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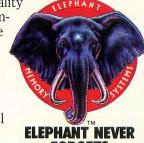
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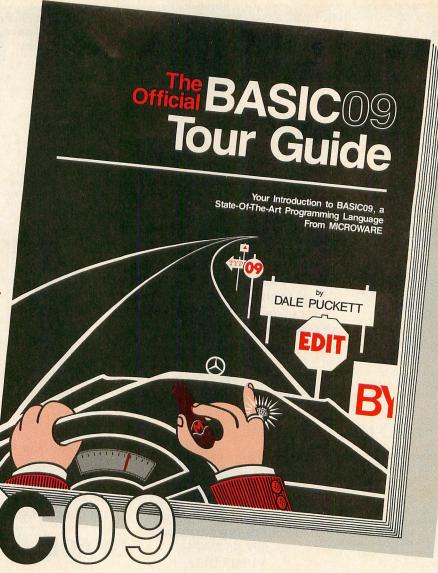
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By KEN KALISH

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The "Pitfalls" in this game are many. Hidden

treasures, jump over the

pits, swing on the vine,

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beware of the scorpion. Another game for the Color Computer with the

same high resolution graphics as "The King."

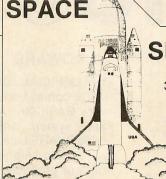
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like the popular arcade game "DEFENDER" Tape \$24.95 32K Machine Code

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FEATURES

20/Color Computing For Kids by Jean Plesser (Education) (Tape Loader; 4K Color) A game for Dad and some special sound. (Hardware) **26/Internal Modem** by Mark Marsten

A neat way to hook up your modem. (General)

30/Grey Flannel by William Barden, Jr. A few thoughts on business and the Color Computer. (Utility) 37/Patching Scripsit by Ashok Basargekar

A faster method. (Tape Loader; 32K Color) 38/Scripsit Redone by Ralph Tenny (Utility) (Tape Loader; 32K Disk) A better method.

49/Statistics: A Tutorial by David Dawson (Tutorial) (Tape Loader; 16K Extended) Making the muddy clear.

(Home Finance) 63/Investor's Analyst by Daniel Jamet (Tape Loader; 16K Extended) Financial analysis for home or small business. 69/Sorcerer's Puzzles by Richard Ramella (Game)

(Tape Loader; 4K Color, 16K Color; and 16K Extended) The Gridleys' visit. 89/More Summer Project Winners (Game)

(16K Color) Fly — Another Winner! 96/AND, OR, NOT by Jon Schild (Tutorial)

Discovering Boolean functions. (Utility) 98/Custom Color by Dennis Kitsz The last piece of Color Burner.

(Utility) 106/Dissecting Your ROM Part ten of a 14-part series.

119/The Devil's Disk Editor by William Barden, Jr. (Tutorial) The last part of a series on disks.



4/PEEK (06,84)

7/INKEY\$

10/DEFUSR by Terry Kepner

16/GOTO School by Dr. Paul Kimmelman

123/On-Line by Wayne Day

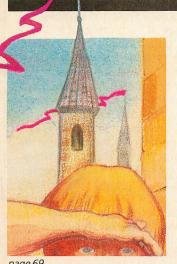
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140/NEW:PRODUCT\$

142/END OF FILE

142/FOR...NEXT (07,84)

"Barden Means Business," by Rich Grote



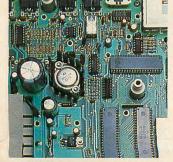
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PEEK (06,84)



usiness isn't a topic you'd expect to hear connected with our Color Computer — our micro wasn't designed as a business machine, and, let's face it, the kinds of business programs that most businessmen require aren't available for it.

But that doesn't mean you can't use your Color Computer for your small business, or home business, or the personal business you do in connection with your home and finances. You just have to look harder for good business programs than would an IBM PC user, and you have to be a little more ingenious than a PC user knows how to be... but that's what sets us, and our computer, apart, isn't it?

To help in your search for creative business programs, we've gathered some special articles to get you on your way. GOTO 30 to read a few words by Bill Barden on the Color Computer and business; thus fortified, GOTO 37 and 38 for a double-dose of Scripsit improvements. One will speed-up Color Scripsit (for those of you with little time to spare). The second will help you prepare mailing labels. Now let's look at the most serious side of business (or home finance): money. GOTO 63 for a program that will help you analyze market options like a pro, and GOTO 49 to learn how statistics can help you plug this information into a formula that will produce decision-facilitating data.

Once you have your business and finances under control, you'll need a break. This month we have two excellent pastime activities for you: GOTO 89 for Fly!, a Summer Project Winner that will convince you those nasty buzzing critters were created by a CPU; then GOTO 69 for Sorcerer's Puzzles, and see how your logic paths are operating this month.

June brings with it the end of school and Father's Day. Your kids will want to study this month's Color Computing For Kids (GOTO 20) to plan their Father's Day treat, and we should all take a trip with Paul Kimmelman in GOTO School for some summertime possibilities (GOTO 16).

Last month I promised the ends of some series, and here they are: GOTO 98 for the last program for Color Burner, and GOTO 119 for the final half of the Devil's Disk Editor. GOTO 106 for a series that's drawing closer to its end: Jake's ROM dissection, version 1.0.

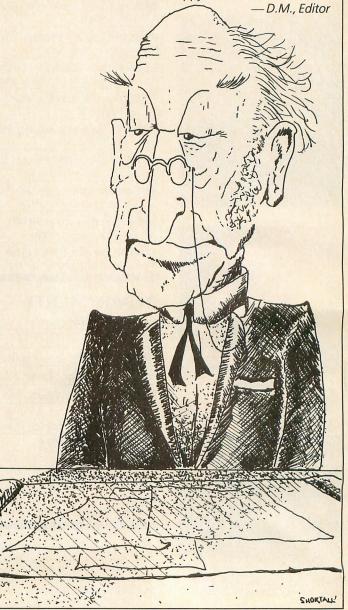
Other projects in the works: GOTO 26 for a neat method to end computer wire confusion; GOTO 96 for a simple explanation of the Boolean functions AND, OR, and NOT. And don't forget our regular features — GOTO 10 (DEFUSR), GOTO 123 (On-Line), GOTO 126 (Reviews), GOTO 140 (New Products) OR you will NOT be on top of the Color Computer world!

A note from the Clear As Mud department: keyboxes are those cute little boxes we place on each article to help our readers determine whether their computer set-up can handle a particular program. If you remember to check them,

you'll never finish typing a long program only to discover it won't run on your machine beause it requires Disk Basic, which you don't have! Since some of our articles contain several programs with different requirements, the keyboxes will now be found on the first page of each program listing; a quick check of the Table of Contents will tell you memory and language requirements for the article, generally.

You'll also find a note referring to the *Tape Loader*; if you haven't seen the ad (or couldn't decide what it means!), the Tape Loader is a cassette tape produced for us each month, to sell to our readers, containing the major program listings from that month's magazine. Since we are not always able to purchase magnetic media rights to all the programs we publish, or becuase some programs are of such limited interest or odd format that they can't easily by put on tape, not all programs in each month's issue will appear on that month's Tape Loader. The Tape Loader banner on program listings, and the Tape Loader notation preceding the memory requirements on the Table of Contents, will tell you which article's listings will be on this month's Tape Loader.

Now, is that clearer? Have a happy summer!



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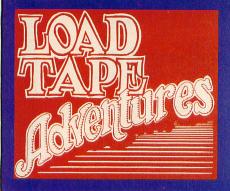
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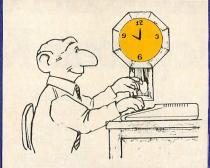
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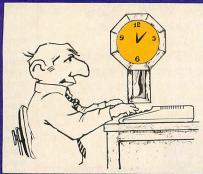
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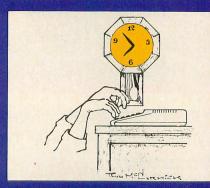












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INKEY\$ __ _

All letters are subject to editing for space considerations.



INKEY\$

The Color Computer Magazine Highland Mill Camden, ME 04843 My first original Extended Basic program used all eight graphics pages and more than 16K of RAM. My advice to fellow readers: quit grumbling and upgrade! It's the only way to realize the true potential of your Color Computer.

Ralph Hedenskoog Gahanna, OH

Managing Data

Just a few lines to thank Keith Baker for the great data management program for the Color Computer in "File It" (January, 1984).

It proved to be every bit as easy to use as indicated, and to modify, with one exception. I have tried several approaches to inserting a line counter for paginating but have been unsuccessful. Perhaps you could supply this modification in a future issue as others may also appreciate this feature for the program.

W. Rau Elyria, OH

Questions and Answers

I am writing to ask if I can get listings of the finalist games in your Summer Programming Project and information on the writing of adventure games.

> Ron Midthun Sauk City, WI

No, sorry, we don't own the finalist games. However, we are negotiating to buy many for publication. Keep an eye on future issues. A new series on game programming will be running soon.

— Eds.

Adapting the Adaptation

Larry Landwehr's article "Remote Override" (March, 1984) is quite concise, but there is a better and easier way than drilling and installing a toggle switch.

In my General Electric cassette recorder, the remote function also shuts off the rewind and fast forward functions. To get around this I desoldered the wires from the remote jack, spliced and soldered them, put heat shrink over the splice and shrunk it. I then traced a wire back from the Play button. I cut and stripped the wire and soldered the wire(s) onto the remote jack.

This fix enables me to fast forward and rewind the tape; but to play or record, it still needs CLOAD/CSAVE or Motor On/Motor Off commands.

Jim Ayres Philadelphia, PA

Converting Cashbook

As a rank amateur at writing programs for my 32K Extended Basic Color Computer, I am always pleased to see good useable programs, and most programs I see are in The Color Computer Magazine. Your 'Cashbook" program (March, 1984), I was distressed to see, is for disk drive systems. Even though I'm not so good at rewriting programs, I undertook the task of converting the **CSAVE and CLOAD routines** for cassette. I would like to share this with other novices that read the magazine (see

I have also put in a routine to exit the program without having to use the Break key:

Listing 1).

160 PRINT" <Q> QUIT PROG-RAM"

210 CLS:ON INSTR ("AVHC&FISDTQ"),M1\$)GOTO10 10,5010,5010,2010,4010,6010, 7010,8010,9010,10010,30000 30000 CLS:END

Charles W. Gordon Ft. Inn, SC

Grabbing Upgrades

When my subscription began a few months ago, I was disappointed that so many of your program listings were not compatible with my family's 16K Color Basic. Radio Shack just slashed the prices on upgrades, and we were among the first to take advantage of the deal, upgrading to 64K Extended Basic

3000 REM *load data from tape* 3010 PRINT"LOADING FILE: ";FS\$ 3020 OPEN"I",#-1,FS\$ 3030 INPUT#-1,FS\$ 3040 INPUT #-1,N\$ 3050 INPUT#-1,C1 3060 INPUT#-1,C2 3070 DIMSA\$(C1),AC\$(C1),T(C1) 3080 IF EOF(-1)THEN3170 3090 FOR L=1TOC1 3100 INPUT#-1,B1\$(L) 3110 INPUT#-1,B2\$(L) 3120 INPUT#-1,B3\$(L) 3130 INPUT#-1,B4(L) 3140 INPUT#-1,AC\$(L) 3150 INPUT#-1,SA\$(L) 3160 NEXTL 3170 GOTO3080 3180 CLOSE#-1:GOTO100 4000 REM *save data to tape* 4010 FT\$=FS\$ 4020 PRINT" YOU ARE IN THE *save* ROUTINE. PREVIOUS DATA UNDER FILENAME : "FT\$" WILL BE LOST": PRINT" AND RE-PLACED WITH DATA NO W IN MEMORY": PRINT 4030 INPUT" ENTER <S> TO CONTINUE"; T\$:IFT\$<>"S"THEN100 4040 OPEN"0",#-1,FT\$ 4050 PRINT"DATA FILE NAME IS" 4060 PRINTFT\$ 4070 PRINT#-1,FT\$ 4080 PRINT#-1,N\$ 4090 PRINT#-1,C1 4100 PRINT#-1, C2 4110 FOR L=1TOC1 4120 PRINT#-1,B1\$(L) 4130 PRINT#-1,B2\$(L) 4140 PRINT#-1,B3\$(L) 4150 PRINT#-1,B4(L) 4170 PRINT#-1,AC\$(L) 4180 PRINT#-1,SA(L) 4190 NEXTL 4200 CLOSE#-1 4210 IF RIGHT\$(FT\$,1)<>"B"THENINPUT" ENTER FOR A BACKUP COPY ";X\$:IFX\$=B"THENFT\$=LEFT\$(FS\$,LEN(FS\$)-1)+"B":PRINT"BACK-UP ";:GOTO4040 4220 GOTO100

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Tricky Maneuvers

For the keyboard upgrade explained in "Custom Color" (October, 1983), can't you use a Model III or 4 keyboard instead of a Model 1? If the Model III and 4 keyboards have numeric keypads built onto them then isn't there any way to remove them?

David Ham Chicago, IL

Yes, you could, if you can cut the circuit board without cracking it while removing the keypad. Model III and 4 keyboards have a hefty metal shield as well; if you can handle a hacksaw, then you could shorten it, but you'd have a problem mounting this end of the keyboard.

— T. Ed.

MC-10 Notes

Thank you, **The Color Computer Magazine** and the authors, Tim McFadden and Doug Kelley of "My MC-10 Speaks ML!," November 1983 issue. I can now save and load machine language programs.

There are three errors in the program listing, however: Line 12 should read GOSUB 1000; Line 110, IF A\$ < 1 OR A\$ > 6 THEN SOUND 1,1:GOTO100 and Line 1040, NEXTC.

For menu selection 2, repeated pressing of W and Z keys could cause an FC error (illegal function call). So, I changed Lines 250 and 260. Line 250 now reads IF A\$="W" THEN A=A+512*(A>=512). Line 260 reads IF A\$="Z" THEN A=A-512* (A<=65023). Entry of 65024 will display the contents of location 65535 (at the lower right corner) as a period.

Griff Fryer Sierra Vista, AZ

Happy Hexload

I have only had my Color Computer for 13 months and I'm already tiring of Basic. I don't have an assembler so I had to ignore your great assembly listings until you published "One Finger Hexload," (November, 1983). I wasn't sure what it was at first, but I typed it in anyway. I am sure glad I did! I use it every day and it's great for POKEing in machine code. I typed in the assembly program "Slither" in the November, 1983 issue and was very impressed! The sound was fabulous and so was the speed compared to the Basic version.

I promise to subscribe for as long as **The Color Computer Magazine** is around (forever!). Jon Alchin Lompoc, CA

Fix (03,84)

CC Term Fix

In "CC Term" (March, 1984, p. 57), Table 2 omitted the arrow key symbols when describing their function. The table should read (from the top): Up Arrow-\$5E, Shift Up Arrow-\$5F, Down Arrow-\$00, Shift Down Arrow-\$5B, Left Arrow-\$7F, Shift Left Arrow-\$18, Right Arrow-\$09, Shift Right Arrow-\$5D.

Spazmorg

"Spazmorg" (March, 1984) has a problem. Line 93 was merged with Line 92. This should not be done since the loop that precedes this line has two exits. One falls out on its own, and the other is a voluntary jump made by the user. Line 93 should read: 93 GOTO 16.

Robot Round Up

In the December, 1983 issue of **The Color Computer Magazine** the article entitled 'Topo, Armatron, Poorbot, and "Mim" ' was exactly what I was seeking. I would like to get

more information on operating an Armatron by a Color Computer. What can I do?

> Stephen Balkum Arrington, TN

Check the April issue of The
Color Computer Magazine
for two more articles on
Robots — Fds.

Bulletin Boards

Syracuse BBS

Color-80 of Syracuse is a new Color Computer bulletin board, on-line 24 hours a day, featuring upload, download, news, sports, merchandise, E-Mail and more. All types of computers are welcome. For more information contact: Kris Olmstead, Sysop, Syracuse, NY or call (315)487-0503 (BBS).

Dallas BBS

Careers, a 24-hour BBS, operates out of Dallas, TX using a 64K Color Computer with three disk drives and a 300 baud Hayes Smartmodem. Its theme is career enhancement through education and information. Call (214)692-0513. The board is sponsored by Elkins Institute in Dallas, Inc. and is run privately by John Novocilsky, Jr.

Clubs

CA Club

A Color Computer Club is forming in the Santa Clarita Valley (Newhall / Valencia / Sagus / Canyon Country). For more information, write: SCV Color Computer Club, c/o David Barry, Jr., 23920 Fambrough St., Newhall, CA 91321, or call (805)254-0924.

Erie, PA

Erie TRS-80 User's Group meets monthly, has an extensive software library of public domain programs and publishes a club newsletter. To join call (814)456-4786 or write club president Tom Kuklinski, 320 Maryland Ave., Erie, Pennsylvania 16505

Northern VA

A new Color Computer Club in Northern Virginia meets monthly in the community room of the Manassas Public Library, Manassas, VA. All Color Computer users, beginners to advanced, are welcome. Regular classes in assembly language and Basic are in progress, and several members are informally meeting as an OS-9 SIG. For more information contact Vice President Allan Weinstein, (703) 361-2293 (in the Manassas area) or Logan McMinn (703) 820-0658 (in the greater Washington, D.C. dialing area).

Evansville, IN

For information concerning the Evansville CoCo Club write Brian Broyles, Box 462, Poseyville, IN, 47633 or call (812)874-2210.



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Jake Commander's article, "Dissecting Your ROM," (July, 1983) says it's possible to read Model I tapes into the Color Computer. It sounds interesting and I would like to know how this is done.

- D.K., Macon, GA

I don't have the actual machine code to do the job, but the technique is simple: the Model I tapes store data as discrete pulses placed between timing pulses. Knowing that there are 500 timing pulses coming from the tape every second, all you need do is write a routine to detect the presence of the timing pulse and to check between the pulses for a data pulse. If there's a pulse there, the data bit is a one; if not, it's a zero. Eight pulses together make up one character.

If you want to use this technique to load a Model I program into the Color Computer, you don't have to do the work yourself: Special Projects manufactures "Magic Box," \$27.95, a cassette program which does this for you. It's very simple to use: load the program, plug the provided special cable into the right joystick port, plug the other end into the cassette player, put your Model I tape into the player, and start loading.

I've used it many times, and while it sometimes makes mistakes (putting blanks in strange locations), it's an improvement over typing the programs in by hand. Be sure to check ads for any other programs that may do this, as well.

Has anyone developed a football and basketball game for the Color Computer? I mean a real-to-life type game for each sport, with time clock, field goals, point after attempt, and a variety of offensive and defensive plays?

Also, is Radio Shack planning to produce a new 360-degree, heavy-

duty version of their joystick? I know Kraft makes one, but I'd like one for my Color Computer.

— S.D., Kansas City, MO

At this point I know of no such programs, and I don't know of anyone planning to do it. That doesn't mean it won't happen.

Yes, by now the new, heavy-duty Kraft joystick should be available in Radio Shack stores — stock number 26-3012, \$39.95 each.

Many thanks to R.C. Lake (August, 1983) for a useful Scripsit modification tip. I have two other problems which, I hope, running Scripsit from RAM might solve.

Is it possible, while running Scripsit, to momentarily return to Basic (to change printer font) and go back to Scripsit without losing text?

Can Scripsit be modified to get the program to print French characters (replacing standard keys such as !, @, #, and so forth)? Most of the letters I write are in French, and it makes for a rather unprofessional look to add the accents with a pen after printing.

- M.M., St-Bruno, Canada

That depends on how Basic interacts with the RAM-based Scripsit. If, when you exit Scripsit, Basic doesn't overwrite anything in the text file, you should be able to return to Scripsit with the file intact. The difficulty would be in avoiding the cold-start address to Scripsit, which assumes the text buffer is empty and resets all the pointers to zero. Has anyone solved this problem?

As far as printing French characters is concerned, you have two choices: either write your own keyboard scan routine that intercepts the Scripsit routine before it sends the characters to the text file buffer and replaces the appropriate keys

with the characters you want to use, or write a printer patch to translate those standard characters you can do without into the French characters your printer uses. Adding to Lake's modification to accomplish this shouldn't be too hard. Either way, you'll have to remember which characters on the display go with each new French character on the printer.

I'm looking for a reasonably priced Pascal for my 32K non-disk Color Computer. I know of one company with Pascal for the Color Computer, but would like to compare it to others before buying. Surely other companies besides Computerware write Pascal for the Color Computer.

-J.B., Sturgis, MI

Who can I contact about obtaining a version of Pascal for my Color Computer? Try as I might, I can't find anyone who knows where I can look.

— J.S., Norfolk, VA

There are only two companies marketing Pascal directly for the Color Computer (Computerware, 1472 Encinitas Blvd., Encinitas, CA 92024, 714-436-3512 and Deft Systems, Inc., POB 359, Damascus, MD 20872, 800-368-3238), several companies have Pascal for the OS/9 and Flex operating systems.

If you have the OS/9 disk operating system, contact Computerware (address above), Frank Hogg Laboratory (130 Midtown Plaza, Syracuse, NY 13210, 315-474-7856), Microware Systems Inc. (5835 Grand Avenue, Des Moines, IA 50312, 515-279-8844), and OmegaSoft (P.O. Box 70265, Sunnyvale, CA 94086, 408-733-6979) for prices and specific Pascal abilities.

If you have Flex, contact Computerware, Frank Hogg Laboratory, Omega-Soft, and Technical Systems Consultants (1208 Kent Ave., P.O. Box 2570, West Lafayette, IN 47906, 317-463-2502) for prices and specific Pascal abilities.

Unfortunately, all the current versions of Pascal I know of require a disk system, with 64K RAM preferred (usually required).

If I find any other sources, I'll let you know. And be sure to keep an eye on the ad pages for new additions.

After installing eight 64K Motorola chips on my F-board Color Computer, I'm experiencing some RFI while the TV in the other room is clear, even when switched to computer. Do you know of a solution?

- J.B., San Francisco, CA



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Sounds like the RF shield isn't securely attached to the circuit board. First, visually inspect the metal shield surrounding the SAM and RAM chips to see if it is securely soldered to the circuit board's ground line. The metal cover should fit tightly over the edge of the shield. If it's loose, solder one end of a wire to the cover, the other end to the shield.

Finally, check the RF modulator for good connections to the circuit board. With any loose connections, you could have RFI problems here, especially if the cable to the TV isn't properly grounded to the computer. Similarly, check the modulator box on your TV. I once had severe RFI problems with my computer and couldn't cure the trouble until I replaced the box on the TV (one of the wires to the UHF screws on the TV was worn through and not making good contact).

Do you know any good screen dump programs for the DMP-120 printer? - L.W., Syracuse, IN

The only one I know of is "Screen Print Routine," \$19.95, sold by Tom Mix Software (3424 College N.E., Grand Rapids, MI 49505, 616-364-4791). It will send whatever is on your video to an Epson,

Microline, or Radio Shack DMP printer. Positive and reverse formats are available, as are horizontal, vertical, small, large, left, right, and center of page layouts. As always, keep an eye on ads for other sources.

My Color Computer won't save any programs to tape and I don't have disk drives. I do know that: the large black plug works; the small grey plug works; the hole that the large grey plug goes into works, because the recorder records with the mike plugged in; and the recorder starts when I type CSAVE. I think either the computer isn't working or the output isn't getting through the cord. Please help!

-B.H., Franklin, PA

Before blaming the computer, make sure you're doing everything right. If you aren't using a CCR-81, borrow one. Put the black plug into the cassette EAR jack. Put the small grey plug into the REM jack. Put the large grey plug into the AUX jack.

Now type in a short program and put a blank tape in the recorder. Press the record and play buttons down at the same time. Type CSAVE. When the recorder stops, unplug all plugs and rewind the tape. Now press the play button. You should hear the program as it was stored on the tape (make sure the volume is set at five). If you do hear the program, put the plugs back in, rewind the tape, and try to CLOAD the program. Keep playing with the volume until the program loads.

If you didn't hear anything on the tape, repeat these steps with a different tape recorder; yours could be bad. If neither tape recorders record, the problem could be either your computer or the cassette cords. Radio Shack sells new cords (26-1207, \$5.95). Buy a new one, or borrow one from a friend, and repeat the above procedures. If you still can't hear anything on the tape recorders, the problem is definitely with your computer; take it in for repairs.

With a monitor is it possible to have a 64 by 24 screen without wraparound?

-C.M., Cut Off, LA

Yes, but you won't be able to read the characters. The Motorola VDG chip determines video resolution, which is limited to 256 dots across the screen and

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192 dots down. Each character is composed of a box of these dots. In standard Radio Shack format of 32 by 16, each box is eight dots wide and 12 dots high. Three dots of width and five dots of height separate characters, leaving five by seven dot characters.

With 64 characters across the screen and 24 lines down, the box is four dots wide and eight dots high. Using one dot to separate them leaves characters three dots wide and seven high. While the height is enough for defining a character, the width is insufficient for legibility.

If you can make do with a screen size of 42 by 24, there's a hardware box that delivers this without eating up any of your computer's RAM. Computer Systems Distributors (P.O. Box 9769, Anaheim, CA 92802, 714-772-1390) sells ColorMate, an expansion box that plugs into the ROMpak port, for \$495. It has another ROMpak port built in so you can still use your other ROMpaks without unplugging ColorMate.

I recently purchased a spooler program for my 64K Color Computer (I upgraded it myself). The instructions for a 64K computer say to type EXEC 3589, then says "WARNING! If you

have 64K and you are running your Basic in RAM, ... if you type EXEC 3569, your Basic will crash." Does this apply to me?

-P.C., Pasadena, CA

Some people copy the ROM into low RAM, switch the upper 32K bank of RAM in place of the ROM, then copy the ROM from low RAM to high RAM. This gives them the chance to play with and modify Basic and to put data or programs in the highest 16K RAM bank above the ROM, which is usually reserved for ROMpaks.

Since you aren't doing this, the warning doesn't apply to you. For a list of some programs that will let you do this, see the June, 1983 DEFUSR column.

The Radio Shack catalog lists a new Color Computer keyboard. How does it compare with other keyboards mentioned in your magazine? Also, are there any incompatibility problems in connecting a Color 2 disk to an old "grey" Color Computer?

Sears' catalog lists an interface box and connector cable for their Communicator 3 electronic typewriter, which interfaces to Model I and III computers. Can I hook one up to my Color Computer? My wife and daughter want a new typewriter and I'd like a letter quality printer.

— D.B., Albany, OR

Radio Shack's replacement keyboard is the same used on their new Color Computer 2, — not a full-travel standard keyboard, but an improvement over the previous chiclet keyboard. Some people don't like the feel of the new keyboard, preferring standard keyboards advertised in our magazine. The advantage of the Radio Shack keyboard is price. I advise you to go to your local Radio Shack and play with the Color Computer 2 keyboard for awhile and see if you like the way it operates. If you don't, then get one of the standard keyboards.

The new Color 2 disk ROMpak is totally incompatible with the old Color Computer even though the drives may be switched (they're identical except for the exterior cosmetics).

The Sears interface works with parallel port computers and can't be used with the Color Computer unless you buy a serial-to-parallel printer converter box, which increases the price by \$70 to \$80.

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D.S., Kentucky

. . You might care to know that this order is repeat business. Recently, I purchased a NEC monitor package from your firm and I was very pleased with your fast service, the quality of merchandise and the ease of set-up.

Thanks again. Looking forward to doing more business with you in the future.

M.S., California

. I used the Skyline 64K Memory Upgrade Kit to improve my "D" board 16K Extended CoCo to its full potential. Since I get three of the four CoCo oriented magazines and borrow the fourth from a friend, I have seen all of the published 64K upgrade methods. None was as simple as the one provided by Skyline with its memory chips . . . had the upgrade up and running in half an hour.

H.G., Virginia

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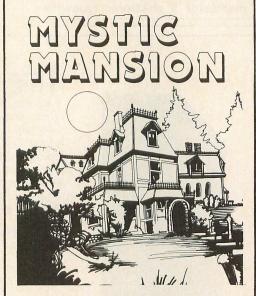
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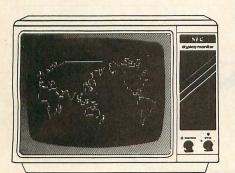
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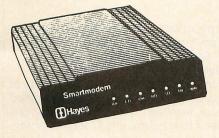
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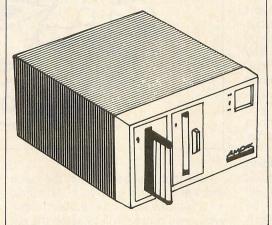
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by Dr. Paul Kimmelman

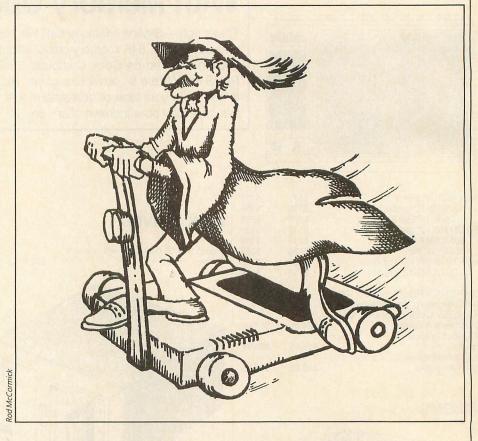
S SPRING WEATHER BEGINS to arrive and the year-end school bells start to ring, thoughts of summer vacation emerge. Students are happy with no more homework, and parents feel frustrated, wondering how the young ones should be entertained over the summer. One source for summer escape is the increasingly popular "computer camp."

The computer camp comes in all different shapes and sizes. Some are homes away from home, others day-long adventures, and some just a few short hours of respite from the often tedious summer boredom. You can find camps run by entrepreneurs (who may or may not be looking for a "fast buck"), colleges and universities with well-planned programs, computer enthusiasts wanting to share their excitement, and yes, even Radio Shack with its well-planned and successful computer workshop for Color Computer users.

Where should you send your budding computer enthusiast? What features should you look for? How much should you spend? These questions must be considered carefully when deciding if computer camp is for your child.

The newspapers and magazines are full of ads claiming their camp will perform wonders for your child. Remember the basketball camp that would make your ten-year-old a Larry Bird? Enough for unfounded claims. A computer camp should help fulfill your child's needs and interests.

Step one should be a visit to the camp and a talk with the director or instructor. Whether the camp costs \$50 or \$500, it is going to be responsible for your most precious possession, your child. Sending your child to a poorly run camp will be a horrible experience and will more than likely destroy any interest your child had in computers, not to mention his or her computing potential.



Now that you have visited the camp and see that it meets your standards, what features are most important? Obviously, your budget will establish the parameters: camp costs vary depending on their type. You can send your child to a camp far away from home which will provide not only computer training but those evil moonlight camp stories, as well. If this type of camping experience interests you, then add costs for transportation, food, and lodging.

For those on a limited budget, opportunities should abound in your own town or city. If you are fortunate enough to live near a university or college, rest assured that summer computer opportunities for children exist. I tend to favor the university setting because it offers your child exposure to the world of higher education, and we all tend to hope our children will end up there, right? Usually the college program is run by enthusiastic col-

lege students earning their future tuition, along with their professors.

Some local camps have also emerged. Like the college camps they can be well-run and designed to meet the needs of your child. A big caution flag is raised here, however. The word computer carries a magical mystique for parents who believe it to be an educational panacea for their child. There are camps that play on the needs of parents who are willing to spend hard-earned cash to provide oppportunities for their children that local schools haven't met. To be certain, visit the camp, talk to the teachers, and ask to see the curriculum — not a bad practice for any of the camps.

Finally, there is our trusted old standby, Radio Shack. Not one to be outdone, the Tandy people have developed their own version of a computer camp.

We'll explore the Radio Shack Computer Camp curriculum later, but for

now let's continue to look at camp features that are very important. Now that we have talked to the director and visited the camp, what's next?

A Camp For Who?

Is the camp really for your child, or are you forcing the experience on him? Don't! How does your child feel about going to camp? Does he show interest in programming activities a la Logo, or does he seem to prefer computer-assist-

ed instructional programs?

Is the length of the camp program suitable? Don't expect your ten-year old to sit for a day with no diversion activities. Some camps offer swimming or recreational activities for the young camper. If the camp lasts for more than three hours, for example, your child will need a pause. Some of the recreational activities may include computer games. Don't be afraid of games — a good blend of computer experiences can make the day more fun and keep your child enthused. Who said learning shouldn't be fun, anyway?

