINE(12,12)-(
19,19),PSET
1050 IF VD<-.2 THEN LINE(12,12)-
(5,19),PSET
1060 CIRCLE(40,12),9,0,1,.5,1:CI
RCLE(40,12),9,5,1,BH,EH
1070 IF K<KX THEN 1090
1080 GOTO 1110
1090 FORIS=K+1TOKX:LINE(45+IS*5,
8)-(45+IS*5,16),PRESET:NEXTIS
1100 GOTO 1120
1110 LINE(45+K*5,8)-(45+K*5,16),
PSET
1120 KX=K
1130 PMODE 4,1
1140 GET(101,25)-(121,45),B,G
1150 PMODE4,2
1160 PUT(XO-10,YO-10)-(XO+10,YO+
10),B,PSET
1170 PMODE 4,1
1180 GET((I*20+2),0)-((I*20+22),
20),B,G
1190 IF I>=12 THEN GET(((I-12)*2
0+1),21)-(((I-12)*20+21),41),B,G

1200 PMODE 4,2
1210 PUT(X-10,Y-10)-(X+10,Y+10),
B,OR
1220 PUT(214,39)-(216,41),V,OR:P
UT(214,161)-(216,163),V,OR:PUT(5
9,161)-(61,163),V,OR:PUT(59,59)-
(61,61),V,OR:LINE(60,162)-(60,19
2),PSET
1230 LINE(249,96)-(255,90),PSET:
LINE(255,102)-(249,96),PSET
1240 GOTO 330
1250 POKE 65494,0:CLS:STOP
1260 GOTO230
1270 END
1280 PCLEAR P:GOTO10
```

```
10 REM SAILDAT CREATES A DATA TA
PE FOR SAILOR
20 DIM P(29),PR(29),CH(15),SH(15
),ST(15),CT(15)
25 CLS:PRINT@12,"SAILDAT":PRINT@
64,"THIS PROGRAM CREATES A DATA
TAPEFOR SAILOR. POSITION THE TAP
E   RECORDER ABOUT 1 COUNT PAST
THE END OF SAILOR. PLACE IN <REC
ORD>AND PRESS <ENTER> WHEN READY
."
26 INPUT Z$
30 OPEN "O",-1,"DATA"
40 RESTORE
50 DATA 0,10,3,1,3,1,3,-3,3,-3,1
,-5,1,-5,-1,-5,-1,-5,-3,-3,-3,-3
,-3,1,-3,1,0,10,0,5
60 FOR I=0 TO 29
70 READ P(I):P(I)=-P(I):NEXT I
80 T=-.3927:X=-9:HW=1.57:Y=11
90 V1=36:V2=100:V=4:VW=10:R=9
100 FOR I=0 TO 15
110 IF I=12 THEN X=-9
120 IF I=12 THEN Y=30
130 T=T+.3927:X=X+20
140 ST(I)=SIN(T):CT(I)=COS(T)
150 SH(I)=SIN(3.14-HW+T):CH(I)=C
OS(T-HW)
160 PRINT#-1,SH(I),CH(I),ST(I),C
T(I)
170 V3=V1+V2+2*V*VW*CH(I)
180 VR=SQR(V3)
190 SW=VW*SH(I)/VR
200 C=-(V2-V1-V3)/(2*V*VR)
210 CW=ABS(C):W=SGN(SW/CW)
220 IF I=10 THEN X=X+1
230 FOR J=0 TO 29 STEP 2
240 PR(J)=INT(P(J)*CT(I)-P(J+1)*
ST(I)+X+.5)
250 PR(J+1)=INT(P(J+1)*CT(I)+P(J
)*ST(I)+Y+.5)
260 PRINT#-1,PR(J),PR(J+1)
270 NEXT J
280 IF T>3.9 AND T<5.5 THEN 300
290 GOTO 310
300 SW=SGN(W):C=0
310 XM=INT(PR(28)-R*C+.5):YM=INT
(PR(29)+R*SW+.5)
320 PRINT#-1,XM,YM
330 NEXT I
340 CLOSE#-1
```


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Business...

Maintain A Mail List With This Program

32K ECB

By Bill Bruck

This is a complete mailing list program for a 32K CoCo with RS Disk, Epson MX-80 printer, and MSB Lowercase Kit. However, it will work with 16k, cassette, other printers, or no lowerkit with modifications below. Extended Basic is required.

Functions supported by this program include:

—Saving 500 names with three line, 39 character addresses

—Alphabetized printout of names and addresses

—Alphabetized video display of all names, all names/addresses, or specific address

—Making labels on RS 26-1404 1-across self-sticking mailing labels (about $19 from RS for 4000)

Instructions for use are pretty self-explanatory. From a menu-driven command mode, you select to input, display, make labels, select one address, printout, or save data. To delete or change a current name, type in the name exactly, and you will be returned a "name on file: delete/change/next" message. ("Next" just means not change or delete.)

After typing in the program, create an initial data file by typing and running a temporary program:

```
10 OPEN "O", #1, "NEWAD"
20 FOR N=1 TO 3
30 PRINT #1, "TEST @1@2@3@"
40 NEXT N
50 CLOSE
```

This data can be deleted after you start running with real data.

Modifications For Other Systems:

4K: Sorry, forget it.

16K: Change lines 30, 90 and 140 to maximum supported on your system.

Cassette only: Change "#1" in lines 130, 150 and 180 to "-1"; change "1" in line 160 to "-1". Similarly, change all "#1's" in lines 1140-1260 to "-1", and add:

```
1135 PRINT "SET CASSETTE, PRINT ENTER"
1136 RR$=INKEY$: IFRR$=""THEN 1136
```

If you do not have a lowercase kit, you probably will not use lowercase in typing in data and commands, and can thus eliminate all lines such as 1130 and 1150 and save typing.

If you have a different printer, look at printer control codes in lines 670, 690, 700, 860, 900, 1860, 1950, and adjust as appropriate. The only control codes necessary are to set tabs to 40 (line 700), utilize tabs (line 860), and line space (CHR$ (10).

As written, the program alphabetizes by first name (because I like it that way); I have modified the program to alphabetize by last name and by zip code — these are relatively easy changes I will leave for your practice. Another "bell and whistle" which can easily be built in is to add a code number to each address for selective printouts of labels.

If you do not want to type this program in, it can be obtained from me for $9.95 on cassette ready to load to disk. The selective printout options and various alphabetizing modes are included in this version.

Specify 16/32k, disk/cassette, and type of printer. For $16.95 you can obtain a complete household system which also includes a budget program, reminder list, phone list, and several others.

```
10 'ADDRESS LIST
20 'VERSION 1.5
30 'BY BILL BRUCK
40 '    7209 CEDAR AVE #1
```


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Pandora's Game Box

Six games, and all are machine language, for fast execution. All use lots of graphics, some high resolution, some low resolution. **MUNCHMAN:** Eat the dots in the maze, but don't get caught. **SPACE RAIDERS:** Defend your planet with lasers, smart bombs, and hyperspace. **DIVE BOMB:** Bombs fall from the top of the screen. Can you catch them before they hit? 35 skill levels mean even very young children can play. **BLOCKAGE:** A unique game, and one of most challenging we've seen. Can you fill the screen with "O's"? It's not easy. **SLOTS:** Great Hi-Res animation in this slot machine. **SQUARES:** A logic puzzle. The computer will scramble the squares, and you must put them back. Believe me, it's not easy! Why do we call this Pandora's Box? Well, once you open it, you may not be able to do anything else for days, and that could be trouble! All six games, **$24.95 tape — $29.95 disk**

Household Helper

This is the one you've been looking for. Just CLOADM and the menu gives you your choice of stopwatch, metric conversions, recipe conversions, gasoline expense computations, or a bills due file that saves to cassette (or disk). This beauty will get lot's of computer time! **$19.95 tape — $24.95 disk**

The Great Word Game

You can look and look, but you'll never find a better word game for any computer. Two to four players compete to see who can hide their own word while guessing the others. Terrific formatting, user "friendly", and FUN. RAINBOW MAGAZINE said "The great word game is, well, great," and "this one does it all with style". (May 1982) Don't miss it. **$19.95 tape — $24.95 disk**

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These have been designed to meet the needs of parents and teachers having children just beginning to read.
PREREAD 1 presents the names of the letters of the alphabet auditorially (by voice on the tape) and asks the learner to press the letter on the keyboard which corresponds to that letter name.
PREREAD 2 presents the sounds of the letters of the alphabet (also by voice) and asks the learner to find the correct letter on the keyboard. The sounds are presented alone and in the context of familiar words. (For example, "Find the letter that says /mmm/ in the word /man/.")
PREREAD 3 flashes letters visually (at speeds you select) and then requires the learner to find those letters on the keyboard.
These programs have been developed by a practicing educator in answer to problems which plague teachers of children who cannot read. The dimension of voice from the T.V. monitor adds excitement and realism!
PREREAD 1, 2 & 3 are sold only as a Prereading package. Each program comes on a separate tape, with complete instruction. **$24.95 (available on tape only)**

Mathpac I

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```
50 '   TAKOMA PARK, MD 20912
60 '   (301) 589-5510
70 PCLEAR 1
80 CLEAR 7000
90 DIM I$(500)
100 CLS(3):PRINT@235,"ADDRESSES"
;
110 PRINT@425,"BY BILL BRUCK";
120 PRINT@457,"301  589-5510";
130 OPEN"I",#1,"NEWAD"
140 FOR CT=1 TO 500
150 LINE INPUT#1,I$(CT)
160 IFEOF(1)=-1THEN180
170 NEXT CT
180 CLOSE#1
190 '      SELECT
200 CLS
210 PRINT "     SELECT ONE",
220 PRINT "  ","  "
230 PRINT"INPUT"
240 PRINT"PRINTOUT"
250 PRINT"MAKE LABELS"
260 PRINT "LIST ALL NAMES"
270 PRINT"DISPLAY ALL ADDRESSES"

280 PRINT"ADDRESS - SPECIFIC"
290 PRINT"SAVE"
300 A$=INKEY$
310 IFA$="I"THEN470
320 IFA$="i"THEN470
330 IFA$="D"THEN990
340 IF A$="M" THEN 1840
350 IF A$="m" THEN 1840
360 IFA$="d"THEN990
370 IFA$="P"THEN660
380 IFA$="p"THEN660
390 IFA$="S"THEN1140
400 IFA$="s"THEN1140
410 IF A$="A"THEN1540
420 IF A$="a"THEN1540
430 IF A$="L" THEN 1680
440 IF A$="l"THEN 1680
450 GOTO300
460 '      INPUT
470 CLS
480 FOR M=1 TO 4
490 PRINT "LINE";M;
500 LINE INPUT"? ";H$(M)
510 IF LEN(H$(M))>39 THEN PRINT
"LINE TOO LONG":GOTO 490
520 IF M=1 THEN GOSUB 600
530 NEXT M
540 I$(HA)=H$(1)+"@"+H$(2)+"@"+H
$(3)+"@"+H$(4)+"@"
550 PRINT"IF ANOTHER NAME PRINT
'Y' ELSE   'N'"
560 Y$=INKEY$:IFY$=""THEN560
570 IF Y$="Y"THEN470
580 IF Y$="y"THEN470 ELSE 200
590 '     BEGIN SORT SUBROUTINE
600 FOR N=1 TO CT
610 GOSUB 2180
620 IF A$(1)=H$(1) THEN 1270
630 IF H$(1)<A$(1) THEN 1470
640 NEXT N
645 CT=CT+1
646 HA=CT
650 RETURN
660 '        PRINTOUT
670 PRINT#-2,CHR$(14);CHR$(27)"E
";"ADDRESSES";CHR$(27)"F"
680 INPUT"DATE";DATE$
690 PRINT#-2,CHR$(18);CHR$(19);T
AB(60)DATE$
700 PRINT#-2,CHR$(27)"D";CHR$(40
);CHR$(9)
710 PAGE=6
720 N=0
730 N=N+1
740 IF N>CT THEN 970
750 GOSUB 2220
760 FOR K=1 TO4
770 LP$(K)=A$(K)
780 NEXT K
790 N=N+1
800 IF N>CT THEN 930
810 GOSUB 2220
820 FOR K=1 TO 4
830 RP$(K)=A$(K)
840 NEXT K
850 FOR K=1 TO 4
860 PRINT#-2,LP$(K),CHR$(9);RP$(
K)
870 PAGE=PAGE+1
880 NEXT K
890 PAGE=PAGE-1:GOSUB 1950
900 PRINT#-2, CHR$(19)
910 GOSUB 1950
```

```
920 GOTO 730
930 FOR K=1 TO 4
940 PRINT#-2,LP$(K)
950 NEXT K
960 GOSUB 1950
970 GOTO 200
980 '     DISPLAY
990 CLS
1000 FOR N=1 TO CT
1010 Y=Y+1
1020 GOSUB 2220
1030 FOR RW=1 TO 4
1040 PRINT A$(RW)
1050 NEXT RW
1060 PRINT " "
1070 IF Y/3=INT(Y/3)THEME$=INKEY
$:IFE$=""THEN1070
1080 IF E$="@"THEN200
1090 NEXT N
1100 Y=0
1110 K$=INKEY$
1120 IFK$=""THEN1110ELSE200
1130 '     SAVE
1140 CLOSE
1150 OPEN"O",#1,"NEWAD"
1160 FORM=1TOCT
1170 PRINT#1,I$(M)
1180 NEXTM
1190 CLOSE#1
1200 OPEN"O",#1,"NBWAD"
1210 FORM=1 TO CT
1220 PRINT#1,I$(M)
1230 NEXTM
1240 CLOSE#1
1250 SOUND 100,10
1260 GOTO 200
1270 '     NAME ON FILE SUBROUTI
NE
1280 GOSUB 2220
1290 FOR K=1 TO 4:PRINT A$(K):NE
XT
1300 PRINT "NAME ON FILE; DELETE
/CHANGE/NEXT"
1310 I$=INKEY$:IF I$=""THEN1310
1320 IF I$="N" THEN 550
1330 IF I$="n" THEN 550
1340 IF I$="D" THEN 1410
1350 IF I$="d" THEN 1410
1360 IF I$="C" THEN 1390
1370 IF I$="c" THEN 1390
1380 GOTO 1310
1390 HA=N
1400 RETURN
1410 FOR K=N TO CT
1420 I$(K)=I$(K+1)
1430 NEXT K
1440 CT=CT-1
1450 GOTO 550
1460 '     INSERT ITEM SUBROUTIN
E
1470 FOR K=CT TO N STEP -1
1480 I$(K+1)=I$(K)
1490 NEXT K
1500 CT=CT+1
1505 HA=N
1510 IF CT>498 THEN PRINT"OUT OF
 STORAGE SPACE";PRINT"SAVE DATA"
:SOUND 100,5:GOTO 230
1520 RETURN
1530 '      ADDRESS - SPECIFIC
1540 INPUT"NAME";NAME$
1550 IF NAME$="" THEN 200
1560 FOR N=1 TO CT
1570 GOSUB 2180
1580 IF A$(1)=NAME$ THEN 1610
1590 NEXT N
1600 CLS:PRINT"NAME NOT FOUND";B
OTO 230
1610 CLS
1620 BOSUB 2220
1630 FOR K=1 TO 4
1640 PRINTA$(K)
1650 NEXT
1660 I$=INKEY$
1670 IF I$=""THEN1660 ELSE 200
1680 '      LIST ALL NAMES
1690 CLS
1700 PI=0
1710 FOR N=1 TO CT
1720 PI=PI+1
1730 BOSUB 2180
1740 PRINT A$(1)
1750 IF INT(PI/13)=PI/13 THEN 17
80
1760 NEXT N
1770 I$=INKEY$:IF I$="" THEN 177
0 ELSE 200
```

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```
1780 PRINT@448,"PRINT'@' TO RETU
RN"
1790 I$=INKEY$
1800 IF I$=""THEN1790
1805 IF I$="@"THEN200
1810 PRINT@448,STRING$(30," ")
1820 PRINT@446," "
1830 GOTO 1760
1840 '        LABELS
1850 CLS
1860 PRINT#-2,CHR$(18);CHR$(27)"
F";CHR$(27)"H";CHR$(10)
1870 PRINT "ADJUST TO TOP OF FOR
M, PRESS 'S'"
1880 I$=INKEY$:IFI$="" THEN 1880

1890 PRINT "ALL OR SOME?"
1900 I$=INKEY$:IF I$="" THEN 190
0
1910 IF I$="@" THEN 200
1920 IF I$="A" OR I$="a" THEN 20
60
1930 IF I$="S" OR I$="s" THEN 19
70
1940 GOTO 1900
1950 PAGE=PAGE+1:IFPAGE>50 THEN
PRINT#-2,CHR$(140);CHR$(10):PAGE
=1:RETURN
1960 RETURN
1970 CLS
1980 PRINT "PRINT 'Y' BY THOSE T
O BE PRINTED"
1990 FOR N=1 TO CT
2000 GOSUB 2180
2010 PRINT A$(1);
2020 Y$=INKEY$:IFY$=""THEN2020
2030 IF Y$="@" THEN 2060
2040 IF Y$="Y" OR Y$="y" THEN PR
INT" Y" ELSE PRINT " ":I$(N)=I$(
N)+"*"
2050 NEXT N
2060 FOR N=1 TO CT
2070 IF RIGHT$(I$(N),1)="*" THEN
 I$(N)=LEFT$(I$(N),LEN(I$(N))-1)
:GOTO 2150
2080 GOSUB 2220
2090 FOR K=1 TO 4
2100 IF K=4 THEN IF A$(4)<>"" TH
EN IF  ASC(A$(4))<65 THEN PRINT#
-2," ":GOTO 2120
2110 PRINT#-2,A$(K)
2120 NEXT K
2130 PRINT#-2,CHR$(10)
2140 I$=INKEY$:IF I$="@" THEN 20
0
2150 NEXT N
2160 GOTO 200
2170 '    GET NAME
2180 T1=INSTR(I$(N),"@")
2190 A$(1)=LEFT$(I$(N),T1-1)
2200 RETURN
2210 '    GET ADDRESS
2220 GOSUB 2180
2230 T2=INSTR(T1+1,I$(N),"@")
2240 T3=INSTR(T2+1,I$(N),"@")
2250 A$(2)=MID$(I$(N),T1+1,T2-T1
-1)
2260 A$(3)=MID$(I$(N),T2+1,T3-T2
-1)
2270 A$(4)=MID$(I$(N),T3+1,LEN(I
$(N))-T3-1)
2280 RETURN
```

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Edit any ASCII File		YES			NO	

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Assembly Language Makes Good Graphics Easy

By Dennis Lewandowski
Rainbow Contributing Editor

(Mr. Lewandowski, an experienced assembly language programmer and teacher, is president of DSL Computer Products.)

This month we are going to start a voyage into the fascinating world of graphics. To date the only screen we have dealt with has been the "normal" ($400-$600) screen. The normal screen is just fine to get your feet wet, and show some of the easier concepts of assembly language programming. The real fun part of the 80C is the graphics. Machine language is perfect for graphics, it's super fast—as you will see in this month's program. Also, you are in total control.

Before we start on the program, let's find out how we actually get the different graphic screens. I'm sure you have heard, and seen, plenty of "buzz" words, such as SAM, VDG, and SCREEN. I'll try to make it so you can keep up with the best of them.

We'll start with SCREEN. If you have Extended Basic you may be familiar with the screen effect. You can designate a screen, in 1.5K increments, using PMODE, then display it, and flip between the normal, and graphic screen without disturbing the contents of either. The method in which this is accomplished is by using the memory just after the normal screen for the graphics screen ($600 and up).

Now if you're lucky enough to have a disk system, you may notice that memory locations from $600 to $989 are used for disk Input/Output (I/O), and variable storage. So the graphic screen must be moved even higher in memory. Just how high can the screen go? All the way to the top. The 80C can start a screen at any ½K position in free RAM memory, or RAM PAGE. The way these "pages" are set is by setting or resetting memory bits connected to the PIA (Peripheral Interface Adapter). This information is then read by the SAM (Syncronous Address Multiplexer), and given to the VDG (Video Display Generator).

This sounds very complex, but hang on, it gets better. To set these bits, all you have to do is store something at the odd memory location. What you store there makes no difference at all. (Remember a BIT is the smallest part of the computer's memory, and is SET when equal to one, and RESET when equal to zero.) To reset these bits, you guessed it, store something at the even memory locations!

To make things a bit easier, try to imagine a toggle switch, storing data at an odd memory location would be similar to pushing the switch ON with your finger. Which finger? Does it matter? The same is true for these memory locations. These locations reside from $FFC0 to $FFD3 (65472 to 65491). The lower six bits control the "graphics modes," the upper 14 bits control the "screen start location."

The chart (Figure 1) shows how the binary data will affect the location of the screen memory. By storing any value at the even memory locations in the column labeled RESET. A zero will be stored and that bit of the address will be reset. Storing to an odd location in the column labeled SET, a one will be stored in that bit. There are seven bits, so a graphic page can begin at any location up to $7F00. This is an excellent example of overkill, since the 80C was only to have 16K, originally. The second chart (Figure 2) shows which bits to set, or reset, to move the screen where you want it in the first 16K of the 80C.

Chart number three deals with the VDG. Once again the bits of this "register" are set, or reset, by doing stores to the graphic mode the 80C is in. Now, before you feel you're getting comfortable with how the graphics work, I'll toss in the clinker. The graphic mode has to be matched by another register, located at $FF22, so both the SAM and the VDG can get their act together. The second half of the figure three gives the corresponding bits to obtain the graphic mode desired.

Now trying to explain the way all of this works together is rather difficult without using an example. So the program listing is an example of how to obtain a graphics screen. This example can be applied to all of the graphic modes available for the 80C. I hope you have been typing in the listings to date as you will probably recognize the routine labeled INTWO from BYTE TREK. (July '82 *Rainbow*)

To start, we EQUate the labels we are using for variables. The first being SCRN, or screen, which is set to $400 (our normal screen location). The second label is SNMEN, or screen memory. This is a pointer used by the ROM routine at $A30A. This two byte pointer is used by Basic as well. Remember $88 is the Most Significant Byte (MSB), and $89 is the Least Significant Byte (LSB). The third label HYRES, which is also the name of the program, is where we will place our graphics screen in RAM memory. The reason for $0E00, is for compatibility with *all* versions of the 80C. The final label you should be familiar with by now, VAR, is for variable.

The program is ORGinated at $1A00, which is going to be the end of our graphic screen. On START we jump to the CLear Screen routine in ROM, to clear the normal screen. Next we load the X register with $04CC, which is about middle of the normal screen. We store this value at SCMEM, doing this is similar to using PRINT@ in Basic, since we set the pointer for the ROM routine to print at

center screen.

Here comes the fun part, using the chart in Figure 3, I have selected the medium graphic mode 128x96. To obtain the mode we want, we must store $C in the Most Significant Nibble (MSN) of the control register at $FF22. To change the screen location, to $0E00, we must turn on bits 0, 1, and 2. To accomplish this we simply do a store to $FFC7, $FFC9, and $FFCB, the fact the A register contains $C0 makes no difference.

Let's BRAnch to WAIT so we can observe the screen we have just created. GOSH, that sure is pretty, all those colors, looks like pop art. The reason for the detour is for anyone who wishes to SEE what I mean when I say superfast. We'll get to WAIT in a minute, just get your stop watch ready, and press the space bar. WHAM! That's superfast! Who needs five megahertz?

By pressing the space bar, we told the program to clear our graphic screen, by BRAnching to SCREN. Here we load the D register with 0, store A at VAR, and load X with HYRES, which is really $0E00, or the start of our graphic screen. Now wait a minute, why store A, how did A get into the discussion in the first place?

I believe you may have been napping last month. The D register is actually the combined register pair of A and B. By loading D with zero, we just loaded A and B with zero. The reason for storing A in VAR now is because we know what we have in VAR, zero, not some random number from power up.

Here we are at PCLS, and here is a new instruction. STD, ++ HMMM. Since D is really two eight bit registers, it sure would be nice if we could tell our pointer X that we want it to point to every other memory location. Well fear not, the nice folks at Motorola had us in mind, because the double plus sign following the X does just that. It tells X to do a double increment. How about three, or four plus signs? No, just one for one byte increments, or two for two byte increments.

The rest of PCLS I'm sure you will recognize as an indexed addressing loop. Once we've cleared the screen we branch to WAIT.

Let's jump slightly ahead and look at WAIT. We call the ROM routine for a keypress, and then compare it to a series of ASCII letter values to see what we want to do. The first letter is X, again our escape key, pressing X will abort the program and send us back to Basic. Next we have N, for Normal screen, pressing N lets us look at the "standard" ($400) screen. Why look at the normal screen? For the next letter I, this is for an Input routine. Pressing I will allow us to put a hex value in the A register, and display it on the graphic screen. Using this we can determine just what color sequences can be obtained.

The final letter is H, for HYRES. This will display our graphic screen. The last instruction of this is a branch to SCREN, so if any other key is pressed, we just clear the graphic screen.

OK, back to NORM, if we press N, we wish to see the normal screen. To do this we must put everything back the way we found it. Load A with 5, the normal value at $FF22. Then store it there. Now reset the screen to $400, using stores to the even bits. This time we don't have to branch to WAIT since we fall into it due to its position in the program.

Let's press I. Doing so we are branched to a routine called INC. at INC, we again branch. This time to INTWO where we get the keypress, display it, and save it. Once we have both keypresses, we return to INC.

Here we do something a little different. Instead of storing $4CC at SNMEM again, to keep our input data neat, we DECrement SNMEM+1. Not once, but TWICE, after all we did get two keypresses. The next time the ROM routine is called to print our keypresses, it will simply print them on top of our old data.

Well that's all for this month. By Inputting different values, you can see just what each byte will display on the graphic screen. Remember you have 256 possible numbers (00-FF). Next month we're going to do something on this screen.

```
0001 0000                NAM HYRES
0002 0000          SCRN  EQU $400
0003 0000          SNMEM EQU $88
0004 0000          HYRES EQU $E00
0005 0000          VAR   EQU $1B
0006 0000                ORG $1A00
0007 1A00 BDA928   START JSR $A928      CLS
0008 1A03 8E04CC         LDX #$4CC      MID SCREEN
0009 1A06 9F88           STX SNMEM      SAVE POINTER
0010 1A08 86C0     GRAF  LDA #$C0       MEDIUM GRAFICS
0011 1A0A B7FF22         STA $FF22      SET CONTROL
0012 1A0D B7FFC7         STA $FFC7      MOVE SCREEN UP
0013 1A10 B7FFC9         STA $FFC9      INTO HIGH MEM
0014 1A13 B7FFCB         STA $FFCB      FOR DISK USERS
```


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```
0015 1A16 B7FFC5        STA $FFC5       SET VDG
0016 1A19 201F          BRA WAIT
0017 1A1B CC0000  SCREN LDD #0          PUT 0 IN D
0018 1A1E 971B          STA VAR         PUT 0 IN VAR
0019 1A20 BE0E00        LDX #HYRES      PUT START IN X
0020 1A23 EDB1    PCLS  STD ,X++        DOUBLE TIME
0021 1A25 8C1A00        CMPX #$1A00     END OF SCRN
0022 1A28 26F9          BNE PCLS        CLEAR THAT SCRN
0023 1A2A 200E          BRA WAIT
0024 1A2C 8605    NORM  LDA #5          NORMAL VALUE
0025 1A2E B7FF22        STA $FF22       RESET CONTROL
0026 1A31 B7FFC6        STA $FFC6       RESET SCREEN
0027 1A34 B7FFCA        STA $FFCA       TO $400
0028 1A37 B7FFC4        STA $FFC4       RESET VDG
0029 1A3A BDA1C1  WAIT  JSR $A1C1       WAIT FOR A
0030 1A3D 27FB          BEQ WAIT        KEYPRESS
0031 1A3F 8158          CMPA #$58       WAS IT X
0032 1A41 274A          BEQ BACK        IF SO BASIC
0033 1A43 814E          CMPA #$4E       WAS IT N
0034 1A45 27E5          BEQ NORM        SHOW VAL OF A
0035 1A47 8149          CMPA #$49       WAS IT I
0036 1A49 2714          BEQ INC         GET INPUT
0037 1A4B 8148          CMPA #$48       WAS IT H
0038 1A4D 27B9          BEQ GRAF        SHOW HI SCREEN
0039 1A4F 20CA          BRA SCREN       CLEAR HI SCREEN
0040 1A51 8D14    INTWO BSR INHEX       GET MSN
0041 1A53 8D33          BSR MSNHEX      MAKE MSN
0042 1A55 971B          STA VAR         SAVE MSN
0043 1A57 8D0E          BSR INHEX       GET LSN
0044 1A59 9A1B          ORA VAR         COMBINE THEM
0045 1A5B B7120F        STA $120F       DISPLAY GRAPHIC
0046 1A5E 39            RTS             RETURN
0047 1A5F 8DF0    INC   BSR INTWO       GET NEW VALUE
0048 1A61 0A89          DEC SNMEM+1     RETURN SCREEN
0049 1A63 0A89          DEC SNMEM+1     POINTER
0050 1A65 20D3          BRA WAIT
0051 1A67 BDA1B1  INHEX JSR $A1B1       INKEY$ W/CURSOR
0052 1A6A 8130          CMPA #$30       ZERO?
0053 1A6C 2DF9          BLT INHEX       LESS TRY AGAIN
0054 1A6E 8139          CMPA #$39       LESS THAN 9
0055 1A70 2E02          BGT ALPHA       MAYBE A-F
0056 1A72 2008          BRA OUT         PRINT IT
0057 1A74 8141    ALPHA CMPA #$41       IS IT A
0058 1A76 2DEF          BLT INHEX       LESS TRY AGAIN
0059 1A78 8146          CMPA #$46       IS IT GREATER
0060 1A7A 2EEB          BGT INHEX       THEN F? AGAIN!
0061 1A7C BDA30A  OUT   JSR $A30A       OK? PRINT IT
0062 1A7F 8030          SUBA #$30       STRIP ASCII
0063 1A81 8109          CMPA #9         9 OR LESS
0064 1A83 2F02          BLE DONE
0065 1A85 8007          SUBA #7         MUST BE ALFHA
0066 1A87 39      DONE  RTS
0067 1A88 48      MSNHEX LSLA           MOVE LSN TO MSN
0068 1A89 48            LSLA            .  .  .  .
0069 1A8A 48            LSLA            .  .  .  .
0070 1A8B 48            LSLA            .  .  .  .
0071 1A8C 39            RTS
0072 1A8D 0A71    BACK  DEC $71         -1 RESTART VECTOR
0073 1A8F 7EA027        JMP $A027       BACK TO BASIC
0074 1A92               END START
```


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BOTH TOOLKITS CONTAIN . . .

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- ☐ **Automatic linefeed** for printers that don't/double space LISTings; or normal PRINT
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- ☐ ASCII/HEX memory **Dumps** to screen or printer
- ☐ **Delete all REMarks** (either REM or ' type)
- ☐ Parallel **ECHO** of screen output to printer

THESE FEATURES ARE FOUND ON BOTH VERSIONS . . .

- — **Transparent** to the user, Install it and forget it until you need it
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- — Same program works with tape or disk and in 16 or 32K
- — Entire system totally **removable** at any time
- — **Compatible** with other utility programs
- — Green/Orange text screen capability
- — Easily **modifiable** command syntax

The Kits are relocatable programs that load any time without bothering your BASIC program or variables or top of memory address. All tools may be turned on or off at will, including the Kit itself.

The tools are available with simple three or four letter commands entered in the direct mode, with the entire instruction set viewable through the HELP command.

The Colorkit is 5K bytes for $29.95
Available on disk with handy BASIC Kit loader for additional $5

RAINBOW CERTIFICATION SEAL

The Microkit is 2.5K bytes for $27.95
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The Classic Game of Life With:

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Disk File Utility with:

- **One key view/copy/load(m) of files**
- **Two key kill/rename of files**
- **Sort directory on name/extension**
- **Pack directory so new files put at end**
- **Directory keyword search of filename**
- **Print DIR with machine code address**
- **Recover killed files**

DEER HUNT

- **Arcade shoot-em-up skill game**
- **Aim only for the deer**
- **Avoid hitting people, cars, train**
- **Will not cause tension headache**
- **BASIC/machine code hybrid**
- **Tape/Disk compatible**

ARIZIN
P. O. Box 8825
Scottsdale, AZ 85252

Software Review...

Three *Startrek* Games Provide Much Fun, Action

Color Computer users are fortunate to have not one, but three, *Startrek* games available for them. They are treble fortunate that all three of the offerings currently available are good ones with some excellent features.

We spent several hours each with *Trek 80C* from A.M. Hearn Software, *Startrek* from Circle City Software and *Trek-16* from Tom Mix Software. Let me say first of all that each of them is a good rendition of this excellent game and that you can hardly go wrong with any of the three versions.

I am sure, however, that everyone will have his favorite. This is simply because different people play the game in different ways. *Startrek* has the most bells and whistles (especially in the 32K version), *Trek 80C* is just about the easiest to play right from the start and *Trek-16* is an overall fine rendition of this classic.

Let's try to take them one at a time:

Startrek is the only one of these programs available on disk as well as tape, and it has the most appealing visual presentation. It essentially uses a reverse video for most of the screen and shows the sector of space you are in with a colored frame, depending on the condition of your ship. As in all versions of the game, all the graphics are in low resolution—but here this is no problem at all. Startrek games are *not* arcade games.

This is a real-time version and requires two-letter commands. Because the screen goes from the reverse-video to regular video line-by-line as updates are given, the updating process sometimes conflicts with your command input and you may have to retype a command. This is a small problem, however, in return for the graphics.

Startrek has a very easy command set and several levels of difficulty. And, as an added bonus, calls you by name as the commander. Finally, when things are done, it prints out the flight's record to your printer—assuming the printer is on. We couldn't find any mention of this in the instructions, so it was a real surprise—although a nice one.

There are various additional features, which you would expect in a 32K version. At higher levels, the enemy can warp and dodge (I refuse to characterize the enemy as a Klingon, for all we know, E.T. is a Klingon) and black holes can supernova. Its a fine version.

The thing we liked best about *Trek 80C* was the navigational aid on screen. The same navigational set is used for *Startrek*, but having it on the screen was a major bonus. It helped us move around within the sectors.

This was the fastest game of the three to "get into" quickly. As a real-time version, we had to make moves fairly rapidly, but a quick whip through the instructions enabled us to play it with some degree of skill. Too, the instructions themselves were the best written of the three.

An added feature of *Trek 80C* is the screen print command, which allows you to print the screen whenever you wish to do so. This is very helpful for galaxy scans, but it also works for making a copy of the fine *HELP* display.

Trek-16 gives the most flavor of the game, with the characters from *Star Trek* itself responding to your commands. This is the only game that is not in real-time, which is both an advantage (gives you more time to think) and a disadvantage (makes the play a little less frenzied). Time is based on movement and happenings rather than on the actual passage of time itself.

Movement here, too, is a little different, since you make your way by displacement from your present position rather than going a number of units in one direction or another. The screen, however, is more colorful although somewhat more difficult to figure out at first. We think, however, it has the best long range scan of the group.

Each of these three has solid playability. You can't go wrong with any of them.

(*Startrek*, Circle City Software, P.O. Box 30166, Indianapolis, IN 46220, $19.95. *Trek 80C*, A. M. Hearn Software, 602 S. 48th St.-Dept. R, Philadelphia, PA 19143, $14.95. *Trek-16*, Tom Mix Software, 3424 College N.E., Grand Rapids, MI 49505, $19.95)

Software Review...

T&D Subscription Software Provides Varied Programs

T&D Subscription Software Cassette features a large number of interesting programs for everyone, ranging from adventure games to poker and cost of living tips.

T & D has arranged its different programs so you don't have "groups" of all games or all business programs. We think this keeps the interest level high and tends to prevent you from skipping or jumping over programs that are very interesting and fun.

We went through all nine programs and the "cover" and were pleased with what we found. Some of the programs encountered were:

Biorhythm is a program with three separate graphs charting physical, emotional and intellectual cycles with a brief synopsis of how to read the charts and what each means. You can then put in your own information and come out with a prediction of how you should be feeling at the present time. (We found it to be extremely accurate!)

Blackjack is played entirely with joysticks, pitting two players against the dealer. You have options such as "hit, stand or doubling;" the player who reaches $1000 before being "busted" by the dealer wins the game.

Cost of Living is a program that is certainly relevant in today's economy. It lists eight categories of helpful hints on how to save money. Some of these categories are how to save money on clothing, food, medical costs and energy and car maintenance. Each tip is well-thought out and presented—we just wish there had been more of them.

If you are looking for a Basic program combining strategy and quick reactions look no further—you've found *Frenzy* (aptly named). Two players use their joysticks to maneuver their "blocks" to chase after point squares. The length of the game depends solely on the players, as they are able to input the winning and losing scores.

Although we mention only four programs here, we feel this gives you a good cross-section of what this subscription service cassette has to offer—and that's a lot. The written directions, contained on a single blue sheet, are correct, concise, and easy to follow. The visual graphics are clear throughout the whole cassette.