Bear in mind that recreational activities should be used for camps of longer duration. A camp that lasts for only a couple of hours daily should get straight to the lesson and remain "on task" full time, but for all-day camps, swimming or vol-

levball is a pleasant relief.

Now look at staffing. One qualified teacher will be able to work well with a small group, but not with a group of, say, 50. While there is no perfect studentteacher ratio, I suggest a range of one staff member to every 10 or 15 students. Excited children don't like to wait very long for answers to their questions, or for teacher to see their newly created proiects.

In many instances there will be a teacher who has assistants to help the students. No problem, but be sure there are enough qualified supervisors for the number of students enrolled. Be sure to ask how many children can be enrolled? Don't stand for "padding" the enrollment unless proper arrangements are made, like more computers, more staff, and more room.

A computer camp should, obviously, have enough computers. Everyone has their own opinion concerning how many computers there should be per student. I suggest no more than two children per computer. In fact, I prefer two per computer because it allows children to share their thoughts as well as their excitement. Doesn't one student per computer seem somewhat lonely?

I also believe that every child should have an opportunity to spend some individual time at the computer. Every student needs some individual time to review the lessons and do some homework. This type of time can be scheduled before camp begins, during breaks, and after camp ends each day.

When looking at the curriculum, check to see if it is common to your child's needs. A Logo camp has everyone working on Logo, for example. I would be leery of a camp that enrolls 25 students and teaches Logo, Basic and Pascal. Those languages span a variety of ability levels, and too much is being done for one group. Look for camps that meet a com-

Chances are you use the Color Computer, so try to find a camp that has at the least some Color Computers. It isn't essential to have Color Computers, but children find security in a familiar environment. Putting your little Color Computer user on an IBM may be a little frightening. Don't be afraid to ask if Color Computers are available. Some camps use a variety of brands.

Finally, what curriculum material will be available at the conclusion of the camps? Is there a textbook? Will instruction sheets be given to the camper during camp? After camp you will want your child to be able to apply the material that was learned. Does the instructor provide suggestions for future use of the camp curriculum? Will a future camp be available for those campers who want advanced lessons? Camp won't be useful if all it does is babysit for your child.

Now that we have looked at the different types of camps and explored some important features, let's find out what a Radio Shack Camp will teach your young-

Radio Shack Camp

The Radio Shack computer camp program was developed by the Radio Shack Computer Training Programs department. What is the most significant advantage of the Radio Shack camp? Your child will be working on the Color Computer, taught by Color Computer-trained instructors, and working with a wellwritten Color Computer curriculum. Radio Shack Computer Centers offer their computer camp programs for children at convenient times, during school breaks and summer, for example.

Each instructor works from a comprehensive manual which is accompanied by overhead projections. Using overhead

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projections is particularly important, because it includes visual presentations along with the lecture. Not every student learns best by hearing the lesson, so being able to see what is going on is good teaching strategy. Students also spend plenty of time working on the computer, doing hands-on activities so the blending of activities is very good. What the manual can't do is teach, so once again be sure to meet the teacher before enrolling.

Each camper is given a manual which he can keep when camp is over: no more excuses for not showing mom and dad how to play music or change colors with

the Color Computer!

There are two different camps offered by Radio Shack for their Color Computer enthusiast. Both camps were designed for beginners, and particularly for students from 12 - 15 years of age. One camp is specifically for Logo instruction; the other for beginning Color Computer operators. The operator's class also includes a unit on Logo. Each camp lasts two hours per day for five days.

The philosophy of the Color Computer Operators Camp is to provide students who have little or no previous computer experience with a background of computer history, operational skills, and an introduction to Basic and Logo. Your child won't leave the camp an expert, but perhaps he will be enthusiastic enough to pursue the hobby. Maybe he will even write programs whose sales will help

support you forever!

Enough dreaming. Let's get back to the operator's class. The camp opens with Radio Shack's software package, "Pioneers in Technology." This presentation gives each camper some background on the history of computers (why do we even need or use computers in our society?).

Following the history of computers, Basic programming is taught. The objectives of the lesson are to explain the meaning of the term Basic, sounds, writing programs that ask questions, counting programs, editing, and changing screen colors.

Camp Secrets

While not divulging camp secrets, can you program your Color Computer to make all the possible sounds? One hint: start at 1. Once you reach the highest note can you bring it back to 1? Get creative — now skip a note or two.

Maybe you aren't an executive secretary and your typing skills leave a little to be desired. What happens when you make a mistake? If you can edit, the problem can be eliminated. Perhaps whole lines need to be eliminated. Campers will learn preliminary editing tech-

Learning about PCLEAR, PCLS, PMODE, Screen, Color Sets, Line, Circle, and Paint are all part of the graphics lesson. Be careful: what you learn at camp may not work at home if your computer doesn't have Extended Basic. Some subroutines, string packing, and animation are also offered during the graphics lesson.

Logo, Too

Now that you know how to make a circle, paint a letter, and get some extra memory for those fancy graphics, what's next? You guessed it: Logo. You thought your child was ready to conquer the computer world, and now they start a whole new unit with another computer lan-

quage.

Logo is an important addition for the Color Computer arsenal. If there was any software that firmly established the Color Computer for educational use, Logo was it. The Logo camp lessons will teach your child about the four modes in Logo, and how to enter and run a Logo procedure. Programming opportunities in Logo are really unlimited, and creativity can produce some exciting programs. If your child's interest is captured, there is a camp devoted to Logo instruction

As noted earlier, the Radio Shack camps are for the novice Color Computer user. Computer Center Manager Bill Farkas (Fairlawn, Ohio) offers some final thoughts for parents of campers: "Try to be supportive of your child's interests." Computers play an important role in our society and children are literally growing up with them.

Farkas also suggests that parents look at some of the books offered by Radio Shack, particularly the Parents Guide To Logo. "Family computing can be a healthy and happy activity," according to Farkas.

Summer really doesn't have to be a long, boring break from school. In fact, it can be a continuation of some pretty exciting learning opportunities. Computer camps can offer those experiences. They can run for several hours to several weeks and cost from \$50 to \$500. They can train beginners to experts. Who knows, maybe camp experiences will find your child publishing some very special Color Computer programs.

Happy camping!

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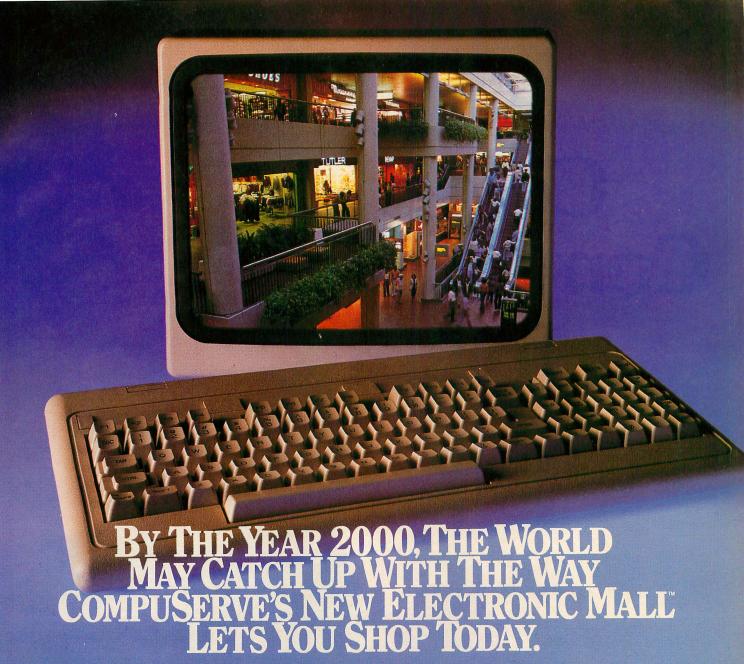
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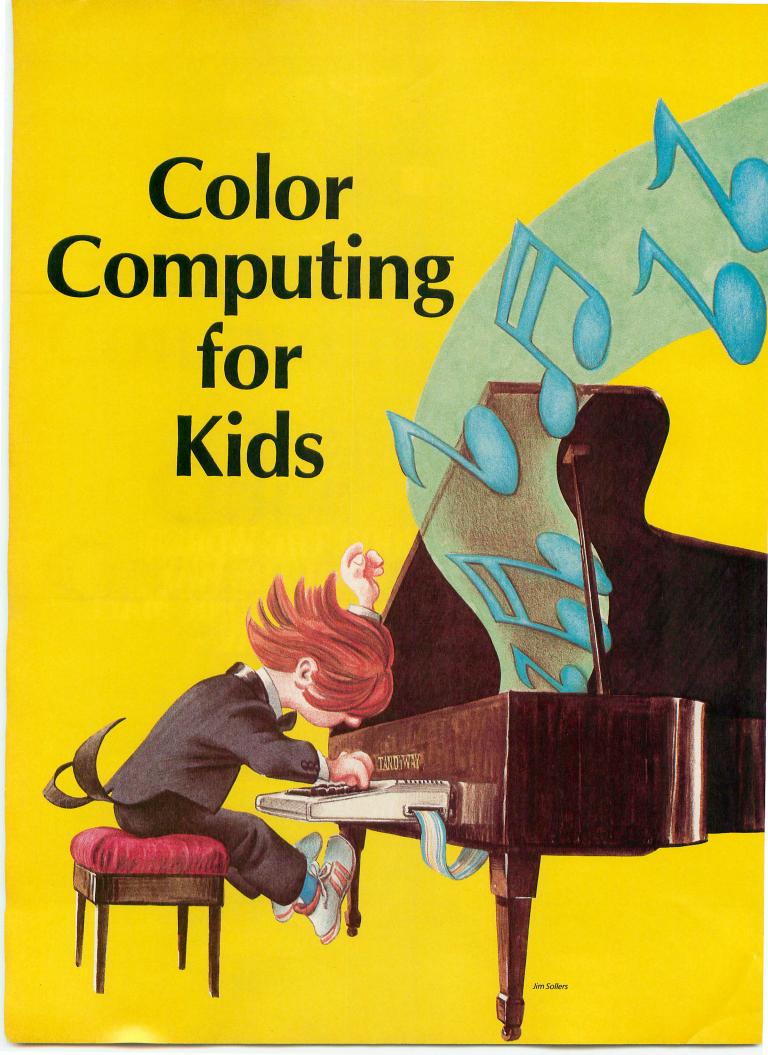
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INKEY\$, a Father's Day gift, and playing your computer like a piano!

by Jean Plesser

AST MONTH WE SURPRISED and delighted some special Moms with electronic greeting cards. This month it's Dad's turn (Father's Day is June 17), and we have a great surprise for him! No, not another greeting card — you can now do that on your own. We're going to challenge Dad with a keyboard match-up game!

to challenge Dad with a keyboard match-up game!
Is Dad an "expert," "so-so," or a "beginning" typist? How about you?
"Keyboard Match-up" offers three skill levels and everyone can work up to expert with practice. It's a fun game the whole family can enjoy, so after you wrap it up for Dad's day, line up and try your own reflexes and knowledge of the keyboard. Bet your typing will get better!

knowledge of the keyboard. Bet your typing will get better!
Before we get to "Keyboard Match-up" we have a few things to learn.
This month we're going to play with INKEY\$.

INKEY\$ (say "Inkey string") is a Color Basic command that tells your computer to check the keyboard and to store as a variable whatever key is pressed. The variable is always a string variable, so the data is always string data. The format is: 10 I\$=INKEY\$. (The variable's letter can be any that you choose.)

In a program, the INKEY\$ command line is read only one time (the computer does not wait for you to respond like it does with an INPUT statement). If you had not pressed a key when the computer read the INKEY\$ line, the variable would simply contain no character at all ("") and the computer would look for more instructions. Use this line to tell the computer that you want something other than nothing.

20 IF I\$="" GOTO 10

Now the computer will keep going back to Line 10 until you press a key. The INKEY\$ statement does not print anything on the screen (INPUT prints a question mark), so you must always add a PRINT statement to let the *user* know what to do. The user is whoever is using your program — it may not always be you!

INKEY\$ vs INPUT

I've mentioned two differences between the INKEY\$ and INPUT statements:

INKEY\$ does not wait for a response from the keyboard before going on to the next statement. INPUT waits for you to press the Enter key.

• INKEY\$ does not print anything on the screen. A separate PRINT statement must be used. INPUT prints a question mark on the screen, and a PRINT message can be included in the statement.

Let's use two short programs to demonstrate these differences, first as an INPUT program, then an INKEY\$ program.

10 CLS

20 PRINT65, "PRESS A KEY THEN PRESS <ENTER> "

30 INPUT K\$

40 PRINT:PRINT"YOU PRESSED- - >";K\$

50 GOTO 20

You must press the Break key to stop this program and the one that follows; they each enter an endless loop. When you have seen the above program run long enough to remember it, type NEW and enter this program:

10 CLS 20 PRINT@65,"PRESS A KEY" 30 K\$=INKEY\$
40 IF K\$=" "GOTO 30
50 PRINT:PRINT"YOU PRESSED - - >"K\$
60 GOTO 20

I think you'll agree that the INKEY\$ program was faster and more efficient, and it may have seemed like more fun because the computer response was immediate.

To INKEY\$ Or Not To INKEY\$

There are two other important differences between INKEY\$ and INPUT that will help you determine which statement to use:

- An INKEY\$ variable will hold only one character at a time, while an INPUT variable will hold up to 255 characters. When you ran the test programs you became aware of this: the INKEY\$ program responded as soon as you pressed a key, but the INPUT program waited until you pressed Enter. If you use INKEY\$ and want to collect keyboard responses, they can be added together in one variable (TK\$ = TK\$ + K\$), but we will not be doing that in this lesson.
- The other difference is that INKEY\$ responses are stored only as string data. This means that numbers would not have a numeric value. But there is a way in Basic to find the value of a number stored as a string. The function is: V = VAL(K\$). This statement tells the computer that V is to equal the VALue of K\$. The next program will put the Value function to work.

INKEY-A-Tune

Program Listing 1 will turn the numbered keys on your computer's keyboard into a piano keyboard. The results may be quite different from a baby grand piano, but remember you're not playing a baby grand. You're playing a computer, and as computers go, ours sounds pretty terrific!

I think you'll have fun with "Inkey-A-Tune" as well as learn a few programming tricks. Here's a line-by-line explanation:

Line 10 is a Remark statement that names my program.

Line 20 clears the screen and prints the title at screen location 43.

Lines 30 – 50 print the numbers to press and the notes they will play. This is a user message that helps the user understand the program.

Line 60 prints a message that tells the user that the notes played will be printed on the screen.

Line 70 will print a space at screen location 352, and the semicolon tells the computer to stay on the same line to print whatever follows. This is a way of printing all the notes that are played right across the screen, starting at location 353. The printing is done later in a loop.

Line 80 assigns whatever key is pressed (INKEY\$) to the variable M\$. A second statement on the same line keeps the computer here until a key has been pressed and M\$ equals a character.

Line 90 is an example of the Value function we talked about. We are using the numbers on the keyboard for a purpose, and their number value is important to the program. For example, if M\$ = "5" the 5 is only a character to the computer — it has no numeric value: it is string data. The Value command gives the number in a string variable a numeric value, and a numeric variable will then hold the value N = 5.

Line 95 is a test statement using the operators < (less than) and > (greater than). Because we are using only eight notes, numbered from one to eight, a keyboard response that is out of this range is an error. The test statement simply sets N to one whenever an error occurs. If this line were omitted from the program, and N were to contain a larger number, we would get an OD ERROR message. This is the computer's way of telling us we ran out of data — we only have eight sets of data to read.

Line 100 begins a For/Next loop that will repeat whatever number of times N equals. This loop will read data until L = N. The data found at that point is then used by the program.

Line 110 sends the computer to the data statements to read one piece of string data (N\$) and one piece of numeric data (T). The second statement on this line tells the computer to go back to Line 100 until L = N.

Line 120 prints the contents of N\$ on the screen at the location designated. Remember the semicolon (;)? Continued use of the semicolon prints the notes on one continuous line. The next statement on this line is the SOUND command, and the contents of T are being used for the *tone* portion of this command. The number five is used for the *duration* (length) of the sound, or note.

Line 130 resets the data pointer to the beginning of the data statements. The program then returns to Line 80 and begins again. If we didn't use the command RESTORE, we would get another OD ERROR message when the program repeated and ran out of data to read.

"Inkey-A-Tune" will continue running until you press the Break key. You can

play simple tunes, and if you make up one that you like, you can play it again because the notes you have played are printed on the screen for you.

Keyboard Match-Up

Program Listing 2 is a keyboard skill game that will make a great Father's Day gift for the special Dad in your life. "Keyboard Match-up" is fun, requires skill, and teaches letter placement.

As always, you may want to get help typing it in or do your typing in short session, the CLOAD what you've saved when you're ready to type some more, CSAVE that session's work, and so on. work, and so on.

I've added a few new routines to this program so I'll first list the variables, then explain "Keyboard Match-up."

The variables:

I\$ = INKEY\$ (keyboard response).

S = the skill level time allowed.

R = a random number used to control a loop that reads data.

L\$ = the letter attained by the "random number read loop."

TM = the total number of matches, or games.

T =the time allowed in each skill level.

TC = the total number of correct matches made.

Lines 20 through 80 print a *menu* on the screen. A menu is used to tell the user what the program offers and give a selection. In this case the user will select a skill level. The skill level is selected by pressing 1, 2, or 3; all other keys are ignored.

Lines 90 through 100 examine the contents of I\$, assign skill values to S and GOTO to the appropriate routine.

Lines 110 through 130 simply keep the game from starting until the user is ready to play. The user indicates he's ready by pressing any key.

Lines 140 through 180 print out the game screen.

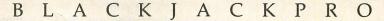
Line 200 selects a random number for the variable R, that will be no greater than 26

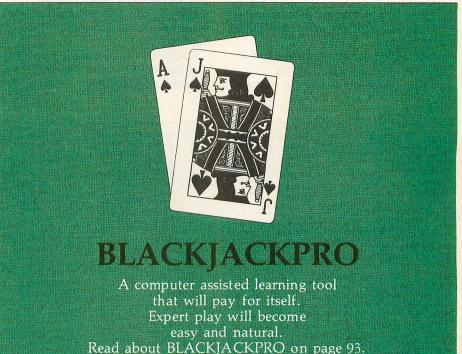
Line 210 uses the value of R to read "R" number of data statements. This results in a random letter (L\$) that will be used in the game.

Line 230 adds one to the total match counter and makes T equal to the value of S.

Line 240 prints the random letter that the user must match.

Lines 250 through 290 create a sound and a time countdown until a key is pressed or time runs out.





SKILLWARE

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Line 300 prints the contents of K\$.

Line 310 examines L\$ for a correct match.

Line 330 is an incorrect match routine. Lines 350 and 360 are for an "out of time" routine.

Line 380 is a correct routine and the total correct counter is added to.

Lines 390 through 460 are executed

after any one of the above routines. Totals are printed on the screen and a replay routine using INKEY\$ is done.

Lines 470 through 490 are the data the letters of the alphabet that are randomly selected.

Summer is the time to live it up a little, and the INKEY\$ command can liven up your old programs. Also, use these ideas to create new and fun programs on some of your quiet, lazy summer afternoons.

We're going to take a break from programming next month and talk about software — how it's made and why we should protect it from modern-day pirates! See you then and have a happy last day of school!

TAPE

Program Listing 1. A Piano Keyboard



4K Color Basic

10 REM--INKEY A TUNE--

20 CLS: PRINT@43, "KEYBOARD FUN"

30 PRINT@98, "THE NUMBERS TO PRES

S FOR EACH NOTE ARE: " 40 PRINT@196, "1=C 3=E2=D4=F "

50 PRINT@260, "5=G 7 = B6 = A

60 PRINT@320, "THE NOTES YOU HAVE PLAYED ARE:

70 PRINT@352,;

80 M\$=INKEY\$:IF M\$="" THEN 80

90 N=VAL(M\$)

95 IF N<1 THEN N=1 ELSE IF N>8 T HEN N=1

100 FOR L=1 TO N

110 READ N\$,T: NEXT L

120 PRINT NS;: SOUND T,5

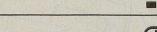
130 RESTORE: GOTO 80

140 DATA C,89,D,108,E,125,F,133

150 DATAG, 147, A, 159, B, 170, C, 176

Program Listing 2.

Keyboard Match-Up





4K Color Basic

10 REM---KEYBOARD MATCH-UP---

20 REM--SKILL MENU--

30 CLS:PRINT@37, **KEYBOARD MATCH GAME**

40 PRINT@106, "SKILL LEVELS:"

50 PRINT@171,"1 = EXPERT"
60 PRINT@235,"2 = SO-SO"

70 PRINT@299, "3 = BEGINNER"

80 PRINT@417, "SELECT A NUMBER--"

90 I\$=INKEY\$: IF I\$="" THEN 80 100 IFI\$="1"THEN S=10 ELSE IFI\$=

"2" THEN S=15 ELSE IF I\$="3" THE

N S=30 ELSE 80

110 CLS: REM--GET READY--

120 PRINT@229, "PRESS ANY KEY TO BEGIN"

130 I\$=INKEY\$: IF I\$="" THEN120

140 REM--GAME SCREEN--

150 CLS:PRINT@65, "THE LETTER TO MATCH BEFORE THE"

160 PRINT@131, "TIME RUNS OUT IS--->"

170 PRINT@204, "TIME = "

180 PRINT@262, "YOUR RESPONSE--->

190 REM---SET-UP VALUES--

200 R = RND(26)

210 FOR X=1 TO R:READ L\$:NEXT X

220 REM--GAME ROUTINE--

230 TM=TM+1: T=S

240 PRINT@152,L\$

250 I\$=INKEY\$

260 SOUND1,1: T=T-1

270 PRINT@211,T

280 IF T=0 THEN 340

290 IFI\$="" THEN 250

300 PRINT@280, I\$

310 IF I\$=L\$ THEN 370

320 REM---INCORRECT ROUTINE-

330 SOUND100,5: GOTO 390

340 REM--OUT OF TIME ROUTINE--

350 SOUND 50,10: PRINT@262, *****

OUT OF TIME***

360 GOTO 390

370 REM---CORRECT ROUTINE---

380 SOUND 200,5: TC=TC+1

390 REM--TOTALS--

400 PRINT@352, "CORRECT MATCHES =

410 PRINT@384, "TOTAL MATCHES ="; TM

420 REM---REPLAY ROUTINE--

430 PRINT@448, "PLAY AGAIN (Y/N)?

440 I\$=INKEY\$:IF I\$="" THEN 440

450 IF I\$="Y"THEN 460 ELSE IF I\$

="N" THEN END ELSE 440

460 RESTORE: GOTO 150

470 DATA A,B,C,D,E,F,G,H,I,J,K

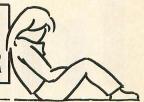
480 DATA L, M, N, O, P, Q, R, S, T, U, V

490 DATA W, X, Y, Z

TAPER



DON'T LET YOUR KIDS GO TO SEED THIS SUMMER



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EDUCATION



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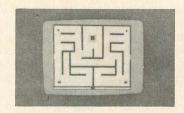
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Internal Modem

Reducing wire confusion

S MY COLOR COMPUTER system grew over the years, I began to realize that I was spending more time being a "boy scout" than I spent programming. After staring at my hopeless tangle of cables, I decided to remove a little clutter. The fact that Radio Shack's videotext machine has a built-in modem, and yet uses the Color Computer case, inspired me to install my modem inside my machine.

After opening my Radio Shack Modem I, I discovered that the circuit board inside is smaller than the case and reasonably flat. A quick measurement of the board revealed that it would fit over the RFI shield inside the computer, with some modifications to the board and the computer case.

If you attempt the following modification you will have to modify the modem and soldering experience is a must. Experience with switches and LEDs is also helpful, but is not absolutely necessary. This modification will also void the warranty on the modem and the computer.

Method

First remove the four screws located on the bottom of the modem. Remove the top cover and you will see the circuit board inside. There are four more screws on the circuit board, attaching it to the bottom half of the case. These must be removed as well. The circuit board should now be free and you may remove it from the case.

To control the modem, the answer/ originate and power toggle switch must be removed. If you are sure this will be a permanent modification, you may take a small pair of wire cutters and carefully cut each terminal of the toggle switch. by M.K. Marston

Try to cut each post as close to the switch case as possible. This becomes a place to solder future wires. If you think you may decide to return the modem to its original state, you will have to remove the switch by carefully heating each terminal, and remove the solder with solder wick or a similar product. Gently break each terminal loose with a small screwdriver and remove the switch. Using a pair of wire cutters, cut each pin of the LEDs on the modem board as close to the base of the LED as possible, leaving as much as possible of the pin on the board (again, for a place to solder the new wires).

You will need two DPDT micro-miniature toggle switches to replace the one you have just removed. Solder a four-

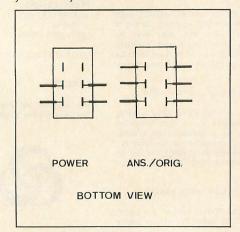


Figure 1. Switch Terminals

teen-inch piece of wire to each terminal on one of the switches. Solder a fourteen-inch piece of wire to all but the top two terminals on the other switch (see Figure 1).

You will also need two LEDs (any of Radio Shack's will work fine). Solder a sixteen-inch piece of wire to each pin on the LED. Be sure to insulate each pin on the LED with electrical tape to prevent shorting.

On the modem circuit board you may either solder four eight-inch pieces of wire to the back of the RS-232 jack, or you may remove the jack, as described with the toggle switch above, and solder the wires directly to the board. If you solder the wires to the back of the jack, add a little solder to each terminal first and then tin each wire. This will ease soldering

Some modifications to the computer case must now be made. First remove the six screws on the bottom of the computer. The top of the case should be free. Four holes are needed to accommodate the two switches and the two LEDs: the area to the right of the logo, just above the keyboard, is a good place. Drill two holes, four inches from the right side of the case and 1/8 inches up from the black area surrounding the keyboard. The holes should be side by side, about an inch apart. The two DPDT switches will be mounted here. Just above each switch, on the curve in the case, drill two more holes. These are for the two LEDs (see Figure 2). After drilling the holes, mount the switches and LEDs. The switch with the two empty top terminals goes in the left hole.

The plastic post in the middle of the RFI shield must be cut at the shoulder (Figure 3) so the modem circuit board may rest on it. After trimming the post, place a piece of double-sided foam tape on the top of the post to prevent any remaining sharp edges from damaging the underside of the circuit board.

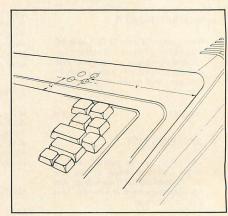


Figure 2. Hole locations for Switches and LEDs.



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is simply a very good, and very fun to play game. It has everything going for it: The challenge of trivia, ease of use, a good social game encouraging conversation, and you may even learn something! The development system (included) even lets you easily create your own custom question disks.

The play of the game is easy to understand, because the computer does all the work for you. It even looks up and presents the proper question!

On each question disk there are five categories, and there are an amazing 1100 questions on each disk. No, that's not a misprint, we said 1100 questions per question disk! Yes, that is a pretty full disk. Because the questions are stored on the disk, instead of in memory, you can play COLOR DISK TRIVIA on any size Color Computer system with one disk drive — 16K, 32K, or 64K.

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The game of **COLOR DISK TRIVIA** can be played by from 1 to 4 people (or teams), and you set the length of the game at the start when you decide how many questions must be answered in each category to win. The computer chooses the categories randomly, though sometimes it will let you choose the category for yourself (or let your opponents choose for you). Because of this category selection by the computer, a single category can often hold you up while one of your opponents slips by to win. The outcome is always in doubt, and no player is ever eliminated.

Trivia lovers will enjoy the fact that you can play without other people if you desire, because the computer will provide plenty of challenge. We want to emphasize that this is, first and foremost, a fun game.

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The Development System

Naturally, in order for our programmers to type in thousands of questions easily and accurately, a good development program to create the question disks had to be written, and we include this program with the game at no additional charge!

The program is all menu-driven and very user-friendly. That means that no knowledge of programming is needed to use it. If you can turn on your computer and type, you're all set! Now sit back and imagine the educational possibilities.

Yes, our question disks have 1100 questions, but the game program will handle question disks having any number of questions from 5 up to a full disk of 1100, so a teacher can type in 50 or 100 questions and answers (the questions are multiple choice), and then the students can play the "game" and have a great time, while accidently picking up the lesson. Let the natural spirit of competition fuel the learning process.

The development program is very easy to use, and gives you options to add questions, change or delete a question, and print the questions and answers on the screen (or a printer, if you have one). You can develop a question disk and easily add questions to it any time you wish.

This program finally gives parents and teachers the opportunity to easily create a custom learning program for any level student, and if we keep it a secret, no-one need know it's more than a game.

TECHNICAL INFORMATION: COLOR DISK TRIVIA is a mixture of Machine Language and BASIC. It uses Fielded Direct Access Disk Files. COLOR DISK TRIVIA requires 16K and at least one disk drive.

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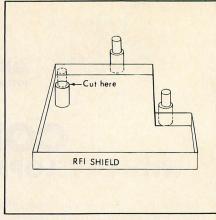


Figure 3. RFI Shield Post

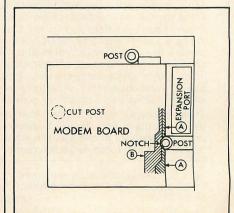
"Test fit" the circuit board by placing it in the computer, over the RFI shield. The back of the circuit board should be even with the back of the plastic frame surrounding the expansion port. There is a small shelf on the frame. This makes a good resting spot for the circuit board, and provides a place to secure it.

On the edge of the board, there is a screw hole. Mark the spot where the hole sits over the shelf. Make a small hole in the shelf at that spot. This will let you use one of the original screws to attach the board at that point. Insert the screw through the circuit board and partially tighten it in the hole on the plastic shelf. The circuit board should be loose enough to move.

Note where the right edge of the circuit board comes in contact with the plastic post at the right side of the RFI shield. Carefully cut a small notch in the circuit board at that point, to allow the board to sit squarely. Take extreme care not to damage any traces in that area (see Figure 4).

Now tighten the screw completely and press the circuit board down onto the foam tape that is covering the plastic post. Your modem is now mounted and ready to be hooked up.

Figure 4. Circuit Board Notch Location



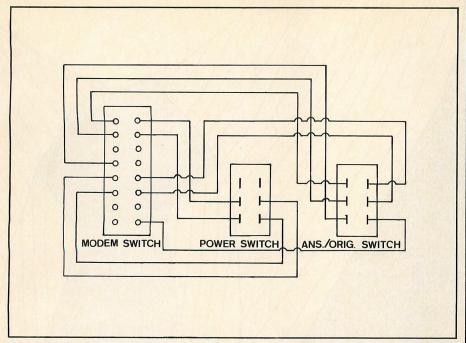


Figure 5. Switch to Modem Hook-up

Hooking Up

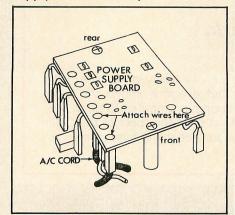
The four wires connecting the RS-232 will be connected first. Prepare the RS-232 jack in the computer in the same manner described above (adding solder to each terminal). The rightmost wire on the jack in the modem goes to the leftmost terminal on the jack in the computer. The wire second from the right in the modem goes to the terminal second from the left in the computer, and so on.

Place the case containing the switches and LEDs next to the computer so the wires will reach the modem board. Solder the wires from the LED on the left of the computer case to the two pins from the original LED on the modem. Be sure to observe that the polarity of the LED in the computer case matches the polarity printed next to the LED pins on the modem board. Information concerning the polarity of the LEDs you have installed in the computer case should be included on the package. No damage will result if they are installed backwards; they simply won't work, and you will have to reverse the leads. Be sure to insulate the connections on the modem board with electrical tape to prevent shorting. Refer to Figure 5 to hook up the switches to the modem board.

Now you need only connect the modem to the telephone lines and power source. The transformer is small enough to fit inside the computer next to the power supply. Solder an eight-inch piece of wire to each prong on the transformer and insulate with electrical tape. Solder

the other ends to the power supply board, as shown in Figure 6. Using electrical tape, secure the transformer to the black metal "fingers" of the heatsink next to the power supply. Coil up the excess cable and tape it, leaving enough cable to reach the power jack on the modem board. If you prefer, the transformer may be left external and the power cable may be run into the computer case through a small notch cut into the back of the case. Obtain a modular telephone extension cord and plug one end into the telephone jack on the modem board. Make a small notch in the back of the computer case and run the extension out the back of the case. Mark this cable "to telephone jack." Run the phone cable. already attached to the modem, through the notch as well. Mark this cable "to telephone."