We found these programs kept us entertained for several hours and could do the same for you!

(T & D Subscription Software, P.O. Box 256-C, Holland, Michigan 49423, $55 per year, $6 per issue)

—Holly Beam

QUASAR ANIMATIONS
Presents Three Fine Additions To Your Software Library

BIGNUM

by Mark Zimmerman and Ed Pollard

RAINBOW CERTIFICATION SEAL

If you gave your computer this problem 1122334455 * 5544332211, it would give you an answer something like 6.22259507 E 18. Not if you had **BIGNUM**. Bignum would give you 62225955070371630005.

There's more. If you tried to raise 25 to the 25th power (25 ↑ 25) you would get 8.88178431 E 34. But **BIGNUM** will give you 88817841970012523233-890533447265625. With a 16K machine you can have up to a 1,024 digit number in each of the registers plus the special "Memory" register. With 32K or 64K, much, much more.

Add, subtract, multiply, divide, and raise numbers to powers you never imagined without a larger computer. Even if you are satisfied with the shortened numbers in the Color Computer, it would give an "OV ERROR" with this problem; 34 to the 45th (34 ↑ 45). **BIGNUM** gives you both the 68 digit result and the exponentiated version (8.25184889).

Store your results in the special Memory register and/or print your results on your printer. Show off your computer's abilities to people with "other computers." This one adds a whole new dimension to your 80C.

All this for only $19.95. 16K required.

SKY-DEFENSE

RAINBOW CERTIFICATION SEAL

Can you survive the first wave of attack? Or the next . . .Or the next. . .? Only your joystick will ever know. Fly horizontally over mountains and terrain and battle the attackers in hi-res action. Machine Language.

16K/Joysticks required. **$18.95**

THE WALL

This 9-color joystick game is not a "BREAKOUT" but a new idea. You are shooting down the bricks to get the "enemy" on the other side. But when you shoot through "the wall" and miss him, points are subtracted. No "ball and paddle," but you shoot bricks at the bricks. This one's unique. 9 colors and sound. Time limit on game play. Joysticks required. $6.95

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ADVENTURES!!!
For TRS-80 COLOR and OSI. These Adventures are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are inter-active 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.")

Adventures require 16k on TRS80, TRS80 color, and Sinclair. They require 8k on OSI and 13k on Vic-20. Derelict takes 12k on OSI. $14.95 each.

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!

TREK ADVENTURE (by Bob Retelle)
This one takes place aboard a familiar starship. The crew has left for good reasons — but they forgot to take you, and now you are in deep trouble.

HAUNTED HOUSE (by Bob Anderson)
It's a real adventure—with ghosts and ghouls and goblins and treasures and problems — but it is for kids. Designed for the 8 to 12 year old population and those who haven't tried Adventure before and want to start out real easy.

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!

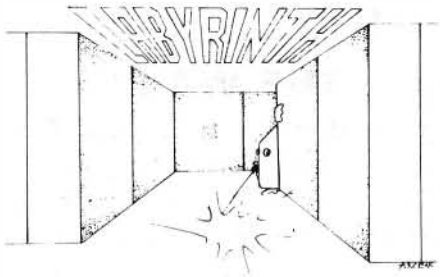
VENTURER!—A fast action all machine code Arcade game that feels like an adventure. Go berserk as you sneak past the DREADED HALL MONSTERS to gather treasure in room after room, killing the NASTIES as you go. Great color, high res graphics, sound and Joystick game for the TRS-80 Color or OSI machines. (black and white and silent on OSI.) Tape only. $19.95.

BASIC THAT ZOOOMMS!!
AT LAST AN AFFORDABLE COMPILER FOR OSI AND TRS-80 COLOR MACHINES!!! 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.

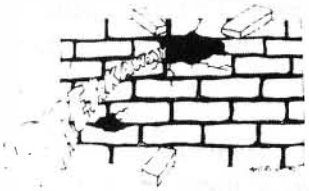
It does have some limitations. It takes at least 8K of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP, USR (X), PEEK, POKE, *, /, +, -, >, <, =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and 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 or TRS-80 Color.

LABYRINTH — 16K EXTENDED COLOR BASIC — With amazing 3D graphics, you fight your way through a maze facing real time monsters. The graphics are real enough to cause claustrophobia. The most realistic game that I have ever seen on either system. $14.95. (8K on OSI)



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 TRS-80, TRS-80 Color, and Sinclair. 13K VIC-20. $14.95 each.



NEW!!
BREAKAWAY — ALL MACHINE CODE — Every computer has some form of BREAKAWAY available. Ours is fast, smooth, has 15 levels of difficulty — and is a bargain!! 16k TRS-80 Color only $9.95.

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TRS-80 COLOR SINCLAIR OSI VIC-20

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ADVENTURES FOR OSI, TRS-80, TRS-80 COLOR, SINCLAIR, PET, VIC-20

ADVENTURES — Adventures are a unique form of computer game. They let you spend 30 to 70 hours exploring and conquering a world you have never seen before. There is little or no luck in Adventuring. The rewards are for creative thinking, courage, and wise gambling — not fast reflexes.

In Adventuring, the computer speaks and listens to plain English. No prior knowledge of computers, special controls, or games is required so everyone enjoys them—even people who do not like computers.

Except for Quest, itself unique among Adventure games, Adventures are non-graphic. Adventures are more like a novel than a comic book or arcade game. It is like reading a particular exciting book where you are the main character.

All of the Adventures in this ad are in Basic. They are full featured, fully plotted adventures that will take a minimum of thirty hours (in several sittings) to play.

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.

TREK ADVENTURE by Bob Retelle — This one takes place aboard a familiar starship and is a must for trekkies. The problem is a familiar one — The ship is in a "decaying orbit" (the Captain never could learn to park!) and the engines are out (You would think that in all those years, they would have learned to build some that didn't die once a week). Your options are to start the engine, save the ship, get off the ship, or die. Good Luck.

Authors note to players — I wrote this one with a concordance in hand. It is very accurate — and a lot of fun. It was nice to wander around the ship instead of watching it on T.V.

CIRCLE WORLD by Bob Anderson — The Alien culture has built a huge world in the shape of a ring circling their sun. They left behind some strange creatures and a lot of advanced technology. Unfortunately, the world is headed for destruction and it is your job to save it before it plunges into the sun!

Editors note to players — In keeping with the large scale of Circle World, the author wrote a very large adventure. It has a lot of rooms and a lot of objects in them. It is a very convoluted, very complex adventure. One of our largest. Not available on OSI.

HAUNTED HOUSE by Bob Anderson — This one is for the kids. The house has ghosts, goblins, vampires and treasures — and problems designed for the 8 to 13 year old. This is a real adventure and does require some thinking and problem solving — but only for kids.

Authors note to players — This one was fun to write. The vocabulary and characters were designed for younger players and lots of things happen when they give the computer commands. This one teaches logical thought, mapping skills, and creativity while keeping their interest.

DERELICT by Rodger Olsen and Bob Anderson — For Wealth and Glory, you have to ransack a thousand year old space ship. You'll have to learn to speak their language and operate the machinery they left behind. The hardest problem of all is to live through it.

Authors note to players — This adventure is the new winner in the "Toughest Adventure at Aardvark Sweepstakes". Our most difficult problem in writing the adventure was to keep it logical and realistic. There are no irrational traps and sudden senseless deaths in Derelict. This ship was designed to be perfectly safe for its' builders. It just happens to be deadly to alien invaders like you.

NUCLEAR SUB by Bob Retelle — You start at the bottom of the ocean in a wrecked Nuclear Sub. There is literally no way to go but up. Save the ship, raise her, or get out of her before she blows or start WWIII

Editors note to players — This was actually plotted by Rodger Olsen, Bob Retelle, and someone you don't know — Three of the nastiest minds in adventure writing. It is devious, wicked, and kills you often. The TRS-80 Color version has nice sound and special effects.

EARTHQUAKE by Bob Anderson and Rodger Olsen — A second kids adventure. You are trapped in a shopping center during an earthquake. There is a way out, but you need help. To save yourself, you have to be a hero and save others first.

Authors note to players — This one feels good. Not only is it designed for the younger set (see note on Haunted House), but it also plays nicely. Instead of killing, you have to save lives to win this one. The player must help others first if he/she is to survive — I like that.

PYRAMID by Rodger Olsen — This is one of our toughest Adventures. Average time through the Pyramid is 50 to 70 hours. The old boys who built this Pyramid did not mean for it to be ransacked by people like you.

Authors note to players — This is a very entertaining and very tough adventure. I left clues everywhere but came up with some ingenous problems. This one has captivated people so much that I get calls daily from as far away as New Zealand and France from bleary eyed people who are stuck in the Pyramid and desperate for more clues.

QUEST by Bob Retelle and Rodger Olsen — THIS IS DIFFERENT FROM ALL THE OTHER GAMES OF ADVENTURE!!!! It is played on a computer generated map of Alesia. You lead a small band of adventurers on a mission to conquer the Citadel of Moorlock. You have to build an army and then arm and feed them by combat, bargaining, exploration of ruins and temples, and outright banditry. The game takes 2 to 5 hours to play and is different each time. The TRS-80 Color version has nice visual effects and sound. Not available on OSI. This is the most popular game we have ever published.

MARS by Rodger Olsen — Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian city, repair your ship and deal with possibly hostile aliens to get home again.

Authors note to players — This is highly recommended as a first adventure. It is in no way simple — playing time normally runs from 30 to 50 hours — but it is constructed in a more "open" manner to let you try out adventuring and get used to the game before you hit the really tough problems.

ADVENTURE WRITING/DEATHSHIP by Rodger Olsen — This is a data sheet showing how we do it. It is about 14 pages of detailed instructions how to write your own adventures. It contains the entire text of Deathship. Data sheet - $3.95. NOTE: Owners of OSI, TRS-80, TRS-80 Color, and Vic 20 computers can also get Deathship on tape for an additional $5.00.

PRICE AND AVAILABILITY:

All adventures are $14.95 on tape except Earthquake and Haunted House which are $9.95. Disk versions are available on OSI and TRS-80 Color for $2.00 additional.

Please specify system on all orders

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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TRS-80 COLOR SINCLAIR OSI VIC-20

Software Review...

This *Astrology* Program Is A First Rate Offering

Astrology has interested people from the very birth of civilization. The ancient Egyptians had court astrologers and paid a great deal of attention to what they had to say. King Arthur's Merlin, we understand, was a sort of astrologer as well as a magician.

The popularity of astrology is best understood, we suppose, by the number of such columns which appear in virtually every daily newspaper. But astrology is an art and involves countless computations and figuring.

Enter *Astrology* from Prickly-Pear Software. Author Susan Petrocci is a person who knows her astrology and has packed it all into one program that does it all.

True astrology is vastly different from the little columns and features you see every day. Mrs. Petrocci has not only programmed the 80C to do the calculations, but she has used the graphic screens to actually draw astrology charts. A 50-page book is included to guide the user through interpretation of his or her chart.

The program itself is very good and easy to use. You must know a few things to get a completely accurate reading—such as the time of your birth and the latitude and longitude of your birthplace. Time zone charts are included, but no latitude and longitude charts (get the *World Almanac* or call your local library's reference desk for help).

We like the program very much but we like the documentation even more. The book takes you through the entire chart and tells you everything you want to know about your horoscope. By combining this excellent text with a fine program, it is very easy to cast a horoscope whenever you wish to do so. Two blank charts are also provided for writing down the details.

Which, as a matter of fact, is our only complaint about *Astrology*. With all the bells and whistles it provides, it would have been nice to have a screen print function built in. Oh well, with all the different printers on the market, that could have resulted in a major headache. And, such a routine would be simple enough to add.

(Prickly-Pear Software, 9822 E. Stella Rd., Tucson, AZ 85730, $34.95 tape, $39.95 disk plus $1.50 s/h)

★ ★ ★ **WARGAMERS** ★ ★ ★

At Last, something for you! Introducing **ACROSS THE RUBICON**, the WWII simulation European Theatre battle game from *ARK ROYAL GAMES*.

- ★ *Mapboard graphics*
- ★ *Color & Sound*
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Book Review...

101 Hints and Tricks Is Not A Treat

When I saw the title of this new book from Arcsoft publishers I knew it was a book I just had to have. I ordered a copy from CMD Micro of Winnipeg, Canada and was very pleasantly surprised when it arrived in less than two weeks. Quite an achievement considering Canada's postal system.

From the title and advertising copy I was expecting a book loaded with routines, POKEs and advanced programming ideas to make CoCo strut it's stuff. Unfortunately titles can be misleading.

The introduction states that the "book is designed for beginners and newcomers, as well as advanced novices". I would agree with it being suitable for beginners but if you are advanced beyond the print command then *Getting Started With Color Basic* and *Going Ahead With Extended Color Basic* do a much better job and cover far more material.

The introduction goes on to say "Amidst our 101 tips are hundreds of secrets, shortcuts, tricks, hints, techniques and make-it-easier instructions". Well, if all of those are there, I couldn't find them. What I did find are a lot of programs of dubious value designed to pad out an otherwide slim volume. Tip 101, an 'Executive Decision Maker' is typical:

```
10 X=RND(100)
20 IF X    49 THEN PRINT "YES" ELSE PRINT
"NO"
```

With few exceptions this is the caliber of the programs contained in this book. There is certainly a need for a book devoted to Color Basic, that will cover the mountain of material not found in the Tandy manuals, but this is not it. If you want to find our more about the inner workings of Co Co spend your money on a subscription to *the RAINBOW, or* CHROMASETTE or something else and give 101 tips and tricks a miss.

(Arcsoft Publishers, P.O. Box 132, Woodsboro, MD 21798, 128 pages, $7.95)

—Geoff Wells

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Hardware...

A "D" Board? Here Is The 64K Answer For You

By Bob Rosen

Last month we ran a short article on the conversion of an "E" Board 80C to upgrade to 64K. The modification is fairly simple, but you can upgrade other boards as well. Here is how to handle the "D" Board, which is, admittedly, more complicated.

We advise you to seek help if you do not have experience in soldering and trace-cutting.

Revove capacitors C61, C31, C64, C35, C67, C45, C70 and C48.

Move the jumper plug at the right of U10 to the 16K position and remove the jumper plug between U8 and U4.

Make the following cuts and add the following jumper wire to the PC Board:

Cut +5v to Pin 9 of the RAMS
Cut +12v to Pin 8 of the RAMS
Cut -5v to Pin 1 of the RAMS
Jumper +5v to the RAMS Pin 1
Jumper +5v to the RAMS Pin 8
Jumper Pin 12 of U4 to Pin 17 of U8
Jumper Pin 9 of U10 to Pin 35 of U10

Bend Pins 4, 5 and 6 of U29 up.

Bend Pin 5 of U11 up.

Connect Pin 6 of U29 to Pin 8 of U29. Plug Pin 8 back into socket.

Connect Pin 4 of U29 to Pin 5 of U11

Connect Pin 5 of U29 to TP1

Install 64K chips in sockets U20-U27.

Note that 64K requires the 1.1 Basic ROM. Almost all series "D" Boards contain the 1.1. It is, however, available from Spectrum Projects, 93-15 86 Drive, Woodhaven, NY 11421 for $36.

Submitting Material To the Rainbow

Contributions to *the RAINBOW* are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other 80C owners.

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

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

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, *the RAINBOW*, P.O. Box 209, Prospect, KY 40059. We will send you some more comprehensive guidelines.

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

Software Review...

Pigskin Predictions Has A Wealth Of Pro Statistics

As the NFL season begins, *Pigskin Predictions* is ready to predict the spread for every game for the year based on each team's past performance.

Each team is rated according to its home field advantage and a power rating, both calculated according to previous game scores. If there is any shortcoming to the program, it is only that the weekly changes in the team's human element (trades, injuries and so on) are not used to calculate team strength. But then, who knows who next week's star will be anyway?

The program gives you a wealth of printouts—enough for even the most hard-core statistics addict. Schedules, ratings, predictions and results are available either by week or by team. Division races are also available with the current week and week-by-week projected records and standings.

The program uses byte-mapped memory, allowing reasonable fast storage and retrieval of information in 16K of memory. Updating with the weekly results takes about two minutes and then it is on to the next week's predictions.

One disadvantage we found, however, was the necessity to enter all the year's schedule at one time. This required some time to do—and we think it would have been more simple to just have a data tape supplied with this information. We would have willingly bought a new data tape next year, too.

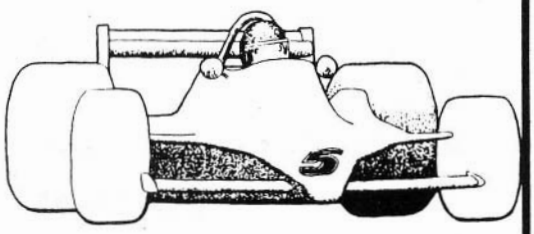
But, for the NFL enthuiast who wants to predict team spreads, standings and results, *Pigskin Predictions* provides a good program to get a jump on the season.

(Rainbow Connection Software, 3514 6th Place NW, Rochester, MN 55901, $19.95 on tape, $24.95 disk)

—Ed Schottland

Coming soon...

REVOLUTION !



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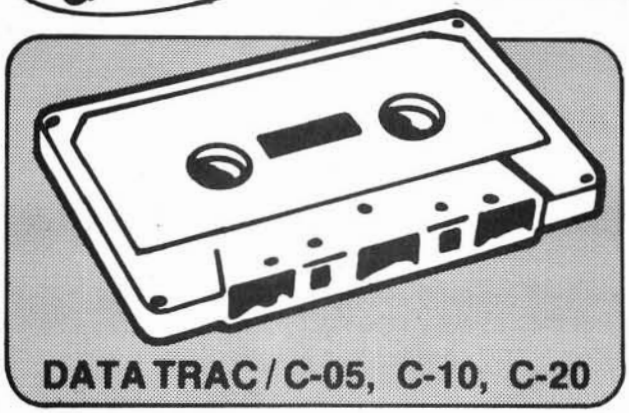

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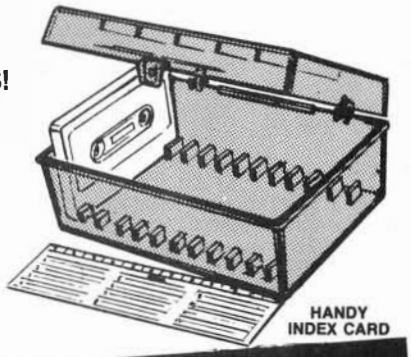

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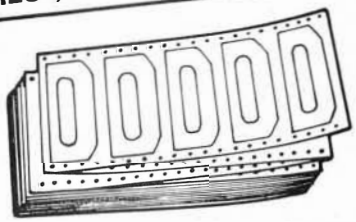

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Graphics...

Here's A Halloween Graphic Program For You

Pumpkins:
(A) Smell
(B) Attract Bugs
(C) Cause Fires
(D) All Of The Above

If you answered "D," you were right. What you win is the program listed below, which will allow you to display a pumpkin in your window for Halloween that doesn't smell, attract bugs or cause fires.

Load in this program, put your monitor or TV in the window and run it. You get an 80C version of a pumpkin for Halloween.

Thanks to the intrepid Dave Hooper for this program.

The Listing:

```
1 REM'THE GREAT PUMPKIN, BY DAVE
 HOOPER
2 REM'CLEARS SCREEN BLACK
3 PMODE4,1:SCREEN1,1:PCLS0
4 REM'REGAIN COLORS IN PMODE 3
5 PMODE3,1
10 REM'DRAW PUMPKIN
30 CIRCLE(128,96),90,7
35 PAINT(128,96),7,7
40 CIRCLE(128,96),45,1,2
45 CIRCLE(128,96),30,1,3
50 CIRCLE(128,96),58,1,1.6
55 CIRCLE(128,96),80,1,1.1
60 CIRCLE(128,96),10,1,9
63 REM'DRAW EYES, NOSE AND MOUTH
65 DRAW"C8;BM68,68E16F16L32"
67 PAINT(84,64),0,8
70 DRAW"C8;BM156,68E16F16L32"
75 PAINT(172,64),8,8
80 DRAW"C8;BM112,92E16F16L32"
85 PAINT(128,88),8,8
90 CIRCLE(128,96),52,8,1,0,.5
95 CIRCLE(128,21),91,8,1,.160,.3
50
100 PAINT(128,124),8,8
105 DRAW"C7;BM88,100D8R8U5"
107 PAINT(92,104),7,7
110 DRAW"C3;BM124,6U4R8D4L8"
115 PAINT(128,4),3,3
120 DRAW"C7;BM164,100D10L8U7"
125 PAINT(160,104),7,7
130 DRAW"C7;BM120,148U8R16D9L16U
1"
135 PAINT(128,144),7,7
140 GOTO140
```


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DRAGON'S BYTE...

Make Monsters From Silicon . . . And Use Them Here

By Bill Nolan
***Rainbow* Contributing Editor**

(Mr. Nolan, an experienced Dungeonmaster in a popular fantasy role playing game on a weekly basis, is the president of Prickly-Pear Software.)

16K ECB

Just like we promised, there are two programs this month. One is a disk menu program that can be used on any disk; the other will create monsters out of silicon.

First, though, I want to talk a little about random numbers and, particularly, some of the things that happen with the random number generator. Random numbers are the lifeblood of a program like *Monsters* this month and the *Dragons* program which we ran in August. For that matter, they are used in most game programs—and a host of other types of programs. So, it is important to make them as random as we possibly can.

To illustrate the problem, try this little experiment. Turn off your 80C and wait 15 seconds like the instruction manual says. Then turn it back on. Now, carefully type in the one-line program below:

```
10 FOR X=1 TO 10: PRINT RND(100): NEXT
```

A row of 10 "random" numbers will appear down the side of your screen. Write these down in order, turn off the computer, turn it back on, type in the same line again and ***RUN*** it. You will get the same list of (not very) random numbers.

You see that this can be a problem. If you are counting on random numbers in a game, you will get the same set of random numbers every time you turn on the computer and load the game. After you play a few times, you will know just what to expect. If it were our *Monster* program listed below, you would get the same monster as the first one every time you ran the program from a cold start (when the computer is first turned on).

That would never do. Luckily, there are some ways to get around the problem, and you will find one of those ways being used in most programs you buy. You should be using one of these methods in the programs you write for yourself, too.

The method used in the *Monsters* program below (and in most Prickly-Pear Software programs) is to insert the statement **X=*RND(0)*** into the middle of an ***INKEY$*** loop like this at the beginning of a program:

```
10 K$=INKEY$: IF K$="" THEN X=RND(0): GOTO 10
```

This is a very reliable method of getting a group of unpredictable numbers, which is really what we are looking for. The problem comes when we can predict what the next "random" number will be. Another way that we can do this is to use the statement **X=RND(-TIMER)** early in the program line. Be sure to use one or the other.

The first listing below is *DISKMENU*. This listing is set up to give you a menu of my first six programs, but the basic idea (and most of the program) can be used to make a menu for almost any group of programs. Let's go through it line by line.

The first lines of consequence, 200 and 300, print out a list of numbers and program names. If you want to use this for other programs, just change the name following the number to the name you want. You can even add more numbers if you want, using PRINT @ positions 327, 359, 391, 423, 455, and 487. If you add more items to the menu you must also change line 400, and add some additional lines as described below. The K$=INKEY$ at the end of line 200 is there to trap any keys that were pressed by accident, or accidently pressed twice. It isn't a bad idea to use one of these before any INKEY$ line.

Line 400 gets a character from the keyboard with the INKEY$ statement, converts it to a number with the VAL function, and checks it to be sure it is not less than one or greater than the number of items in the menu. If you add to the menu (or shorten it), you must change the 6 in K > 6 to be the same as the number of the last item in the menu. If the program finds a number within the range specified, it will then GOTO a line whose number depends on the value of K. If K is 1 it will GOTO the first line in the list, if K is 2, then the second line in the list, etc. Since this is the case, you should have as many line numbers in the list a you have items in the menu. If your menu is longer than six items, you will have to add more line numbers (separated by commas) to the end of line 400.

Lines 500 to 1000 are RUN commands. The name in the quotes in these lines must be exactly the same name you used when SAVEing the program to disk in the first place. This program, as written, will only work with BASIC programs. To use a menu with machine language programs requires a slightly different program.

To use this program, type it in and save it to disk using the command SAVE "MENU." Then load each of the programs from line 300, and SAVE it to the same disk using the same name used in the approriate line 500-1000. When you have done that, all you will have to do is insert the disk the next time you want one of the programs, and type RUN "MENU." There is no need to check the directory or anything like that. The menu acts as a directory, and you won't have the problem of typing names wrong either. Just key your choice.

The *Monsters* program below will give you most of the necessary statistics for a monster. All you have to do is flesh it out with a bit of a description. Color, number of legs, general shape, and things like that. All of the number generation will be done. If you run through the selection

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• Relocate, join, duplicate individual and unique sets of lines at the push of a button		• **Retype** entirely any lines to be moved or joined
• Create the following using only 31 keystrokes: CLS:A$-String$ (15,"") + MID$ (CL$, 6, 2). To change the — symbol to = requires only 3 keystrokes!!!!		• **Type** that line using 47 keystrokes. To change the symbol, **Backspace** and **retype** using 33 more strokes!
• Retain the sequence of commands in temporary memory with special reserved key		• **Retype** lost lines!
• One keypush and the right side of the keyboard converts to a numeric Keypad		• **Stretch** those fingers!
• Correct bugs while your program is running, without losing data.		• Oops! **Lost** data! **Retype, Reload** and **Save** data while swearing a lot.
• Edit programs, data and strings using the full screen editor.		• NO CAN DO!

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process a few times, I'm sure you will find something interesting.

Let me tell you about one of mine. This fellow is known as the Swamp Demon, and although he isn't really a true demon, the distinction will not be a great comfort to any players encountering him. Or her: Naturally there are Ms. Swamp Demons trotting around too! There may even be little Juniors and Junior Misses, but nobody has ever seen one. The adult Swamp Demons stand 15 to 20 feet high on their hind legs, balancing on their massive tails.

They bite for 2-20 points of damage, claw with either or both of their massive forepaws for 1-10 points of damage, and swing their tail for 2-12 points. In addition, they can breathe a cloud of noxious swamp gas once per day, with a range of 20 feet, and size of 10 feet by 10 feet by 10 feet. Anyone in the area of the gas must save versus poison at -4 or be overcome for 1 to 6 rounds.

Worse that that, the Swamp Demon can cast a 5 die lightning bolt from his left hand, and a 5 die fireball from his right, each three times a day. He can do any three of the above attacks in any given round—his choice. By the way, it takes a +2 or better weapon to hit him.

These big guys are AC -2, 18 HD, and very intelligent. Naturally they are Chaotic Evil. If you kill one (ha!) the electrical essence of his body discharges through the boggy ground when he falls, and will do 6-36 points of damage to anyone within 50 feet, unless they roll lower than their dexterity on 2D20 totaled together. A successful roll indicating that they leaped up into the air, and were not touching the ground when the shock ocurred.

A party actually killed one of these wimps in one of my adventures. Of course, the party consisted of a 10th level Mage, an 11th level Paladin with a Holy Avenger sword, a 9th level Bard, a 9th level Ranger, and a couple of lesser fighters. The Swamp Demon aquitted himself quite well, though, and it was a very close fight. If you have a party that thinks they can slay anything, let them meet ol' Swampy. See you next month, and if you have any questions or comments, write me at Prickly-Pear Software, 9822 E. Stella Road, Tuscon, AZ 85730.

Listing 1

```
10 'DISKMENU
20 'PRICKLY-PEAR SOFTWARE
200 CLS0:PRINT@69,"MENU - KEY YO
UR CHOICE";
300 PRINT@135,"1. DEMONS";:PRINT
@167,"2. THIEF SKILLS";:PRINT@19
9,"3. DICEBAG";:PRINT@231,"4. DR
AGONS";:PRINT@263,"5. RINGS";:PR
INT@295,"6. MONSTERS";:K$=INKEY$
400 K$=INKEY$:K=VAL(K$):IF K<1 O
R K>6 THEN 400 ELSE SOUND 150,1:
ON K GOTO 500,600,700,800,900,10
00
500 RUN"DEMONS":END
600 RUN"THIEF":END
700 RUN"DICE":END
800 RUN"DRAGONS":END
900 RUN"RINGS":END
1000 RUN"MONSTERS":END
```