Figure 6. Transformer to Power Supply Board Hook-up



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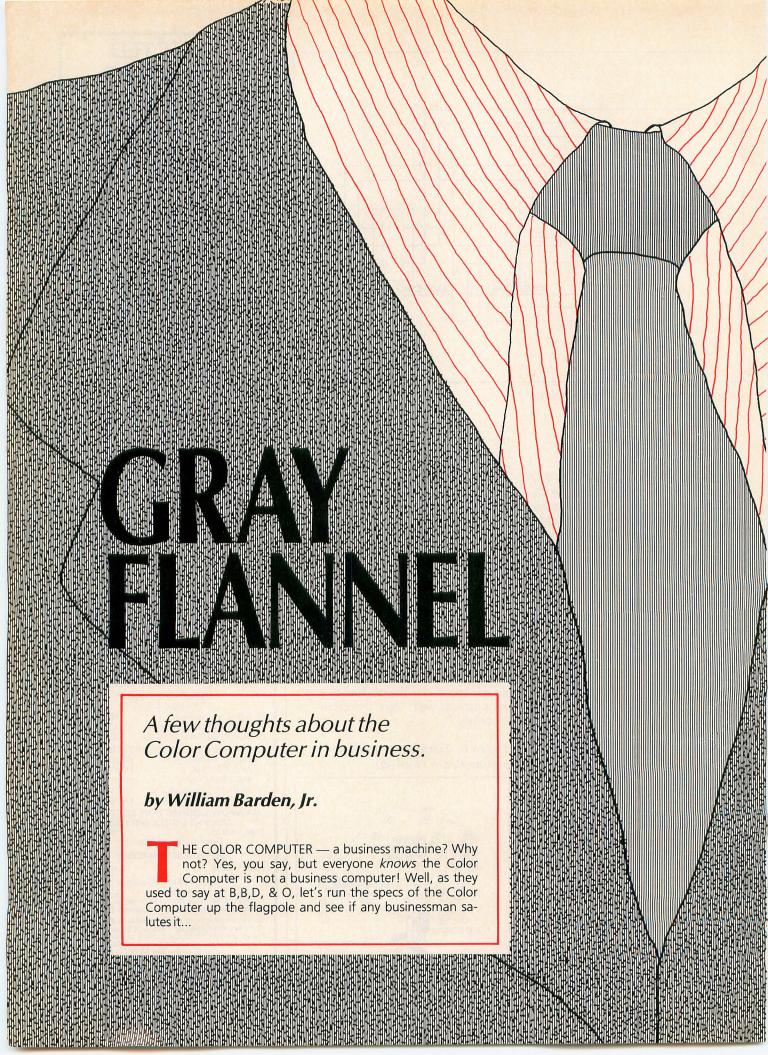
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What are the requirements of a business computer? They're changing rapidly. Ten years ago, small businesses would have killed for a system as versatile as a disk-based Color Computer to run accounting packages, inventory, and reports. Ten years from now, nobody will be able to understand how businesses were able to suffer along with the antiquated IBM PC.

At this point in time, a "business system" might be loosely defined as having these qualities:

- A large quantity of business applications software
- Lots of disk space
- A moderately high-speed printer for reports
- A good keyboard and display
- User friendliness

Does the Color Computer meet these qualifications?

Leaving the question of business applications software aside for the moment, look at the other criteria. The Color Computer has a moderate amount of disk space. You could, for example, add two drives and be up to 320K bytes of disk storage, and that's without having to use any disk space for the operating system, as on some systems. Add two more drives, and you've got 640K bytes. No hard disk

is available as yet, but you can store a lot of data even with two drives.

Now that Radio Shack makes their printers selectable for either parallel or serial interfacing, you can get some very nice printers for use on the Color Computer. A good example is the DMP-120 at 120 characters per second — a bargain at about \$500. Need 132 columns for those massive business reports? You've got the DMP-420 at about \$1000. Certainly there's no lack of any grade of printer for the Color Computer from Radio Shack — or add someone else's serial printer.

The new Color Computer keyboard is not as good as an IBM design, by any means, but it's perfectly adequate for extended typing. The display would admittedly be better at 64 or 80 characters per line, but 32 characters per line is workable.

As far as user friendliness goes, how can an office clerk be intimidated by the Color Computer? I'd certainly think the massive (in comparison) IBM PC would be much more imposing.

This brings us to business applications software for the Color Computer. It's one of those chicken/egg situations. The Color Computer has the user base to support more business packages, but software developers don't perceive it as

a business system. Because there isn't much in the way of business software, nobody considers using it as a business system.

Could the Color Computer function as a business system if there were more applications software? It's certainly a stateof-the-art system with its 6809 microprocessor and the powerful commands of Extended Basic. The disk storage, keyboard, and display are workable as well. When you consider that there are a significant number of people in Great Britain using the Sinclair ZX-81 (the British equivalent of the Timex//Sinclair TS1000 you see advertised for \$29.95) as a serious business system(!), I think it's safe to say the Color Computer is underrated as a potentially good system for small businesses! This especially applies to Mom and Pop operations that don't require and can't afford a Tandy 2000 or IBM PC with printer for \$5500. They can get a system that'll do a fine job at less than half the price — with high-speed printer and disk storage.

Think about it in terms of what constitutes a "business system" currently. You may not need that Model 16 or IBM PC for your small business application after all! And you'll still be able to sneak in sessions of "The Sands of Egypt" after quitting time!

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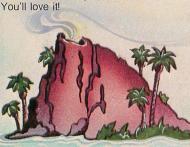
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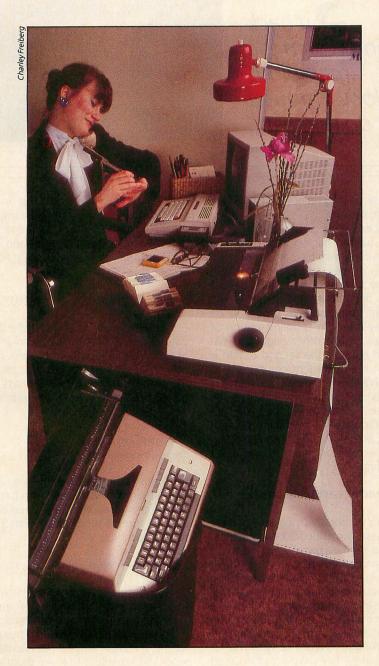
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Patching Scripsit

by Ashok Basargekar



obert Lake's article in the August, 1983 issue of **The Color Computer Magazine** prompted me to prepare a patch to Scripsit on the RAM for use with my Line Printer VIII.

The Line Printer VIII can run at 1200 baud and I thought it would be nice if Scripsit would let me use this baud with my printer. At first I tried to POKE 150,41 before executing Scripsit, but this did not work. I also tried to add LDX #\$0029 and STX \$95 in Mr. Lake's patch to Scripsit. This also did not work. Finally after careful study of Scripsit, I developed the following patch that permits me to use nine different printer bauds. I have also added a feature that will let me underline any word in the text by enclosing it in the less than and greater than signs. Of course, since these signs are reserved by my patch for the underlining feature, they will not be available for their normal use.

As soon as you EXEC &H6000, a menu for selecting a baud appears on your screen. After the baud rate is selected, the main menu will appear on the screen.

To patch Scripsit with my features, you will need to create the object code of my assembly language program on tape, placed just after Scripsit in RAM. Prepare it following the instructions in Mr. Lake's article. To load the new Scripsit, you simply type CLOADM "SCRIPSIT" and then CLOADM my patch. Some of the original Scripsit's code will be overwritten, and some new codes will be added to Scripsit.

The entire new program can then be CSAVEd on tape: CSAVEM "SCRIPSIT", &H6000, &H7A16, &H6000.

I have tried to add enough comments in my patch to clarify the program. The assembly language program is written using EDTASM+ (Radio Shack).

Listing begins page 40

Scripsit Redone

by Ralph Tenny

OLOR SCRIPSIT IS a fairly good word processing package. The program pak version is excellent, except that it uses cassette for storage and lacks some features the disk version has. The disk version unhappily lacks two important features found in the cassette version. Even so, it is a good buy for all except the professional writer who demands high productivity. Most important, all versions of Scripsit are comfortable to use and are easily learned. So, let's avoid some of the shortcomings and improve our operating speed.

Sit back and watch the marvelous Color Computer do the rest."



Document Formats

Formatting a document is most timeconsuming. Business letters have inside addresses and other special arrangements. Each of my Disk Scripsit disks contains samples of various types of documents saved on the disk as an example file. By loading this file instead of starting with an empty file, I can quickly edit the date, address and salutation, then proceed to the letter. Since Scripsit writes over text my new letter soon "eats up" the original document, and I have been able to begin on the body of the letter almost immediately, instead of formatting a new document. The same can be done with cassette Scripsit by saving a short example of each format on a "read only" cassette.

Cassette Scripsit automatically saves the basic print parameters — text width, margins, lines per page, etc. — as part of the tape file, making document reprinting or editing really easy. Unfortunately, Disk Scripsit omitted this excellent feature, so the only possible remedy seems to be to make a cryptic entry in the sample file prompting you to re-enter these parameters in the menu. Disk Scripsit has a limited set of special print emphasis codes built into the print controls menu (option 7); these can be changed to suit your printer. For example, I substituted Epson "start italics" and "stop italics" codes for Radio Shack "start underline" and "stop underline" and "enhanced print" for "start elongation" codes. These new codes remained a permanent record

on the disk, so they do not have to be entered each session.

It has been my experience that Color Scripsit's built-in paging commands do not result in predictable performance on the Epson printer, so I use one of two tricks. The first is to make each page a separate document that stands alone during the print process (and can be printed by the print spooling option of Disk Scripsit while other pages are entered and edited). The second option is to format the document completely on the screen and use the BREAK4 command to print the document, one line at a time. Of course, it gets tiring pressing the Break and numeral 4 keys during an entire page, but what else can you be doing during the print operation if you don't use spooling?

Headers and Footnotes

Although Color Scripsit does not have a satisfactory provision for headers, footnotes and similar special formats, these can be handled one of two ways. Make a trial print-out to determine where pages should end, and edit in the required header or footnote. If you are printing on single pages (with a friction feed printer, for example), you can prepare each page in advance with the required header, then print it as discussed above. Otherwise, simply make the header part of the page during the final edit process.

With mailing labels available in pinfeed format, it is easy to handle them by entering the required names and addresses in some sort of special format and use a Basic program to print the labels. For example, I use this data format:

%Joe Blow/3768 Windy Ave./Tempest NX 99999

By building the data base (the list of names) with slashes and percentage signs as field delimiters, it then becomes easy to write simple Basic programs to print the names in one of two formats. The first format is standard label format:

Joe Blow 3768 Windy Ave. Tempest NX 99999

Because I maintain membership information (almost 300 names) for a national hobby organization, I also need to be able to furnish membership lists using this format:

Joe Blow, 3768 Windy Ave., Tempest NX 99999

After some experimentation I was able to develop Program Listings 1 and 2. They are simple, single-purpose programs to list data from only one file. They work for me; if I had several files to maintain, it would be expedient to make them interactive so they would prompt for a file name, number of copies of each label, number of names, etc.

Programs begin page 42



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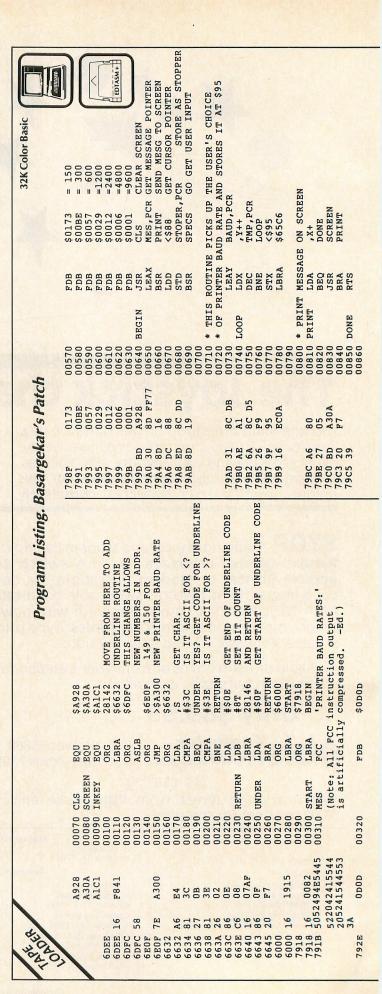
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00330	00340	00360	00380	00400	00420	00440	00460	00480 00490 00500 00510	00520 00530 00540 00550 00550
313A20202037	323A20203131	333A20203135	343A20203330	353A20203630	363A20313230	30 0D 373A20323430	383A20343830	0D 0D 0D0D 0D0D 3120544F2039 3A20	
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00000	TOT.	AL ERRORS					
BAUD	7	98B					
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FLASH		9FC					
INKEY		101					
KBSCAI		A09					
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SCAN 7A0D SCREEN A30A SPECS 79C6 START 7918 STOPER 7988 TMP 798A UNDER 6643

LOOP

LP

LP1

LP2

LP3 MES OUT

OUT1 PRINT RETURN 79B0

79D8

79DE

7A08

32K Disk Extended Color Basic

Program Listing. Tenny's Membership List



10 CLEAR2000 20 GOTO1000

30 L1\$=""

35 FOR P=1T0100 '100 CHARS. MAX

PER DATA ENTRY

40 CH\$=MID\$(A\$,P,1)

50 IF CH\$="/" THEN200

60 IF CH\$="" THEN150

70 L1\$=L1\$+CH\$

80 NEXT P

150 PRINT#-2,L1\$:RETURN

200 CH\$=", ":L1\$=L1\$+CH\$

210 NEXT P

1000 OPEN"I", #1, "NIMLIN/TXT"

1005 L=1 'LINE COUNTER FOR LABEL FORMAT

1010 FOR C=1TO300 'READ WHOLE FI

1020 LINEINPUT#1,A\$ 'ONE LINE AT

A TIME 1025 IF A\$="" THEN2000 'END OF F ILE

1030 GOSUB30

1032 L=L+1:IF L>56 THEN2010 'PAGE FORMATTING

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5024 E. Departure Drive Raleigh, NC 27604 (919) 876-6124 1037 A\$=MID\$(A\$,2) 'SKIP "%"
2000 CLOSE 1:STOP 'ALL PRINTED
2010 PRINT#-2,CHR\$(12); 'FORM FE
ED
2015 L=1:GOTO1035 'NEW LINE COUN
T FOR NEXT NAME

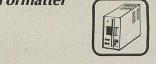
TAPER

32K Disk Extended Color Basic

Program Listing.

Tenny's Label Formatter





5 CLEAR2000

1035 NEXT C

10 GOTO1000

20 L1\$="":L2\$="":L3\$="":L4\$="":L

5\$=""

30 P=2

40 CH\$=MID\$(A\$,P,1)

55 IF CH\$="/"THEN70

60 L1\$=L1\$+CH\$

63 P=P+1

66 GOTO70

70 P=P+1:CH\$=MID\$(A\$,P,1)

75 IF CH\$="/" THEN90

80 L2\$=L2\$+CH\$

85 GOTO70

90 P=P+1:CH\$=MID\$(A\$,P,1)

95 IF CH\$="/" THEN110

100 IF CH\$="" THEN180

105 L3\$=L3\$+CH\$:GOTO90

110 P=P+1:CH\$=MID\$(A\$,P,1)

115 IF CH\$="/" THEN150

120 IF CH\$="" THEN180

130 L4\$=L4\$+CH\$:GOTO110

150 P=P+1:CH\$=MID\$(A\$,P,1)

155 IF CH\$="" THEN180

160 L5\$=L5\$+CH\$:GOTO150

180 RETURN

1000 OPEN"I", #1, "NIMLIN/TXT"

1010 FOR X=1TO300

1015 LINEINPUT #1,A\$

1017 IF A\$="" THEN1120

1020 GOSUB20

1025 Y=1

1030 PRINT#-2,L1\$:Y=Y+1

1032 PRINT#-2, L2\$: Y=Y+1

1034 PRINT#-2,L3\$:Y=Y+1

1040 IF L4\$="" THEN1100

1050 PRINT#-2, L4\$:Y=Y+1

1060 IF L5\$="" THEN1100

1070 PRINT#-2, L5\$: Y=Y+1

1100 PRINT#-2, CHR\$(13);:Y=Y+1

1115 NEXT X

1120 STOP

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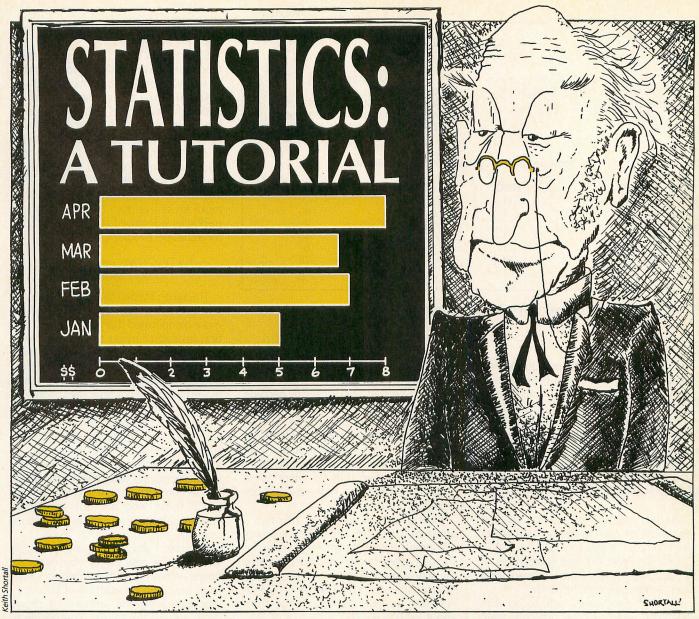
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B EFORE I JOINED the University of Nebraska staff, I recall skipping over statistical programs in computer magazines in my rush to the game or utility programs. This was really unfortunate; many statistics programs can prove useful in personal and business applications, once the user understands a few basic ideas. I will attempt to show you how to use these programs, and discuss statistics in general.

Descriptive Statistics

All statistical procedures can be loosely categorized as *inferential* or *descriptive*. Descriptive statistics describe, or summarize, a group of numbers. Program Listing 1 is my package for doing a group of descriptive statistics on any set of scores. The scores could be almost anything — from sales during the week, to the amount of your phone bills. In the sample output shown in Table 1, the pro-

by David Lionell Dawson

gram is analyzing the cost of various Color Computer software packages. I wanted to know whether a particular \$39 program was relatively expensive or cheap.

The first set of printed values attempt to find the most typical or average score, or price, in this case. The first of these is the *mean* which is what most people would call the "average." The mean is just the scores added together and divided by the number of scores you are considering. This is a very common descriptive statistic, and is probably familiar to most readers. The mean demonstrates how descriptive statistics describe or summarize — by taking a large group of numbers and turning this group into one score that is representative of them all.

The next value, the *median*, is simply the exact middle score. A formula is used in the program that considers even numbers of scores and tied scores at the middle of the group when the mean calculation is made. This is why the score may appear as a fraction, even when only whole numbers were under consideration. The idea is the same: the median is the middle score.

The median and mean are both important because the mean is affected more by the value of *each* score than is the median. Often the mean is not the best, or most typical, average score. The median is commonly used, for example, when figures are given stating the average income in the United States. To demonstrate why this is done, suppose that only three people live in the U.S., and that they make \$10,000, \$12,000, and \$14,000. The mean here would be \$12,000, and it would be a good estimate of the average.

Summary StatisticsSoftware for Color Computer

	CENTRAL VALUE	VARIABI	ILITY
MEAN	33.9515001	RANGE	85
MEDIAN	24.7	STANDARD DEVIATION	23.5893629
MODE	21.95	SKEWNESS	1.65374558
		KURTOSIS	1.45556159

Software for Color Computer Frequency Distribution

SCORES	FREQ	CUMFREQ	CUMPERCENT
95-110	1	20	1
79 – 94	1	19	.95
63 - 78	1	18	.9
47 - 62	1	17	.85
31 – 46	1	16	.8
15- 30	14	15	.75
-1 - 14	1	1	.05

Table 1. Output from Descriptive Statistics Program

Now suppose that the person earning \$14,000 wrote and sold a great arcade game; the next year his earnings rose to \$1,000,000. With salaries of \$10,000, \$12,000 and \$1,000,000, the mean is now around \$340,000 — not a very true picture of what the average person makes! The median, or middle score, would still be \$12,000, because it is still the score between the lowest and highest.

The last measure of average score is the *mode*, or merely the score that occurs the most. If you look at Line 10010 of Listing 1, you will find four scores of \$21.95. No other score appears that often, which makes it the mode.

The next two scores have to do with variability, which is how different from each other the numbers we are considering are. Does everyone get a grade of 100 on the test, or is there a wide range of scores?

The first statistical measure of the variability of scores is the *range*. This is merely the high score minus the low score. The *range* is an inferior measure; for example, one very high score on one test in a history class would make a student seem very inconsistent, while all her other test scores might be very close together.

The standard deviation is a much better and more widely accepted measure of variability. This value would be large if, looking for instance at the sales made by your salespeople during a given month, a few sales were very high and a few were very low. The value would be small if all your sales staff did about equally. The standard deviation represents how stretched out the scores are, or how much they differ from each other.

The last two values in the summary statistics portion refer to the shape of the group of scores. This idea will become clearer as we look at each in turn.

Skewness has to do with the number of high scores versus the number of low scores. If there are more high scores than low scores, the skewness would be a negative number; but, if there were more low scores than high, the number would be positive.

Kurtosis is how spread, or pointed, a group of scores are. The more the scores are spread evenly, the more negative the kurtosis score becomes, and the more the scores are the same, or pile up, the more positive the score becomes. Skewness and kurtosis statistics range from about -2.0 to +2.0.

The Frequency Distribution Table gives: the number of scores within a range (labeled FREQ); the number below that range (labeled CUMFREQ); and the percent of the total the CUMFREQ represents (labeled CUMPERCENT). Looking at Table 1, it could be said that 85 percent of the scores are below 53.

Using the Info

From the sample output in Table 1 we can see that the mean and median are very different. If we also look at Figure 1, we can see there are a few very high scores which, if you remember the earlier discussion, affect the mean more than the median.

Refer to Figure 1; it is easy to understand the skewness and kurtosis numbers. The skewness of 1.65 indicates more low scores than high, as is quite evident in the polygon. The kurtosis of 1.45 means a very peaked distribution, or that

many of the scores are the same — also apparent in Figure 1.

So, what do these final figures mean? It appears that there are a large number of software packages between \$20 and \$30, but also a few costing as much as \$100; the average is about \$24 (using the median). My \$39 program, therefore, is above average. Using the Frequency Distribution Table, I can see that about 80 percent of all packages included in my study cost less than \$39. The software I was considering buying is more expensive than 80 percent of the packages advertised. I decided to look for a cheaper program.

Inferential Statistics

The second broad category of statistics is called *inferential statistics*. These are more complicated than descriptive statistics. Instead of trying to just summarize data, these procedures ask questions like: Is one group in a class really composed of better readers? Are more sales made by older or younger salespeople?

Though more complicated, the answers to this type of question seem more satisfying than those provided by descriptive statistics. This discussion of inferential statistics will be very limited: I will demonstrate what these procedures can accomplish, but I strongly recommend those who are not acquainted with these statistics do some background reading.

Suppose you were interested in whether the new policy you began at home — paying your children an allowance based on completion of chores — was increasing the amount of chores done around the house. You decide to test the idea; you get a measure of the number of chores done by each child for one of the days before you started your new system, and another measure for one of the days after the system took effect. How would you know if there was a real difference?

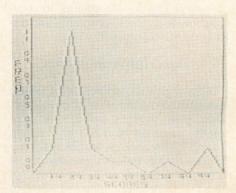


Photo 1. Anova Graph—Frequency Polygon

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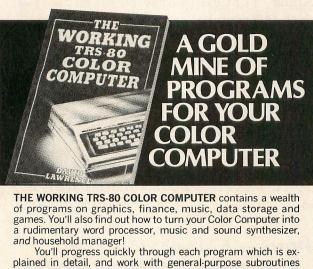
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Using the Analysis of Variance Program (ANOVA) given in Listing 2, you could produce Table 2, an analysis that would answer this question. The columns SS, df (degrees of freedom), and MS refer to quantities beyond the scope of this discussion, but what is important is the number at the bottom labeled F. The F value can be looked up in a simple table found in any statistics book, and will tell us immediately if the groups are significantly different. To look up the value, use the df which appear to the left of the equals sign: in this case 1 and 3. The 1 is the numerator df and 3 is the denominator df. Find the 1 in the table column and the 3 in the table row (in most tables), and see where they meet. This will give you the critical F. If your F number is large enough, the groups are different. Since many of you do not have a table available to you, as a rule of thumb for degrees of freedom of moderate size, with a total greater than 10, an F of more than four will be significant. As df's become larger the necessary F becomes smaller.

In this example, where df=1,3, the necessary F is 10.13 for P=.05, or a 5 percent chance of being wrong (this percentage is taken from a statistics book). The value found of 2.45 (see Table 2), therefore, is too small for significance, which means the two groups are probably not different. In plain words, you should stop wasting money paying your children for chores, as it does not help.

ANOVA

The ANOVA program presented here allows for repeated measure. This is very rare, but it is much more useful than those programs that require the researcher to place different people in each group being studied. For example, in our allowance test, a non-repeated measures program would require half the chil-

	MEAN		
	Mean for Subject	t 1 = 1	
	Mean for Subject		
	Mean for Subject	t 3 = 3.	5
	Mean for Subject	t4 = 5	
	Mean for Subject	t 1 = 2.	5
	Mean for Subject	t 2 = 3.	25
	ANOVA Summ		
SOURCE	ANOVA Summ Repeated Measur SS		
SOURCE Between S	Repeated Measur SS	es One V	Vay
	Repeated Measur SS	es One V	Vay
Between S	Repeated Measur SS 18.375	es One V df 3	Vay
Between S Within S	Repeated Measur SS 18.375 2.5	es One V df 3 4	Way MS
Between S Within S Treat	Repeated Measur SS 18.375 2.5 1.12500003	es One V df 3 4	MS 1.12500003

Table 2. Output from ANOVA

ANDVA S	R YRANKUZ	EPEATEI	DHE WAY
SOURCE	SS	DF	ms .
BETW.	18.375	3	
REAT	1,125000	03 1	1.1250000
RESID.	1.374999	97 3	.45833332
TOTAL	20.875	7	
F (1	, 3)= 2,	454545	57

```
INSTRUCTIONS (Y/N)? H
KEY (I) FOR KEYBOARD INPUT OF
DATA OR (D) FOR DATA STATEMENTS

D
PRINTER OUTPUT (Y/N)? N
MEANS (Y/N)? Y
MEANS (Y/N)? Y
MEAN SUBJECT 1 = 1
MEAN SUBJECT 2 = 2
MEAN SUBJECT 3 = 3.5
MEAN SUBJECT 4 = 5
MEAN LEYEL 2 = 3.25
```

Photo 2a. and 2b. Data Screens

dren to get an allowance for doing chores, and half to be given allowance money and not do chores. This is clearly impractical, as it would be in a classroom, where it is hard to treat two separate groups differently. With ANOVA this difficulty needn't arise.

The type of data that can be used with this program is quite limited, as are nearly all microcomputer ANOVA programs. If data is collected on the same people in several levels of some condition, this analysis will be appropriate most of the time. Any F larger than 4.0 will be significant, but unless the user has some statistical knowledge the *accuracy* of the result cannot be considered complete. Many topics I have had to skip here are necessary to accurately determine the appropriateness of this analysis for a specific type of data.

Using the Programs

The most important detail when using these programs is to enter the kind of data the program expects, in the expected order. The Descriptive Statistics Program can be used with almost any type of numbers, unlike the ANOVA program. However, the Frequency Distribution Table (Table 1) and graph assume integer or mixed numbers, not all decimal fractions. Multiply all data by a constant if you find yourself with decimal fractions, so answers will be displayed correctly.

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The Frequency Distribution Table prints the number of scores within the interval .5 above to .5 below the interval printed — a convention. The graph is similar, and counts and plots the number of scores within the interval represented by its midpoint at the bottom. Most importantly, the graph plots the last two whole numbers in the scores as the horizontal scale, so if you use decimal fractions all the numbers on the horizontal will be zero. Also, if you use very large numbers the horizontal will be difficult to interpret. Use the graph only to get a feeling for the general distribution of the scores, and use the table for precise numbers within specific ranges.

The most obvious and potentially useful modification would be the capability to save data files to disk or tape. A routine to input from tape or disk could be added to Listing 1 after Line 50. The variable N holds the number of data points, and the array D(N)holds the data. Be sure to dimension D in the routine.

The same kind of routine could be added after Line 110 in Program Listing 2. The number of levels is stored in K, the number of subjects in N, and the data in D(K,N). This routine should also contain a dimensioning of the variable D.

A Save routine could be constructed appearing after Line 140 in Listing 1 and Line 180 in Listing 2. If the routines were inserted as suggested, data could still be edited in data statements and then saved to tape or disk.

Statistics can be used in many situations. The first program should be accessible to everyone, while the second should be used with caution — it is the most powerful, but there are many considerations that have not been covered here. However, feel free to experiment with the program; it is a tool used by many scientists and should at least provide insight into scientific methods. I hope my introduction has shown the potential of inferential statistics and will motivate you to continue reading about the subject.

LOADER

Program Listing 1. Descriptive Statistics





6 REM REMOVE REMARKS TO PROVIDE MORE ROOM FOR DATA IF YOU WISH. 10 PCLEAR4: CLS: PRINT STRING\$ (32, "#")

20 PRINT:PRINT" DESCRIPTIVE STATISTICS":PRINT:PRINT" DAVID LIONELL DAWSON"

30 PRINT: PRINTSTRING\$(32,"#"):PR INT: PRINT"KEY ENTER TO CONTINUE 40 IF INKEY\$="" THEN 40

45 REM OPTIONS.

50 CLS:PRINT@192,"(K) EYBOARD EN TRY OR (D) ATA STATEMENTS":: I NPUT CH\$

60 IF CH\$="D" THEN 110

65 REM KEYBOARD DATA ENTRY.

70 INPUT"NUMBER OF CASES"; N

80 DIM D(N), F(N)

90 FOR X=1 TO N:PRINT "ENTER CAS

E #";X;:INPUT D(X):NEXT

100 GOTO 140

110 CLS:PRINT:PRINT:PRINT"BEGIN DATA IN LINE 10000 GIVE NUMBER OF CASES THEN LIST THE DATA I N ANY ORDER. ": PRINT" IF ALL THE D ATA IS ENTERED KEY 'R' ELSE PRE SS ANY OTHER KEY ANDTHE PROGRAM WILL STOP."