Listing 2

```
10 CLS0:PRINT@138,"RANDOMIZING";
:PRINT@425,"HIT ANY KEY";:K$=INK
EY$
```


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```
20 K$=INKEY$:IF K$="" THEN X=RND
(0):GOTO 20:ELSE SOUND 150,1
30 CLS:X=RND(8):ONX GOTO40,40,40
,50,50,60,70,80
40 PRINT" FREQUENCY --- COMMON":
GOTO90
50 PRINT" FREQUENCY --- UNCOMMON
":GOTO90
60 PRINT" FREQUENCY --- RARE":GO
TO90
70 PRINT" FREQUENCY --- VERY RAR
E":GOTO90
80 PRINT" FREQUENCY --- UNIQUE":
PRINT" NUMBER APPEARING --- 1":G
OTO100
90 PRINT" NUMBER APPEARING --- 1
 TO";RND(100)
100 PRINT" ARMOR CLASS ---";RND(
15)-6
110 PRINT" MOVEMENT ---";RND(20)
120 PRINT" # OF HIT DICE ---";RN
D(18)
130 PRINT" % IN LAIR ---";RND(10
0);"%"
140 PRINT" # OF ATTACKS ---";:Y=
RND(4):PRINTY
150 PRINT" DAM/ATK=1 TO";:FORX=1
TOY:PRINTRND(8)+1"-";:NEXTX:PRIN
T
160 X=RND(10):PRINT" SP. ATTACK
- ";:IFX=1THENPRINT"BREATH WEAPO
N"ELSEIFX=2THENPRINT"POISON"ELSE
PRINT"NONE"
170 X=RND(10):PRINT" SP. DEFENSE
 - ";:IFX=1THENPRINT"+ WEAPON TO
 HIT"ELSEIFX=2THENPRINT"LIKES FI
RE"ELSEIFX=3THENPRINT"NEVER SURP
RISED"ELSEPRINT"NONE"
180 X=RND(10):PRINT" MAGIC RES.
- ";:IFX>2THENPRINT"STANDARD"ELS
EPRINTRND(100);"%"
190 PRINT" INTELLIGENCE --- ";:X
=RND(6):ONX GOTO200,210,220,220,
230,240
200 PRINT"NON-":GOTO350
210 PRINT"LOW":GOTO250
220 PRINT"AVERAGE":GOTO250
230 PRINT"HIGH":GOTO250
240 PRINT"GENIUS"
250 PRINT" ALIGNMENT - ";:X=RND(
9):ONX GOTO260,270,280,290,300,3
10,320,330,340
260 PRINT"L. GOOD":GOTO350
270 PRINT"N. GOOD":GOTO350
280 PRINT"C. GOOD":GOTO350
290 PRINT"C. NEUTRAL":GOTO350
300 PRINT"C. EVIL":GOTO350
310 PRINT"N. EVIL":GOTO350
320 PRINT"L. EVIL":GOTO350
330 PRINT"L. NEUTRAL":GOTO350
340 PRINT"NEUTRAL"
350 PRINT" SIZE --- ";:X=RND(5):
ONX GOTO360,370,370,380,380
360 PRINT"SMALL":GOTO390
370 PRINT"MEDIUM":GOTO390
380 PRINT"LARGE"
390 PRINT@480,"ANOTHER MONSTER?
(Y/N)";:K$=INKEY$
400 K$=INKEY$:IFK$<>"Y" AND K$<>
"N" THEN X=RND(0):GOTO 400:ELSE
SOUND 150,1:IF K$="Y" THEN 30 EL
SE END
```

Back Issue Availability

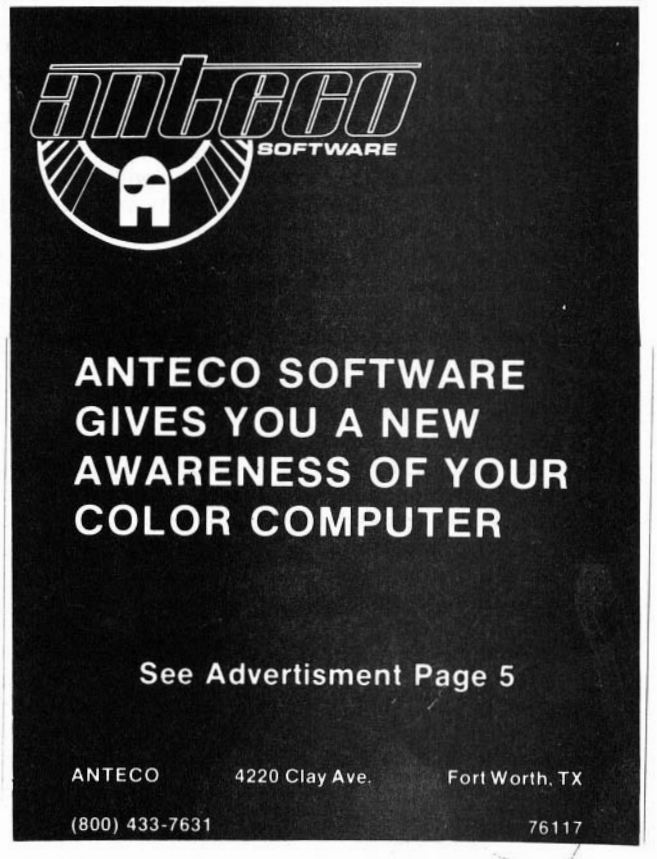
Back copies of all issues of *the RAINBOW* are again now available.

All back issues sell for the single issue cover price—which is $2 for copies of numbers 1-8, $2.50 for numbers 9-14 and $2.95 for numbers greater than 14. In addition, there is a $3.50 charge *per order* for postage and handling. This charge applies whether you want one back issue or all of them.

Most back issues are available on white paper in a reprint form. All back issues now available would be $33.95, plus $3.50 shipping and handling—a total of $37.45. VISA and MasterCard accepted. Kentucky residents please add 5 percent state sales tax.

Due to heavy demand, we suggest you order back issues you want now while supplies last.

Copies of Vol. 1, No. 10 are now available. For those who missed it, it can be ordered for $2.50 plus $1.25 postage and handling.



Software Review...

Disk Data Handler Is A Fine Data Base Program

By Arnold Weiss

Disk Data Handler (DDH) comes on a cassette and is accompanied by 13 pages of instructions (one cover page and six sheets, two sides each). Loading instructions for the program are not given until the middle of page two of the instructions. A disk should be installed in Drive 0 and the program *CLOAD*ed. Do not save yet! Then the program should be *RUN*. This will *SAVEM* a machine language program (called RS/DDH) to the disk. Then you *SAVE "DDH/BAS"*.

DDH provides a powerful and versatile program for storing, sorting and selecting data. It sets up two types of files (1) Quick Files (sequential files) and (2) Extended Files (random access files).

The maximum number of records each "quick file" can hold is determined by the total record size—499 24 character records, 245 50 character records, 123 100 character records, 50 248 character records. The maximum character size of a record is 254.

Each record may be divided into up to 14 fields (13 if using extended files). Each field may be up to 99 characters long (long fields will reduce the number of fields available).

Sorts may be carried out on any field, subfield, or sections of contiguous fields, in either ascending or descending order. All sorts retain prior order to allow for multiple sorts. Sort time for 250 records is less than 10 seconds.

Records may be selected on the data content of any field, subfield, or combinations of fields in the basic record. Selection time is one second per criterion used.

Reports may be directed to screen, printer or disk files, to be read by user-written BASIC programs. Report formation allows the user to determine the fields or subfields to be output and allows control of line feeds, tabulation to specified columns, insertion of literal character strings, and supression of trailing blanks within any field.

As mentioned above an additional, optional 254 character, 14 field "extended file" record may be linked to each record. If used, the "extended file" will reduce the maximum size of the "quick file" record by four characters and one field. The size of the "extended file" record is not a factor in determining the maximum number of records per disk file. The "extended file" my not be used for sorts or selections, but can be called from the "quick file" at any time. If the "extended file" option is used, each record in the "quick file' does not have to have an associated "extended file." If a "quick file" record is deleted its extended file is deleted. Each "extended file" record can be referred to by only one "quick file" record.

Another nice feature is the abilty to define a new file and read into it corresponding records from an old file.

The quick file displays the number of the record in use, the total number of records in the file, the number of records selected, and the maximum number of records the file can hold. This allows you to split the file if you are approaching the maximum number.

When ending the program, a prompt is given to make certain you have saved the file to disk if you have made any changes in it. Also if not all the records are selected you are warned about this. If only some of the records are selected you can read the balance of the records with a single command.

As can be seen from the above, this system provides a versatile and complex system for data handling. The only fault I could find is the documentation. Examples are given, but I had a difficult time figuring out how to use all the commands. I think that a small data base (6 to 12 records) supplied along with the program would go far in demonstrating the various commands available. It might be a good idea just to give the information to be typed in. By typing it in yourself, you could learn how to correct any mistakes.

The next to last page of the instructions shows how to use *DDH* to set up a file to record the holdings of stock, and the last page has a BASIC program to show how to use this file to create a report showing profit and loss. I found this section of the instructions to be better written than the instructions on setting up the files.

If you need to set up list, catalog, etc. which you will need to sort and/or select from by one or more parameters, this program is definitely for you. The machine language section of the program makes its operation quite fast, and the versatilty built into it should provide you with all the options you'll need.

(Custom Software Engineering, 807 Minutemen Causeway, Cocoa Beach, FL 32931, $44.95 plus $1 s/h)

Software Review...

Quad Data Base Is An Easy To Use System

Quad Data Base comes on a cassette with two programs on it. One for cassette files, the other for disk files. Accompanying the cassette is one sheet (2 sides) of instructions.

Both versions will work with either 16k or 32k. The programs produce sequential files and are very easy to use. Neither are sophisticated programs, and offer no sort feature. However, for simple files, the programs are fast and do not involve a lot of study before they are ready for input.

The program allows you to print to the screen or, the screen and printer. You can search, print, update or quit. After searching you can delete, print, edit or move on to the the next record. All of these are accomplished by single key commands.

The program author ends the instructions with "As you may have guessed by now, the QUAD in QUAD Data Base stands for Quick and Dirty. I think you'll find it very useful though." It may be "Quick and Dirty," but it is certainly worth the $7 it costs.

(Transformation Technologies, 194 Lockwood Lane Bloomingdale, IL 60108, $7)

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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**

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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**

SOFTWARE DEVELOPMENT SYSTEM

The Micro Works Software Development System (SDS80C) is a complete 6809 editor, assembler and monitor package contained in one Color Computer program pack! Vastly superior to RAM-based assemblers/editors, the SDS80C is non-volatile, meaning that if your application program bombs, it can't destroy your editor/assembler. Plus it leaves almost all of 16K or 32K RAM free for **your** program. Since all three programs, editor, assembler and monitor are co-resident, we eliminate tedious program loading when going back and forth from editing to assembly and debugging!

The powerful screen-oriented Editor features finds, changes, moves, copys and much more. All keys have convenient auto repeat (typamatic), and since no line numbers are required, the full width of the screen may be used to generate well commented code.

The Assembler features **all** of the following: complete 6809 instruction set, conditional assembly, local labels, assembly to cassette tape or to memory, listing to screen or printer, and mnemonic error codes instead of numbers.

The versatile monitor is tailored for debugging programs generated by the Assembler and Editor. It features examine/change of memory or registers, cassette load and save, breakpoints and more. **SDS80C Price: $89.95**

MICROTEXT: COMMUNICATIONS VIA YOUR MODEM!

Now you **can** use your printer with your modem! Your computer can be an intelligent printing terminal. Talk to timeshare services or to other personal computers, print simultaneously through a second printer port, and redisplay text stored in memory. Dump to a cassette tape, or printer, or both. Microtext can be used with any printer or no printer at all. It features user-configurable duplex/parity for special applications, and can send any ASCII character. You'll find many uses for this general purpose module! Microtext is available in ROMPACK, ready-to-use, for $59.95.

PARALLEL PRINTER INTERFACE — Serial to parallel converter allows use of all standard parallel printers. PI80C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **PI80C Price: $69.95**

GAMES

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Hardware Review...

Two New Joysticks Are Big Improvement

As we suspected, both of the sets of joysticks we tried out this month are an improvement over the Radio Shack standard. And Radio Shack needs no apology, for if these two latest entries in the get-a-better-grip-on-things movement weren't improvements, then why bother? Spectrum Stick by Spectrum Projects, on the one hand, and an un-nicknamed joystick on the other from Endicott Software are improvements for different reasons.

Let's examine Endicott's entry first.

At first glance, the Endicott joystick looks a lot like the Radio Shack model. At the end of a six-foot cord is a black plastic box with a chrome stick and a red button. It's small enough to wrap your fingers around and it's solid. The secret of Endicott's built-to-take-it construction seems to lie in the ridged design; the corners and ridges reinforce the box in much the same way corrugation adds strength to cardboard, and steel, too, for that matter. If you are the type who steps on his equipment, or has kids, then this Sampsonite of joysticks may be just what you're looking for.

In use, we found the Endicott joystick to be smooth and responsive. Our only criticism is that the lever is too much like power steering; we'd prefer more resistance in order to have a better "feel" for the action. Still, the price is right and the Endicott joysticks are not only made to last but are small enough to tuck behind the 80C until you need them.

If "feel" is your thing, like it is ours, then the new *Spectrum Stick* of all those on the market, is the one to reach for. The handle is big and, while it moves easily and smoothly in action, it's "tighter" and more like the arcade joysticks than anything we've yet encountered. The fire button has a good strong spring, too.

The box is a big one, perhaps more than very small hands could handle without setting it on a table or other surface, but a treat for those of us who feel more in command with a good-sized (6x3) control box in our grip.

Too bad it isn't a bit heavier. Our only complaint with the Spectrum Stick is that it is a bit lightweight in construction, although an accidental drop on a concrete floor caused not so much as a scratch.

A valuable added feature of the *Spectrum Stick* is a handy LED on/off indicator. We've found that it's a useful reminder to turn off the compter when you're shutting down for the night. Too bad the 80C doesn't have one built in. While we like the size of the *Spectrum Stick*, its bulk could cause a minor problem in where to store it, but the top of the TV works well for us—and lets us use the "on/off" LEDS, too. In case you are looking for some other storage area, the *Spectrum Stick* comes with an extra-long, nine-foot cable. And speaking of cable, we found that the cable is resistant to tangling.

Which do we prefer? Personally, we like the "feel" and added features of the *Spectrum Stick*, the "firmest" movement we've found to date. But, at half the price and built to last, the Endicott model is a solid buy, too.

(Endicott Software, P.O. Box 12543, Huntsville, AL 35802. $18.95 each or two for $35.95, plus $2 shipping.)
(Spectrum Projects, 93-15 86th Drive, Woodhaven, N.Y. 11421, $39.95 each plus $2 shipping.)

—Jim Reed

Software Review...

Here Is A Time-Telling Experience For Children

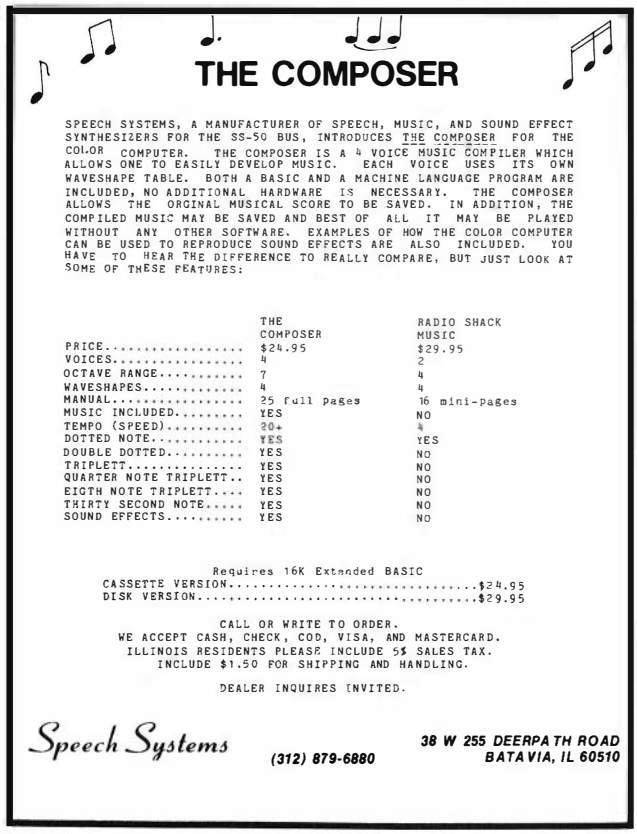
Using audio and visual reinforcement in a program is usually very successful as a teaching aid for youngsters. That concept certainly applies in this educational program for teaching children to tell time.

A working clock appears on the high res screen with a select lever (hour and quarter hour intervals and five and one minute intervals) and a selection between hours and minutes. There is also an inside and outside dial on the clock. The numerals on the outside perimeter are to be used for telling minutes while the numbers on the face of the clock are for telling the hour. You may choose the hour only—in which case the hour hand appears on the screen and points to a specific hour. Or, you can choose both the hour and minute intervals, which causes both time hands to appear.

At that point, the computer chooses random times on the clock and it is up to the child, for which this program is designed, to tell the correct time. Each time a correct answer is input, a small clock appears on the left hand margin. After ten correct answers are recorded, the small clocks will disappear to the tune "Hickory Dickory Dock" will play. You may then return to the same level or choose another.

We like the fact that there are so many features to choose from in this program. The "mix and match" levels enable any child to tell time at his or her own rate of speed. Also, since the computer does not accept a wrong answer, no matter how many tries a child makes, he will eventually reach the correct answer.

The audio sounds are well chosen and serve only to



enhance the program. There is a different sound for each input so children can tell by just the varying degrees of the sound whether they have a right or wrong time. The visual graphics are excellent with easy-to-read numbers and the perceptible difference between the hour and minute hands.

Although instructions must be given to a child before using the program, we feel that *Clock* is an excellent and fast-working method of teach children to tell time.

(B5 Software, 1024 Bainbridge Place, Columbus, OH 43228. $24.95)

—Holly Beam

Software Review...

RunCalc Will Keep Your Jogging Records

You can't sit in front of your 80C keyboard *all* the time. And, if jogging/running is the form of excercise you decide to go with, then *RunCalc* will let you combine running and computering.

Written by Bill Brown, a former coach and marathon runner, this program is easy to use and gives you some extra incentive to run as well.

It is not a logbook for runners. Rather, *RunCalc* will give you information on how well you are doing, how fast you have to run to achieve certain goals and the like. It is an excellent help program for anyone interested in running.

In all, there are several parts to the program. One of them will determine the pace at which you run. This is expressed in several ways—average pace per mile and quarter mile, and speed in miles per hour, feet per second and meters per second. The calculations are quick and precise.

A "Goal Calculator" proved to be the most interesting part of the program to us. This area of the program will tell you what pace it will take to run a certain distance in a certain time. But, that is not all: It even gives "splits," so you can get the pace in increments that you can then compare to your actual time when doing the running itself.

RunCalc also includes a calorie counter. It tells you the number of calories you have used up on a given run. You simply input your weight, your time and the distance you ran. There is also a metric conversion module, so you can convert metric distances to miles.

We found this program very easy to use and the information very useful. We even did a little running, which we are sure would please coach Brown. Similarly, we are certain he would be horrified at the results of our venture into this sport.

(Home Run Computer Products, Box 511, Dale, IN 47523, $12.95)

Software Review:..

Color Computer *Toolkit* Is An Excellent Package

By Donald D. Dollberg

The availability of software for the Color Computer has increased exponentially over the past year. While most of this new software may be classed as entertainment, i.e., games, a number of serious programs such as word processors, editor/assemblers, financial management programs etc. have appeared.

Utility programs have been slowly appearing with several rather good ones coming out in the past several months. I would like to comment on one of the most recent entries—the Color Computer *Toolkit* by Arizin of Scottsdale, Arizona.

The *Toolkit* is a general purpose program with a wide range of utilities suitable for all operations of the Color Computer. It retails for $29.95 for tape and $34.95 for disk—a very modest price considering all the functions available. The program is written in position independent machine language and occupies approximately 5K of memory. Obviously, the program is designed for a 32K system but will work on a 16K machine. For the 16K users who are horrified at the loss of 5K of memory, I learned from ARIZIN that a condensed 2.5K version will soon be available—probably by the time you read this review. Of course, you won't have all of the tools (utilities) provided in the 5K version.

The *Toolkit* is a command-oriented system which operates in the Direct mode and for all practical purposes becomes an extention of the computer operating system. Seven pages of documentation concisely describe *Toolkit* operations. To load the *Toolkit*, it is necessary to do a CLEAR 200, 27000 to protect the program from BASIC writing over it. The program is loaded and executed like other ML programs.

The *Toolkit* commands may be loosely grouped into three categories: (1) commands for BASIC programs, (2) commands for machine language programs, (3) and miscellaneous commands. All commands are preceded with a "." (period) and may be listed with the HELP command.

MISCELLANEOUS COMMANDS

.DARK/.LITE—These commands provide several different colored text screens. .DARK provides a dark screen with light characters (inverse video) and the current line highlighted. .LITE provides the standard text screen. Using SCREEN 0,1 will provide two additional color choices. All of these screens can be used for all computer operations.

.TXON/.TXOF—.TXON is the default for automatic text screen operation—the normal situation for the 80C. .TXOF provides the user with manual control of the text and graphics screens. By using SCREEN 1,n (n=0 or 1), you can toggle between the graphics and text screens. This is of great value when debugging graphics programs as the graphics screen can be viewed in Direct mode.

.KLON/.KLOF—.KLON produces a short high pitch tone when each of the keys are pressed. This is a nice feature for touch typists as it provides a positive response when a key is pressed. The tone is modifiable using BASIC's SOUND command. .KLOF turns the tone off.

.ECON/.ECOF—For those of you with printers, this is an excellent feature. .ECON slaves the printer to the keyboard and screen, producing a hard-copy of everything entered. This feature is useful for making a hard-copy of all of a program's combined output—like the directions which normally appear on the screen. .ECOF turns this feature off.

.SNLF/.DBLF—Provides single and double linefeeds to the printer, respectively.

.FNIN—This command allows the user to program 10 keys (0-9) with any BASIC command or series of commands which operate in the Direct mode. A maximum of 255 characters may be programmed per key. Using this function is easy. Simply press @ followed by the appropriate number key and ENTER. Although .FNIN can be used to program the keys with single BASIC commands, the real value is the formation of BASIC macros.

.PDLY/.RDLY—Print delay and run delay are two related commands in that they control the speed of operation. For both commands, a delay value of one to nine can be chosen with nine being the slowest. Pressing the space bar will override the delay while a 0 restores normal speed. .PDLY is very useful when listing programs to the screen while .RDLY is an excellent program debugging tool. .RDLY also has a single step mode which allows you to pause after the execution of each program statement.

BASIC COMMANDS

.OLD—This command does just what you think it would—the reverse of NEW. .OLD restores a program after a NEW or DEL has been entered. In fact, if you accidentally do this before saving the program to tape and the *Toolkit* is not resident in memory, you can load the *Toolkit* and enter an .OLD to recover the program.

.PROT/.REST—Protect and restore are used to merge (append) a program to one already in memory. Although this process can be done with a series of PEEK's and POKE's, it is very easy to do a merge with the *Toolkit*. With the first program in memory simply enter .PROT and then load the second program. Renumber the second program with line numbers greater than the first and then enter .REST. The programs are now merged. Another nice use of these functions is the ablity to RUN a second program while the first is protected. This will only work if the two programs do not change the PCLEAR value.

.SCON/.SCOF—One of the most useful tools provided in the program is the screen editor which is turned on with .SCON. The screen editor provides the ability to edit BASIC lines by simply moving the cursor with the arrow keys to the line with the error and correcting. A shift-right-arrow opens up space for the insertion of additional characters while a shift-left-arrow closes space or, rather, deletes characters.

.GBL—Global search. This capability is almost worth the entire price of the *Toolkit*. Searching capability is a must when debugging programs. To use this command, simply type .GBL, enter the search term in response to the prompt and .GBL will print the line with the first occurrence of the search term. To look for additonal occurrences type a ".". .GBL will also find BASIC words in a program when the search term is preceded by a shift-clear.

.VAR—Variable List. .VAR provides a list of all numeric and string variables as well as BASIC functions (FN) used in a program. For this command to work properly, the program must be RUN to initialize all variables. .VAR will also report the number of string bytes used, the amount of string space reserved, the current top of memory and the range of free memory.

.BRON/.BROF—Break disable. .BRON allows the user to disable the BREAK key. However, this is not a complete disable as BREAK will still operate when it is pressed in response to an INPUT or LINE INPUT.

.DELR/.DELS—Delete REM's and spaces. With these commands you can type BASIC programs with as many REM statements and spaces as you need to make the program readable when printed. However, to conserve memory and reduce processing time, these commands will

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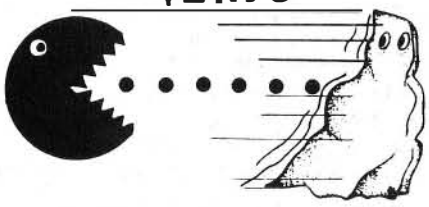

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remove all REM's and excess spaces; but will not remove spaces in PRINT formats.

MACHINE LANGUAGE COMMANDS

.MEM—A full function monitor is provided by the .MEM command. .MEM will ask for the start address (in either decimal or hex) and then print that address in hex and decimal followed by the contents of that location expressed in hex, ASCII, decmal, and double decimal (16 bit address). A blinking "H" cursor at the end of the line allows you to modify memory by entering the appropriate hex code. Pressing shift-clear will change the cursor to a blinking "S" indicating that the ASCII value may be entered. The up and down arrows allow you to scroll forward or backward through memory while a left arrow allows inputting a new start address. If you have previously entered .ECON, you can obtain a hard copy of the display.

.DUMP—The .DUMP command can be used to print a portion of memory either to the screen or the printer. This listing can be in either hex or ASCII and is formatted at eight bytes per line. The printer width should be adjusted to accommodate this format.

.BLOK—Block move allows you to move any portion of memory. Simply enter the start and end addresses of the memory block to be moved followed by the new start address. .BLOK will allow you to either copy or move the block. A "C" will cause .BLOK to copy the memory block leaving the original intact. If an "M" is entered, then the block will be moved and the original block set to zeros. The M option cannot be used when moving the *Toolkit* itself as this will crash the system.

.CSAV—To copy a machine language program—for backup purposes—it is necessary to determine the start, end and transfer addresses. Although this can be done using several *PEEK*s, it is much easier with .CSAV. .CSAV will display: CSAVEM "filename," start, end, transfer for the most recent *CLOADM*ed ML program. If the screen editor is on, the line may be edited before executing the command.

.DATA—The .DATA command will convert ML programs to BASIC DATA statements for incorporation within a BASIC program. .DATA will pack up to 80 bytes in hex format per line.

.MMRG/.MPRG—.MMRG will merge a relocatable machine language subroutine to the end of a BASIC program so that a single CSAV will save a single file of the combined BASIC/ML program. The BASIC program can be listed, edited, etc. without affecting the ML routine. In fact the ML routine is transparent to the user.

With this very limited discussion of the utilities available in the *Toolkit*, you now have a good idea of the tremendous capability and versatility that this single package adds to the Color Computer. By now you're probably wondering if there are any "bugs." There were several, but these have been corrected by ARIZIN. About a week after purchasing the program I received a letter indicating several "fixes" to the *Toolkit*, i.e. *POKE*s to make, plus some additional information like how to change each of the command names to whatever you like. For example, I changed the .GBL command to .FIND. The fact that several bugs were present in a program of this size and capability does not bother me in the least when you have a company like ARIZIN that quickly corrects their mistakes and demonstates excellent support of their product.

I have talked with ARIZIN and I can assure you that they are serious at supporting their software and will gladly assist the user. This program is an excellent package, professionally done and definitely recommended for any serious Color Computer user.

(Arizin, P. O. Box 8825, Scottsdale, AZ 85252, $29.95 tape, $34.95 disk)

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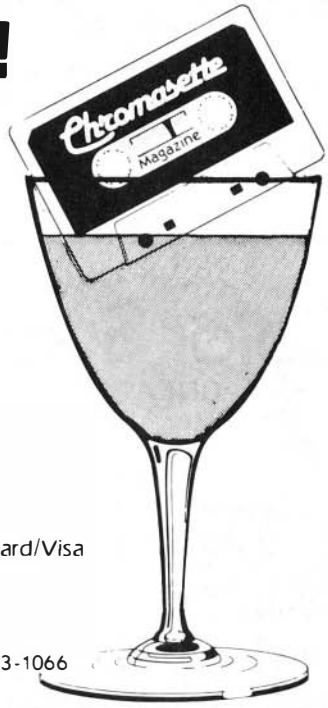

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Business...

An Accounts Receivable Program Can Help You

32K ECB

By Ron Garrett

This program will allow you to set up a disk-based accounts receivable program to maintain balances on accounts of money owed you.

This program, from the East Texas Color Computer Club, is fairly self-prompting, based on the menu and instructions as you go along. There are a few "tricks," however, with which you will have to be acquainted.

First and most important, you must first format a disk using option 9 from the main menu. When you set up a new disk file, be absolutely sure you do not have your program disk in the drive, as the file takes up the entire disk and will overwrite any data or programs currently on the disk. If you do not remove your program disk, this program will erase it!

Once you have formatted a disk, you can use option 3 to set up names and addresses of accounts. Other options are easily understandable from the main menu.

Option 10, which allows you to exit the program, should be used rather than ***BREAK***ing out of the program. If you do use ***BREAK***, be sure to type ***CLOSE*** and ***ENTER*** it before you remove your disk from the drive.

If you make a mistake in entering information, you cannot go back to it. Instead, use option 4 from the main menu to make corrections.

Finally, once you enter the program and type ***RUN***, you may get a ?SN ERROR IN ####. Don't worry. Just type ***RUN*** again and the program will run. If you type ***CLEAR 900*** before running the program, you will not get this error message.

The Listing:

```
10 'ACCOUNTS RECEIVEABLE
20 'WRITTEN BY RON GARRETT FOR
30 'THE EAST TEXAS COLOR COMPUTE
R
40 'CLUB.  2101 E. MAIN ST.
50 'HENDERSON, TX. 75652
60 'ALL RIGHTS RESERVED
70 'COPYRIGHT MAY, 1982
80 FILES 2,512
90 CLS:X$=STRING$(76,"*"):X2$=ST
RING$(76,"-")
100 CLEAR 900
110 CLS:PRINT@224:INPUT"ENTER TO
DAYS DATE: ";C1$
120 INPUT"ENTER ACCOUNTS RECEIVE
ABLE FILE          NAME ";N$
130 N1$="TRANSACT"
140 GOSUB 330:'OPEN AND DEFINE F
ILE
150 PRINTX$:PRINT:PRINT"
      MENU":PRINT
160 PRINT"1. ACCOUNT LIST (WITH
RECORD #S)"
170 PRINT"2. PRINT OF SPECIFIED
ACCOUNTS"
180 PRINT"3. ADDING NEW ACCOUNTS
"
190 PRINT"4. CORRECTING ACCOUNT
INFO"
200 PRINT"5. ENTERING CHARGE/PAY
MENT          TRANSACTIONS"
210 PRINT"6. COPY FILE"
220 PRINT"7. MONTHLY STATEMENT P
REPARATION"
230 PRINT"8. MONTHLY CLOSEOUT OF
 ACCOUNTS"
240 PRINT"9. SETUP NEW FILE DISK
"
250 PRINT"10. EXIT PROGRAM"
260 PRINT:INPUT"ENTER OPTION DES
IRED ";O
270 IF O<1 OR O>10 THEN CLS:GOTO
 150
280 ON O GOSUB 400,630,1000,1270
,2030,2410,2520,3030,3440,310
290 CLS:PRINT@224:INPUT"DO YOU W
ISH TO CONTINUE ";Z1$
300 IF LEFT$(Z1$,1)="Y" THEN CLS
:GOTO 150
310 CLOSE
320 CLS:PRINT@230,"PROCESSING CO
MPLETE":END
330 'OPEN AND DEFINE FILE
340 OPEN"D",#1,N$:OPEN"D",#2,N1$
350 FIELD#1,5 AS AC$,5 AS A$,5 A
S B$,8 AS C$,26 AS D$,26 AS E$,2
6 AS F$,26 AS G$,5 AS H$
360 FOR X=1 TO 10
370 FIELD#2,((X-1)*24) AS QV$,8
AS I$(X),5 AS J$(X),1 AS K$(X),5
 AS L$(X),5 AS M$(X)
380 NEXT X
390 RETURN
400 'ACCOUNT LIST
410 CLS:PRINT@224,"    DO YOU WA
NT A HARDCOPY?"
420 PRINT:PRINT:PRINT:PRINT:INPU
T"ENTER <Y> OR <N>";ZA$
430 IF LEFT$(ZA$,1)="N" THEN 560
440 PRINT#-2,CHR$(31);TAB(12);"A
CCOUNTS IN FILE";CHR$(30);CHR$(1
3)
450 PRINT#-2,"CODE";TAB(6);"ACC#
";TAB(14);"PAST DUE";TAB(28);"LA
ST UPDATE";TAB(42);"NAME";TAB(66
);"CREDIT LIMIT"
460 FOR X=1 TO 80
470 GET#1,X
480 AC=CVN(AC$):A1=CVN(A$):B1=CV
N(B$):H1=CVN(H$)
490 IF A1=11111 THEN 620
500 PRINT#-2,AC;TAB(6);A1;TAB(14
);
510 PRINT#-2,USING"$$#,###,###.#
#";B1;:PRINT#-2,TAB(28);C$;TAB(4
2);D$;TAB(66);:PRINT#-2,USING"$$
#,###,###.##";H1
520 PRINT#-2,TAB(42);E$:PRINT#-2
```

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```
,TAB(42);F$
530 PRINT#-2,STRING$(2,10)
540 NEXT X
550 RETURN
560 FOR X=1 TO 80:GET#1,X
570 AC=CVN(AC$):A1=CVN(A$):B1=CV
N(B$):H1=CVN(H$)
580 IF A1=11111 THEN 620
590 PRINT AC,A1,:PRINTUSING"$$#,
###,###.##";B1,:PRINTC$,D$,E$,F$
,G$,,H1
600 FOR II=1 TO 2000:NEXT
610 NEXT X
620 RETURN
630 'PRINT SPECIFIED ACCOUNTS
640 CLS:PRINT@224:INPUT"ENTER A
CCOUNT NUMBER: ";AC1
650 FOR X=1 TO 80:GET#1,X
660 A1=CVN(A$)
670 IF A1=AC1 THEN 710 ELSE NEXT
680 CLS:PRINT@224,"ACCOUNT NOT I
N FILE":PRINT:PRINT:PRINT:PRINT
690 INPUT"DO YOU WISH TO TRY ANO
THER #";Z$
700 IF LEFT$(Z$,1)="Y" THEN 640
ELSE RETURN
710 CLS:PRINT@224,"DO YOU WISH T
O PRINT OUT        TRANSACTIONS
ALSO?":PRINT:PRINT:PRINT:PRINT
720 INPUT"ENTER <Y> OR <N>";Z$
730 IF LEFT$(Z$,1)="Y" THEN ZA=1
740 AC=CVN(AC$):A1=CVN(A$):B1=CV
N(B$):H1=CVN(H$)
750 PRINT#-2,"COMPUTER CONTROL C
ODE: ";AC
760 PRINT#-2,"ACCOUNT NUMBER: ";
A1
770 PRINT#-2,"PREVIOUS BALANCE:
";:PRINT#-2,USING"$$#,###,###.##
";B1
780 PRINT#-2,"LAST UPDATE WAS: "
;C$;CHR$(13)
790 PRINT#-2,D$:PRINT#-2,E$:PRIN
T#-2,F$:PRINT#-2,"PHONE# ";G$
800 PRINT#-2,"CREDIT LIMIT: ";:P
RINT#-2,USING"$$#,###,###.##";H1
810 IF ZA=1 THEN 830 ELSE CLS:IN
PUT"DO YOU WISH ANOTHER PRINTOUT
";Z$
820 IF LEFT$(Z$,1)="Y" THEN 640
ELSE RETURN
830 PRINT#-2:PRINT#-2,TAB(2);"DA
TE";TAB(12);"TICKET NO.";TAB(28)
;"DEBIT/CREDIT";TAB(46);"AMOUNT"
;TAB(60);"BALANCE"
840 Y=(AC*5):Y1=Y+5
850 GET#2,Y:FOR X=1 TO 10
860 I1$(X)=I$(X):J1(X)=CVN(J$(X)
):K1$(X)=K$(X):L1(X)=CVN(L$(X))
870 M1(X)=CVN(M$(X)):NEXT X
880 FOR X=1 TO 10
890 IF I1$(X)="NOT USED" THEN 97
0
900 PRINT#-2,TAB(2);I1$(X);TAB(1
2);J1(X);TAB(28);:IF K1$(X)="D"
THEN PRINT#-2,"CHARGES";
910 IF K1$(X)="C" THEN PRINT#-2,
"PAYMENT";
920 PRINT#-2,TAB(39);
930 PRINT#-2,USING"$$#,###,###.#
#";L1(X);:PRINT#-2,TAB(53);
940 PP=PP+L1(X):M1(X)=PP
950 PRINT#-2,USING"$$#,###,###.#
#";M1(X)
960 NEXT X:Y=Y+1:IF Y<Y1 THEN 85
0
970 CLS:PRINT@228,"END OF DATA":
PRINT:PRINT:PRINT:PRINT
980 INPUT"DO YOU WANT MORE PRINT
OUTS      ENTER <Y> OR <N>";Z$
990 IF LEFT$(Z$,1)="Y" THEN 640
ELSE RETURN
1000 'ADD NEW ACCOUNTS
1010 FOR X=1 TO 80
1020 GET#1,X:A1=CVN(A$):IF A1=11
111 THEN 1070 ELSE NEXT
1030 CLS:PRINT@234,"DISK FULL"
1040 PRINT@262,"PLEASE INSERT AN
D              FOREMAT NEW DISK
."
1050 FOR X9=1 TO 2000:NEXT X9
1060 RETURN
1070 CLS:INPUT"ENTER NEW ACCOUNT
# ";A1
1080 LINEINPUT"ENTER CUSTOMERS N
AME: ";D1$
1090 LINEINPUT"ENTER CUSTOMERS S
TREET ADDRESS:  ";E1$

1100 LINEINPUT"ENTER CUSTOMERS C
ITY,STATE & ZIP";F1$
1110 INPUT"ENTER CUSTOMERS PHONE
# ";G1$
1120 INPUT"ENTER CREDIT LIMIT: "
;H1
1130 INPUT"ENTER PREVIOUS BALANC
E ";B1
1140 LSET AC$=MKN$(X)
1150 LSET A$=MKN$(A1)
1160 LSET B$=MKN$(B1)
1170 LSET C$=C1$
1180 LSET D$=D1$
1190 LSET E$=E1$
1200 LSET F$=F1$
1210 LSET G$=G1$
1220 LSET H$=MKN$(H1)
1230 PUT#1,X
1240 CLS:PRINT@224:INPUT"DO YOU
HAVE MORE NAMES TO ENTER ";Z$
1250 IF LEFT$(Z$,1)="Y" THEN GOT
```

```
0 1000
1260 RETURN
1270 'CORRECTING ACCOUNT INFO
1280 CLS:PRINT@224:INPUT"ENTER A
CCOUNT NUMBER: ";AC1
1290 INPUT"DO YOU WISH TO CHANGE
            1 NAME & ADDRESS INFO
            2 TRANSACTION DATA  "
;NO
1300 FOR X=1 TO 80:GET#1,X
1310 A1=CVN(A$):IF A1=AC1 THEN L
SET C$=C1$:PUT#1,X:GET#1,X:GOTO
1350
1320 NEXT X
1330 CLS:PRINT@224,"SORRY, THAT
ACCOUNT# IS NOT IN  MY FILES ";:
INPUT"DO YOU WISH TO TRY      ANO
THER NUMBER ";Z$
1340 IF LEFT$(Z$,1)="Y" THEN 127
0 ELSE RETURN
1350 IF NO=2 THEN 1670
1360 AC=CVN(AC$):A1=CVN(A$):B1=C
VN(B$):H1=CVN(H$)
1370 C1$=C$:D1$=D$:E1$=E$:F1$=F$
:G1$=G$
1380 CLS:PRINT" 1. ACCOUNT# ";A1
1390 PRINT" 2. PREV. BAL :";:PRI
NTUSING"$$#,###,###.##";B1
1400 PRINT" 3. DATE :";C$
1410 PRINT" 4. NAME : ";D1$
1420 PRINT" 5. ADDRESS: ";E1$
1430 PRINT" 6. CITY,ST.ZIP: ";F1
$
1440 PRINT" 7. PHONE# ";G1$
1450 PRINT" 8. CREDIT LIMIT: ";:
PRINTUSING"$$#,###,###.##";H1
1460 PRINT:PRINT:INPUT"WHICH DO
YOU WISH TO CHANGE?    ENTER 1,2
,3,4,5,6,7 OR 8";OC
1470 IF OC>8 THEN 1380
1480 IF OC=1 THEN INPUT"ENTER NE
W ACCOUNT # ";A1
1490 IF OC=2 THEN INPUT"ENTER NE
W BALANCE: ";B1
1500 IF OC=3 THEN INPUT"ENTER NE
W DATE: ";C2$
1510 IF OC=4 THEN INPUT"ENTER NE
W NAME: ";D1$
1520 IF OC=5 THEN INPUT"ENTER NE
W ADDRESS: ";E1$
1530 IF OC=6 THEN LINEINPUT"ENTE
R NEW CITY, STATE & ZIP: ";F1$
1540 IF OC=7 THEN INPUT"ENTER NE
W PHONE# ";G1$
1550 IF OC=8 THEN INPUT"ENTER NE
W CREDIT LIMIT: ";H1
1560 IF OC=0 THEN 1580
1570 GOTO 1380
1580 LSET AC$=MKN$(AC)
1590 LSET A$=MKN$(A1)
1600 LSET B$=MKN$(B1)
1610 LSET C$=C2$:LSET D$=D1$
1620 LSET E$=E1$:LSET F$=F1$
1630 LSET G$=G1$:LSET H$=MKN$(H1
)
1640 PUT#1,X
1650 CLS:PRINT@224:INPUT"DO YOU
WISH TO MAKE MORE        UPDATES
 ";Z$
1660 IF LEFT$(Z$,1)="Y" THEN 127
0 ELSE RETURN
1670 AC=CVN(AC$):Y=(AC*5)
1680 Y1=Y+5
1690 GET#2,Y:FOR X=1 TO 10
1700 I1$(X)=I$(X):J1(X)=CVN(J$(X
)):K1$(X)=K$(X):L1(X)=CVN(L$(X))
1710 M1(X)=CVN(M$(X)):NEXT X
1720 FOR X=1 TO 10
1730 IF I1$(X)="NOT USED" THEN 1
890
1740 CLS:PRINT"1. TICKET DATE: "
;I1$(X)
1750 PRINT"2. TICKET NUMBER: ";J
1(X)
1760 PRINT"3. DEBIT/CREDIT: ";K1
$(X)
1770 PRINT"4. AMOUNT: ";:PRINTUS
ING"$$#,###,###.##";L1(X)
1780 PRINT"5. BALANCE:";:PRINTUS
ING"$$#,###,###.##";M1(X)
1790 PRINT:PRINT:PRINT:INPUT"WHI
CH DO YOU WISH TO CHANGE?    ENT
ER 1,2,3,4 OR 5 ";OS
1800 IF OS>5 THEN GOTO 1740
1810 IF OS=0 THEN 1880
1820 IF OS=1 THEN INPUT"ENTER NE
W DATE: ";I1$(X)
1830 IF OS=2 THEN INPUT"ENTER NE
```