120 N\$=INKEY\$:IF N\$="" THEN 120 ELSE IF N\$<>"R" THEN END

125 REM DATA STATEMENT DATA ENTR

130 READ N:DIM D(N):FOR X=1 TO N :READ D(X):NEXT

140 FOR X=1 TO N:T=T+D(X):NEXT:M=T/N

150 PRINT"COMPUTING ... PLEASE W

AIT ...";

155 REM SORT ROUTINE.

160 FOR X=1 TO N:PRINT"...";:FOR Y=1 TO N:IF D(X) < D(Y) THEN W=D(Y)

Y):D(Y)=D(X):D(X)=W

170 NEXTY, X

175 REM CALCULATE MEDIAN.

180 MI = INT(N*.5)

185 IF D(MI) <> D(MI+1) AND N/2=INT(N/2) THEN MD=(D(MI)+D(MI+1))/2:GOTO260

190 LL=D(MI)-.5

192 FOR X=MI TO 0 STEP -1: IF D(X

)=D(MI) THEN NEXT

200 NB=X:CC=MI

210 CC=CC+1: IF CC<=N THEN IF D(M

I)=D(CC) THEN CX=CX+1:GOTO210

220 C2=MI

230 C2=C2-1:IF C2>OTHEN IF D(MI)

=D(C2) THEN CZ=CZ+1:GOTO230

240 NW=CX+CZ+1

250 MD = LL + ((N/2 - NB)/NW)

255 REM CALCULATE MODE.

260 CO=1:W=0:FOR X=1 TO N

270 CO = X + 1

280 IF CO < N+1 THEN IF D(X) = D(CO)

THEN IW=IW+1:CO=CO+1:GOTO280

290 IF IW>W THEN W=IW:MO=D(X)

300 IW=0:NEXT X

305 REM CALCULATE STANDARD DEVIA TION.

310 T=0:PRINT"***";:FOR X=1 TO N $:T=T+(D(X)-M)^2:NEXT:SD=SQR(T/N)$

315 REM CALCULATE SKEWNESS.

320 T=0:PRINT"*";:FOR X=1 TO N:T $=T+((D(X)-M)/SD)^3:NEXT:SK=T/N$

325 REM CALCULATE KURTOSIS.

Telewriter-64 the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
- True lower case characters
- User-friendly full-screen editor
- Right justification
- Easy hyphenation
- Drives any printer
- Embedded format and control codes
- Runs in 16K, 32K, or 64K
- Menu-driven disk and cassette I/O
- No hardware modifications required

THE ORIGINAL

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

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

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

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

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

- Color Computer News, Jan. 1982

TELEWRITER-64

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

64K COMPATIBLE

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

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64×24 and $85 \times 24!!$ Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51×24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

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

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

FEATURES & SPECIFICATIONS:

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

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dotgraphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

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

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

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

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

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

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

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

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

(Add \$2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

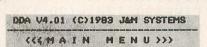
Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

```
330 T=0:PRINT"*";:FOR X=1 TO N:T
=T+((D(X)-M)/SD)^4:NEXT:KU=T/N-3
335 REM CALCULATE RANGE.
340 \text{ RA} = D(N) - D(1)
345 REM DISPLAY STATISTICS.
350 CLS:PRINT@192, "SUMMARY STATI
STICS READY. ": PRINT: INPUT "OUTPUT
 TO (P) RINTER OR
EEN"; Y$: IF Y$="P" THEN 420
360 CLS:PRINT:PRINT:PRINT"SUMMAR
Y STATISTICS": PRINT: PRINT" CENTRA
L TENDENCY": PRINT" MEAN"; M: PRINT"
MEDIAN"; MD: PRINT" MODE"; MO
370 PRINT:PRINT"VARIABILITY":PRI
NT"RANGE"; RA: PRINT"STANDARD DEVI
ATION"; SD: PRINT
380 PRINT"SKEWNESS"; SK: PRINT"KUR
TOSIS"; KU
390 PRINT:PRINT"KEY TO CONTINUE"
400 IF INKEY$="" THEN 400
410 GOTO 480
415 REM PRINT SUMMARY STATISTICS
420 INPUT"NAME OF DATA"; N$: PRINT
#-2, TAB(31) "SUMMARY STATISTICS":
PRINT#-2,"":PRINT#-2,"":PRINT#-2
, N$
430 PRINT#-2, TAB(33) "CENTRAL VAL
UE":PRINT#-2,"":PRINT#-2,"MEAN";
440 PRINT#-2, "MEDIAN"; MD: PRINT#-
2, "MODE"; MO
450 PRINT#-2,"":PRINT#-2,TAB(34)
"VARIABILITY": PRINT#-2,""
460 PRINT#-2, "RANGE"; RA: PRINT#-2
,"STANDARD DEVIATION";SD:PRINT#-
2,""
470 PRINT#-2, "SKEWNESS"; SK: PRINT
#-2, "KURTOSIS"; KU
475 REM CONSTRUCTION OF FREQUENC
Y DISTRIBUTION TABLE.
480 CLS: PRINT@192, "CONSTRUCT FRE
QUENCY DISTRIBUTIONTABLE (Y/N)";
:INPUT Y$:IF Y$="N" THEN 640
490 INPUT "NUMBER OF INTERVALS";
NO: IF NO=0 THEN IF N>15 THEN NO=
15 ELSE NO=N
500 NO=INT((((D(N)+1)/NO)+.5)+.5
510 INPUT"OUTPUT TO (S) CREEN OR
           (P) RINTER"; Y$: IF Y$="
P" THEN 600
520 PRINT"SCORES
                    FREO
                            CUMFRE
  CUM%
```

```
530 FOR X = INT(D(N) + .5) TO D(1) - N
O STEP -NO:PRINTUSING "###";X;:P
RINT"-";:PRINTUSING"###";X+NO-1;
:T=0:FOR Z=1 TO N:IF D(Z)>X-.5 A
ND D(Z)<X+NO-1+.5 THEN T=T+1
540 NEXTZ:PRINT"
                     ":T:
550 PRINT"
              "; N-CF; "
                           ";: IF
CF <= 0 THEN PRINT"1.00":CF=T+CF E
LSE PRINTUSING"#.###"; (N-CF)/N:C
F=T+CF
560 NEXT X
570 PRINT"KEY ENTER"
580 IF INKEY$="" THEN 580
590 GOTO 640
595 REM PRINT DISTRIBUTION TABLE
TO PRINTER.
600 INPUT"NAME"; N$:PRINT#-2,N$:P
RINT#-2,"":PRINT#-2,"FREQUENCY D
ISTRIBUTION": PRINT#-2, STRING$ (80
,"-"):PRINT#-2,"SCORES";TAB(20)"
FREQ"; TAB(40) "CUMFREQ."; TAB(60)"
CUMPERCENT"
610 FOR X=INT(D(N)+.5) TO D(1)-N
O STEP -NO:PRINT#-2,X:"-":X+NO-1
;: T=0: FOR Z=1 TO N: IF D(Z) > X-.5
AND D(Z)<X+NO-1+.5 THEN T=T+1
620 NEXT Z:PRINT#-2,TAB(20)T;:PR
INT#-2, TAB(40)N-CF;: IF CF=0 THEN
 PRINT#-2, TAB(60)"1.00":CF=T+CF
ELSE PRINT#-2, TAB(60)(N-CF)/N:CF
=T+CF
630 NEXT X
635 REM DRAW POLYGON.
640 CLS:PRINT:PRINT:PRINT"POLYGO
N MENU": PRINT@192,"(F) OUR COLOR
 OR (T) WO COLOR";: INPUT Y$: IF Y
$="F" THEN PMODE3,1 ELSE PMODE 4
,1
650 IF Y$="F" THEN INPUT"COLOR O
F POLYGON (6)=CYAN, (7)= MAGENTA
 (8)=ORANGE";C:COLORC,5
660 IF Y$="T" THEN INPUT "COLOR
OF POLYGON (0)=BLACK, (5)=BUFF";
C:IF C=0 THEN COLOR 0,5 ELSE COL
OR 5,0
665 REM CONSTRUCT DRAW STRINGS F
OR NUMBERS.
670 PCLS:DIM NU$(10):NU$(1)="BD1
ND6":NU$(2)="BD1NL3R3D3L6D3R6BU"
:NU$(3)="BDlNL3R3D3NL6D3L6":NU$(
4)="BM+3,+1D4L6NU4R6D2":NU$(5)="
BD1NR3L3D3R6D4L6":NU$(6)="BD1NR3
L3D3R6D4L6U4":NU$(7)="NL3R3D6":N
U$(8)="BD1R3D3NL6D3L6U6R3":NU$(9
)="R3D3ND3L6U3R3"
```

Disk Drive Analyzer

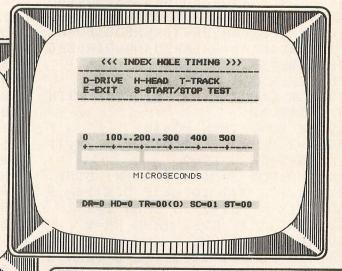
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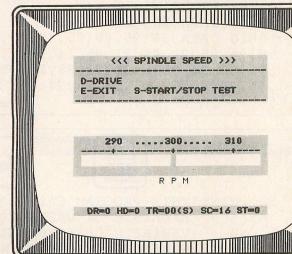


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- ALIGNMENT SENSITIVITY TEST
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- 7 DIRECTIONAL SEEK TEST 8 HEAD ROTATION TEST A ANALOG ALIGNMENT AID C CHANGE TEST PARAMETERS
- DR=0 HD=0 TR=10(L) SC=01 ST=00





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<<< ALIGNMENT SENSITIVITY >>> H-HEAD T-TRACK S-START/STOP TEST D-DRIVE

DR=0 HD=0 TR=16(M) SC=16 ST=00

This program is a must for:

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Circle No. 100 on Reader Service Card

680 NU\$(0)="BD1R3D6L6U6R3" 685 REM DRAW LABELS ON GRAPH. 690 LINE (20,0)-(255,176), PSET, B :DRAW "S3BM4,48L8D4NR8D4BD4NR8D4 ND4R8NU4L2D4BD4L8D4NR8D4R8BD4L8D 8NE4NG4R8U8":DRAW"S3BM106,185NR8 D4R8D4NL8BR6NR8U8R8BR6R8D8L8U8BR 14ND8R8D4NL4D4BR6NR8U4NR8U4R8BR6 NR8D4R8D4L8 700 SCREEN1,1 705 REM CALCULATE FREQUENCY WITH IN INTERVAL. 710 IF MO=0 THEN MO=10 720 X=20:ST=INT((D(N)-D(1))/8.2): IF ST<2 THEN ST=2 730 T=0:FOR Z=D(1) TO D(N) STEP ST:T=0:FOR X=1 TO N:IF D(X)>Z-.5AND D(X) < Z + ST - 1 + .5 THEN T = T + 1740 NEXT X:IF T>FE THEN FE=T 750 NEXT Z 760 MH=(FE*24)+14:IF FE<6 THEN Z =6 ELSE Z=FE 770 IF MH>160 THEN MH=160 775 REM LABEL VERTICAL SCALE. 780 LL=INT(Z/7+.5):FOR X=14 TO 1 58 STEP 24:W\$=STR\$(Z):DRAW"BM14, "+STR\$(X)+NU\$(VAL(MID\$(W\$,LEN(W\$)-1,1))):DRAW"BM14,"+STR\$(X+8)+N U\$(VAL(RIGHT\$(W\$,1))):Z=Z-LL:IFZ<0 THEN Z=0

790 NEXT X 795 REM LABEL HORIZONTAL SCALE. 800 X=20:FOR Z=D(1) TO D(N) STEP ST:W=INT((Z+ST+Z)/2):X=X+23:IFX>247 THEN NEXT Z ELSE W\$=STR\$(W): DRAW"BM"+STR\$(X)+",177"+NU\$(VAL(MID\$(W\$, LEN(W\$)-1,1))):DRAW"BM"+STR\$(X+8)+",177"+NU\$(VAL(RIGHT \$(W\$,1))):NEXT Z 810 LINE(20,176)-(20,176), PSET 815 REM DRAW LINES. 820 D=20:FOR Z=D(1) TO D(N) STEP ST:T=0:FOR X=1 TO N:IF D(X)>Z-.5 AND D(X) < Z + ST - .6 THEN T = T + 1830 NEXT X:D=D+24:LINE-(D,176-(M H*(T/FE))), PSET: NEXTZ 840 LINE-(D+20,176), PSET 850 IF INKEY\$="" THEN 850 860 INPUT "CONTINUE (Y/N)"; Y\$: IF Y\$="Y" THEN RUN ELSE END 875 REM THE FOLLOWING IS SAMPLE DATA (SEE TEXT). 885 REM DELETE THIS BEFORE SAVIN G THE PROGRAM. 10000 DATA 20 10010 DATA 94.95,69.95,49.95,19. 98,24.95,21.95,21.95,14.95,21.95 ,91.95,24.95,9.95,21.95,19.95,29 .95,24.95,19.95,29.95,24.95,39.9

Program Listing 2. ANOVA



16K Extended Color Basic



1 REM ONE-WAY REPEATED

6 REM FOR EXTRA SPACE FOR DATA D ELETE ALL REMARKS AND USE THE CO MMAND: POKE 25,6:NEW <ENTER>

9 REM BEFORE THE PROGRAM IS LOAD ED.

10 CLS:PRINT@96," ANALYSIS OF VARIANCE":PRINT:PRINT"FOR ONE -WAY DESIGNS": PRINT" WITH REPEATE D MEASURES.

20 PRINT:PRINT STRING\$(32,128):P RINT: PRINT" PROGRAM BY DAVID LION ELL DAWSON BASED ON FORMULAS IN WINER, B.J.STATISTICAL PRINCIPLE S IN EXPER-IMENTAL DESIGN. NEW Y ORK: MCGRAW-HILL, 1971."

30 IF INKEY\$="" THEN 30

40 CLS:PRINT@160,"INSTRUCTIONS (Y/N)";: INPUTY\$: IF Y\$="N" THEN 10 0

45 REM INSTRUCTIONS.

50 PRINT"THIS PROGRAM CALCULATES AN ANALYSIS OF VARIANCE FO R ONE VARIABLE DESIGNS EVERY SUBJECT APPEARING IN EV ERY LEVEL"

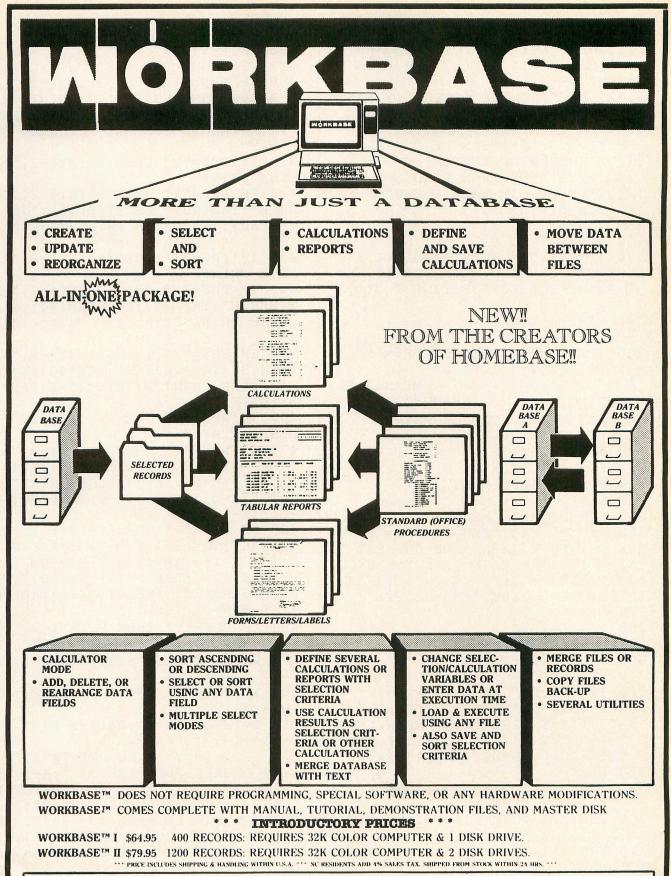
60 PRINT: PRINT" THERE MUST BE EQU AL NUMBERS OF OBSERVATIONS IN E ACH CELL (ONE FOR EACH SUBJECT) BUT THERE MAY BE ANY NUMBER OF LEVELS OF THE VARIABLE."

70 INPUT"(MORE)";XX

80 PRINT"YOU MAY USE EITHER DATA MENTS OR KEYBOARD DATA STATE-IF DATA STATEMENTS ARE ENTRY. USED BEGIN WITH LINE NUMBER 5000."

90 PRINT"THE NUMBER OF LEVELS SH OULD AP- PEAR FIRST THEN THE NUM BER OF SUBJECTS IN EACH THEN T WITH ALL THOSE IN ONE L HE DATA EVEL TO- GETHER IN THE SAME ORDE R IN EACHLEVEL. ": PRINT: PRINT 95 REM OPTIONS.

58/June 1984



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```
100 INPUT"KEY (I) FOR KEYBOARD I
         DATA OR (D) FOR DATA S
NPUT OF
TATEMENTS."; YY$
110 INPUT"PRINTER OUTPUT (Y/N)";
PP$
115 REM DATA ENTRY ROUTINE.
120 IF YY$="D" THEN READ K ELSE
INPUT"NUMBER OF LEVELS"; K
130 IF YY$="D" THEN READ N ELSE
INPUT"NUMBER IN EACH GROUP"; N
140 DIM D(K,N)
150 FOR L=1 TO K
160 FOR S=1 TO N
170 IF YY$="D" THEN READ D(L,S)
ELSE PRINT"ENTER DATA FOR LEVEL"
; L:PRINT"SUBJECT"; S;: INPUT D(L, S
180 NEXT S,L
190 INPUT "MEANS (Y/N)"; YY$
200 IF YY$="Y" THEN IF PP$="Y" T
HEN PRINT#-2,"
                        MEANS" EL
SE PRINT"
                   MEANS"
205 REM FIND SUMS FOR MEANS.
210 DIM P(N), T(K)
220 FOR S=1 TO N
230 FOR L=1 TO K
240 P(S)=P(S)+D(L,S)
250 NEXT L
255 REM DISPLAY MEANS.
260 IF YY$="Y" THEN IF PP$="Y" T
HEN PRINT#-2, "MEAN FOR SUBJECT "
;S;"=";P(S)/K ELSE PRINT"MEAN SU
BJECT ";S;"=";P(S)/K:C=C+1:IF C>
10 THEN C=0: INPUT" (MORE)";XX
270 NEXT S
280 FOR L=1 TO K
290 FOR S=1 TO N
300 T(L)=T(L)+D(L,S)
310 NEXT S
320 IF YY$="Y" THEN IF PP$="Y" T
HEN PRINT#-2, "MEAN FOR LEVEL "; L
; "="; T(L) /N ELSE PRINT MEAN LEVE
L ";L;"=";T(L)/N:CC=CC+1:IF CC>1
0 THEN CC=0: INPUT" (MORE)";XX
330 NEXT L
340 FOR X=1 TO N:G=G+P(X):NEXT
350 O = (G^2)/(K*N)
360 FOR L=1 TO K: FOR S=1 TO N:T=
T+(D(L,S)^2):NEXT S,L
370 FOR X=1 TO K:H=H+(T(X)^2):NE
XT: H=H/N
380 FOR X=1 TO N: F=F+(P(X)^2): NE
XT: F=F/K
385 REM DISPLAY SUMMARY TABLE
```