SUPERIOR ORACLE SOFTWARE
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```
W TICKET # ";J1(X)
1840 IF OS=3 THEN INPUT"ENTER D/
C CHANGE:";K1$(X)
1850 IF OS=4 THEN INPUT"ENTER CO
RRECT AMOUNT: ";L1(X)
1860 IF OS=5 THEN INPUT"ENTER CO
RRECT BALANCE: ";M1(X)
1870 GOTO 1740
1880 NEXT X
1890 FOR X=1 TO 10
1900 LSET I$(X)=I1$(X)
1910 LSET J$(X)=MKN$(J1(X))
1920 LSET K$(X)=K1$(X)
1930 LSET L$(X)=MKN$(L1(X))
1940 LSET M$(X)=MKN$(M1(X))
1950 NEXT X
1960 PUT#2,Y
1970 Y=Y+1:IF Y<Y1 THEN 1690
1980 CLS:PRINT@136,"OUT OF DATA"
1990 PRINT@224,"DO YOU WISH TO M
AKE MORE CHANGES"
2000 PRINT:PRINT:PRINT:PRINT:INP
UT"ENTER <Y> OR <N> ";Z$
2010 IF LEFT$(Z$,1)="Y" THEN 127
0 ELSE RETURN
2020 'ENTERING TRANSACTIONS
2030 CLS:PRINT@224:INPUT"ENTER A
CCOUNT# ";AC1
2040 FOR X=1 TO 80:GET#1,X
2050 A1=CVN(A$):IF AC1=A1 THEN L
SET C$=C1$:PUT#1,X:GOTO 2080 ELS
E NEXT
2060 CLS:PRINT@224,"ACCOUNT NOT
FOUND":PRINT:PRINT:PRINT:INPUT"D
O YOU WISH TO SEARCH FOR      A
NOTHER NUMBER?";Z$
2070 IF LEFT$(Z$,1)="Y" THEN 203
0 ELSE RETURN
2080 AC=CVN(AC$):Y=(AC*5):Y1=Y+5
2090 GET#2,Y
2100 FOR X=1 TO 10:I1$(X)=I$(X):
J1(X)=CVN(J$(X)):K1$(X)=K$(X):L1
(X)=CVN(L$(X)):M1(X)=CVN(M$(X)):
NEXT X
2110 GOTO 2140
2120 Y=Y+1:IF Y<Y1 THEN 2090
2130 CLS:PRINT@224,"FILE IS FULL
":PRINT:PRINT:PRINT:PRINT:INPUT"
HIT ENTER TO RETURN TO MENU ";Z$
:RETURN
2140 FOR X=1 TO 10:CLS:INPUT"(IF
 THERE IS NO MORE DATA, ENTER 'N
OT USED')                    ENT
ER TICKET DATE: ";I1$(X)
2150 IF I1$(X)="NOT USED" THEN 2
250
2160 PRINT:INPUT"ENTER TICKET NU
MBER:";J1(X)
2170 PRINT:INPUT"ENTER DEBIT OR
CREDIT (D) OR (C)";K1$(X)
2180 IF K1$(X)="D" THEN 2210
2190 IF K1$(X)="C" THEN 2210
2200 GOTO 2170
2210 PRINT:INPUT"ENTER THE AMOUN
T: ";L1(X)
2220 IF K1$(X)="D" THEN M1(X)=M1
(X-1)+L1(X)
2230 IF K1$(X)="C" THEN M1(X)=M1
(X)-L1
2240 NEXT X
2250 FOR X=1 TO 10
2260 LSET I$(X)=I1$(X)
2270 LSET J$(X)=MKN$(J1(X))
2280 LSET K$(X)=K1$(X)
2290 LSET L$(X)=MKN$(L1(X))
2300 LSET M$(X)=MKN$(M1(X))
2310 NEXT X
2320 PUT#2,Y
2330 PRINT:INPUT"DO YOU WISH TO
ENTER ADDITIONAL TRANSACTIONS FO
R THIS CUSTOMER  ";Z$
2340 IF LEFT$(Z$,1)="Y" THEN 235
0 ELSE RETURN
2350 IF Y<Y1 THEN Y=Y+1:GOTO 209
0
2360 CLS:PRINT@224,"DO YOU WISH
TO ENTER ADDITIONAL TRANSACTIONS
? ";:INPUT"ENTER <Y> OR <N>";Z$
2370 IF LEFT$(Z$,1)="Y" THEN 203
0
2380 X=0:Y=0:U=0
2390 RETURN
2400 'COPY FILE
2410 CLS:PRINT @224,"  DO YOU HA
VE ONE DISK OR 2?"
2420 PRINT:PRINT:PRINT:PRINT:INP
UT" ENTER 1 OR 2 ";Z
2430 IF Z=1 THEN 2490
2440 CLS:PRINT@224,"INSERT DISK
TO BE COPIED IN      DRIVE ZERO,
PLEASE"
2450 PRINT@320,"INSERT BLANK DIS
K IN DRIVE ONE"
2460 PRINT:PRINT:PRINT:INPUT"HIT
 ENTER WHEN READY";Z$
2470 BACKUP 0 TO 1
2480 RETURN
2490 CLS:INPUT"INSERT DISK TO BE
 COPIED         HIT ENTER WHEN RE
ADY";Z$
2500 BACKUP 0
2510 RETURN
2520 'MONTHLY STATEMENT PREPARAT
ION
2530 CLS:INPUT"POSITION PAPER:
HIT ENTER WHEN READY";Z$
2540 PRINT#-2:INPUT"ENTER YOUR C
OMPANY NAME";CN$
2550 INPUT"ENTER YOUR ADDRESS";A
D$
```

COLOR COMPUTER DISK SYSTEM

We offer a complete disk drive interface system for the color computer, featuring the Tall Grass Technologies Double Density, buffered disk controller card. The disk interface board plugs into the color computer expansion socket and provides for doubling the storage capacity of single density type disk drives by using GCR encoding / decoding techniques. Power may be taken internally from the system or from an external power supply (not normally required even with piggyback 4116's installed)..This controller will support up to 4 single/double density, single/double sided 5 & 1/4 inch disk drives. These include Shugart 400 series, Siemens 82, TEAC 50 series, Pertec FD200, MPI B51/52/91/92, Tandon and others. The controller uses standard 10 sector diskettes and does not read or write the soft-sectored IBM style formats used by TRS-80 or FLEX systems. Two reasons for not using a soft sectored system are cost and reliability.

The Tallgrass double density format offers more margin for worn diskettes, dirt etc. and less expensive single density disk drives & diskettes. All you need to add to have a complete disk system is a disk drive / cable.

DISK OPERATING SYSTEM (DOS)

The Disk Operating System for the Tallgrass Technologies Disk controller (CCMO + 9) is a full featured "BASIC" compatible operating system. It is fully integrated with the ROM basic system already in the color computer and automatically is initialized upon system power on much the same as the R.S. disk system does. But there is a big difference between that disk system and CCMO+ 9. First of all we support any mix of 35, 40 or 80 track single or double sided disk drives, which allows a minimum of 4 times the storage capacity of the "other" disk system. We also make far better use of the disk storage space by using sector allocation for each file instead of the granual method of 8 sector blocks which can waste anywhere from 1 to 7 sectors for each file on the disk. For example, on their DOS, if 5 files each required only 2 sectors there would be 40 disk sectors allocated, a waste of 30 disk sectors or almost 4 "granuals". This is not the case in our disk system, only the required number of sectors would be used.

Many other disk systems using a sector allocation system have a problem with file fragmentation and excessive seek time after a disk is used over and over adding and deleting files until it becomes so bad that the disk must be re-formatted to correct the problem. With CCMO + 9 this is not the case, as files are deleted the disk space is automatically repacked to help keep files from being fragmented and decrease access time.

The DOS is contained in a ROM on the disk controller the same as the R.S. disk system so you don't have to "bootstrap" the DOS off of a disk and it doesn't get clobbered easily by a runaway program as most ram based systems do. The DOS does "NOT" require Extended Basic and will run on a 4, 16 or 32K system without any modifications. CCMO + 9 uses approximately 1K of ram for the disk system which is taken from the top of memory, this allows all previously purchased tape software to function with the disk system, this is not so with the R.S. disk system.

CCMO + 9 supports both Basic and Machine language programs. It is easily accessible to the beginner or advanced machine language programmer with easy to use and well documented entry points to perform disk as well as screen/printer/keyboard input & output. It includes 10 disk file functions to open, close, read/write random or sequential files, read specific sector of file, flush sector buffer to file, close & rewind file (re-open) and process disk system errors. The screen/printer/keyboard I/O functions include: input character, output character, output text string, output carriage return, output 2/4 hex characters, output space character and read/write single disk sector.

The "BASIC" interface system allows Basic and Basic programs to communicate with the disk system much the same as the R.S. disk system does with a few added features. It includes both Direct and Indirect basic commands, Direct commands can be executed any time and Indirect commands are contained with "Basic" programs. The Direct commands include: LOAD or SAVE (binary/ASCII basic program disk file), CHAIN (load & execute basic program) and COOS "disk command". The "COOS command allows you to execute a specific disk command from the free standing disk system, these include: LOAD/SAVE machine language or memory file, REMOVE one or more disk files, CHANGE disk file name, CHECK disk file for errors, ANALYZE disk directory, STRACK set tracks & sides for disk drive, SCMP set compare on/off, RUN load & execute machine language disk program, GOTO execute machine language program at specified address, and NEW initialize disk. If the "COOS" command is executed without any command following control is passed to CCMO+ 9 where any of the previously mentioned commands can be executed directly thus providing total control of the entire system. The command system is easy to learn and remember with a minimum of effort on the users part. The BASIC interface system was designed to be compatible with the existing I/O commands used with tape files for easy conversion and upgrading to disk. When using Basic disk files up to 9 files can be active at once with all disk file memory allocation being done automatically at run time, you don't have to reserve file space as with the R.S. disk system. The indirect basic commands include: Open, Print, Input, Line Input (ext. Basic), EOF, Rewind, Close, Print Using (Ext. Basic), these all function in the same manner as basic tape file I/O.

CCMD + 9 has one other unique feature not found in most disk systems. Eash disk initialized by the system is assigned a disk label which can be used instead of a disk drive number, the system will automatically locate which drive the diskette is on and use it accordingly. This can be very usefull in basic programs which use files on multiple disks, you don't have to worry which disk belongs in which drive.

Part of the power and flexibility of CCMO+9 lies in the Disk Utility System which allows the system commands to be greatly expanded by adding utility or transient disk commands. These commands are automatically handled by the system so as not to overwrite Basic programs in memory and can even be called by a Basic program in some cases. For example you can perform a disk copy or backup while still preserving a basic program currently in memory, no other system that we know of has this ability. We currently have a list of utilities available and will be adding to it constantly to improve the system.

SOFTWARE SUPPORT

This disk system is the most recent one to enter the color computer disk market and is currently the only one with any disk software to support it. There should be no problem in the future with a lack of software for this system because, it is extremely easy to interface software to. We currently have available for the disk system: a Disk Assembler which allows files larger than memory to be assembled, a Disk Text Editor which makes writing Basic and Assembler programs easy and also will edit files larger than memory, a Disk Text Editor/Processor (WORD PROCESSOR) "TEXTPRO1 which is easy to learn and extremely powerful for its price range. TEXTPRO II is an advanced version with expanded features: programmable tabs, 3 line processable headers, decimal/center/right justify/ horizontal tabs, keyboard input processing and more. A Disk Disassembler/Source generator, a Disk system monitor which includes all of the "TRSMON" monitor commands & has access to all of CCMO+9 disk commands & automatically locates itself at the top of memory to stay out of the way, and a full compliment of disk utilities. The utility disk includes: full disk backup, build disk text file from keyboard, 24 hour screen clock, single or multiple disk file copy, text file executive processor, ASCII/HEX file dump/list/map utility, ASCII file lister/printer, and a disk relabel utility. All at prices far below what other disk system software sells for.

TG-99 Disk Controller w/CCMO+ 9 DOS ROM	$159.95
CCASM9 Disk Assembler	$ 34.95
CCEOT9 Disk Text Editor	$ 24.95
CCOISS Disk Disassembler Source Generator	$ 29.95
CCTPR1 Disk Text Editor/Word Processor TEXTPRO 1	$ 39.95
CCTPR2 Disk Text Editor/Word Processor TEXTPRO 2	$ 59.95
CCUTLY Disk Utilities	$ 19.95
DOSMON Disk system monitor/utility program	$ 29.95
CGAME1 HI-RES Graphic games Space Invaders, Meteroids, Space War	$ 49.95
CGAME2 Mixed games Battle Fleet, Space Traders, Adventure	$ 39.95

SPECIAL LIMITED OFFER

We have a complete disk system package available that includes: a 40 track single sided disk drive with power supply, case, 2 drive cable, TG-99 controller w/CCMO+9 and a disk containing CCUTLY disk utilities and CCEOT9 disk editor all assembled and tested for $499.00
Additional 40 track drive with power supply & case tested. $300.00

For double sided drives add $100.00 per drive. Add $5.00 per drive for shipping. NO COD's on disk drives or disk system special. Shipping for disk controller add $2.50, for Disk software only add $1.00. Visa & M/C add 3% (this is what the bank charges us).

Manufactured under license from Tall Grass Technologies.

CO RESIDENT EDITOR/ASSEMBLER

Co-resident Editor/Assembler that will allow the user to create, edit and assemble machine language programs for the color computer. The editor portion of the program is similar to the text editor in TEXTPRO. The assembler will output machine object code to either cassette tape in a 'CLOADM' readable format or directly to memory for direct execution. The assembly listing can optionally be output to the printer connected to the RS-232/Printer port on the color computer. All errors are displayed with a full text message for easy identification. The assembler supports the full compliment of the M6809 instruction set and also will cross assemble 6800 source code to produce M6809 compatible object code.

CO-RES9 **$39.95**

SYSTEM MONITOR

TRSMON is a 2K system monitor program that will allow you to explore the workings of the color computer. It features 9 debuging commands, tape load and save compatible with Basic "CLOADM", up/down load via RS232 port, terminal package that allows the color computer to be used as a terminal at baud rates up to 9600 baud and a printer driver to direct display output to the printer for memory dumps, disassemblies etc. The program is position independent so it can be moved anywhere within the system memory. A very powerful tool at a very reasonable price. Commands Include:

Memory examine & change, Goto defined address, Load Tape program (w/offset), Load Motorola S1-S9 file (RS232), Save Tape program, Send memory file S1-S9 (RS232), Set and/or display breakpoints, Remove one or all breakpoints, Define printer/terminal baud rate, Set and/or display registers, Dump memory in Hex & Ascii format, Disassemble memory file, Terminal mode & optional buffer, Fill memory, Move block of memory, Find memory byte sequence, Exit monitor to Basic, Exit monitor to Rom Pack ($C000), Re-initialize monitor, Direct output to printer.

TRSMON ON TAPE **$19.95**
TRSMON on 2716 Eprom **$34.95**

8K COLOR RAM/EPROM CARTRIDGE HOLDS 4-2716 EPROM or RAM	**$24.95**
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MOTOROLA 6809 PROGRAMMERS MANUAL	**$11.95**
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TEXTPRO
TEXT EDITOR/PROCESSOR

TEXTPRO is a complete text editor & text processing program for the Color Computer. The program includes our powerful full function text editor plus the added features of a text processor. The entire program utilizes only 6K of memory space including the tape, screen and keyboard buffers. It is extremely fast in editing and processing text files and is compatible with Basic ASCII formatted tape files.

The Editor itself includes 24 commands including string search & replace; line and automatic line edit modes which allow you to insert, delete, change or add characters. Automatic line editing allows you to skip forward and backward for checking and editing, all screen editing immediately updates the screen so you know exactly what you are doing at all times. The Editor also has commands to move or copy single lines or blocks of text from one place to another. Some of the other commands include Tape load, save and append; Automatic line numbers, delete line, set input line length and printer output.

The Text Processor includes 29 commands for formating the output, some of them include: page length, left margin, top & bottom margin, line length, justify & fill modes, page heading, center line, double width print, margin control, single, multiple & special indent modes, test lines left on page, display & input from keyboard and even special control codes can be sent to the printer for different print densities etc. It even has a repeat command with a next command to redo all of or a portion of the file as many times as needed. TEXTPRO will turn your color computer into a full fledged text processing machine at a price you won't believe. Available on 'CLOADM' compatible cassette.

SPECIAL INTRODUCTORY PRICE $29.95
RS. DISK VERSION $49.99

DATAPACK
DATA COMMUNICATIONS PACKAGE

DATAPACK is a Terminal package program for the COLOR COMPUTER, allowing you to use the color computer as a buffered computer terminal through a modem to a time sharing network or as a direct connect terminal to another computer system at rates up to 9600 baud. This program is more than a standard "Videotext" type program in that it will allow you to save data stored in the buffer either to cassette tape, or output a hard copy to a printer. The data buffer is automatically set to the maximum size of your system memory when entered to allow maximum space for saving data. The program includes features to send control codes and to enable or disable keyboard echo. When the terminal mode is exited the contents of the buffer may be viewed on the screen or saved to tape for later loading. Also the RS-232 port can be used to plug your printer back in for sending the screen buffer to the printer. An additional feature is the ASCII format that is used on tape is compatible with the CER-COMP Text Editor program and BASIC, enabling you to edit or delete unwanted information.

PRICE: $24.95 ON CASSETTE
RS. DISK VERSION $49.95

5566 Ricochet Avenue
Las Vegas, Nevada 89110

CER-COMP
(702) 452-0632

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```
2560 LINEINPUT"ENTER YOUR CITY,
STATE & ZIP:    ";CZ$
2570 INPUT"ENTER STATEMENT DUE D
ATE: ";SD$
2580 LINEINPUT"ENTER MESSAGE FOR
 PAST DUE       ACCOUNTS: ";PD$
2590 LINEINPUT"ENTER MESSAGE FOR
 ACCOUNTS WHICHARE OVER CREDIT L
IMIT ";CL$
2600 LINEINPUT"ENTER MESSAGE FOR
 ALL ACCOUNTS: ";AL$
2610 A9=40-LEN(CN$):B9=40-(LEN(A
D$)/2):C9=40-(LEN(CZ$)/2)
2620 FOR X=1 TO 80
2630 PRINT#-2,TAB(A9);CHR$(31);C
N$;CHR$(30)
2640 PRINT#-2,TAB(B9);AD$:PRINT#
-2,TAB(C9);CZ$
2650 PRINT#-2,STRING$(2,10)
2660 PRINT#-2,TAB(55);"BILLING D
ATE: ";C1$
2670 PRINT#-2,X$:PRINT#-2:PRINT#
-2,CHR$(31);TAB(14);"STATEMENT";
CHR$(30);CHR$(13)
2680 PRINT#-2,X$:GET#1,X
2690 PRINT#-2,"CREDIT LIMIT ";:P
RINT#-2,USING"$$#,###,###.##";H1
2700 B1=CVN(B$):PP=B1
2710 PRINT#-2,"ACCOUNT NUMBER ";
CVN(A$);"      PREVIOUS BALANCE "
;:PRINT#-2,USING"$$#,###,###.##"
;B1
2720 PRINT#-2:PRINT#-2,D$:PRINT#
-2,E$:PRINT#-2,F$:PRINT#-2:PRINT
#-2
2730 PRINT#-2,TAB(2);X2$
2740 PRINT#-2:PP=B1
2750 AC=CVN(AC$):Y=(AC*5):Y1=Y+5
2760 PRINT#-2,TAB(2);"DATE";TAB(
20);"TICKET#";TAB(30);"CHG/PAYME
NT";TAB(50);"AMOUNT";TAB(65);"BA
LANCE"
2770 PRINT#-2
2780 GET#2,Y
2790 FOR XY=1 TO 10:I1$(XY)=I$(X
Y):J1(XY)=CVN(J$(XY)):K1$(XY)=K$
(XY):L1(XY)=CVN(L$(XY)):M1(XY)=C
VN(M$(XY)):NEXT XY
2800 FOR XY=1 TO 10
2810 IF I1$(XY)="NOT USED" THEN
GOSUB2930:GOTO 2900
2820 PRINT#-2,TAB(2);I1$(XY);TAB
(20);J1(XY);TAB(30);
2830 IF K1$(XY)="D" THEN PRINT#-
2,"CHARGES";TAB(42);
2840 IF K1$(XY)="C" THEN PRINT#-
2,"PAYMENT";TAB(42);
2850 IF K1$(XY)="D" THEN PP=PP+L
1(XY) ELSE IF K1$(XY)="C" THEN P
P=PP-L1(XY)
2860 PRINT#-2,USING"$$#,###,###.
##";L1(XY);:PRINT#-2,TAB(57);:PR
INT#-2,USING"$$#,###,###.##";PP
2870 NEXT XY
2880 Y=Y+1:IF Y<Y1 THEN 2780
2890 GOSUB 2930
2900 CLS:PRINT@224:INPUT"PLEASE
ADVANCE PAPER TO NEXT    PAGE:::
 HIT ENTER WHEN READY";Z$
2910 NEXT X
2920 RETURN
2930 PRINT#-2,TAB(2);X$
2940 H1=CVN(H$)
2950 PRINT#-2,"  THIS STATEMENT
MUST BE";:PRINT#-2,TAB(50);"AMOU
NT DUE: ";:PRINT#-2,USING"$$#,##
#,###.##";PP
2960 PRINT#-2,"  PAID IN FULL, O
N OR";:PRINT#-2,TAB(50);"CREDIT
USED ";:PRINT#-2,USING"$$#,###,#
##.##";PP
2970 PRINT#-2,"  BEFORE    ";SD$;
:PRINT#-2,TAB(42);"AVAILABLE CRE
DIT ";:PRINT#-2,USING"$$#,###,##
#.##";H1-PP
2980 PRINT#-2,"  TO AVOID SERVIC
E CHARGES"
2990 PRINT#-2:IF B1<>0 THEN PRIN
T#-2,PD$
3000 IF PP>H1 THEN PRINT#-2,CL$
```