```
390 IF PP$<>"Y" THEN INPUT"KEY E
NTER FOR SUMMARY TABLE"; XX:CLS
400 IF PP$="Y" THEN PRINT#-2,"
  ANOVA SUMMARY TABLE": PRINT#-2,
"REPEATED MEASURES ONE WAY" ELSE
 PRINT"ANOVA SUMMARY REPEATED ON
E WAY"
410 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT
420 IF PP$="Y" THEN PRINT#-2, "SO
URCE"; TAB(20); "SS"; TAB(40); "df";
TAB(60); "MS" ELSE PRINT "SOURCE
                   MS"
          DF
430 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT
440 IF PP$="Y" THEN PRINT#-2,"BE
TWEEN S"; TAB(20); F-O; TAB(40); N-1
 ELSE PRINT"BETW. ";F-O;TAB(18);
N-1
450 IF PP$="Y" THEN PRINT#-2,"WI
THIN S"; TAB(20); T-F; TAB(40); N*(K
-1) ELSE PRINT"WITHIN"; T-F; TAB(1
8);N*(K-1)
460 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT""
470 IF PP$="Y" THEN PRINT#-2,"
TREAT"; TAB(20); H-O; TAB(40); K-1; T
AB(60); (H-O)/(K-1) ELSE PRINT"TR
EAT "; H-O; TAB(18); K-1; TAB(20); (H
-0)/(K-1)
480 IF PP$="Y" THEN PRINT#-2,"RE
SIDUAL"; TAB(20); T-H-F+O; TAB(40)
N-1)*(K-1); TAB(60); (T-H-F+O)/((N
-1)*(K-1)) ELSE PRINT"RESID.";T-
H-F+O; TAB(18); (N-1)*(K-1); TAB(20)
); (T-H-F+O)/((N-1)*(K-1))
490 IF PP$="Y" THEN PRINT#-2,"TO
TAL"; TAB(20); T-O; TAB(40); K*N-1 E
LSE PRINT"TOTAL ";T-O;TAB(18);K*
N-1
500 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT
510 A=(H-O)/(K-1):B=(T-H-F+O)/((
N-1)*(K-1)):F=A/B
520 IF PP$="Y" THEN PRINT#-2,"F
WITH DEGREES OF FREEDOM ";K-1;"
";(N-1)*(K-1);"=";F ELSE PRINT"F
 (";K-1;",";(N-1)*(K-1);")=";F
522 REM SAMPLE DATA TO VERIFY EN
TRY OF THE PROGRAM (SEE TEXT).
523 REM DELETE THIS BEFORE SAVIN
G THE PROGRAM.
5000 DATA 2,4
5010 DATA 1,2,3,4
5020 DATA 1,2,4,6
```

An Important Bulletin for Home Computer Users

This is the only programming system you'll ever need for your home computer.

If you own a small home computer, the story we're about to tell you could be of great help. It's about a revolutionary new software programming system that will let you and your entire family take full advantage of that machine you bought. But first things first, so here's a list of the home computers this product was specifically designed for: Atari 400, 600, 800, XL Series; Commodore Pet, VIC 20 and 64; IBM PCJr; TRS-80 color computer; TI-99/4A and the Timex Sinclair 1000, 2048 and 2068. If you own one of these computers, it would be well worth your time to read further.

THE PROBLEM WITH HOME COMPUTERS

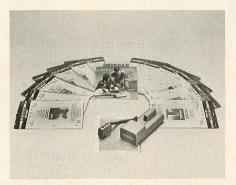
As you probably know, the problem with these small computers is how to get good software into them. Keyboard entry is too time consuming. Diskettes do the job well, but the loaders are expensive and so are the diskettes. Cassette loading is less expensive, but the cassettes themselves still aren't cheap and sometimes a program has to be read again and again before it actually is entered. Furthermore, few of these software manufacturers guarantee their product to run at all.

So unfortunately, a lot of these potentially useful computers are relegated to just game-playing or, even worse, they find their way onto a closet shelf somewhere behind the bowling ball or last year's magazines.

THE SOLUTION IS DATABAR SOFTWARE

Now, thanks to the engineers at Databar Corporation, you can bring your computer back to life. They have developed OSCAR which stands for an Optical Scanning Reader. What it does is read a bar code program in much the same manner as your local supermarket reads the bar code information on your grocery products. OSCAR plugs directly into your computer, and can read even complex programs extremely fast. In fact, in a recent time test it took a graduate computer programmer 1 hour, 9 minutes and 43 seconds to successfully type-in a program. To enter that same program, it took an eight-year-old child with no computer experience only eight minutes and

With OSCAR, programming is also inexpensive. The bar code programs read by OSCAR are printed on paper, making the programs inherently a lot less costly to produce than cassette tapes or diskettes. And because the programs cost less to produce, they can be sold to you for significantly less.



But, just because they cost less doesn't mean they aren't of the highest quality. In fact, they are so good and reliable, we are almost alone among software manufacturers to guarantee our product to run as advertised.

Databar Corporation has already developed an extensive library of programs ranging in subject matter from non-violent games to science, health, home management, writing skills and more. These programs are readily available at your local computer store and they retail for under \$10 (about 1/3 what a diskette costs).

THE DATABAR CLUB

But amazingly, you can get great software programs for an unbelievable \$1.25 each—if you choose to join the Databar Club. Every charter member gets 12 monthly issues of the Databar magazine each featuring at least eight great programs. In addition, this

family oriented magazine also features articles on related subjects and computer use in general. The subjects covered by the software include: games, home management, classroom learning, health, law, science, writing skills, and computer programming. What's more, Databar Club members get a three-ring binder for their software programs as well as eligibility for exciting contests.

But whether you join the Databar Club or purchase individual program packages from your favorite retailer—OSCAR can dramatically change the amount and quality of the use you get out of your computer. And let's face it: in the not so distant future much of an individual's competence will be tied up in how well he or she interfaces with a computer.

This trial offer includes OSCAR plus the premier issue of Databar magazine. OSCAR is backed by a full 1-year warranty and if you aren't 100% satisfied with OSCAR, then you can return the unit within 30 days for a full refund.

To order, credit card holders call toll free and ask for OSCAR, or send a check plus \$1.50 for shipping and handling for each unit ordered.

OSCAR with the premier issue of Databar magazine can be yours for only \$79.95. And the premier edition of Databar magazine provides all details necessary for joining the Databar Club. So send for your OSCAR today—and take full advantage of your computer tomorrow.

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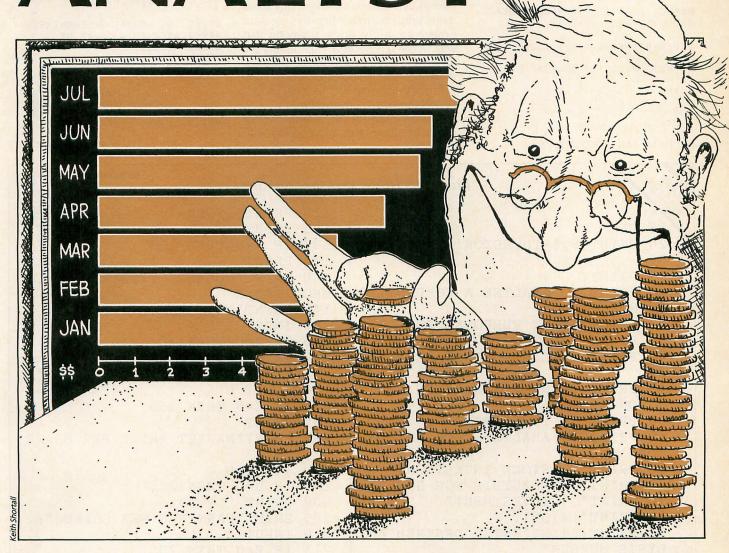
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INVESTOR'S ANALYST



analyze a company's assets: common stocks, preferred stocks, and bonds for investment value. Serious investment in corporate stocks or bonds is complex because of the quantity of information that must be analyzed. The financial section of the daily paper can give you a stock's transaction volume, or quote the day's prices, but this is not nearly enough. When you invest in a company's stock, you become a part owner; by pur-

by Daniel C. Jamet

chasing bonds, you become a creditor of the company.

Before using the program you'll need the financial statements of the company in which you're considering investing. The analysis should be based on the company's latest annual report (available to the public from the company or through brokerage firms).

Run the program and the menu gives you the options of analyzing common stocks, preferred stocks, or bonds.(See Photo 1. The program should be used to analyze convertible preferred stocks as common stock.) Make your selection; you are then asked to enter data. You can locate all the data needed in the financial statements. Enter the data as

prompted; the ratios will be computed and displayed on screen, and the significance of each ratio will be given (as shown in Photo 1b).

Pointers

Here are a few pointers for potential investors. For common stocks investment, look first at each company's earnings record. Earnings per share and divi-

IMPUT THE FOLLOWING INFORMATION

HET INCOME AVAILABLE FOR COMMON STUCK=? 17467000

NUMBER SHARES OF COMMON STOCK DUTSTANDING=? 254670

DIVIDENT PER SHARE=? 1.26

MARKET PRICE PER SHARE=? 36.3

EARMINGS PER SHARE=1 24.0

CONMON STOCKHOLDERS'
EQUITY=7 125930

Photo 1a. Data Entry Screen

dends per share are of particular interest. Potential preferred stockholders should be interested in the yield on their investment. The measurement of the safety of an investment in preferred stock is the firm's ability to meet its preferred dividend requirements. Potential bondholders should pay particular attention to these three factors:

- The rate of return on their investment;
- The firm's ability to meet its interest requirements;
- The firm's ability to repay the principal of the debt when it falls due.

Don't expect to buy stocks, watch their value increase, sell them, buy some more, and keep repeating this pleasant experience. It just doesn't happen that way. While it is necessary to identify the underlying trend over a long time period, it is impossible to spot the high and low points in the shorter swings. Even professionals can't do it consistently.

Possible goals for the careful investor might be: long-term appreciation with little emphasis on current yield; relatively high current income that will increase over the years; or a combination of both. It is also safer to invest with companies that have top-quality management and a strong financial position. These companies are among the innovative and aggressive leaders in a growing industry. Their sales, earnings and dividends are increasing and have good prospects of increasing in the future.

EARNINGS PER SHARE ON COMMON STUCK= \$68.59

SIGNIFICANCE

GIVES THE AMOUNT OF EARNINGS APPLICABLE TO A SHARE OF COMMON STOCK.

PRESS (ENTER) TO CONTINUE?

Photo 1b. Same Results Screen

Program Listing. Investor's Analyst

16K Extended **Color Basic**



- LOADER 15 CLS
 - 20 PRINT@6, "-INVESTOR'S ANALYST-
 - 25 PRINT
 - 30 PRINT"TO ANALYSE A COMPANY FO
 - R INVES-"
 - 35 PRINT"TMENT PURPOSES ITS LATE
 - ST FINAN-"
 - 40 PRINT"CIAL REPORT IS REQUIRED
 - 45 PRINT: PRINT" (1) ANALYSIS FOR C OMMON STOCK"
 - 50 PRINT" INVESTMENT"
 - 55 PRINT"(2) ANALYSIS FOR PREFERR ED"
 - 60 PRINT" STOCK INVESTMENT"
 - 65 PRINT"(3) ANALYSIS FOR BOND"
 - 70 PRINT" INVESTMENT"
 - 75 PRINT"(4)QUIT"
 - 80 PRINT: PRINT" ENTER DESIRED ANA
 - LYSIS NUMBER"
 - 85 Z\$=INKEY\$
 - 90 IF Z\$="" THEN 85
 - 95 ON VAL(Z\$) GOTO 100,550,805,1
 - 050
 - 100 CLS : COMMON STOCK
 - 105 PRINT"INPUT THE FOLLOWING IN FORMATION"
 - 110 PRINT
 - 115 PRINT"NET INCOME AVAILABLE F
 - OR COMMON"

- 120 PRINT"STOCK=";
- 125 INPUT A
- 130 IF A=0 THEN 115
- 135 PRINT
- 140 PRINT"NUMBER OF SHARES OF CO
- MMON STOCK"
- 145 PRINT"OUTSTANDING=";
- 150 INPUT B
- 155 IF B=0 THEN140
- 160 PRINT
- 165 PRINT"DIVIDENDS PER SHARE=";
- 170 INPUT C
- 175 IF C=0 THEN 165
- 180 PRINT
- 185 PRINT"MARKET PRICE PER SHARE
- =";
- 190 INPUT D
- 195 IF D=0 THEN 185
- 200 PRINT
- 205 PRINT"EARNINGS PER SHARE=";
- 210 INPUT E
- 215 IF E=0 THEN 205
- 220 PRINT
- 225 PRINT"COMMON STOCKHOLDERS'"
- 230 PRINT"EQUITY=";
- 235 INPUT F
- 240 IF F=0 THEN 225
- 245 PRINT
- 250 PRINT"OPERATING EXPENSES=";
- 255 INPUT G
- 260 IF G=0 THEN 250

265 PRINT 270 PRINT"NET SALES="; 275 INPUT H 280 IF H=0 THEN 270 285 PRINT: PRINT" DO YOU NEED TO C HANGE ANY OF" 290 PRINT"THE ABOVE VALUES? YES OR NO";: INPUT P\$ 295 IF P\$="YES" THEN 100 300 IF P\$="Y" THEN 100 305 IF P\$="N" THEN 310 310 LET EPS=A/B 315 LET DY=C/D 320 LET PER=D/E 325 LET BVS=F/B 330 LET OER=G/H 335 CLS 340 PRINT: PRINT" EARNINGS PER SHA RE ON COMMON" 345 PRINT USING"STOCK=\$\$###.##"; EPS 350 PRINT 355 PRINT@138, "SIGNIFICANCE" 360 PRINT: PRINT GIVES THE AMOUNT OF EARNINGS" 365 PRINT"APPLICABLE TO A SHARE OF" 370 PRINT"COMMON STOCK." 375 PRINT@480, "PRESS <ENTER> TO CONTINUE";: INPUT Z\$ 380 CLS 385 PRINT: PRINT USING DIVIDEND Y IELD=%###.##";DY 390 PRINT@138, "SIGNIFICANCE" 395 PRINT: PRINT" SHOWS THE RATE E ARNED BY" 400 PRINT"STOCKHOLDERS BASED ON CURRENT 405 PRINT"PRICE FOR A SHARE OF S TOCK." 410 PRINT@480, "PRESS <ENTER> TO CONTINUE"::INPUT Z\$ 415 CLS 420 PRINT: PRINT USING "PRICE-EARN ING RATIO=##.#"; PER 425 PRINT@138, "SIGNIFICANCE" 430 PRINT: PRINT "INDICATES WHETHE R PRICE OF" 435 PRINT"STOCK IS IN LINE WITH EARNINGS." 440 PRINT@480, "PRESS <ENTER> TO CONTINUE";: INPUT Z\$ 445 CLS

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450 PRINT: PRINT BOOK VALUE PER S HARE OF" 455 PRINT USING COMMON STOCK=\$\$# ##.##";BVS 460 PRINT@138, "SIGNIFICANCE" 465 PRINT: PRINT" MEASURES THE REC ORDED VALUE" 470 PRINT"OF NET ASSETS BEHIND E ACH" 475 PRINT"SHARE OF STOCK." 480 PRINT@480, "PRESS <ENTER> TO CONTINUE";:INPUT Z\$ 485 CLS 490 PRINT: PRINT USING "OPERATING EXPENSE RATIO=##.#";OER 495 PRINT@138, "SIGNIFICANCE" 500 PRINT: PRINT "INDICATES MANAGE MENT'S ABILITY" 505 PRINT"TO CONTROL EXPENSES." 510 PRINT: PRINT WOULD YOU LIKE T O DISPLAY" 515 PRINT"RATIOS AGAIN? YES OR N O"::INPUT P\$ 520 IF P\$="YES" THEN 335 525 IF P\$="Y" THEN 335 530 IF P\$="NO" THEN 540 535 IF P\$="N" THEN 540

540 PRINT@480, "PRESS <ENTER> FOR MENU";: INPUT Z\$ 545 GOTO 15 550 CLS: PREFERRED STOCK 555 PRINT"INPUT THE FOLLOWING IN FORMATION" 560 PRINT 565 PRINT"DIVIDEND PER SHARE OF PREFERRED" 570 PRINT"STOCK="; 575 INPUT A 580 IF A=0 THEN 565 585 PRINT 590 PRINT"MARKET PRICE PER SHARE OF" 595 PRINT"PREFERRED STOCK="; 600 INPUT B 605 IF B=0 THEN 590 610 PRINT 615 PRINT"NET INCOME AVAILABLE F OR" 620 PRINT"PREFERRED STOCK="; 625 INPUT C 630 IF C=0 THEN 615 635 PRINT 640 PRINT"ANNUAL PREFERRED DIVID

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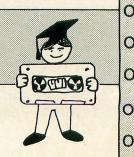
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645 INPUT D 650 IF D=0 THEN 640655 PRINT: PRINT DO YOU NEED TO C HANGE ANY OF" 660 PRINT"THE ABOVE VALUES? YES OR NO";: INPUT P\$ 665 IF P\$="YES" THEN 550 670 IF P\$="Y" THEN 550 675 IF P\$="NO" THEN 685 680 IF P\$="N" THEN 685 685 LET PDY=A/B 690 LET TDE=C/D 695 CLS 700 PRINT: PRINT USING "DIVIDEND Y IELD=%###.##";PDY 705 PRINT@138, "SIGNIFICANCE" 710 PRINT: PRINT" SHOWS THE RATE E ARNED BY" 715 PRINT"STOCKHOLDERS BASED ON CURRENT" 720 PRINT"PRICE FOR A SHARE OF S TOCK." 725 PRINT@480, "PRESS <ENTER> TO CONTINUE";: INPUT Z\$ 730 CLS 735 PRINT: PRINT"TIMES PREFERRED DIVIDENDS" 740 PRINT USING "EARNED=##.#"; TDE

745 PRINT@138, "SIGNIFICANCE" 750 PRINT: PRINT" SHOWS THE ADEQUA CY OF CURRENT" 755 PRINT"EARNINGS TO PAY DIVIDE NDS ON" 760 PRINT"PREFERRED STOCK." 765 PRINT: PRINT WOULD YOU LIKE T O DISPLAY" 770 PRINT"RATIOS AGAIN? YES OR N O";:INPUT P\$ 775 IF P\$="YES" THEN 695 780 IF P\$="Y" THEN 695 785 IF P\$="NO" THEN 795 790 IF P\$="N" THEN 795 795 PRINT@480, "PRESS <ENTER> FOR MENU";: INPUT Z\$ 800 GOTO 15 805 CLS: BOND 810 PRINT"INPUT THE FOLLOWING IN FORMATION" 815 PRINT 820 PRINT"OPERATING INCOME="; 825 INPUT A 830 IF A=0 THEN 820 835 PRINT 840 PRINT"ANNUAL INTEREST EXPENS E=";

845 INPUT B

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SORT ENTIRE FILE on 3 fields at one time

SORT ANY SIZE FILE whether it's 200 or 2000 records

SELECT SUB-SETS of file for sorting or reporting

SCAN FILES alphabetical by any field

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PRO-COLOR-FILE was so well received that over 70% of the owners of the original version ordered the PRO-COLOR-FILE *ENHANCED* upgrade in the first 2 weeks of its introduction. Find out for yourself why people in almost every state, Canada, South America, and even the Far East and Europe have turned to PRO-COLOR-FILE *ENHANCED* for their information management needs.

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850 IF B=0 THEN 840

855 PRINT

860 PRINT"TOTAL LIABILITIES=";

865 INPUT C

870 IF C=0 THEN 860

875 PRINT

880 PRINT"TOTAL ASSETS=";

885 INPUT D

890 IF D=0 THEN 880

895 PRINT:PRINT"DO YOU NEED TO C HANGE ANY OF"

900 PRINT"THE ABOVE VALUES? YES

OR NO";: INPUT P\$

905 IF P\$="YES" THEN 805

910 IF P\$="Y" THEN 805

915 IF P\$="NO" THEN 925

920 IF P\$="N" THEN 925

925 LET NIE=A/B

930 LET DR=C/D

935 CLS

940 PRINT:PRINT"NUMBER OF TIMES INTEREST"

945 PRINT USING"EARNED=##.#"; NIE

950 PRINT@138, "SIGNIFICANCE"

955 PRINT:PRINT"MEASURES THE COV ERAGE OF INTER-"

960 PRINT"EST REQUIREMENTS, PART ICULARLY"

9.65 PRINT"ON LONG TERM DEBT."

970 PRINT@480, "PRESS <ENTER> TO CONTINUE";:INPUT Z\$

975 CLS

980 PRINT:PRINT USING"DEBT RATIO

=%###.##";DR

985 PRINT@138, "SIGNIFICANCE"

990 PRINT: PRINT" INDICATES THE PERCENTAGE OF"

995 PRINT"ASSETS FINANCED THROUG H BOR-"

1000 PRINT"ROWING; IT SHOWS THE EXTENT"

1005 PRINT"OF TRADING ON THE EQUITY."

1010 PRINT:PRINT"WOULD YOU LIKE TO DISPLAY"

1015 PRINT"RATIOS AGAIN? YES OR NO";:INPUT P\$

1020 IF P\$="YES" THEN 935

1025 IF P\$="Y" THEN 935

1030 IF P\$="NO" THEN 1040

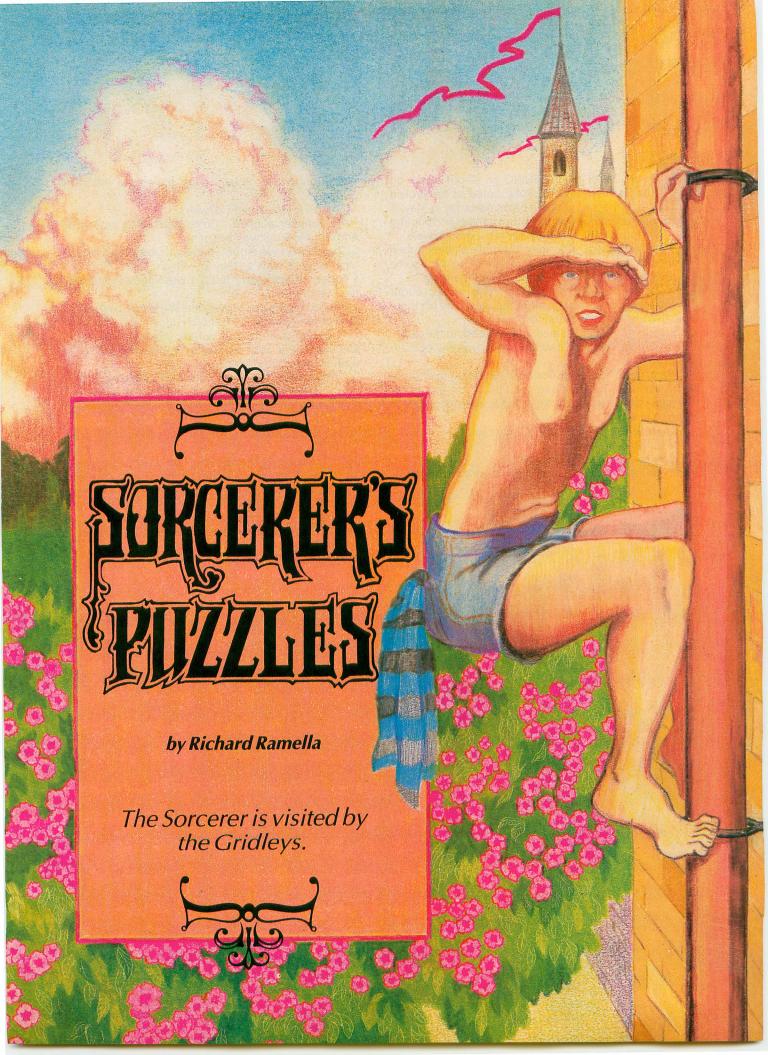
1035 IF P\$="N" THEN 1040

1040 PRINT@480, "PRESS <ENTER> FO

R MENU";:INPUT Z\$

1045 GOTO 15

1050 END



PRING WAS THREATENING an all-out attack on the Sorcerer's castle, Poke noted as he strolled along the parapet on a balmy Saturday in May. A profusion of rainbow weed, prism pansies and bunting vine lapped happily at the base of the granite walls.

The boy did a little jig on the grave of winter, then decided to shinny down a rainspout to pick some wildflowers for Sunflower. It seemed only fitting.

Before he could hop over the crenel, his eye caught a wide, sweeping movement in the west. The hill there was aswarm with... Somethings!

"Invasion!" Poke screamed, running back to the castle. "Fill the moat! Man the battlements! Lower the portcullis!"

"Here, here!" Sorcerer Donald E. Goldberg said somewhat testily. He was trying to get a bit of sun and nap at the same time. He rose from a rather handsome carved patio chair and shaded his eyes.

"There are hundreds of them!" Poke said.

"Yes, there are, lad."

"How will we defend ourselves?"

"By giving them copious amounts of strawberry seltzer

tonic. Don't worry, Poke, it's just the annual visit of the Gridleys."

"As in Fire when ready, Gridleys?"

The Sorcerer laughed. "Go tell Bob there's work to do. And you and Sunflower help him."

The Gridleys were good-humored, roly-poly creatures. Most were as wide as they were high. Short of ordering a battery of laboratory tests, it was impossible to tell if they were human.

It fell to Sunflower to welcome the leader of the thousand or so creatures — a General Pudge.

"Hut-two-three-four. Hut-two-howdy!-three-four!" said the general as he entered the room. He didn't simply walk. He marched at 90-degree angles.

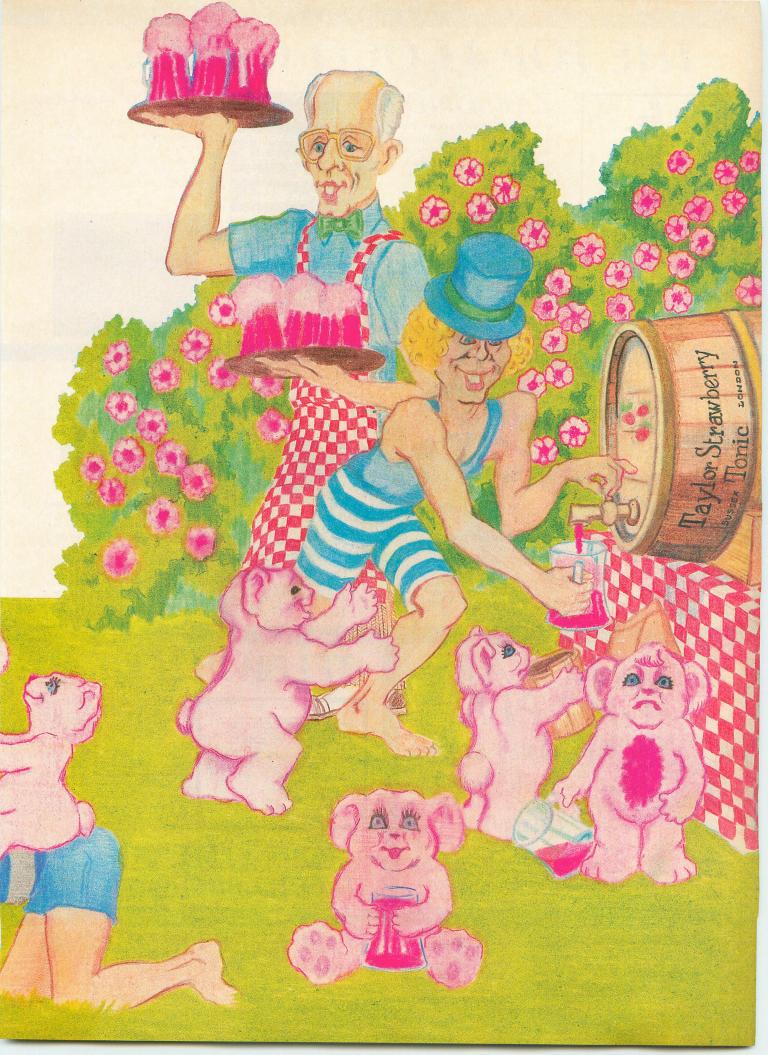
"Welcome to the Sorcerer's castle," the girl said.
"We're happy to be here," said General Pudge.

"I'll show you to your room," Sunflower offered.
"I know where it is, dumpling. Want to dance?"

"No, there's no music. And I'm not a dumpling."

"That's okay," said Pudge. "There's a song in my heart." And with that he hut-two-three-foured away. Sunflower followed, watching this curious, restrained style of dancing. Pudge did not abandon his 90-degree travel. This caused him to traverse the entire labyrinth of the Four Great Blue Hallways of the castle, until he came to his room, which was only a few steps from where he began his trek (see puzzle "Square Dance")





THE TOP 4 COCO GAMES...

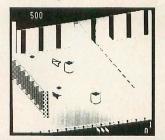


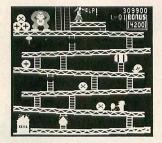
CUBIX

By Spectral Associates. Very much like the arcade smash! Jump little Cubix around the 3D maze trying to change the color of all the squares. With Death Globes, Discs, Snakes, etc. 32K Tape: \$24.95

ZAKSUND

From Elite Software comes this fantastic arcade style space action game with 3 different stages of moving 3-D graphics. You've never seen anything like this on your CoCo! Great sound too! 32K Tape: \$24.95



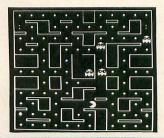


THE KING

Previously called 'Donkey King', you simply cannot buy a more impressive game for your CoCo. With 4 different screens and loads of fun! From Tom Mix Software. 32K Tape: \$25.95

GHOST GOBBLER

From Spectral Assoc. This. "PAC" theme game has been improved several times. It is definitely the best of its type. Brilliant color, action and sound, just like an arcade. 16K Tape: \$24.95



COLORCADE SUPERJOYSTICK MODULE



JOYSTICK INTERFACE/RAPID FIRE/6 FT. EXTENDER ALL IN ONE! The Colorcade allows connection of any Atari type joystick to your CoCo (including the Wico Red Ball). These switch type sticks are extremely rugged and have a faster and more positive response. They will improve the play of almost any action game.

An adjustable speed rapid fire circuit is built in. Press your fire button and get a great burst of fire instead of just a single shot! You get a real advantage in shooting games that do not have repeat fire.

ATARI JOYSTICK



CAN BUY WICO #15-9730 \$31.95

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"RED BALL"

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Give a professional look to your project or product! High quality 3 piece injection molded plastic with spring loaded door. Designed especially for the CoCo ROM slot

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P.C. board for 27XX EPROMS... \$4.00 Ea.

COLORWARE LIGHT PEN



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WITH SIX FREE PROGRAMS ON CASSETTE!

The Colorware Light Pen plugs directly into your joystick port and comes with six fun & useful programs on cassette. Easy instructions show how to use it with Basic and it's compatible with light pen software such as Computer Island's "Fun Pack." Order yours today. Only \$19.95 complete.

TELEWRITER-64

TELEURITER-64

This is an actual unrebouched poloroid photo of a black and white screen showing the 5124 character set that is senerated by "Feletext-64", bottle how there is also true lower cases not the reverse were case letters that werely represent lower case letters that werely represent lowers.

Telemriter-64 is truly the most powerful and sochisticated word processor you can buy for your color Computer or IMP-100. If you own a printer or are thinking of setting oney you really should not be without this program. Telemriter can be yeld with any 16%, 32% or 64% system and with any

A B C D E F G H I J K L H N D P Q R S T U V U X Y
2 1 2 3 4 5 6 7 8 9 0 ! " \$ \$ 2 & " () X = [3 ;
a b t d e f s h i j k l h n o p q r s t u v x x y
2 , . / i < > ? + ! " \$ \$ 2 & " () X : = - II

DISK \$59.95 CASSETTE... \$49.95

Colorware researched the word processors available for the Color Computer. This is the best. Telewriter-64 is a truly sophisticated system that is marvelously easy to use. It works with any 16K, 32K or 64K system and any CoCo compatible printer.

TOP-RATED COCO WORD PROCESSOR

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'REAL TALKER'

HARDWARE Voice Synthesizer

NEW from COLORWARE.. only...\$59.95

THINKING OF BUYING A COCO VOICE SYNTHESIZER? READ THIS....

Making your computer talk couldn't be any easier! 'Real Talker' is a full featured, ready to use, HARDWARE voice synthesizer system in a cartridge pak. It uses the Votrax SC-01 phoneme synthesizer chip to produce a clear, crisp voice.

FREE TEXT-TO-SPEECH

Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about \$40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phonemes are the fundimental sounds or building blocks of word pronunciation. There are 64 different phonemes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phoneme level is both fascinating and educational. The Phoneme Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.



You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phoneme sequences used to create approximately 1400 of the most used words in the English language.

How about compatibility? 'Real Talker' is compatible with any 16K, 32K, 64K, Extended or non-extended Color Computer. It works with any cassette or disk based system, with or without the Radio Shack Multi-slot expander. No other synthesizer under \$100 can make this claim. Most other CoCo voice synthesizers require an expensive Multi-slot expander in order to work with the disk system. 'Real Talker' requires only an inexpensive Y-adapter. This is an important consideration if you plan on adding a disk or have one already.

YOU DECIDE....

Order yours today on our Toll-Free Order Line. If you are not delighted with your 'Real Talker' system, simply return it within 30 days for a prompt, courteous refund.



COLORWARE INC. 78-03A Jamaica Ave. Woodhaven, NY 11421 (212) 647-2864



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WE ACCEPT VISA, MASTER CARD, M.O. 'S, CHECKS.
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"Say, I almost forgot!" Pudge said, snapping his fat little fingers with limited success. "I left my four ponies in the stable, and I need someone to go down there and switch their positions."

"All right," Sunflower said doubtfully,
what do I do?"

Pudge grinned. "Those silly things believe they're chess pieces, and that's the only way they'll move. The magenta ones and the orange ones have to be switched. You'll figure it out." (see "Knightly Pursuits".)

Sunflower started to leave, then turned. "Why do all you Gridleys only go places in straight lines and right angles?"

Pudge started. "What do you know?" he asked.

"Nothing," said Sunflower. "I was just asking."

"Straight lines and right angles are the most efficient means of movement," the general said with a frown. "Right?"

"Not necessarily," the girl said.

"Ah-hah, you do know!" The little general moved very close. "You've heard of our research," he whispered.

"What research?"

"Observe," said Pudge. He pointed to a chair. "I want to go to that chair, but I am facing somewhat away from it. To reach the chair, I march five steps forward, do a sharp left face and approach the chair."

"If you're so inclined," Sunflower allowed.

"But then there's the Diagon Theory," Pudge said. "It's still experimental, but our scientists are moving closer every day to irrefutable proof that to reach that very chair, it is only necessary to walk diagonally toward it."

"I shall hope night and day for suc-

cess," Sunflower smiled.

"You're a kind girl," Pudge said, "and for being so nice, I will show you the preliminary results of our research this evening after I've had a few strawberry seltzer tonics."

"You're going to attempt diagonal movement?"

"Do I look crazy?" Pudge asked. "No, we have a little test model for diagonal movement, and I shall let you have a go

at (and he whispered in the smallest of voices) The Diagons!"

Sorcerer's Notes

"Square Dance works in 4K Color Basic and 4K MC-10 Basic. Four overlapping blue rectangles are drawn, and a flashing orange cursor appears. The object is to turn the entire network of lines to orange by traveling it. First, take the orange cursor to the starting position you want by tapping the letter A for north, Z for south, the comma key for west, and the period key for east. When ready to challenge the pathway, tap the asterisk key, holding down the shift key as you do. At this point, the number 215 appears at top left screen. Now your travels will leave a trail of orange, and the number will be reduced by one each time a position of the network turns orange. If, the first time you arrive at any intersection, you leave it by turning left or right, the intersection will remain blue, allowing you to travel through it a second time. When the network is entirely orange, you will be recognized as a winner. You will have to recognize losing positions for

yourself and start over.
"Knightly Pursuits" works in 16K Color Basic and 20K MC-10 Basic. A stable with nine stalls in a three-by-three grid holds four horses: magenta in the northwest and northeast stalls, orange at the southwest and southeast. Object is to reverse the positions, ending with orange ponies at northwest and northeast, magenta at southwest and southeast. A small flashing cursor may be moved among the stalls by tapping the arrow keys. To move a horse, position the cursor in the stall of the horse that will travel and tap M for move. The word WHERE? will appear on the screen and then be erased. The horses' moves must mimic those of a knight on a chess board two squares in one direction and then one left or right. To select a move, bear in mind W stands for west, N for north, E for east and S for south. Then tap any of the following eight applicable compass directions: NNW, WWN, WWS, SSW, SSE, EES, EEN, NNE. You will see your direction displayed at the top right of the screen. If nothing happens when you attempt to move, the move is illegal, such as attempted moves out of the stable, into an occupied stall, or from an unoccupied stall. To erase a botched move entry, tap x. The computer recognizes a winning position. It also knows the minimum number of moves required to win and will inform you if you win in that number. Otherwise, it will not reveal the number but will let you know you can better your score.

"The Diagons" works only in 16K Extended Basic. A four-by-five playing board is drawn. In the top row are magenta diagons, and the bottom row has orange diagons. The object is to reverse the colors by moving according to strict rules. Note a small dark circle over the diagon in the northwest corner square. This is a cursor and may be moved by tapping the arrow keys. This cursor must be positioned on the diagon to move. To make a move, two choices must be made in turn. First, tap 1, 2 or 3 for the number of squares you will move the piece diagonally. Next, tap any of the following letters to take the piece in the direction they represent: A - northwest, s - northeast, z - southwest, x - southeast. Both colors of diagons may move up and down. The game is lost if two diagons of different colors wind up in any diagonal row. A winning position is recognized by the computer. There is a rare situation when an incorrect move command can put diagons in the same slanting row without recognizing the losing pattern until the next move has been made. Consider this a secret present from the Sorcerer.

4K Color Basic

TAPER

Program Listing. Square Dance



120 CLS 130 CLEAR 100

140 PRINT @ 233, "SQUARE DANCE";

150 FOR T=1 TO 30

160 SOUND RND(8)*13,1

170 NEXT

180 U\$="A"

190 D\$="Z"

200 L\$=" ."

210 R\$="."

220 YS="WINNER"

Color Power I Expands Your CoCo to CP/M

```
### ACTUAL COLOR POWER II DISPLAY ####

OZ COLOR POWER II GIVES YOU MORE --- INCLUDING:

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OR INSTRUCTIONS INCLUDED ON USING 6845 DIRECTLY FROM YOUR CoCo

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Plug Color Power II into the expansion port of your 64K CoCo or CoCo 2, plug your disk controller into Color Power II, and insert our disk into your drive. You are now ready to run thousands of CP/M programs such as WordStar®, MailMerge®, SpellStar,TM and StarIndex.TM It's that simple!

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VIP Writer™

additional (Formerly Super "Color" Writer II) By Tim Nelson RATED TOPS IN RAINBOW, HOT COCO, COLOR Cost!! COMPUTER MAGAZINE & COLOR COMPUTER WEEKLY

The most powerful and easy-to-use word processor is available in the showpiece and workhorse of the Library: The VIP Writer™. Because of its undisputed superiority over all Color Computer word processors, it was selected by Dragon Data Ltd. of England and TANO in the U.S., to be the Official Word Processor for their line of Dragon microcomputers.

The result of two years of research, the VIP Writer™ offers every feature you could desire from a word processor. It is the most powerful, fastest, most dependable and most versatile. With the hi-res display, workspace and compatibility features built into the Library the Writer is also the most usable.

"... Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless... Features for the professional, yet it is easy enough for newcomers to master... Certainly one of the best word processors available for any computer..." October 1983 "Rainbow"

"Word processing with VIP Writer is like driving a high-performance vehicle . . . This Ferarri of a package has more features than Telewriter, Easywriter (for the IBM PC), or Applewriter." October 1983 "Hot CoCo"

The Writer will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance. You can even automatically print multiple copies.

Although all versions feature tape save and load, the disk version provides the Mini Disk Operating System common to the whole **Library**, plus disk file linking for continous printing.

Professional features of particular note:

- Memory-Sense with BANK SWITCHING to fully utilize 64K, giving
- not just 24 or 30K, but up to 61K of workspace with the rompak version and 50K with the disk version.

 TRUE FORMAT WINDOW allowing you to preview the printed page ON THE SCREEN BEFORE PRINTING, showing centered lines, headers, FOOTNOTES, page breaks, page numbers, & margins in line lengths of up to 240 characters. It makes HYPHENATION a snap.

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- wide reports and graphs (up to 240 columns!)
- wide reports and graphs (up to 240 columns!).

 FREEDOM to imbed any number of PRINTER CONTROL CODES anywhere, EVEN WITHIN JUSTIFIED TEXT.

 Full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, SEVEN DELETE FUNCTIONS, LINE INSERT, LOCATE AND CHANGE, wild card locate, up to TEN SIMULTANEOUS block manipulations, word wrap around, programmable tabs, display memory used and left, non-breakable space, and headers, footers and FOOTNOTES.

 Automatic justification, automatic pagination, automatic contering
- Automatic justification, automatic pagination, automatic centering, automatic flush right, underlining, superscripts, subscripts, pause
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 Type-ahead, typamatic key repeat and key beep for the pros, ERROR DETECTION and UNDO MISTAKE features, 3 PROGRAMMABLE functions, auto column creation, and an instant on-screen HELP TABLE.

32K (Comes with tape & disk) \$59.95

(Includes VIP Speller)

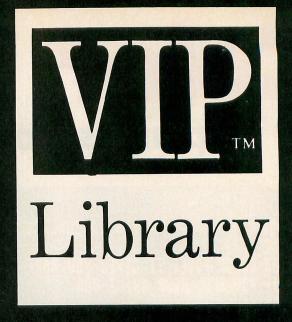
P Speller™

WITH A 50,000 WORD INDEXED DICTIONARY!

By Bill Argyros

Gone are the eyestrain, boredom and fatigue from endless proof-reading. VIP Speller[™] is the fastest and most user-friendly speller for your CoCo. It can be used to correct any ASCII file — including VIP Library[™] files and files from Scripsit[™] and Telewriter[™]. It automatically checks files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the word in context, with upper and lowercase. VIP Speller™ comes with a specially edited 60,000 word dictionary which, unlike other spellers for the CoCo, is indexed for the greatest speed. The shorter your file, the quicker the checking time. And words can be added to or deleted from the dictionary or you can create one of your own. VIP Speller™ also comes with the Library's mini disk operating system for easy disk manipulation.

32K DISK ONLY \$39.95 Lowercase displays not available with this program.



By Kevin Herrboldt

You can forget the other toy calcs — The real thing is here! No other spreadsheet for the Color Computer gives you:

- 20 ROWS BY 9 COLUMNS ON THE SCREEN AT ONCE
- LOWERCASE LETTERS WITH DESCENDERS
 UP TO 16 CONCURRENT DISPLAY WINDOWS
- **FLOATING-POINT MATH**

Includes

VIP Speller at no

- **CHOICE OF SINGLE AND DOUBLE PRECISION**
- WORKS WITH BASE 2, 10, AND 16 NUMBERS UP TO 512 COLUMNS BY 1024 ROWS

- US TO 512 COLUMNS BY 1024 ROWS

 USER DEFINABLE WORKSHEET SIZE FOR MORE MEMORY
 LOCATE FUNCTION TO FIND CHECK NUMBERS, NAMES, ETC.

 COLUMN/ROW MULTIPLE SORTS
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VIP Calc™ is truly the finest and easily the most powerful electronic worksheet and financial modeling program available for the Color Computer. Now every Color Computer owner has access to a calculating and planning tool better than VisiCalci, containing all its features and commands and then some, WITH USABLE DISPLAYS. Use Visicalc templates with VIP Calc™!

There's nothing left out of **VIP Calc™**. Every feature you've come to rely on with VisiCalc™ is there, and then some. You get up to 5 TIMES the screen display area of other spreadsheets for the Color Computer and Memory-Sense with BANK SWITCHING to give not just 24, or 30, but UP TO 33K OF WORKSPACE IN 64K!!! This display and memory allow you the FULL SIZE, USABLE WORKSHEETS you require. You also get: User definable worksheet size, up to 512 columns by 1024 rows! *
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Both versions feature Tape save and load, but the disk version also has the Mini Disk Operating System of the entire **Library**.

32K (Comes with tape & disk) \$59.95

32K does have hi-res displays, sort or edit

Check These Library Prices:

- **Fully CoCo 2 Compatible**
- Nine Display Formats: 32 by 16 51, 64, 85 by 21 or 24
- **True Lowercase & Descenders**
- Four Different Display Colors
- 32 & 64K Compatible
- Memory Sense Bank Switching
- Up to 51K Disk, 53K Tape
- Mini Disk Operating System
- **■** Compatible With All Printers

VIP Terminaly (Formerly Super "Color" Terminal)

RATED BEST IN JANUARY 1984 "RAINBOW"

By Dan Nelson

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

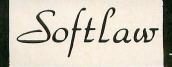
For your important communication needs you've got to go beyond software that only lets you chat. You need a smart termnal so that you can send and receive programs, messages, even other VIP Library[™] files. VIP Terminal[™] has "more features than communications software for CP/M, IBM and CP/M 86 computers."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

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

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System common to the Library.

32K (Comes with tape & disk) \$49.95

(Tape comes in 16K but without hi-res displays)



TRS-80 is a trademark of Tandy Corp. VisiCalc is a trademark of VisiCorp.

AUTHOR'S SUBMISSIONS ARE ENCOURAGED.

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VIP Database

(Formerly Super "Color" Database)
INCLUDES MAIL MERGE CAPABILITIES TOO! By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the **VIP Database*** will keep track of all your data, and it will merge VIP Writer™ files.

The VIP Database™ features the Library Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. Records can be searched for specific entries, using multiple search criteria. With database form merge you may also combine files, sort and print mailing lists, print "boiler plate" documents, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the VIP Writer™and VIP Terminal™. Unlimited print format and report generation with the ability to imbed control codes for use with all printers.

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

32K DISK \$59.95

64K Required for math package & mail merge

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!" By Tim Nelson

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

This high-speed machine code disk utility has a special dual cursor screen display to look at the data on your disk. You are able to: Verify or modify disk sectors at will * Type right onto the disk to change unwanted program names or prompts * Send sector contents to the printer * Search the entire disk for any grouping of characters * Copy sectors * Backup tracks or entire disks * Repair directory tracks and smashed disks * Full promoting to belo you every step of the way * 50 smashed disks * Full prompting to help you every step of the way * 50-plus page Operators Manual which teaches disk structure and repair.

16K DISK \$49.95 Lowercase displays not available with this program.



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Order Status and Software Support call (612) 881-2777

Available at Dealers everywhere. If your Dealer is out of stock ORDER DIRECT!

In Canada distributed by Kelly Software Distributors, LTD. P.O. Box 11932, Edmonton, Alberta T5J 3L1 (403) 421-8003 MAIL ORDERS: \$3.00 U.S. Shipping (\$5.00 CANADA; \$10.00 OVER-SEAS). Personal checks allow 3 weeks.

All Disk Programs are also available on 3" Diskettes for the Amdek Color AMDISK-III Micro-Floppy Disk System for an additional \$3.00 each. ©1983 by Softlaw Corporation

```
230 M=179
240 PK=1024
250 REM * For MC-10 change above
line to PK=16384
260 CLSO
270 B$=CHR$(175)
280 O$=CHR$(255)
290 FOR A=1 TO 19
300 A$=A$+B$
310 NEXT
320 FOR X=44 TO 230 STEP 62
330 PRINT @ X,A$;
340 PRINT @ X+256,A$;
350 FOR Z=X TO X+256 STEP 32
360 PRINT @ Z,B$;
370 PRINT @ Z+19,B$;
380 NEXT Z,X
390 PRINT @ M,O$;
400 X$=INKEY$
410 IF X$="*" THEN H=215: GOTO 4
70
420 S=M
430 GOSUB 600
440 PRINT @ S,B$;
450 PRINT @ M,O$;
460 GOTO 400
470 X$=INKEY$
480 S = M
490 GOSUB 600
500 PRINT @ M,O$;
510 PRINT @ 0,H;
520 IF H=0 THEN 690
530 IF S=108 OR S=170 OR S=172 O
R S=315 OR S=317 OR S=379 THEN P
RINT @ S,B$;
540 IF S=236 OR S=234 OR S=232 O
R S=313 OR S=377 OR S=441 THEN P
RINT @ S,B$;
550 IF X\$=D\$ AND PEEK(PK+M-64)=2
55 THEN PRINT @ M-32,0$;
560 IF X\$=U\$ AND PEEK(PK+M+64)=2
55 THEN PRINT @ M+32,0$;
570 IF X$=L$ AND PEEK(PK+M+2)=25
5 THEN PRINT @ M+1,0$;
580 IF X$=R$ AND PEEK(PK+M-2)=25
5 THEN PRINT @ M-1,0$;
590 GOTO 470
600 \text{ U=PEEK(PK+M-32)}
610 D=PEEK(PK+M+32)
620 L=PEEK(PK+M-1)
630 R=PEEK(PK+M+1)
640 IF X$=U$ AND U=175 THEN M=M-
32: H=H-1
650 IF X$=D$ AND D=175 THEN M=M+
32: H=H-1
660 IF X$=L$ AND L=175 THEN M=M-
1: H=H-1
```

```
670 IF X$=R$ AND R=175 THEN M=M+
1: H=H-1
680 RETURN
690 J=1
700 FOR C=131 TO 291 STEP 32
710 PRINT @ C,MID$(Y$,J,1);
720 J=J+1
730 NEXT
740 SOUND 100+RND(10)*10,1
750 GOTO 740
760 END
```

(APER OADER

Program Listing. Knightly Pursuits



16K Color Basic

```
110 REM * SORCERER'S PUZZLES #7
* RICHARD RAMELLA *
120 CLEAR 500
130 CLS0
140 Z$="WHERE?"
150 U$=CHR$(94)
160 D$=CHR$(10)
170 L$=CHR$(8)
180 R$=CHR$(9)
190 PRINT @ 232, "KNIGHTLY PURSUI
TS";
200 K=0
210 Z=1
220 FOR L=50 TO 0 STEP -15
230 N=N+1
240 IF N/2=INT(N/2) THEN V=8: GO
TO 260
250 V=7
260 GOSUB 660
270 NEXT L
280 FOR T=1 TO 1500
290 NEXT T
300 CLS0
310 FOR Y=0 TO 30 STEP 10
320 FOR X=0 TO 60
330 SET(X,Y,5)
340 NEXT X,Y
350 FOR X=0 TO 60 STEP 20
360 FOR Y=1 TO 29
370 SET(X,Y,5)
380 NEXT Y,X
390 V=7
400 K=2
410 L=6
420 GOSUB 660
430 L=46
440 GOSUB 660
450 V=8
```

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```
1340 GOSUB660
1350 GOTO 540
1360 IF A$<>"SSE" THEN 1460
1370 IF A=42 OR B>2 GOSUB 1790:
GOTO 540
1380 IF POINT(A+27,B+20)<>0 GOSU
B 1790: GOTO 540
1390 O=A
1400 W=B
1410 GOSUB 1840
1420 K=B+20
1430 L=A+24
1440 GOSUB 660
1450 GOTO 540
1460 IF A$<>"EES" THEN 1560
1470 IF A>2 OR B=22 GOSUB 1790:
GOTO 1890
1480 IF POINT(A+49,B+10)<>0 GOSU
B 1790: GOTO 540
1490 O=A
1500 W=B
1510 GOSUB 1840
1520 K=B+10
1530 L = A + 43
1540 GOSUB 660
1550 GOTO 540
1560 IF A$<>"EEN" THEN 1660
1570 IF A>2 OR B=2 GOSUB 1790: G
OTO 540
1580 IF POINT(A+47,B-10)<>0 GOSU
B 1790: GOTO 540
1590 O=A
1600 W=B
1610 GOSUB 1840
1620 K=B-10
1630 L=A+43
1640 GOSUB 660
1650 GOTO 540
1660 IF A$<>"NNE" THEN 1770
1670 IF A=42 OR B<22 GOSUB 1790:
GOTO 540
1680 IF POINT(A+27,B-20)<>0 GOSU
B 1790: GOTO 540
1690 Q=A
1700 W=B
1710 GOSUB 660: GOSUB 1840
1720 K=B-20
1730 L=A+23
1740 GOSUB 660
1750 GOSUB 1790
1760 GOTO 540
1770 P=1
1780 GOTO 930
1790 A$=""
1800 FOR J=31 TO 191 STEP 32
1810 PRINT @ J, CHR$(128);
1820 NEXT J
```

```
1830 RETURN
1840 \text{ V=POINT}(A+7,B)
1850 TY=TY+1
1860 FOR Y=B TO B+7
1870 FOR N=O TO O+15
1880 RESET(N,Y)
1890 NEXT N,Y
1900 RETURN
1910 PRINT @ 225, "WINNER IN"TY"M
OVES.";
1920 IF TY=1+(ASC(U\$)-14)/5 THEN
PRINT @ 257, "LOWEST POSSIBLE SC
ORE": GOTO 1920
1930 PRINT @ 257, "YOU CAN DO BET
TER, THOUGH...";: GOTO 1930
1940 END
```

TAPER

16K Extended Color Basic



Program Listing. The Diagons

```
110 REM * SORCERER'S PUZZLES #7
* RICHARD RAMELLA *
120 CLS
130 CLEAR 100
140 PRINT @ 234, "THE DIAGONS";
150 FOR T=1 TO 30
160 SOUND RND(8)*13,1
170 NEXT
180 CLS0
190 PCLEAR 4
200 PMODE 3,1
210 PCLS1
220 DIM C(10,10),D(10,10),E(10,1
0),F(20)
230 U$=CHR$(94)
240 D$=CHR$(10)
250 L$=CHR$(8)
260 R$=CHR$(9)
270 GET(10,7)-(23,23),C
280 CIRCLE(16,16),9,3
290 PAINT(16,16),3,3
300 GET(10,7)-(26,25),D
310 PUT(8,7)-(26,25),C
320 CIRCLE(16,16),9,4
330 PAINT(16,16),4,4
340 \text{ GET}(10,7)-(26,25), E
350 PUT(8,7)-(26,25),C
360 SCREEN1,1
370 FOR X=0 TO 128 STEP 32
380 LINE(0,X)-(128,X), PSET
390 LINE(X,0)-(X,160), PSET
400 NEXT X
410 LINE(0,X)-(128,X),PSET
420 Y=7
```



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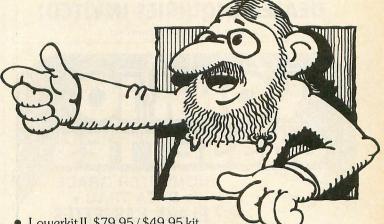
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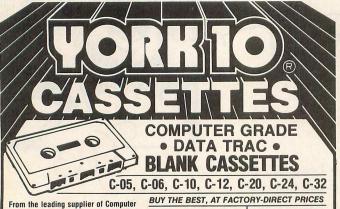
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	The same of the sa				

430 FOR X=8 TO 104 STEP 32 440 SOUND X+Y,1 450 PUT(X,Y)-(X+19,Y+18),D460 SOUND X+Y,1 470 PUT(X,Y+128)-(X+19,Y+146),E 480 NEXT 490 X=16 500 Y = 16510 CIRCLE(X,Y),4,2 520 A\$=INKEY\$ 530 IF A\$= " THEN 520 540 IF A\$>"0" AND A\$<"4" THEN L= VAL(A\$): GOTO 520 550 V=X 560 W=Y 570 IF A\$=U\$ AND Y>16 THEN Y=Y-3 2 580 IF A\$=D\$ AND Y<144 THEN Y=Y+ 32 590 IF A\$=L\$ AND X>16 THEN X=X-3 2 600 IF A\$=R\$ AND X<112 THEN X=X+ 32 610 CIRCLE(V,W), 4, PPOINT(V,W) 620 CIRCLE(X,Y),4,2 630 G=PPOINT(X,Y)640 S=PPOINT(X,Y) 650 IF S<>7 AND S<>8 THEN 520 660 IF L=0 THEN 520 670 L=L-1680 IF X=16 OR Y=16 THEN 690 ELS E IF PPOINT(x-32,y-32)<>5 THEN 6 90 ELSE IF A\$="A" THEN V=X-36: W =Y-41: GOSUB 740690 IF X=112 OR Y=16 THEN 700 EL SE IF PPOINT(X+32,Y-32)<>5 THEN 700 ELSE IF A\$="S" THEN V=X+28: W=Y-41: GOSUB 740 700 IF X=16 OR Y=144 THEN 710 EL SE IF PPOINT(X-32,Y+32)<>5 THEN 710 ELSE IF A\$="Z" THEN V=X-36: W=Y+23: GOSUB 740 710 IF X=112 OR Y=144 THEN 720 E LSE IF PPOINT(X+32,Y+32)<>5 THEN 720 ELSE IF A\$="X" THEN V=X+28: W=Y+23: GOSUB 740 720 IF L>0 THEN 620 730 GOTO 520 740 PUT(X-6,Y-8)-(X+13,Y+9), C 750 IF G=8 THEN PUT(V,W)-(V+18,W+18), E ELSE PUT(V,W)-(V+18,W+18) , D 760 SOUND X+Y-10,1770 IF A\$="A" THEN X=X-32: Y=Y-3 780 IF A\$="S" THEN X=X+32: Y=Y-3 2

1983 unit sales	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oc t	Nov	Dec	Total Aver	age	Best	Worst
Bach	136	139	119	161	130	104	84	121	95	115	75	161	1440	<u>a</u>	161	75
Chalone	120	170	152	170	182	102	89	157	162	129	64	158		B	182	64
Dolan	188	157	103	112	161	122	99	145	145	103					188	97
Feagan	105	94	127	115	157	97	61	132	113						174	61
Graham Graham	135	135	183	116	151	104	86	149		MA					183	63
Harpel	134	102	190	161	180	85		A SE								
Jordan	105	109	188	171	120											V
Latour	112	128	124	129												
Lucido	158	110														
Phelps	167														15	75 78
Prats							7							CTE	W ME	75
Schaeferle W										H	11		TING S	13	193	78
Taylor					MA			A			U	OPE	RATI	145	190	88
Torres					131		A CO	TA			OTHE	7		135	177	105
Turner				127	131					NO	15	178	1635	136	190	75
Wehlen	1		145	142	154			137	125	106	60	151		125	154	60

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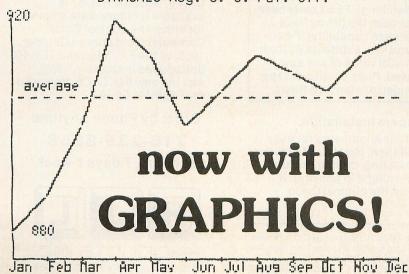


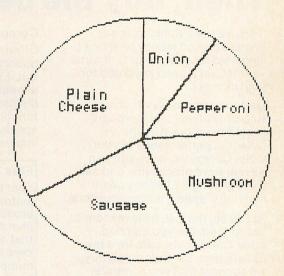
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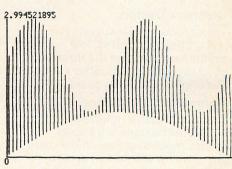
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```
790 IF A$="Z" THEN X=X-32: Y=Y+3
800 IF A$="X" THEN X=X+32: Y=Y+3
2
810 CIRCLE(X,Y),4,2
820 IF L>0 THEN RETURN
830 J=1
840 FOR Q=16 TO 144 STEP 32
850 FOR R=16 TO 112 STEP 32
860 U=PPOINT(R,Q)
870 IF U=7 THEN F(J)=1 ELSE IF U
=8 THEN F(J)=2 ELSE F(J)=0
880 J=J+1
890 NEXT R,Q
900 IF F(1)+F(2)+F(3)+F(4)=8 AND
 F(17)+F(18)+F(19)+F(20)=4 THEN
1230
910 K=F(3)+F(8)
920 GOSUB 1160
930 K=F(2)+F(7)+F(12)
940 GOSUB 1160
950 K=F(1)+F(6)+F(11)+F(16)
960 GOSUB 1160
970 K=F(5)+F(10)+F(15)+F(20)
980 GOSUB 1160
990 K=F(9)+F(14)+F(19)
1000 GOSUB 1160
1010 \text{ K}=\text{F}(13)+\text{F}(18)
1020 GOSUB 1160
1030 \text{ K}=\text{F}(2)+\text{F}(5)
1040 GOSUB 1160
1050 \text{ K}=\text{F}(3)+\text{F}(6)+\text{F}(9)
1060 GOSUB 1160
1070 \text{ K}=\text{F}(4)+\text{F}(7)+\text{F}(10)+\text{F}(13)
1080 GOSUB 1160
1090 \text{ K} = \text{F}(8) + \text{F}(11) + \text{F}(14) + \text{F}(17)
1100 GOSUB 1160
1110 \text{ K}=\text{F}(12)+\text{F}(15)+\text{F}(18)
1120 GOSUB 1160
1130 \text{ K}=\text{F}(16)+\text{F}(19)
1140 GOSUB 1160
1150 RETURN
1160 IF K>2 AND K/2 <> INT(K/2) TH
EN 1170 ELSE RETURN
1170 PRINT@RND(63)*8,"LOSER !";
1180 SOUND 5,10
1190 SCREEN1,1
1200 SOUND 45,5
1210 SOUND 89,5
1220 GOTO 1170
1230 PRINT@RND(63)*8, "WINNER!";
1240 SOUND RND(100)+125,5
1250 SCREEN 1,1
1260 SOUND RND(100)+100,8
1270 GOTO 1230
1280 END
```

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Selectable printer formats (line feeds,

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Print while receiving data*. Spool received data while receiving more (64K).

Buffer editor has these features: Move forward and reverse through buffer. Insert, type over, delete lines or characters.

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A

As with all good Professional programs, Ultra Term + is all machine code. This program has been tested by those both familiar and unfamiliar with communications programs. And when you call for some technical support, you won't get an answering machine during our business hours (10-5 CST M-Sat.) under normal circumstances. Technical help is usually available all day.

Note: Color Term + PLUS + should have all of the same capabilities described above by the time you read this ad, but call first to make sure. Ultra Term + is ready to ship now.

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*Ultra Term + supports the 80 column board made by PBJ, Inc. If you already have the board, simply order the program, but those of you who don't can get a good deal.

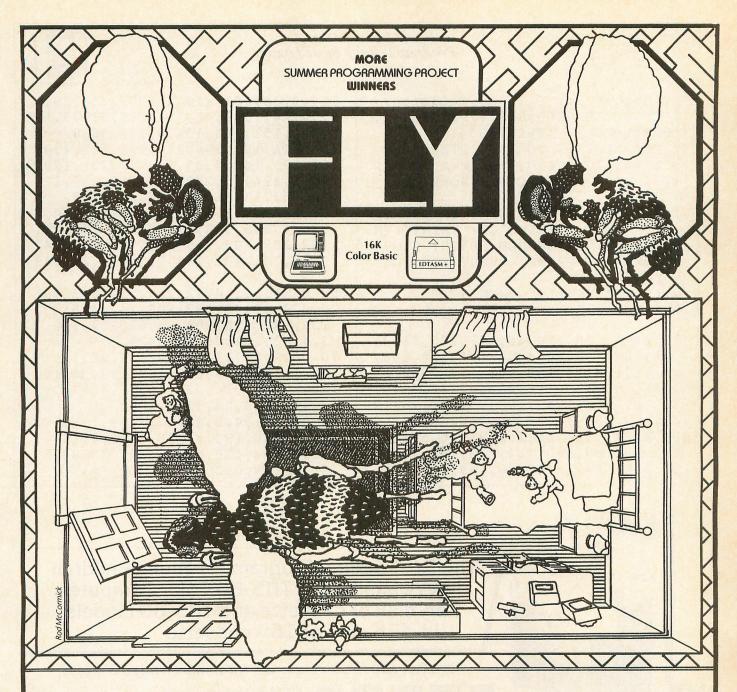
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LY, BY RONALD BOULANGER, is the first runner up in the assembly language category of 1983's Summer Programming Project. "Fly" is fast, and will soon have your head buzzing. Here's the author's description, and directions:

The object of the game is to catch as many flies as you can in three minutes. Each fly caught creates an obstacle. Be careful, you may be trapped by those obstacles. The more flies you catch, the tougher the game becomes. Each fly caught gives you one point.

Type CSAVE and Run the Basic loader. Entering Y to the ARE YOU READY? prompt will run the game. Pressing Break will return you to Basic so you can prepare a tape; type CSAVEM "FLY", 8192,8895,8192 to save the shorter machine code.

On top of the screen, the score board is shown. From left to right is the actual score (sc); the high score (hs); and the time (three minutes to begin). The bottom of the screen is the prompt: SELECT SPEED (1 – 9). The lower the number you press, the faster the game will be.

At this point, only keys 1 to 9 and the Break key are operating. The Break key will initiate a new game.

The game is played with the cursor control keys (arrow keys) up, down, left, right. Once the speed has been selected, the game starts. The blue dot is the fly,

controlled by the computer. The white dot is controlled by the player using the arrow keys. To score points, touch the blue dot with a white dot. Once you touch the fly it will freeze and you will hear a tone. This will create an obstacle and give you one point.

If you or the fly are trapped between obstacles, depress letter τ for trap; this will stop the game and check for a new high score.

To play again, just select a speed. You can change speed any time in the game by depressing the letter s (for select). This will freeze the time left; once your speed selection has been made, the game continues where it stopped.

Program Listing. Basic Loader



16K Color Basic

O 'Loader for FLY, R. Boulanger 1 CLS: CLEAR200,8191: PRINT@204, "FLY LOADER": PRINT@384 2 FOR AD=8192 TO 8895 STEP 32 3 LN=LN+10: CK=0: FOR M=AD TO AD +31: READ D: CK=CK+D: POKE M,D: NEXT M 4 READ CH: IF CH<>CK THEN PRINT"

DATA TYPO IN LINE"LN: PRINT" CH ECKSUM OF "CK" SHOULD BE "CH: STOP 5 NEXT AD: PRINT" READY FOR FLY? (Y/N/BREAK)"

6 IF INKEY\$<>"Y" THEN 6 7 EXEC 8192

10 DATA 158,116,48,137,255,56,31 ,20,189,169,40,48,141,2,128,206, 4,161,198,29,189,165,154,189,169 ,162,189,169,118,204,48,48,3940 20 DATA 221,242,198,255,79,151,2 41,183,255,32,74,38,250,31,152,9 0,38,245,48,141,2,118,206,5,165, 198,18,189,165,154,223,136,4543 30 DATA 141,2,32,20,189,161,177,

129,3,39,181,129,48,35,245,129,5 7,34,241,128,48,151,195,57,79,15 1,194,151,240,134,9,151,3680 40 DATA 193,204,255,128,142,4,0, 167,128,140,4,33,38,249,231,128, 140,5,224,38,249,198,255,237,129 ,140,5,255,35,249,48,31,4282 50 DATA 48,136,224,237,132,140,4 ,32,34,246,198,175,142,4,240,231 ,132,159,208,215,210,198,159,142 ,4,80,231,132,159,211,215,213,48 60 DATA 142,4,22,204,51,58,237,1 29,204,48,48,237,132,142,4,5,237 ,132,142,4,3,204,83,67,237,132,1 42,4,13,204,72,83,3426 70 DATA 237,132,220,242,253,4,15 ,23,1,169,132,255,129,193,36,16, 129,129,36,16,129,65,36,4,134,10 ,32,10,134,94,32,6,3053 80 DATA 134,8,32,2,134,9,151,192 ,23,1,136,132,6,139,3,52,2,141,1 7,150,194,129,68,16,39,255,93,53 ,2,74,129,0,2516



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90 DATA 38,237,32,195,182,1,19,1 29,59,35,51,134,0,183,1,19,182,4 ,25,74,183,4,25,129,47,38,35,134 ,57,183,4,25,2464 100 DATA 182,4,24,74,183,4,24,12 9,47,38,19,134,53,183,4,24,182,4 ,22,74,183,4,22,129,47,38,3,22,0 ,242,222,195,2515 110 DATA 51,95,17,131,0,0,38,248 ,214,210,158,208,150,192,141,76, 159,208,215,210,158,211,214,213, 189,161,193,129,84,16,39,0,4328 120 DATA 223,129,83,38,40,52,54, 141,2,32,18,206,5,230,48,141,1,5 8,198,18,189,165,154,223,136,23, 254,200,57,134,255,222,3729 130 DATA 136,167,196,51,95,17,13 1,5,229,38,246,53,54,129,0,39,2, 151,193,150,193,141,5,159,211,21 5,213,57,129,8,38,6,3457 140 DATA 31,18,48,31,32,30,129,9 ,38,6,31,18,48,1,32,20,129,94,38 ,7,31,18,48,136,224,32,9,129,10, 38,58,31,1554 150 DATA 18,48,136,32,141,1,57,1 66,132,129,128,39,5,231,164,141, 6,57,231,132,167,164,57,129,255, 38,3,31,33,57,129,159,3216

160 DATA 38,116,52,54,23,0,120,5 3,54,134,255,167,164,166,63,129, 128, 38, 7, 49, 63, 167, 164, 31, 33, 57, 166,33,129,128,38,4,2823 170 DATA 49,33,32,241,166,168,22 4,129,128,38,5,49,168,224,32,229 ,166,168,32,129,128,38,226,49,16 8,32,32,217,142,4,5,236,3687 180 DATA 132,92,193,58,39,4,237, 132,32,5,198,48,76,237,132,57,14 2,4,22,204,48,58,237,129,198,48, 237,132,134,68,151,194,3678 190 DATA 150,240,145,241,35,10,1 51,241,252,4,5,221,242,253,4,15, 189,33,107,22,254,2,31,33,129,17 5,16,39,255,132,57,189,3872 200 DATA 169,118,198,21,134,255, 183,255,32,74,38,250,90,38,245,1 2,240,32,169,134,0,71,142,1,22,1 98,3,166,133,90,169,133,3815 210 DATA 167,133,90,42,249,198,3 ,108,133,38,3,90,42,249,57,82,79 ,78,65,76,68,96,66,79,85,76,65,7 8,71,69,82,96,2913 220 DATA 80,82,69,83,69,78,84,83 ,96,70,76,89,83,69,76,69,67,84,9 6,83,80,69,69,68,96,40,49,45,57, 41,255,53,2508

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16K Color Basic	c						
			Program L	isting. Fly!			
A1C1 A1B1 A976	00001 POLCAT 00002 POLKEY 00003 AUDON	EQU EQU	\$A1C1 \$A1B1 \$A976	20B0 ED 84 20B2 8E 0403 20B5 CC 5343 20B8 ED 00	00085 00086 00087 00088	STD LDX LDD STD	,X #\$403 #\$5343 0,X
A9A2 A59A A928	00004 SELMUX 00005 TXTMOV 00006 CLSCRN 00007	EQU EQU	\$A9A2 \$A59A \$A928	20BA 8E 040D 20BD CC 4853 20C0 ED 00	00089 00090 00091	LDX LDD STD	#\$40D #\$4853 0,X
2000 2000 9E 74 2002 30 89 FF38 2006 1F 14	00008 00009 INIT 00010 00011	ORG LDX LEAX TFR	\$2000 \$74 \$FF38,X X,S	20C2 DC F2 20C4 FD 040F 20C7 17 01A9 20CA 84 FF	00092 00093 00094 CPUDIR 00095	LDD STD LBSR ANDA	\$F2 . \$40F RND #\$FF
2008 BD A928 200B 30 8D 0280 200F CE 04A1 2012 C6 1D	00012 00013 00014 00015	JSR LEAX LDU LDB	CLSCRN MESG,PCR #\$4A1 #\$1D	20CC 81 C1 20CE 24 10 20D0 81 81 20D2 24 10	00096 00097 00098 00099	CMPA BHS CMPA BHS	#193 CURLFT #129 CURRGT
2014 BD A59A 2017 BD A9A2 201A BD A976 201D CC 3030	00016 00017 00018 00019	JSR JSR JSR LDD	TXTMOV SELMUX AUDON #\$3030	20D4 81 41 20D6 24 04 20D8 86 0A 20DA 20 0A	00100 00101 00102 CURDN 00103	CMPA BHS LDA BRA	#65 CURUP #\$0A DIR
2020 DD F2 2022 C6 FF 2024 4F 2025 97 F1	00020 00021 00022 00023	STD LDB CLRA STA	\$F2 #\$FF \$F1	20DC 86 5E 20DE 20 06 20E0 86 08 20E2 20 02	00104 CURUP 00105 00106 CURLFT 00107	LDA BRA LDA BRA	#\$5E DIR #\$08 DIR
2027 B7 FF20 202A 4A 202B 26 FA 202D 1F 98	00024 OUV 00025 00026 00027	STA DECA BNE TFR	SFF20 OUV B,A	20E4 86 09 20E6 97 C0 20E8 17 0188 20EB 84 06	00108 CURRGT 00109 DIR 00110 DIRECT 00111	LDA STA LBSR ANDA	#\$09 \$C0 RND #\$06
202F 5A 2030 26 F5 2032 30 8D 0276 2036 CE 05A5	00028 00029 00030 00031	DECB BNE LEAX LDU	OUV SEL,PCR #\$5A5	20ED 8B 03 20EF 34 02 20F1 8D 11 20F3 96 C2	00112 00113 NEXT 00114 00115	ADDA PSHS BSR LDA	#\$03 A MAIN \$C2
2039 C6 12 203B BD A59A 203E DF 88 2040 8D 02	00032 00033 00034 00035	LDB JSR STU BSR	#\$12 TXTMOV \$88 POLL	20F5 81 44 20F7 1027 FF5D 20FB 35 02 20FD 4A	00116 00117 00118 DEC 00119	CMPA LBEQ PULS DECA	#\$44 BEGIN A
2042 20 14 2044 BD AlB1 2047 81 03 2049 27 B5	00036 00037 POLL 00038 00039	BRA JSR CMPA BEQ	BEGIN POLKEY #\$03 INIT	20FE 81 00 2100 26 ED 2102 20 C3 2104 B6 0113	00120 00121 00122 00123 MAIN	CMPA BNE BRA LDA	#\$00 NEXT CPUDIR \$0113
204B 81 30 204D 23 F5 204F 81 39 2051 22 F1	00040 00041 00042 00043	CMPA BLS CMPA BHI	#\$30 POLL #\$39 POLL	2107 81 3B 2109 23 33 210B 86 00 210D B7 0113	00124 00125 00126 00127	CMPA BLS LDA STA	#\$3B TIME #\$00 \$0113
2053 80 30 2055 97 C3 2057 39 2058 4F	00044 00045 00046 00047 BEGIN	SUBA STA RTS CLRA	#\$30 \$C3	2110 B6 0419 2113 4A 2114 B7 0419 2117 81 2F	00128 00129 00130 00131	LDA DECA STA CMPA	\$0419 \$0419 #\$2F
2059 97 C2 205B 97 F0 205D 86 09 205F 97 C1	00048 00049 00050 00051	STA STA LDA STA	\$C2 \$F0 #\$09 \$C1	2119 26 23 211B 86 39 211D B7 0419 2120 B6 0418	00132 00133 00134 00135	BNE LDA STA LDA	TIME #\$39 \$0419 \$0418
2061 CC FF80 2064 8E 0400 2067 A7 80 2069 8C 0421	00052 00053 00054 UP 00055	LDD LDX STA CMPX	#\$FF80 #\$0400 ,X+ #\$0421	2123 4A 2124 B7 0418 2127 81 2F 2129 26 13	00136 00137 00138 00139	DECA STA CMPA BNE	\$0418 #\$2F TIME
206C 26 F9 206E E7 80 2070 8C 05E0 2073 26 F9	00056 00057 CLS 00058 00059	BNE STB CMPX BNE	UP ,X+ #\$05E0 CLS	212B 86 35 212D B7 0418 2130 B6 0416 2133 4A	00140 00141 00142 00143	LDA STA LDA DECA	#\$35 \$0418 \$0416
2075 C6 FF 2077 ED 81 2079 8C 05FF 207C 23 F9	00060 00061 DOWN 00062 00063	LDB STD CMPX BLS	#\$FF ,X++ #\$5FF DOWN	2134 B7 0416 2137 81 2F 2139 26 03 213B 16 00F2	00144 00145 00146 00147	STA CMPA BNE LBRA	\$0416 ~ #\$2F TIME TIMEO
207E 30 1F 2080 30 88 E0 2083 ED 84 2085 8C 0420	00064 00065 SIDE 00066 00067	LEAX LEAX STD CMPX	-1,X -32,X ,X #\$420	213E DE C3 2140 33 5F 2142 1183 0000 2146 26 F8	00148 TIME 00149 DELAY 00150 00151	LDU LEAU CMPU BNE	\$C3 -01,U #\$0000 DELAY
2088 22 F6 208A C6 AF 208C 8E 04F0 208F E7 84	00068 00069 00070 00071	BHI LDB LDX STB	SIDE #\$AF #\$4F0	2148 D6 D2 214A 9E D0 214C 96 C0 214E 8D 4C	00152 00153 00154 00155	LDB LDX LDA BSR	\$D2 \$D0 \$C0 CPUMOV
2091 9F D0 2093 D7 D2 2095 C6 9F 2097 8E 0450	00072 00073 00074 00075	STX STB LDB LDX	\$D0 \$D2 #\$9F #\$450	2150 9F D0 2152 D7 D2 2154 9E D3 2156 D6 D5	00156 00157 00158 00159	STX STB LDX LDB	\$D0 \$D2 \$D3 \$D5
209A E7 84 209C 9F D3 209E D7 D5 20A0 8E 0416 20A3 CC 333A	00076 00077 00078 00079 00080	STB STX STB LDX	,X \$D3 \$D5 #\$416 #\$333A	2158 BD AlC1 215B 81 54 215D 1027 00DF 2161 81 53 2163 26 28	00160 00161 00162 00163	JSR CMPA LBEQ CMPA	POLCAT #\$54 HIGHS #\$53
20A6 ED 81 20A8 CC 3030 20AB ED 84 20AD 8E 0405	00080 00081 00082 00083 00084	LDD STD LDD STD LDX	#\$333A ,X++ #\$3030 ,X #\$405	2163 26 28 2165 34 36 2167 8D 02 2169 20 12 216B CE 05E6	00164 00165 00166 00167 00168 PRTSEL	BNE PSHS BSR BRA LDU	COMPA A,B,X,Y PRTSEL ERASE #\$5E6