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```
3010 PRINT#-2:PRINT#-2,AL$
3020 RETURN
3030 'CLOSEOUT OF FILES
3040 CLS:PRINT@224:INPUT"DO YOU
WISH TO CLOSE SPECIFIC   FILES O
R ALL FILES              ENTER A
 FOR ALL, S FOR SPECIFIC";Z$
3050 IF LEFT$(Z$,1)="A" THEN 308
0
3060 IF LEFT$(Z$,1)="S" THEN 315
0
3070 GOTO 3040
3080 CLS:PRINT@224:INPUT"ARE YOU
 SURE YOU WANT TO CLOSE  THE ACC
OUNTS";Z$
3090 IF LEFT$(Z$,1)<>"Y" THEN RE
TURN
3100 CLS:PRINT@232,"CLOSING ACCC
OUNTS"
3110 GOSUB 3660
3120 CLS:PRINT@230,"ALL ACCOUNTS
 CLOSED"
3130 FOR X=0 TO 1000:NEXT X
3140 RETURN
3150 CLS:PRINT@224:INPUT"  ENTER
 ACCOUNT NUMBER FOR THE    ACCOU
NT YOU WISH TO CLOSE: ";AA1
3160 FOR X=1 TO 80:GET#1,X
3170 IF AA1=CVN(A$) THEN 3200 EL
SE NEXT
3180 CLS:PRINT@224:INPUT"ACCOUNT
 NOT FOUND ***  DO YOU   WISH TO
 SEARCH FOR ANOTHER #";Z$
3190 IF LEFT$(Z$,1)="Y" THEN 315
0 ELSE RETURN
3200 A1=CVN(A$):B1=CVN(B$):C2$=C
$:H1=CVN(H$)
3210 CLS:PRINT"ACCOUNT# ";A1
3220 PRINT"PREVIOUS BALANCE:";
3230 PRINTUSING"$$#,###,###.##";
B1
3240 PRINT"LAST UPDATED: ";C2$
3250 PRINT:PRINTD$:PRINTE$:PRINT
F$
3260 PRINT"PHONE# ";G$
3270 PRINT:PRINT"CREDIT LIMIT: "
;
3280 PRINTUSING"$$#,###,###.##";
H1
3290 PRINT:PRINT
3300 INPUT"ARE YOU SURE YOU WANT
 TO        CLOSE THIS ACCOUNT ";
Z$
3310 IF LEFT$(Z$,1)<>"Y" THEN RE
TURN
3320 AC=CVN(AC$):Y=(AC*5)
3330 FOR WX=Y TO Y+5
3340 I1$="NOT USED":J1=0000:K1$=
"N":L1=0000:M1=0000
3350 FOR XA=1 TO 10:LSET I$(XA)=
I1$:LSET J$(XA)=MKN$(J1)
3360 LSET K$(XA)=K1$:LSET L$(XA)
=MKN$(L1):LSET M$(XA)=MKN$(M1)
3370 NEXT XA
3380 PUT#2,WX
3390 NEXT WX
3400 CLS:PRINT@230,"THE ACCOUNT
SPECIFIED           HAS BEEN CLO
SED....."
3410 PRINT:PRINT:PRINT:PRINT:INP
UT"DO YOU WISH TO CLOSE ANOTHER
   FILE ";Z$
3420 IF LEFT$(Z$,1)="Y" THEN 315
0
3430 RETURN
3440 CLS:PRINT@224,"WHEN FOREMAT
ING A NEW DISK, THE ENTIRE DISK
IS USED AND EVERY-  THING ON THE
 DISK IS EITHER     ERASED OR WR
ITTEN OVER."
3450 PRINT:PRINT"PLEASE CHECK AN
D MAKE SURE THAT YOU HAVE A DATA
 DISK IN THE      DRIVE AND NOT Y
OUR PROGRAM DISK!"
3460 PRINT:PRINT:INPUT"HIT ENTER
 WHEN READY";Z$
3470 A1=11111:B1=0000:C2$="NEW":
D1$="NOT USED":E1$="NOT USED":F1
$="NOT USED":G1$="NOT USED":H1=0
```


New Color Computer Products

★ *Disassembler-Assembler (DISASM)* ★

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```
ØØØ
3480 FOR X=1 TO 80
3490 LSET AC$=MKN$(X):LSET A$=MK
N$(A1)
3500 LSET B$=MKN$(B1)
3510 LSET C$=C2$:LSET D$=D1$:LSE
T E$=E1$:LSET F$=F1$:LSET G$=G1$
:LSET H$=MKN$(H1)
3520 PUT#1,X:NEXT X
3530 FOR X=1 TO 10:I1$(X)="NOT U
SED":J1(X)=00000:K1$(X)="N":L1(X
)=00000:M1(X)=00000:NEXT
3540 FOR X1=5 TO 501
3550 FOR X=1 TO 10
3560 LSET I$(X)=I1$(X)
3570 LSET J$(X)=MKN$(J1(X))
3580 LSET K$(X)=K1$(X)
3590 LSET L$(X)=MKN$(L1(X))
3600 LSET M$(X)=MKN$(M1(X))
3610 NEXT X
3620 PUT#2,X1
3630 NEXT X1
3640 RETURN
3650 'MONTHLY CLOSEOUT OF ACOUNT
S
3660 FOR XG=1 TO 80:GET#1,XG:AC=
CVN(AC$)
3670 A1=CVN(A$):B1=CVN(B$):C1$=C
$:D1$=D$:E1$=E$:F1$=F$:G1$=G$:H1
=CVN(H$)
```

```
3680 IF A1=11111 THEN 3810
3690 Y=AC*5:Y1=Y+5
3700 GET#2,Y:FOR X=1 TO 10
3710 I1$(X)=I$(X):J1(X)=CVN(J$(X
)):K1(X)=K$(X):L1(X)=CVN(L$(X)):
M1(X)=CVN(M$(X))
3720 IF I1$(X)="NOT USED" THEN 3
750
3730 IF K1$(X)="D" THEN PP=PP+L1
(X)
3740 IF K1$(X)="C" THEN PP=PP-L1
(X)
3750 I1$(X)="NOT USED":J1(X)=00:
K1$(X)="N":L1(X)=00:M1(X)=00
3760 LSET I$(X)=I1$(X):LSET J$(X
)=MKN$(J1(X)):LSET K$(X)=K1$(X)
3770 LSET L$(X)=MKN$(L1(X)):LSET
 M$(X)=MKN$(M1(X))
3780 NEXT X
3790 PUT#2,Y
3800 Y=Y+1:IF Y<Y1 THEN GOTO 370
0
3810 LSET AC$=MKN$(AC):LSET A$=M
KN$(A1):LSET B$=MKN$(PP):LSET C$
=C1$:LSET D$=D1$
3820 LSET E$=E1$:LSET F$=F1$:LSE
T G$=G1$:LSET H$=MKN$(H1)
3830 PUT#1,XG
3840 NEXT XG
3850 RETURN
```

CORRECTIONS

In the *Gradebook* program in September, please make Line 560 read as follows:

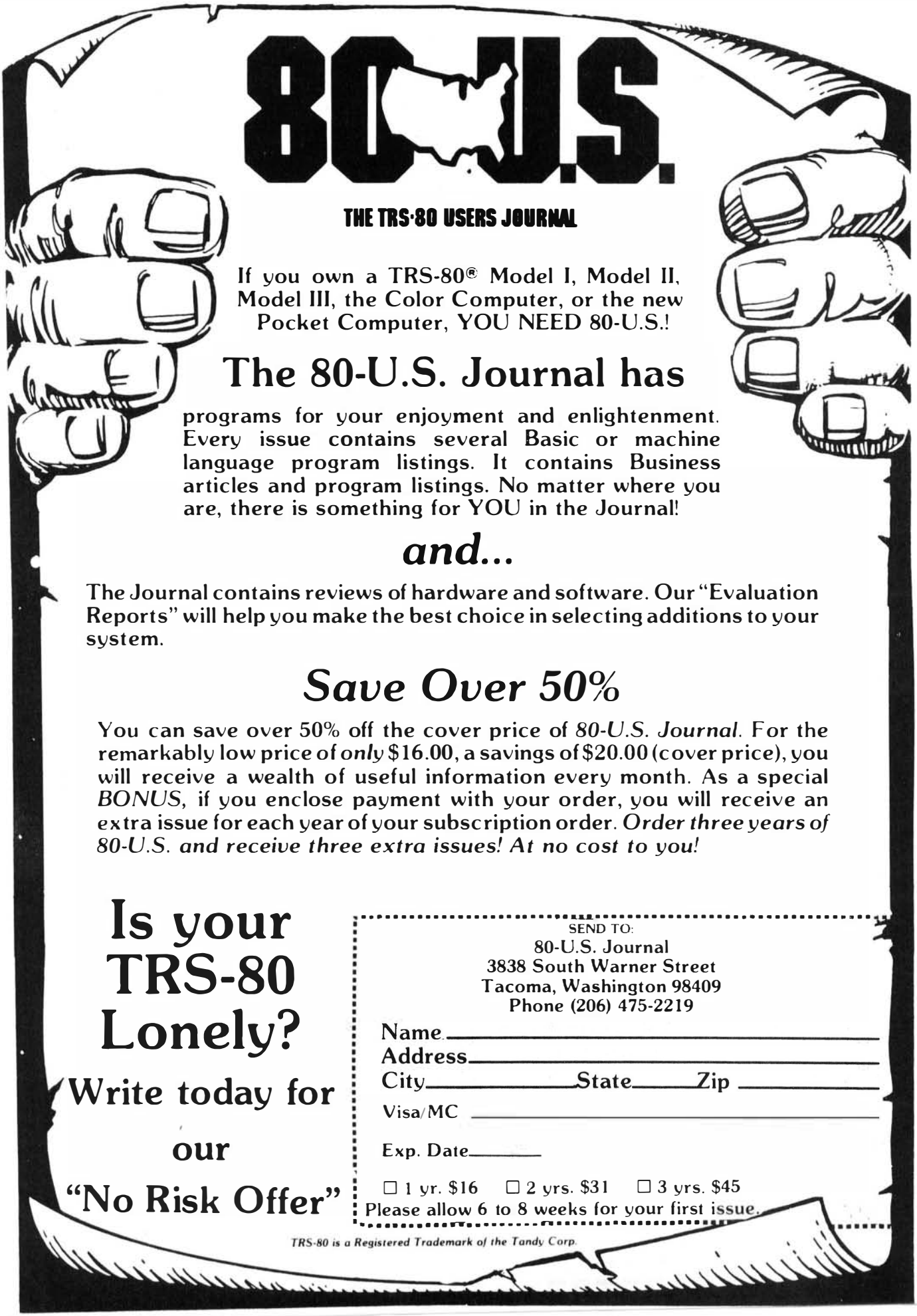
```
560 IF K<>5 THEN LINEINPUT "ENTE
R STUDENT NUMBER ";STUDENT$:GOSU
B1110 ELSE CHECK=1
```

In addition, insert a colon and the following at the end of Line 1050: **CLASS$ = CLASS$ = "/DAT"**

Arnold Weiss point out the following corrections may be necessary in *The Track* when loading a previously saved track:

```
7050 A=VAL(A$)
7051 IF A>0 THEN GOSUB7200
7052 IF A$=" " THEN S=S+9 ELSE I
F A$="T" THEN S=1
7060 IF A>0 THEN GOSUB7200
7061 IF ZZ=1 GOTO7085
7230 IF N>E2 THEN GOTO7243
7240 FI$=MID$(TF$(N),4,8)
7241 IF FI$<>"" THEN ZZ=1:GOTO 7
7290
7243 CLS:PRINT@352,"SORRY, ";N$;
" IS NOT A VALID #":GOSUB 81
```

Also, Mr. Weiss points out there should be a) symbol at the end of Line 130.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Video...

Hook Your CoCo Up To Your Home VCR

4K

By Bob Rosen

(Mr. Rosen is President of Spectrum Projects.)

Have you ever wondered whether you can videotape from your Color Computer?

I have been using my 80C and my VCR for more than a year now. For as little as $399, you, too, can have an inexpensive color graphic generator. The easiest way to do this is to boost up the VHF input of your VCR. I suggest replacing the six-foot audio cable that Radio Shack gives you and replace it with an eight-foot piece of coaxial cable. (RS#15-1530; $3.49) and an adaptor to change one end of the cable to a phono plug (RS 275-252; $1.59) that would plug into your color computer. If you want to switch from the VHF antenna to the color computer output—going to the VHF input of your VCR—purchase an A-B switchbox (RS 15-1254; $4.95) and a two-foot piece of coaxial cable (RS 15-1533; $2.49). Hook up the two inputs and switch between them.

You are now ready to turn on your color computer, VCR and TV set, turning the VCR tuner to either Channel 3 or 4 (one that is not a local TV channel) and do the same for your TV. Make sure the channel select switch on your color computer matches the channel on both the TV and VCR and that the VCR/TV switch is on the VCR position. If the picture is not clear, fine tune both the VCR and TV until you get the desired picture quality.

You are now ready to videotape and watch what comes out of your color computer. You can tape art gallery and MPP results, hi-res games, CompuServe and Connection-80 sessions and your own home movies.

Below is a program that shows how the color computer can be used as a graphic generator.

The Listing:

```
10 CLS(1)
20 UL=16
30 INPUT "Enter duration of print"; SPEED
40 INPUT"Enter duration between titles";DE
50 CLS(1)
60 COLOR 1,3
70 FOR T=1 TO 5:T$(T)="": NEXT
80 FOR T=1 TO 5:T$(T)="": NEXT:NL=0: FOR T=1 TO
5
90 READ A$
100 IF A$="NXT" THEN T=5: GOTO 120:ELSE
T$(T)=A$
110 IF A$="END" THEN T=5: SW=1:GOTO 120
120 NEXT: IF SW=1 THEN 240
130 FOR T=1 TO 5
140 IF T$(T) <> ""THEN NL=NL+1
150 NEXT
160 SL=VL-NL :SL=INT(S2/2)
170 FOR T=1 TO NL
180 X=LEN(T$(T))
190 X=32-X:X=INT(X/2)
200 PRINTTAB(X)T$(T)
210 NEXT: FOR S=1 TO SPEED; NEXT:IF SW=1
THEN STOP: GOTO 230
220 CLS(1): FOR T=1 TO DE: NEXT: IF SW=1 THEN
GOTO 220: ELSE GOTO 80
230 CLS(1): GOTO230
240 CLS(1): GOTO 240
250 DATA MR. AND MRS. JOHN DOE, NXT
260 DATA PROUDLY PRESENTS HOME MOVIES,
NXT
270 DATA STARRING DICK, JANE, NXT
280 DATA AND SPOT, NXT
290 DATA OUR TRIP TO FLORIDA, NXT
300 DATA 08/15/82, NXT
310 DATA END
```

For those who want to tape "pure video" instead of RF, I would suggest purchasing the Video Interface Kit($19.95) from: Jarb Software, 1169 Florida Street, Imperial Beach, CA 92032.

The color computer is a powerful machine and can now be used in conjunction with your VCR.

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PRINT #-2, (From Page 7)

will all benefit greatly from his fine columns, the first of which appears this month under the standing title of *Using Graphics*.

And speaking of titles, we know you will very much enjoy *Charlie's Machine*. Charlie Roslund has become one of the giants of machine language programming for the Color Computer and will be presenting a new machine language utility for your use each month. Welcome, Charlie.

I know you will all also welcome our other new friends to the world of 80C (or CoCo, see, we're mellowing on the subject of nicknames), the TDP System 100 users.

We promised and pledged that we would produce a magazine only for one computer—and, as far as we're concerned, that promise is very much intact. Simply, this is because the CoCo (there it is, again) and the TDP-100 are the *same* computer. I hope you will encourage TDP-100 users to join your clubs and share information with them.

For you close *Rainbow* watchers, yes, we've made some minor makeup changes. We have eliminated most of the "continued" lines when stories are broken only by an ad. That means if there is no *copy* in between, just turn the page(s). This, we're told, makes for cleaner makeup. Also note the little rainbows at the end symbolize "the end" of an article or column.

Finally, thank you for the many positive responses to our editorial on the subject of software piracy last month.

—Lonnie Falk

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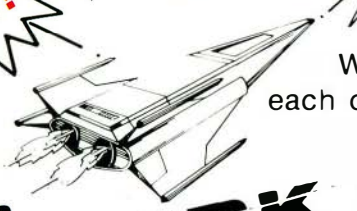

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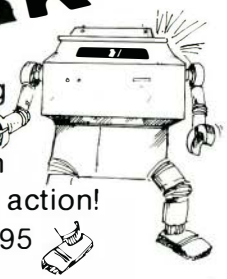

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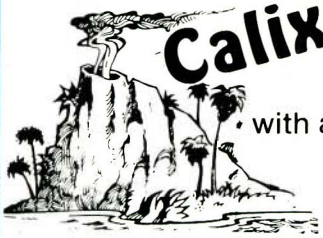

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