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SKILLWARE CORPORATION

_					A LIVE	T. C. C. C.	4	-					
216E 30	8D 013A	00169	LEAX	SEL, PCR		2210 A6	A8 :	20 00	248 S	PACE2	LDA	\$20,Y	
2172 C6	12	00170	LDB	#\$12		2213 81	80		249		CMPA	#\$80	
2174 BD	A928	00171	JSR	TXTMOV		2215 26	E2		250		BNE	RTN	
2177 DF	88	00172	STU	\$88		2217 31 221A 20	A8 D9		251 252		LEAY	\$20,Y	
2179 17 217C 39	FEC8	00173 00174	LBSR RTS	POLL		221C 8E	040		253 S		BRA LDX	SWAP #\$0405	
217D 86	FF	00175 ERASE	LDA	#\$FF		221F EC	00		254		LDD	0,X	
217F DE	88	00176	LDU	\$88		2221 5C			255		INCB		
2181 A7	40	00177 BACKSP	STA	0,0		2222 Cl	3A 04		256		CMPB	#\$3A	
2183 33 2185 11	5F	00178 00179	LEAU CMPU	-1,U #\$5E5		2224 27 2226 ED	00		257 258		BEQ	RESETO 0,X	
2189 26	F6	00180	BNE	BACKSP		2228 20	05		259		BRA	COUNTI	
218B 35	36	00181	PULS	A,B,X,Y		222A C6	30			ESET0	LDB	#\$30	
218D 81	00	00182 COMPA	CMPA	#\$00		222C 4C 222D ED	0.0		261		INCA	0 4	
218F 27	02	00183	BEQ	PLYDIR		222D ED 222F 39	00		262 263 C	COUNTI	STD RTS	0,X	
2191 97 2193 96	C1 C1	00184 00185 PLYDIR	STA LDA	\$C1 \$C1		2230 8E	041		264 T		LDX	#\$0416	
2195 8D	05	00186	BSR	CPUMOV		2233 CC	303		265		LDD	#\$303A	
2197 9F	D3	00187	STX	\$D3		2236 ED	81		266		STD	,X++	
2199 D7	D5	00188	STB	\$D5		2238 C6 223A ED	30		267 268		LDB STD	#\$30	
219B 39 219C 81	08	00189	RTS	#000		223C 86	44		269		LDA	0,X #\$44	
219E 26	06	00190 CPUMOV 00191	CMPA BNE	#\$08 CPURGT		223E 97	C2		270		STA	\$C2	
21A0 1F	12	00192	TFR	X,Y		2240 96	FO		271 H	IIGHS	LDA	\$F0	
21A2 30	1F	00193	LEAX	-01,X		2242 91	F1		272		CMPA	\$F1	
21A4 20	1E	00194	BRA	CHK1	No.	2244 23 2246 97	OA F1		273 274		BLS STA	RETRY \$F1	
21A6 81 21A8 26	09	00195 CPURGT 00196	CMPA BNE	#\$09 CPUUP		2248 FC	040		275		LDD	\$405	
21AA 1F	12	00196	TFR	X,Y		224B DD	F2		276		STD	\$F2	
21AC 30	01	00198	LEAX	01,X		224D FD	040	F 00	277		STD	\$40F	
21AE 20	14	00199	BRA	CHK1		2250 BD	216		278 R	RETRY	JSR	PRTSEL	
21B0 81	5E	00200 CPUUP	CMPA	#\$5E		2253 16 2256 1F	FE0 21		279	ІТСНК	LBRA TFR	BEGIN	
21B2 26 21B4 1F	07 12	00201 00202	BNE	CPUDN X,Y		2258 81	AF		281	ITICHK	CMPA	Y,X #\$AF	
21B6 30	88 E0	00203	LEAX	-\$20,X	City Charles	225A 102			282		LBEQ	HIT	
21B9 20	09	00204	BRA	CHK1		225E 39			283		RTS		
21BB 81	0 A	00205 CPUDN	CMPA	#\$0A		225F BD	A97		284 S	OUND	JSR	AUDON	
21BD 26	3A	00206	BNE	RTN	CAT IN	2262 C6 2264 86	15 FF		285 286 L	ENTH	LDB	#\$15 #\$FF	
21BF 1F 21C1 30	12 88 20	00207	TFR LEAX	X,Y \$20,X		2266 B7	FF2		287 T		STA	\$FF20	
21C4 8D	01	00209 CHK1	BSR	CHCK		2269 4A			288		DECA		
21C6 39		00210	RTS			226A 26	FA		289		BNE	TONE	
21C7 A6	00	00211 CHCK	LDA	0,X		226C 5A	75		290		DECB		
2109 81	80	00212	CMPA	#\$80		226D 26 226F 0C	F5 F0		291 292		BNE	LENTH \$FO	
21CB 27 21CD E7	05 20	00213 00214	BEQ STB	EXCH 0,Y		2271 20	A9		293		BRA	SCORE	
21CF 8D	06	00214	BSR	CKSIDE		2273 86	00		294 R	RND	LDA	#0	
21D1 39		00216	RTS			2275 47			295		ASRA		
21D2 E7	00	00217 EXCH	STB	0,X	Total or	2276 8E	011		296		LDX	#\$116	
21D4 A7	20	00218	STA	0,Y		2279 C6 227B A6	03 85		297 298		LDB LDA	#\$03 B,X	
21D6 39 21D7 81	FF	00219 00220 CKSIDE	RTS CMPA	#\$FF	1000	227D 5A			299		DECB	D,A	
21D9 26	03	00221	BNE	OPPONT		227E A9	85		300 L		ADCA	B,X	100
21DB 1F	21	00222 TFR	TFR	Y,X		2280 A7	85		301		STA	B,X	
21DD 39		00223	RTS			2282 5A	710		302		DECB		
21DE 81 21E0 26	9F 74	00224 OPPONT 00225	CMPA	#\$9F	4	2283 2A 2285 C6	F9 03		303 304		BPL	LOOP1	
21E0 26 21E2 34	36	00226 HIT	BNE PSHS	HITCHK Y,X,B,A		2287 6C	85		305 L		LDB INC	#\$03 B,X	
21E4 17	0078	00227	LBSR	SOUND	TANK TANK	2289 26	03		306		BNE	RTS1	
21E7 35	36	00228	PULS	Y,X,B,A	1	228B 5A			307		DECB		
21E9 86	FF	00229	LDA	#\$FF		228C 2A 228E 39	F9		308 309 R		BPL	LOOP2	
21EB A7 21ED A6	20 3F	00230 00231	STA LDA	0,Y -01,Y		228E 39	1F4E41		310 M		RTS FCC	/RONALD	/
21EF 81	80	00232	CMPA	#\$80		2295	60		311		FCB	\$60	
21F1 26	07	00233	BNE	SPACE		2296 424		414E 00	312		FCC	/BOULAN	GER/
21F3 31	3F	00234	LEAY	-01,Y			4552 ECC	0115	2 4 4 4 6	1-1-11			,
21F5 A7 21F7 1F	20 21	00235 SWAP 00236	STA TFR	0,Y	100			output		Charles and the second	THE RESERVE THE PERSON NAMED IN		.)
21F9 39	21	00237 RTN	RTS	Y, X		229F 22A0 505	60 524553		313 314		FCB FCC	\$60 /PRESEN	TTS/
21FA A6	21	00238 SPACE	LDA	01,Y	100	545	53						10,
21FC 81	80	00239	CMPA	#\$80		22A8	60		313		FCB	\$60	
21FE 26	04 21	00240 00241	BNE	SPACEL		22A9 464			316		FCC	/FLY/	,
2200 31 2202 20	F1	00241	LEAY BRA	01,Y SWAP		22AC 534 22B2	454C45 60		317 S 318		FCC FCB	/SELECT \$60	/
2204 A6	A8 E0	00243 SPACE1	LDA	-\$20,Y		22B3 535			319		FCC	/SPEED/	
2207 81	80	00244	CMPA	#\$80		22B8	60	00	320		FCB	\$60	
2209 26	05	00245	BNE	SPACE2	Star Sta	22B9 283			321		FCC	/(1-9)/	
220B 31	A8 E0	00246	LEAY	-\$20,Y		00000 m	200		322		END	INIT	
220E 20	E5	00247	BRA	SWAP		00000 TC	TAL E	KKUKS					
AUDON	A976 COMP			ERASE	217D	LOOP2	2287	POLKEY	AlB1		221C	SWAP	21F5
BACKSP BEGIN	2181 COUN 2058 CPUD			EXCH	21D2	MAIN	2104 228F	POLL	2044		22AC	TFR	21DB
CHCK	21C7 CPUD		P 20DC 20FB	HIGHS	2240 21E2	MESG NEXT	20EF	PRTSEL RESETO	216B 222A	SELMUX	A9A2 2080	TIME TIME0	213E 2230
CHK1	21C4 CPUM			HITCHK	2256		21DE	RETRY	2250	SOUND	225F	TONE	2266
CKSIDE	21D7 CPUR		20E6	INIT	2000	OUV	2027	RND	2273	SPACE	21FA	TXTMOV	A928
CKSIDE CLS CLSCRN	2107 CPUR 206E CPUU A928 CURD	P 21B0 DIRE	CT 20E8	LENTH LOOP1	2264	PLYDIR	2193	RND RTN RTS1	2273 21F9 228E	SPACE SPACE	2204	TXTMOV UP	A928 2067

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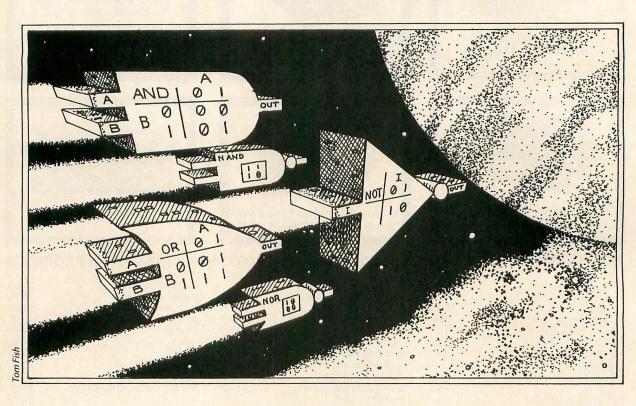
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AND, OR, NOT

Boolean functions, and what they <u>really</u> mean!



4K Color Basic



B ESIDES THE NORMAL operators for addition, subtraction, multiplication, division, and exponentiation, we have three logical, or Boolean, operators in Basic: AND, OR, and NOT. In most versions of Basic (including Color and Extended Color) these may be used to combine conditions in an If statement, as in IF J>O AND K=1 THEN PRINT "YES". Anyone who sees this realizes that both conditions must be true before the word YES will be printed. Likewise, IF J>O OR K=1 THEN PRINT "YES" means that if either condition is true (or if both are true) the Print statement will be executed.

Boolean operators combine conditions as stated in Basic rather than as stated in English. In English it is quite permissible to say "If A is 2 or 3, add 1 to C." This is not the same as IF A=2 OR 3 THEN C=C+1 as many novice programmers have discovered. In some versions of Basic this statement would be an error. In

by Jon J. Schild

Color Computer Basic it is not an error, but it does not do what its author intended.

A similar problem occurs with NOT. It negates a condition stated in Basic, not as stated in English. The English statement "If A is not less than 10, add 1 to C" is not translated as IF A NOT < 10 THEN C=C+1 but as IF NOT A<10 THEN C=C+1. The condition (A<10) must be negated as a whole.

Boolean operators were originally defined on a bit-by-bit basis and can still be used that way in Color Computer Basic. Since they are operators, it is possible to set up a table to show their possible argument values and their results (Table 1).

Each bit of the two operands takes part in the operation as shown. The following program illustrates the operation of AND and OR on whole operands.

10 FOR X = 0 TO 15 : FOR Y = 0 TO 15
20 PRINT X; Y, X and Y; X OR Y
30 NEXT Y
40 PRINT
50 NEXT X

Notice that 3 OR 5 is 7 (in bits: 011 OR 101 = 111) because each bit in one operand is ORed with the corresponding bit in the other. Also, note 3 AND 5 is 1 (011 AND 101 = 001) because the bits are ANDed together in corresponding pairs.

Nice. But how does that relate to the AND and OR in If statements? They are exactly the same thing. All we need do is define the terms *true* and *false* as they relate to conditions and If statements.

The required definitions are:

- True relates to conditions the same as

 1 (all bits set to 1). Really! Try it. Just
 type PRINT 3=3. You will get −1.
- False relates to *conditions* the same as zero (all bits set to 0). You can demonstrate that with PRINT 2+2=5.
- True relates to *If statements* as anything but zero. The Then part of the statement is executed if the condition equals any value except zero.
- False relates to *If statements* as zero, the same as for conditions.

In the normal case we would have something like: IF J>0 OR K=1 THEN PRINT "YES" ELSE PRINT "NO". The condition J>0 is evaluated and yields either a -1 or a zero. The K=1 condition likewise yields either -1 or zero. These two values are then ORed together, and if the result is other than zero, YES is printed. If the result is zero, No is printed.

Let's use these definitions to see why IF A=2 OR 3 THEN C=C+1 doesn't do what was expected. According to Tandy's documentation, relational operators (equals, less than, greater than, less than or equal to, greater than or equal to, and not equal to are executed before Boolean operators (AND, OR, NOT). A=2 is evaluated first, giving as its result either -1 or zero depending on the current value of A. The result is then ORed with three. This can never result in a zero value, so C=C+1 is always executed no matter what value A has.

The Boolean operators can be used in normal Let statements also, which means they can be used in functions defined by the DEF FN statements in Extended Color Basic. That is useful, if you know how to use them. For instance, I wrote a program that involved PEEKing characters from the Color Computer's screen memory. It didn't work. I found that because of the internal character generator in the Video Display Generator (VDG) chip, the

X	Υ	XANDY	XORY	NOTX
0	0	0	0	1
0	1	0	1	1
1	0	0	1 1	0
1	1	12041	1	0

Table 1. Argument Values and Results

code stored in screen memory doesn't always match the normal ASCII code sent via Print statements. CLS: PRINT CHR\$(48): PRINT @ 64 prints a zero at the upper left corner of the screen, but CLS: POKE 1024, 48: PRINT @ 64 prints a reversed zero. Look at Table 2.

It is necessary to convert back and forth in several places. The obvious way to handle this is by using either a function or a GOSUB command to do the conversion. Since Extended Basic lets us define functions, that seems the easiest way to go. Without Extended Basic it would be necessary to use GOSUBs. (It is also possible to do the conversions in assembly language.) I chose to define one function for each conversion. I wrote the two functions below, FNA to convert to ASCII from PEEK/POKE code, and FNP to convert to PEEK/POKE code from ASCII. I will state the functions first, then show how they relate to the discussion in the early part of the article.

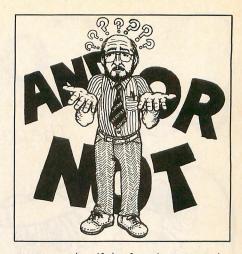
5 DEF FNA(X) = ((((X<&H20) AND &H60) OR ((X<&H40) AND (X>&H1F) AND &HE0) OR ((X<&H80) AND (X>&H5F) AND &HC0)) + X) AND &HFF

10 DEF FNP(X) = ((((X<&H20) AND &H20) OR ((X<&H40) AND (X>&H1F) AND &H40) OR ((X<&H80) AND (X>&H5F) AND &HA0)) + X) AND &HFF

These functions look quite forbidding, so let's examine them piece by piece, beginning with FNA.

((X<&H20) AND &H60) If the PEEK/POKE code (PPc) is less than &H20 (that is, in the range &H00 – &H1F) it needs to be converted to the range &H60 – &H7F. This requires adding &H60 to whatever the code may be. If X is any value in this range, the condition (X<&H20) will be true. That is, it will evaluate to –1 (all bits 1). So ((X<&H20) AND &H60) will evaluate to &H60. If X is a value outside this range, (X<&H20) will be false, or zero, and ((X<&H20) AND &H60) will evaluate to zero.

((X<&H40) AND (X>&H1F) AND &HE0) If the PPc is in the range &H20 through &H3F we need to convert it to the range &H00 through &H1F. This range cannot actually be put on the screen with a Print



statement, but if the functions are to be inverses of each other all codes must convert to something. This requires subtracting &H20, which is the same (for an eight-bit byte) as adding &HEO and then throwing away the high-order bit. We'll worry about that high-order bit later. For a value in the range &H20 through &H3F, both (X<&H40) and (X>&H1F) will evaluate to true (-1) while for any X value outside this range one condition or the other will evaluate to false (0). When the two are ANDed together, a true (-1)will be produced only if both conditions are met. - 1 AND &HEO will give &HEO. If the X value is outside this range, we have 0 AND &HEO, which gives a zero.

((X<&H80) AND(X>&H5F) AND &HCO) In a similar fashion to the preceding part, this will produce &HCO for an X value in the range &H60 through &H7F or zero for any value outside this range.

These three values (two of which will be zero) are ORed together (they could have been added with the same result) and the result is added to the original X value. Two of the ranges will produce an extra high-order bit which needs to be discarded. The AND &HFF at the end of the function will keep only the eight loworder bits, getting rid of the troublesome high-order bit we didn't want. Voila! Whatever PPc was in X to start with, the function now returns the proper adjusted value. Note that two of the PPc ranges, &H40 through &H5F and &H80 through &HFF, will fail all tests and cause a zero to be added to X at the end. That is because those two ranges are the same in PPc and ASCII and thus do not need to be converted.

FNP will work the same way as FNA to perform the reverse conversion.

To use these two in non-Extended Basic, replace DEF FNA(X) or DEF FNP(X) on the left of the equal sign by Y or some other variable name, add :RETURN to the end, and use them as GOSUBs.

Character Series	PEEK/POKE Code	ASCII Code
@ thru underscore (normal)	&H40&H5F	&H40&H5F
@ thru underscore (reversed)	&H00-&H1F	&H60-&H7F
space through ? (normal)	&H60&H7F	&H20-&H3F
space through ? (reversed)	&H20&H3F	N/A



Editor's note: This month we present the assembly language program for Dennis's Color Burner (Part I — March 1984, Part II — May 1984). This is the last bit of information you'll need to use the Color Burner. We apologize that space considerations made this delay necessary. The package is finally complete!

ATISSUE ATISSUE		Program Listing 2. Ass		J			
A		00100 **************	The College of the Co				
		00110 * COLOR BURNER DRIVER 1.0 00120 * BY DENNIS BATHORY KITSZ	3D16	A0	00600 P27128 00610 *	FCB	\$A0
		00130 * COPYRIGHT (C) 1984 BY		3D17	00620 TABSP1	EOU	*
		00140 * DENNIS BATHORY KITSZ	3D17	00	00630 OSP1	FCB	\$00
		00150 **************	3D18	00	00640 RSP1	FCB	\$00
		00160 *	3D19	00	00650 SSP1	FCB	\$00
		00170 *	3D1A	00	00660 PSP1	FCB	\$00
D00		00180 ORG \$3D00			00670 *		
		00190 *		3D1B	00680 TABSP2	EOU	*
		00200 * OFFSET (0 4 8 12 16 20	3D1B	00	00690 OSP2	FCB	\$00
		00210 * 24 28) PLACED BY BASIC	3D1C	00	00700 RSP2	FCB	\$00
		00220 * TO INDICATE EPROM TYPE	3D1D	00	00710 SSP2	FCB	\$00
		00230 *	3D1E	00	00720 PSP2	FCB	\$00
D00	00	00240 OFFSET FCB \$00	THE WATER		00730 *	Sometra	
D01	0000	00250 STTADR FDB \$0000		3D1F	00740 TABSP3	EOU	*
D03	4000	00260 STTDAT FDB \$4000	3D1F	00	00750 OSP3	FCB	\$00
D05	0800	00270 ENDADR FDB \$0800	3D20	00	00760 RSP3	FCB	\$00
		00280 *	3D21	00	00770 SSP3	FCB	\$00
		00290 * THE TABLES BELOW HOLD	3D22	00	00780 PSP3	FCB	\$00
		00300 * THE PROGRAMMING DETAILS	nive desired and		00790 *	100	400
		00310 * FOR EIGHT EPROMS. FIXED	and some of the	3D23	00800 TABSP4	EQU	*
		00320 * TABLES ARE PROVIDED FOR	3D23	00	00810 OSP4	FCB	\$00
		00330 * 2716, 2732, 2764 AND	3D24	00	00820 RSP4	FCB	\$00
		00340 * 27128 EPROMS. OTHER	3D25	00	00830 SSP4	FCB	\$00
		00350 * TYPES ARE FILLED IN BY	3D26	00	00840 PSP4	FCB	\$00
		00360 * THE BASIC DRIVER.			00850 *		
		00370 *	The state of the		00860 * THIS	ROUTINE	CONFIGURES
	3D07	00380 TAB16 EQU *			00870 * PORT		
D07	03	00390 02716 FCB \$03			00880 *		
D08	CO	00400 R2716 FCB \$C0	3D27 8E	FF40	00890 CONAIN	LDX	#\$FF40
D09	91	00410 S2716 FCB \$91	3D2A C6	04	00900	LDB	#\$04
DOA	93	00420 P2716 FCB \$93	3D2C 4F		00910	CLRA	
		00430 *	3D2D A7	01	00920	STA	1,X
	3D0B	00440 TAB32 EQU *	3D2F A7	84	00930	STA	, X
DOB	02	00450 02732 FCB \$02	3D31 E7	01	00940	STB	1,X
DOC	CO	00460 R2732 FCB \$C0	3D33 39		00950	RTS	
DOD	90	00470 S2732 FCB \$90			00960 *		
DOE	80	00480 P2732 FCB \$80			00970 * THIS		
	2000	00490 *	The state of the s		00980 * THE A	PORT A	S OUTPUT
DOD	3D0F	00500 TAB64 EQU *	2024 00	2210	00990 *		ant .
DOF D10	03	00510 02764 FCB \$03	3D34 8E	FF40	01000 CONAOT	LDX	#\$FF40
D10	C4	00520 R2764 FCB \$C4	3D37 C6	04	01010	LDB	#\$04
D11 D12	A4	00530 S2764 FCB \$A4	3D39 4F	0.1	01020	CLRA	
DIZ	A0	00540 P2764 FCB \$A0	3D3A A7	01	01030	STA	1,X
	2012	00550 * 00560 TABL28 FOR *	3D3C 4A	0.4	01040	DECA	
D12	3D13	OCCUPATION DO	3D3D A7	84	01050	STA	X
D13	03	00570 027128 FCB \$03	3D3F E7	01	01060	STB	1,X
D14	C4	00580 R27128 FCB \$C4	3D41 39		01070	RTS	

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```
02010 *
                                                                                                   02020 * THIS ROUTINE CONVERTS
                        01090 * THIS ROUTINE CONFIGURES
                        01100 * PORTS B, C AND D AS
01110 * OUTPUTS. B, C AND D
01120 * ARE USED TO PROVIDE A
                                                                                                   02030 * ONE BYTE FROM BINARY
                                                                                                   02040 * TO TWO HEXADECIMAL
02050 * DIGITS AND DISPLAYS
                        01130 * BYTE OF DATA AND AN
01140 * ADDRESS TO THE EPROM
                                                                                                   02060 * THEM ON THE SCREEN.
                                                                                                   02070 *
                        01150 *
                                                                                                   02080 SHOWAD
                                                                                                                     PSHS
                                                                           3DA1 34
                                                                                       02
3D42 C6
                                                                           3DA3 44
                                                                                                   02090
                                                                                                                     LSRA
                        01160 CONBCD
                                         LDB
                                                    #$04
                                                                                                                     LSRA
3D44 8E
            FF40
                                          LDX
                                                    #$FF40
                                                                           3DA4 44
                                                                                                   02100
3D47 4F
                        01180
                                          CLRA
                                                                           3DA5
                                                                                44
                                                                                                   02110
                                                                                                                     I.SRA
                                                                                                   02120
3D48 A7
            03
                        01190
                                                    3.X
                                                                           3DA6
                                                                                                                     LSRA
                                          STA
3D4A 4A
                                                                                                                                CONVRT
                        01200
                                          DECA
                                                                           3DA7
                                                                                8 D
                                                                                                   02130
3D4B A7
            02
                        01210
                                                    2,X
                                                                           3DA9
                                                                                                   02140
                                                                                                                     STA
                                                                                                                                , Y+
                                                                                        A0
                                                                                                   02150
3D4D E7
            03
                        01220
                                          STB
                                                    3,X
                                                                           3DAB 35
                                                                                        02
                                                                                                                     PULS
                        01230
                                                                                 84
                                                                                                                                #$0F
3D4F 4F
                                          CLRA
                                                                           3DAD
                                                                                        OF
                                                                                                   02160
                                                                                                                      ANDA
3D50 A7
            05
                                                                           3DAF
                                                                                 8D
                                                                                                   02170
                                                                                                                                CONVRT
                        01240
                                          STA
                                                    5 . X
                                                                                                                      BSR
3D52 4A
3D53 A7
                                                                           3DB1 A7
3DB3 39
                        01250
                                          DECA
                                                                                        AO
                                                                                                   02180
                                                                                                                     STA
                                                                                                                                , Y+
                                                                                                   02190
            04
                        01260
                                          STA
                                                    4 . X
                                                                                                                     RTS
3D55
      E7
            05
                        01270
                                          STB
                                                                           3DB4
                                                                                81
                                                                                        OA
                                                                                                   02200 CONVRT
                                                                                                                      CMPA
                                                                                                                                #$0A
                                                    5 . X
3D57 4F
                        01280
                                                                                                   02210
                                                                                                                     BCC
                                                                                                                                LETTER
                                          CLRA
                                                                           3DB6
3D58 A7
            07
                        01290
                                          STA
                                                    7,X
                                                                           3DB8 8B
                                                                                        70
                                                                                                   02220
                                                                                                                      ADDA
                                                                                                                                #$70
3D5A 4A
3D5B A7
                        01300
                                                                                                   02230
                                                                                                                     RTS
                                          DECA
                                                                           3DBA 39
                                                                                        37
                                                                                                   02240 LETTER
                                                    6,X
                                                                           3DBB
                                                                                                                     ADDA
                                                                                                                                #$37
                                                                                                   02250
3D5D E7
            07
                        01320
                                          STR
                                                    7,X
                                                                           3DBD
                                                                                 39
                                                                                                                     RTS
3D5F 39
                        01330
                                          RTS
                                                                                                   02270
                        01340
                                                                                                           * THE EPROM PROGRAMMING
                        01350
                               * THIS ROUTINE USES THE
                                                                                                   02280
                                                                                                           * ROUTINE BEGINS HERE.
                        01360 * OFFSET POKED BY BASIC
01370 * TO DETERMINE THE EPROM
                                                                                                   02290 * IT CONSISTS OF PORT
                                                                                                   02300 *
                                                                                                             CONFIGURATION, SETTING
                        01380 * TYPE AND SELECT THE
01390 * CORRECT TABLE FOR USE
                                                                                                           * UP ADDRESS AND DATA TO
                                                                                                   02310
                                                                                                   02330 * PROGRAMMING PULSES.
02340 *
                                                                                                   02320 * THE EPROM, AND ISSUING
                        01400 * BY PROGRAMMING SOFTWARE
                        01410 *
3D60 34
            10
                        01420 ETYPE
                                          PSHS
                                                                           3DBE 8E
                                                                                                   02350 PROGMX
                        01430
01440
3D62 8E
            3D07
                                          LDX
                                                    #TAB16
                                                                           3DC1 17
                                                                                        FFA9
                                                                                                   02360
                                                                                                                     LBSR
                                                                                                                               MESSER
3D65 B6
            3D00
                                          LDA
                                                    OFFSET
                                                                                                   02370
                        01450
                                          LEAY
3D68
     31
                                                                                                   02380
                                                                                                             THIS ROUTINE CONFIGURES
                                                    A,X
            10
3D6A 35
                        01460
                                          PULS
                                                                                                           * PORT A FOR OUTPUT TO
                                                                                                   02400 * EPROM, PORTS B C D FOR
02410 * OUTPUT TO EPROM.
3D6C 39
                        01470
                                          RTS
                        01480
                        01490 * THIS ROUTINE DISPLAYS
                                                                                                   02420
                        01500 * MESSAGES DURING READ,
01510 * PROGRAM, VERIFY AND
                                                                                                    02430
                                                                                                           CONFIG
                                                                                                                     LBSR
                                                                                                                                CONAOT
                                                                                                   02440 02450
                                                                           3DC7 17
                                                                                        FF78
                                                                                                                     LBSR
                                                                                                                                CONBCD
                        01520 * ERASE CHECK.
                        01530 *
                                                                                                    02460
                                                                                                           * D AND Y REGISTERS ARE
3D6D 108E 0460
                        01540 MESSER
01550
                                          LDY
                                                    #$0460
                                                                                                   02470
                                                                                                             POINTED TO STARTING
3D71 C6
                                                                                                   02480 * ADDRESS OF THE EPROM
            10
                                          LDB
                                                    #$10
3D73 A6
                        01560 MLOOP1
                                          LDA
                                                                                                   02490 *
                                                    , X+
                                                                                                             AND STARTING DATA IN
3D75 A7
3D77 5A
            A0
                        01570
                                          STA
                                                    , Y+
                                                                                                    02500
                                                                                                             MEMORY TO PROGRAM.
                        01580
                                          DECB
                                                                                                   02510 *
3D78 26
            F9
                        01590
                                                                                                   02520
                                                    MLOOP1
                                                                           3DCA FC
                                          BNE
                                                                                       3D01
                                                                                                                     LDD
                                                                                                                                STTADR
3D7A 39
                        01600
                                          RTS
                                                                           3DCD 10BE 3D03
                                                                                                   02530
                                                                                                                     LDY
                                                                                                                                STTDAT
                        01610 *
                                                                                                   02540
                        01620 * THIS ROUTINE PROVIDES
01630 * A SHORT DELAY TO ASSURE
01640 * THAT CONTROL SIGNALS
                                                                                                   02550
                                                                                                             THIS ROUTINE LATCHES
                                                                                                   02560 * DATA INTO THE LOWER
02570 * AND UPPER HALVES OF THE
                        01650 * ARE PROPERLY RECEIVED
01660 * BY BOTH PIA AND EPROM
                                                                                                             EPROM'S ADDRESS, GETS
                                                                                                   02580
                                                                                                   02590 * THE DATA FROM MEMORY,
                                                                                                   02600 *
                        01670 *
                                                                                                             AND LATCHES THAT TO THE EPROM THROUGH THE PIA.
3D7B 34
3D7D C6
            04
                        01680 DELAY1
                                          PSHS
                                                                                                   02610 *
                                                    #$04
                        01690
                                          LDB
                                                                                                   02620 *
3D7F 5A
                        01700 LOOP1
                                          DECB
                                                                           3DD1 E7
                                                                                       02
                                                                                                   02630 AGAIN
                                                                                                                     STB
3D80 26
                        01710
                                          BNE
                                                    LOOP1
                                                                           3DD3 A7
3DD5 34
                                                                                        04
                                                                                                   02640
                                                                                                                     STA
                                                                                                                                4 , X
                        01720
01730
3D82 35
            04
                                          PULS
                                                                                        06
                                                                                                   02650
                                                                                                                     PSHS
                                                                                                                                D
3D84 39
                                         RTS
                                                                           3DD7 A6
                                                                                        A0
                                                                                                                                , Y+
                                                                                                   02660
                                                                                                                     LDA
                        01740
                                                                           3DD9 A7
                                                                                        84
                                                                                                   02670
                                                                                                                     STA
                        01750 * THIS ROUTINE CREATES A
                                                                                                   02680
                        01760 * 50 MS DELAY REQUIRED
                                                                                                   02690 * THE ADDRESS AND DATA
                        01770 * FOR THE PROGRAMMING
01780 * PROCESS. THE ACTUAL
                                                                                                   02700 * ARE DISPLAYED FOR THE
                                                                                                   02710 * USER AS THE PROGRAMMING
02720 * GOES ON.
                        01790 * DELAY CREATED HERE IS
                        01800 * APPROXIMATELY 50.1 MS
                                                                                                   02730 *
                        01810
                                                                           3DDB 34
                                                                                       20
                                                                                                   02740
02750
                                                                                                                     PSHS
3D85 34
            06
                        01820 D50MS
                                          PSHS
                                                                           3DDD 108E 0478
3DE1 17 FFBD
                                                                                                                               #$0478
                                                                                                                     LDY
            18F8
                                                    #$18F8
#$0001
3D87 CC
                        01830
                                          LDD
                                                                                                   02760
                                                                                                                     LBSR
                                                                                                                                SHOWAD
3D8A 83
            0001
                        01840 LOOP50
                                          SUBD
                                                                                                   02770
02780
                                                                           3DE4
                                                                                 35
                                                                                        20
                                                                                                                     PULS
3D8D 26
            FB
                                          BNE
                                                    LOOP50
                                                                                 35
                                                                           3DE6
                                                                                        06
                                                                                                                     PULS
                                                                                                                                D
                        01860
01870
                                          PULS
                                                                                                   02790
3D8F 35
            06
                                                                           3DE8
                                                                                 34
                                                                                        06
                                                                                                                     PSHS
                                                                                                                                D
3D91 39
                                          RTS
                                                                           3DEA
                                                                                 17
                                                                                        FFA5
                                                                                                   02800
                                                                                                                      LBSR
                                                                                                                                DISADR
                        01880
                                                                           3DED
                                                                                 35
                                                                                        06
                                                                                                   02810
                                                                                                                     PULS
                                                                                                                                D
                        01890 * THIS ROUTINE DISPLAYS
                                                                                                   02820
                                                                           3DEF
                                                                                        06
                                                                                                                     PSHS
                                                                                                                               D
                        01900 * A 16-BIT ADDRESS IN HEX
01910 * BY CALLING THE BYTE
                                                                                                   02830
                                                                                                   02840 * THE ACTUAL PROGRAMMING
02850 * TAKES PLACE IN THIS
02860 * ROUTINE. INTERRUPTS
                        01920 * DISPLAY ROUTINE TWICE
                        01930 *
                                                                                                             ARE DISABLED TO KEEP
3092 34
            30
                        01940 DISADR
                                          PSHS
                                                                                                   02870 *
3D94 108E
            0470
                        01950
                                                    #$0470
                                          LDY
                                                                                                             THE PROGRAMMING PULSE
                                                                                                   02880
3D98 8D
            07
                                                                                                             OF THE CORRECT LENGTH,
                        01960
                                          BSR
                                                    SHOWAD
                                                                                                   02890
3D9A 1F
3D9C 8D
            98
                        01970
                                                                                                   02900 *
                                                                                                             THE EPROM TYPE IS
                                          TFR
                                                    B,A
                                                                                                   02910 * ESTABLISHED, AND A
02920 * SEQUENCE OF OFF-READ-
            03
                        01980
                                          BSR
                                                    SHOWAD
3D9E
            30
                        01990
                                          PULS
                                                    X,Y
3DA0 39
                        02000
                                                                                                          * GET SET-PULSE-GET SET-
```

	02040 + DEAD OFF TO FOLLOWED		02200 #
	02940 * READ-OFF IS FOLLOWED. 02950 *	2=22 0= 2=00	03380 *
2001 11 50		3E33 8E 3F88	03390 LDX #MESSG7
3DF1 1A 50	02960 PROGRM ORCC #\$50	3E36 C6 OD	03400 LDB #13
3DF3 34 20	02970 PSHS Y	3E38 17 FF32	03410 LBSR MESSER
3DF5 17 FF68	02980 LBSR ETYPE	3E3B 39	03420 RTS
3DF8 A6 A4	02990 LDA ,Y		03430 *
3DFA A7 06	03000 STA 6,X		03440 * THE CHECK FOR AN ERASED
3DFC 17 FF7C	03010 LBSR DELAY1		03450 * EPROM BEGINS HERE. AN
3DFF A6 21	03020 LDA 1,Y		03460 * ERASED EPROM CONTAINS
3E01 A7 06	03030 STA 6,X		03470 * ALL FF (255) AS SENT
3E03 17 FF75	03040 LBSR DELAY1		03480 * FROM THE FACTORY, OR
3E06 A6 22	03050 LDA 2,Y		03490 * AFTER ERASURE UNDER
3E08 A7 06	03060 STA 6,X		03500 * ULTRAVIOLET LIGHT. THIS
3E0A 17 FF6E	03070 LBSR DELAY1		03510 * ROUTINE READS THE VALUE
3EOD A6 23	03080 LDA 3,Y		03520 * IN THE EPROM.
3EOF A7 06	03090 STA 6,X		03530 *
3E11 17 FF71	03100 LBSR D50MS	3E3C 8E 3F48	03540 ERASEX LDX #MESSG3
3E14 A6 22	03110 LDA 2,Y	3E3F 17 FF2B	03550 LBSR MESSER
3E16 A7 06	03120 STA 6,X		03560 *
3E18 17 FF60	03130 LBSR DELAY1		03570 * SETUP WITH PORT A AS
3E1B A6 21	03140 LDA 1,Y		03580 * INPUT AND PORTS B, C
3E1D A7 06	03150 STA 6,X		03590 * AND D AS OUTPUT FOLLOWS
3E1F 17 FF59	03160 LBSR DELAY1	2012 17 0000	03600 *
3E22 A6 A4	03170 : LDA ,Y	3E42 17 FEE2	03610 LBSR CONAIN
3E24 A7 06	03180 STA 6,X	3E45 17 FEFA	03620 LBSR CONBCD
	03190 *	3E48 17 FF15	03630 LBSR ETYPE
	03200 * ONE BYTE HAS BEEN	3E4B A6 21	03640 LDA 1,Y
	03210 * BURNED; A CHECK IS MADE	3E4D A7 06	03650 STA 6,X
	03220 * TO SEE IF THE PROCESS		03660 *
	03230 * IS COMPLETE. IF NOT,		03670 * D IS POINTED TO THE
	03240 * THE NEXT BYTE IS TAKEN		03680 * STARTING ADDRESS IN THE
	03250 * FROM MEMORY FOR BURNING		03690 * EPROM
	03260 * INTO THE EPROM.	2040 00 2001	03700 *
2005 25 05	03270 *	3E4F FC 3D01	03710 LDD STTADR 03720 *
3E26 35 20	03280 PULS Y		
3E28 35 06	03290 PULS D		03730 * THE LSB AND MSB OF THE
3E2A C3 0001	03300 ADDD #\$0001		03740 * ADDRESS ARE LATCHED
3E2D 10B3 3D05 3E31 26 9E	03310 CMPD ENDADR		03750 * INTO THE EPROM, AND 03760 * THE ADDRESS AND DATA
3E31 26 9E	03320 BNE AGAIN		
	03330 *		03770 * ARE DISPLAYED FOR THE 03780 * USER.
	03340 * IF THE BURNING IS DONE,		
	03350 * A MESSAGE IS DISPLAYED	3E52 E7 02	03790 * 03800 AGIN1 STB 2.X
	03360 * AND CONTROL IS RETURNED 03370 * TO BASIC.	3E52 E7 02 3E54 A7 04	03800 AGIN1 STB 2,X 03810 STA 4,X
	03370 " 10 BASIC.	1 3534 A/ 04	03010 31A 4,A

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3E56 34 06	03820 PSHS D		04260 * Y POINTS TO THE DATA
3E58 17 FF37	03830 LBSR DISADR		04270 * STORED IN MEMORY.
3E5B A6 84	03840 LDA ,X		04280 *
3E5D 34 22	03850 PSHS Y,A	3E94 FC 3D01	04290 LDD STTADR
3E5F 108E 0478	03860 LDY #\$0478	3E97 10BE 3D03	04300 LDY STTDAT
3E63 17 FF3B	03870 LBSR SHOWAD		04310 *
3E66 35 22	03880 PULS A,Y		04320 * A AND B ARE LATCHED AS 04330 * THE LSB AND MSB OF THE
3E68 81 FF	03890 CMPA #\$FF		04340 * EPROM'S ADDRESS, AND
3E6A 35 06	03900 PULS D		04350 * ALL THE INFORMATION IN
3E6C 26 0E	03910 BNE EFAULT		04360 * PROGRESS IS DISPLAYED
3E6E C3 0001	03920 ADDD #\$0001 03930 CMPD ENDADR		04370 * FOR THE USER.
3E71 10B3 3D05 3E75 26 DB	03940 BNE AGIN1		04380 *
3E/3 20 DB	03950 *	3E9B E7 02	04390 AGIN2 STB 2,X
	03960 * A CORRECT ERASURE OR	3E9D A7 04	04400 STA 4,X
	03970 * A FAILED ERASURE IS	3E9F 34 06	04410 PSHS D
and store and st	03980 * DISPLAYED FOR THE USER.	3EA1 17 FEEE	04420 LBSR DISADR
BERTHE LOS	03990 *	3EA4 A6 84	04430 LDA ,X
3E77 8E 3F98	04000 LDX #MESSG8	3EA6 34 20	04440 PSHS Y
3E7A 20 5A	04010 BRA OUT1	3EA8 108E 0478	04450 LDY #\$0478
	04020 *	3EAC 17 FEF2	04460 LBSR SHOWAD 04470 LDA #\$7A
3E7C 8E 3F68	04030 EFAULT LDX #MESSG5	3EAF 86 7A	04470 LDA #\$7A 04480 STA ,Y+
3E7F 20 55	04040 BRA OUT1	3EB1 A7 A0 3EB3 35 20	04490 PULS Y
	04050 * 04060 * THE VERIFY ROUTINE	3EB5 A6 A4	04500 LDA ,Y
	04070 * (COMPARISON OF EPROM	3EB7 34 20	04510 PSHS Y
	04080 * WITH MEMORY CONTENTS)	3EB9 108E 047C	04520 LDY #\$047C
	04090 * BEGINS HERE. THE SETUP	3EBD 17 FEE1	04530 LBSR SHOWAD
	04100 * OF PORT A AS INPUT AND	3ECO 35 20	04540 PULS Y
ACTUAL TO THE TOP IN THE	04110 * PORTS B, C AND D AS	3EC2 A6 84	04550 LDA ,X
THE RESERVOIS	04120 * OUTPUT, PLUS EPROM	3EC4 Al AO	04560 CMPA ,Y+
	04130 * TYPING, IS DONE HERE.	3EC6 35 06	04570 PULS D
	04140 *	3EC8 26 10	04580 BNE VFAULT
3E81 8E 3F38	04150 VERIFX LDX #MESSG2	3ECA C3 0001	04590 BACK ADDD #\$0001 04600 CMPD ENDADR
3E84 17 FEE6	04160 LBSR MESSER 04170 *	3ECD 10B3 3D05 3ED1 26 C8	04610 BNE AGIN2
3E87 17 FE9D	04170 * 04180 LBSR CONAIN		04620 *
3E8A 17 FEB5	04190 LBSR CONBCD	-/-	04630 * EITHER A VERIFICATION
3E8D 17 FED0	04200 LBSR ETYPE	-)	04640 * COMPLETE OR A VERIFY
3E90 A6 21	04210 LDA 1,Y		04650 * FAILURE IS REPORTED IN
3E92 A7 06	04220 STA 6,X		04660 * THE MESSAGES THAT
	04230 *		04670 * FOLLOW.
	04240 * D POINTS TO THE START		04680 *
	04250 * ADDRESS IN THE EPROM,	3ED3 8E 3FA8	04690 LDX #MESSG9



3ED6	17	FE94	04700	OUT1	LBSR	MESSER	1 3FC	9 A6	84	05150		LDA	, X
3ED9	39		04710		RTS			B 34		05160		PSHS	A,Y
			04720	*					8E 0478	05170		LDY	#\$0478
3EDA	34	36		VFAULT	PSHS	X,Y,D		1 17		05180		LBSR	SHOWAD
3EDC		3F58	04740	VINOBI	LDX	#MESSG4		4 35		05190		PULS	Y, A
3EDF		FE8B	04750		LBSR	MESSER		6 A7		05200		STA	, Y+
3EE2		36	04760		PULS	X,Y,D		8 35		05210		PULS	D
3EE4		E4	04770		BRA	BACK		A C3		05210			#\$0001
3EE4	20	E4	04770		DRA	BACK						ADDD	
									B3 3D05	05230		CMPD	ENDADR
						O READ THE	3F2	1 26	DD	05240		BNE	AGIN3
					NTS OF A				k is the second	05250	*		
					MEMORY B	EGINS HERE		3 8E		05260		LDX	#MESSGB
			04820				3F2	6 20	AE	05270		BRA	OUT1
3EE6		3FB8		READRX		#MESSGA	COST CONTRACT			05280			
3EE9	17	FE81	04840		LBSR	MESSER				05290	*		
			04850	*						05300	* THE MI	ESSAGES	TO BE
			04860	* THE U	SUAL SET	UP OF PORT				05310	* DISPL	AYED FOL	LOW HERE.
			04870	* A AS	INPUT, P	ORTS B, C				05320	* NOT A	LL THE M	IESSAGES
						UT FOLLOWS				05330	* ARE US	SED BY V	ERSION 1.0
			04890								* OF TH		
3EEC	17	FE38	04900		LBSR	CONAIN					* SOFTW		Dominan
	-									05360		TICE.	
3EEF		FE50	04910		LBSR	CONBCD	3F2	Ω 5	0524F475241			FCC	/PROGRAMMING/
3EF2		FE6B	04920		LBSR	ETYPE	31.2		D4D494E47				compressed -Ed)
3EF5	A6	21	04930		LDA	1,Y	3F3		6060	05380	AII FC	FDB	\$6060
3EF7	A7	06	04940		STA	6,X	3F3		6060	05390		FDB	\$6060
			04950	*									
			04960	* D POI	NTS TO T	HE EPROM	3F3		60	05400	w======	FCB	\$60
			04970	* START	ADDRESS	, Y POINTS	3F3		64552494659	05410	MESSG2	FCC	/VERIFYING/
			04980	* TO TH	E STARTI	NG PLACE	2-		94E47	05400			25252
			04990	* FOR D	ATA STOR	AGE IN	3F4		6060	05420		FDB	\$6060
				* MEMOR			3F4		6060	05430		FDB	\$6060
			05010				3F4		6060	05440		FDB	\$6060
3EF9	FC	3D01	05020		LDD	STTADR	3F4		60	05450		FCB	\$60
3EFC			05030		LDY	STTDAT	3F4	8 4	552415345		MESSG3	FCC	/ERASE/
Juic	TOPL	3003	05040	*	прт	SIIDAI	3F4	D	60	05470		FCB	\$60
					SSES ARE	LAMCHED	3F4	E 4	34845434B	05480		FCC	/CHECK/
					THE EPRO		3F5	3	6060	05490		FDB	\$6060
					NFORMATI		3F5	5	6060	05500		FDB	\$6060
							3F5	7	60	05510		FCB	\$60
					AYED FOR	THE	3F5		64552494659		MECCCA	FCC	/VERIFY/
				* USER.							HESSG4	FCB	\$60
			05100				3F5	_	60	05530			
3F00		02		AGIN3	STB	2,X	3F5	-	641494C53	05540		FCC	/FAILS/
3F02		04	05120		STA	4,X	3F6		60	05550		FCB	\$60
3F04		06	05130		PSHS	D	3F6		154	05560		FCC	/AT/
3F06	17	FE89	05140		LBSR	DISADR	3F6	7	60	05570		FCB	\$60
										The said			

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1	3F68	4552415345		MESSG5	FCC	/ERASE/	3FE2	54595045	06000		FCC	/TYPE/	
	3F6D	60	05590		FCB	\$60	3FE6	6060	06010		FDB	\$6060	
	3F6E	4641494C53	05600		FCC	/FAILS/	3FE8	44424B495453	06020 MES	SGD	FCC	/DBKITS	Z/
	3F73	60	05610		FCB	\$60		5A	25220			0.00	
	3F74	4154	05620		FCC	/AT/	3FEF	60	06030		FCB	\$60	
	3F76	6060	05630	ипадас	FDB FCC	\$6060	3FF0	524F58425552 59	06040		FCC	/ROXBUR	Y/
	3F78 3F7C	4255524E 60	05650	MESSG6	FCB	/BURN/ \$60	3FF7	60	06050		FCB	\$60	
	3F7D	4641494C53	05660		FCC	/FAILS/	3FF/	60	06060 *		FCB	\$60	
	3F82	60	05670		FCB	\$60		3FF8	06070 ZZZ	777	EOU	*	
	3F83	4154	05680		FCC	/AT/		3770	06080 *	444	EQU		
	3F85	6060	05690		FDB	\$6060		0000	06090		END		
	3F87	60	05700		FCB	\$60	00000	TOTAL ERRORS	00000		DIVD		
	3F88	4255524E		MESSG7	FCC	/BURN/	00000	TOTAL BRROKE					
	3F8C	60	05720	провол	FCB	\$60							
	3F8D	434F4D504C45			FCC	/COMPLETE/							
		5445				,,	AGAIN	3DD1	MESSG9	3FA8		R2764	3D10
	3F95	6060	05740		FDB	\$6060	AGIN1	3E52	MESSGA	3FB8		READRX	3EE6
	3F97	60	05750		FCB	\$60	AGIN2	3E9B	MESSGB	3FC8		RSP1	3D18
	3F98	4550524F4D	05760	MESSG8	FCC	/EPROM/	AGIN3	3F00	MESSGC	3FD8		RSP2	3D1C
	3F9D	60	05770		FCB	\$60	BACK	3ECA	MESSGD	3FE8		RSP3	3D20
	3F9E	455241534544	05780		FCC	/ERASED/	CONAIN		MLOOP1	3D73		RSP4	3D24
	3FA4	6060	05790		FDB	\$6060	CONAOT		027128	3D13		S27128	3D15
	3FA6	6060	05800		FDB	\$6060	CONBC		02716	3D07		S2716	3009
	3FA8	564552494659		MESSG9	FCC	/VERIFY/	CONFIG		02732	3D0B		S2732	3D0D
	3FAE	60	05820		FCB	\$60	CONVRT		02764	3D0F		S2764	3D11
	3FAF	434F4D504C45	05830		FCC	/COMPLETE/	D50MS	3D85	OFFSET	3D00		SHOWAD	3DA1
		5445					DELAYI		OSP1	3D17		SSPl	3D19
	3FB7	60	05840		FCB	\$60	DISADE		OSP2	3D1B		SSP2	3D1D
1	3FB8	52454144494E	05850	MESSGA	FCC	/READING/	EFAULT		OSP3	3D1F		SSP3	3D21
	2000	47	05060		nan	252	ENDADE		OSP4	3D23		SSP4	3D25
	3FBF 3FC0	60 4550524F4D	05860 05870		FCB FCC	\$60 /EPROM/	ERASEX	3D60	OUT1 P27128	3ED6 3D16		STTADR STTDAT	3D01 3D03
	3FC5	6060	05870		FDB	\$6060	LETTER		P27128 P2716	3D16		TAB128	3D03
	3FC7	60	05890		FCB	\$60	LOOP1	3D7F	P2732	3DOE		TAB120	3D13
	3FC8	4550524F4D		MESSGB	FCC	/EPROM/	LOOP1		P2764	3D12		TAB32	3D07
	3FCD	60	05910	прообр	FCB	\$60	MESSER		PROGMX	3DBE		TAB64	3DOF
	3FCE	52454144	05920		FCC	/READ/	MESSGI		PROGRM	3DF1		TABSP1	3D17
	3FD2	6060	05930		FDB	\$6060	MESSG		PSP1	3D1A		TABSP2	3D1B
	3FD4	6060	05940		FDB	\$6060	MESSG		PSP2	3D1E		TABSP3	3D1F
	3FD6	6060	05950		FDB	\$6060	MESSG4		PSP3	3D22		TABSP4	3D23
1	3FD8	424144		MESSGC	FCC	/BAD/	MESSG		PSP4	3D26		VERIFX	3E81
	3FDB	60	05970		FCB	\$60	MESSG		R27128	3D14		VFAULT	3EDA
	3FDC	4550524F4D	05980		FCC	/EPROM/	MESSG		R2716	3D08		ZZZZZZ	3FF8
	3FE1	60	05990		FCB	\$60	MESSGE	3 3F98	R2732	3DOC			

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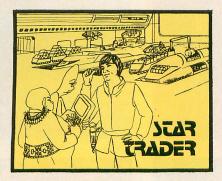
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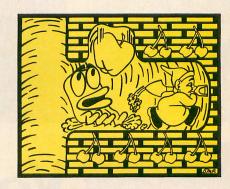
MR DIG

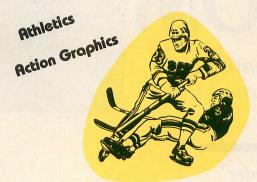
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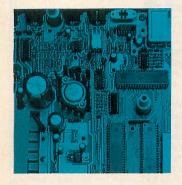
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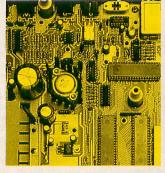
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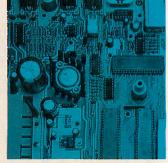
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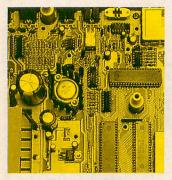
Dissecting



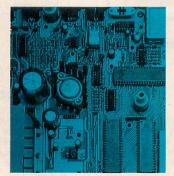


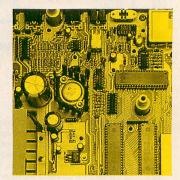








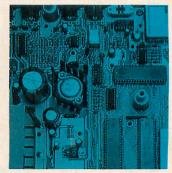






Your ROM

Extended Basic continues.
The tenth of 14 articles.



by Jake Commander

HERE'S NOT TOO MUCH I can add this month — the code says it all by itself. Apart from the humble HEX\$ function, the code splits nicely into two parts: that which deals with the Renumber (RENUM) command, and that which deals with RS-232-related input/output.

The Renumber routine operates in three passes. The first validates the line numbers to ensure all referenced line numbers are defined in the program. At the same time, all line numbers are converted to a five-byte binary format. Then the start line numbers are renumbered, and finally the five-byte binary numbers are reconverted to ASCII and renumbered as appropriate. This can be a little difficult to follow, as a couple of subroutines operate differently on each pass.

Following on the heels of RENUM is the HEX\$ function. This is another string function, which is only remarkable in that it's not included along with the string functions in last month's code.

The last block of code deals with the

DLOAD command, which hardly gets a mention in the version of the user's manual I'm blessed with. The mysterious protocol required to use the DLOAD command can be unravelled from this routine. Also included are a host of routines dealing with RS-232 interfacing, such as block and character I/O. These routines serve to make the Color Computer a much more useful machine than the manual alludes to. Why the DLOAD command is so downplayed still puzzles me.

WHAT THE Program Listing. ROM Dissection—Part 10

	Jake's Comment	Get next line link RTS to caller if end prog Add inc to line number	ire Error in too big iline number LSB < 250? ;OK if so ;?FC Error otherwise	. save and line	;End link; ;Restore new line number	;If not end prog ;Else adj stak to skip nrml RTS		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	just for n	;=> next line link ;RTS to caller if end prog	chr	; bump to next byte :Get byte from Basic line	; If end of line	Hold line number gap start	Yes search for ref'd line	;=2, at line # gap start?	; is so ;=3, at line # gap start?	;No, get next byte	Flag for undefined line number ;Set flag & posn X	;Skip over line number gap	Line number MSB in A	-	;Else reset MSB zero	really zero?		;Else reset LSB zero	;Hold binary line number ;Save it for search	; Search for this line	Restore line number gap start:	This line link or line number	Set gap byte 0 to 1 or 2	scan past	gap start = 1	Get line number	;Save for gap replacement ;Save & flag line number in gap	
	Mnemonic Operand	LDX ,X BSR \$8A86 ADDD <\$CF BIO \$8A82	₫:		LDD ,X PULS A,B	BNE \$8A90 LEAS 2,S		ifo		BSR \$8A86		LDA .X		STX <\$0F	BEQ \$8AB2		BEQ \$8AD3		LDA #3 STA ,X+		LDD 1,X		CLRA 2 V		BEQ \$8AC0	m	STD 1,X STD. <\$2B		BLO SBAAC		INC ,X+	BRA \$8A99			STX <\$47 BRA \$8AC7	000
"Dissection — Fall 10	Line Code Object Numbr Addr Code M	8A77 AE 8A79 8D 8A7B D3	01275 8A7F 81 FA 01276 8A7F 81 FA 01277 8A81 25 EE 01278 8A83 7E B44A	RTS 1 back if end prog	8488 848A	01282 8A8C 26 02 01283 8A8E 32 62	8A90 39	line num	01286 8A93 30 1F	8A95 30 8A97 8D	8A99	8A9D A6	8A9F 27	8AA1	8AA4	8AA6 4A	8AA9	8AAA 26		8AB0 20	01303 8AB2 EC 01	8AB6 27	01306 8AB8 4F	SABB 6A 0	27 0	8ABF	01311 8AC0 ED 01 01312 8AC2 DD 2B	8AC4 BD	01314 8AC7 9E 0F 01315 8AC9 25 E1	8ACB DC	8ACD 6C	8AD1 20		8AD7 AE	01323 8AD9 9F 47 01324 8ADB 20 EA	
1 Ogiani Listing. NON	Jake's Comment	RENUM start line; Save for search; Search for line number	Reset variable pointers ;Default of 10	Default increment Toron	default start line number Parse current chr	;If non numeric	;Save new line number ;Parse current chr	if end of line	; If non numeric chr after ","	;ASCII # to X ;Save start line #	Parse current chr	Suntax check for "."	;If non numeric after ","	;ASCII # to X	line	;?SN Error if not end of line	;Search for start line number ;Save start line link pointer	New line number	Search for new line number New line link < start link?	;?FC Error if so	Get all new line numbers	Reset Basic link pointers	; Search for start line number	; Save start ine link pointer :Update line number daps		Fill gaps with new line numbrs	Reset variable pointers	Goto direct mode		lst	Flag 2nd pass	Start line link pointer	ne number for i	pass?	;Yes, don't alter line numbers ;Else insert new line number	
	Mnemonic Operand	LDX <\$D1 STX <\$2B JMP \$AD01	JSR \$AD26 LDD #\$000A	α	STD <\$D1 JSR <\$A5					STX <\$D1					BEQ \$8A83				54			3- CD-	BSR \$8A02	BSR S8A91	· 65- 67	ን የን	JSR \$AD26	JMP \$AC73	line numbers	LDA	STA / Che		LDD <\$D5	TST <\$D8		0000
	Line Code Object Numbr Addr Code	01219 8A02 9E D1 01220 8A04 9F 2B 01221 8A06 7E AD01	RENUM new, start, inc 01222 8A09 BD AD26 01223 8A0C CC 000A 01224 8A0F DD O5	8A11 DD 8A13 5F	8A14 DD 8A16 9D	8A18 24 8A1A 8D		8A20 27	8A25 24	8A27 8U 8A29 9F	8A2B 9D	01240 8A2F BD B26D	8A32 24		8A38 27	8A3A BD	8A3D 8D 8A3F 9F	8A41 9E	01249 8A43 8D BF 01250 8A45 9C D3	8A47 25	01252 8A49 8D 1C	8A4E BD	8A51 8D	8A55 8D	8A57 8D	8A5B BD	8A5E BD 8A61 BD		atart	8A67 86 4F	8468	8A6B 9E	8A6D DC	8A71 0D	01270 8A73 26 02 01271 8A75 ED 02	101

	Jake's Comment	Copy up to open gap last address copied New parse pointer Target line number bointer	yte	;MSB zero-flag ;LSB zero-flag	;Line # MSB this point ;OK if non zero	;Else must use non zero		zero	;Else must use non zero ;Flag LSB really zero	;Store LSB ;Parse current chr	0. 77	;Else cont line scan	<pre>;=> Basic start ;Adjust for next op</pre>	;=> next line link ;Current line # as renumbered	le #	chr	Get byte from Basic line	; ii end of line ;=1 at line gap start?	;Yes ==3 at line dap start?	No, get next byte	" In	<pre>;Print message ;Restore gap pointer</pre>	<pre>;Get undefined line pointer ;Print undefined line #</pre>	Print "IN" & current line #	Restore gap pointer	;save gap pointer ;Get binary line # from gap	;Save in FPAC1 ;Convert to floating point	PAC1 to ASC ap pointer	;# line # chrs	Get ASCII chr	Keep tally of chrs filled Place ASCII # in gap	
1000	Mnemonic Operand	\$ \ \ X		STA 2,X STA 4,X		LDB #1 INC 2.X		BNE \$8B71	LDB #1 INC 4,X		CMPA #\$2C BEQ \$8B13	\$881	LDX <\$19 LEAX -1,X	LEAX 1,X		X 3,X			BEQ \$8BAE SUBA #2		LDX #\$8BD8	JSR \$B99C LDX ,S		JSR \$BDC5		'n	STD <\$52 JSR \$880E	to	LDB #5 LEAX 1.X	LDA , X BEQ \$8BC9	STA , U+	10000
2000	Line Code Object Numbr Addr Code	884E BD 8851 9E 8853 9F 8855 35	8B57 8 8B59 A	8B5B A7 8B5D A7	8B5F D6 8B61 26	8B63 C6 8B65 6C	8B67 E7	8B6B 26	8B6D C6 8B6F 6C	8B71 E7 8B73 9D	8B75 81 8B77 27	8B79 20	1403 8B7B 1404 8B7D	8B7F 30 8B81 EC	1407 8B83 DD	8B88 30	1411	1412 8B90 4A	1414 8B91 27 1415 8B93 80		1418 8B99 8E	1419 8B9C BD 1420 8B9F AE	1421 8BA1 EC 1422 8BA3 BD	8BA6 8BA9	1425 8BAC 35	1427 8BBO EC	8BB2 DD 8BB4 BD	1430 8BB7 BD 1431 8BBA 35	01432 8BBC C6 05 01433 8BBE 30 01	1434 8BC0 A6 1435 8BC2 27		
	Jake's Comment	0)	;End-of-line pointer ;Bump to link pointer	RTS to caller if end prog Bump over link pointer	; Align before next chr; Save as parse pointer	Parse next chr		; II not token, get next cnr ;Parse pointer	;Two-byte function? ;Yes, skip it	;RAM vector	Yes BLSE"?	Yes	No, parse next chr ;Parse chr after "GO"	; "TO"? : 1 GOTO	; SUB.:	;Parse possible line number	ω	;Cont scan of line ;Current parse pointer	Save target line # pointer	inter	II (;Again if not ;Bump past line number	Pointer LSB to B	jine number = 5 chrs?	5 chr line number	E TO	;End of 5 chr gap = destination ;Copy down program	Now have 5 chr gap		# chrs required to open gap; New program end pointer	;= copy destination ;Save new program end	
0000	t Mnemonic Operand	binary LDX 4		BSR	LEAX	JSR				JSR	BEQ	BEQ	BNE \$8AED JSR <\$9F	~	4	JSR <\$9F			PSHS TSB	LDX <\$A6	JSR	BLO \$	TFR X,D		BLO \$8841		LEAX B	BRA	LDX <\$1B STX <\$43	8 X	STX <\$41 STX <\$1B	
200	Line Code Object Numbr Addr Code	line nui 8ADD 8ADF	8 A B A	8 A 8 A	8 A 8 A	8 A	8AF0 27	8AF2 2A 8AF4 9E	8AF6 8AF8	8AFA BD	8AFF 8B01	8B03 27	8B07 8B09	8B0B 81 8B0D 27	8B0F 81	8B13 9D	8B17 9D	8B19 20 8B1B 9E	8BID 8BIF	8B22 9E	8B26 BD	8B29 25 8B2B 30	ω α	8B31 C0	8B35 25	8B37 33 8 8B39 50	8B3A 8B3C	8B3F 20 1 8B41 9F 4	8B43 8B45	8B47 50 8B48 30 8	13/9 8B4A 9F 41 1380 8B4C 9F 1B	

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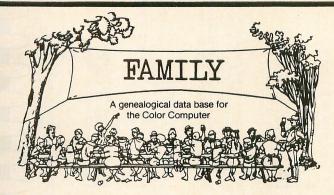


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	nd Jake's Comment	;Compute # < 256 to B ;Baud rate delay for 300 baud ;Baud rate 0 (300) ;Yes, 300 baud ;Baud rate delay=1200 ;Baud rate 1 (1200)? ;FC Error if baud not 0 or 1 ;Setup baud rate delay ;Get lst I/P block to buffer ;-3 ;Set device # = -3	;DLOAD"M"? ;If so ;?SN Error if not EOL ;ASCII file? ;No, FM Error ;Initialize Basic cold ;?FM Error		; Normal CLOADM ;File type ;Set device nun ;Read block to ;File type = bi ;?FM Error if r ;Zero constant		;EOF marker; ;EOF marker; ;Hoput 2-byte address to D; ;Add offset; ;Load address ;to X; ;EOF; ;Close if so; ;Get I/P chr from buffer; ;Store in mem; ;Went in OK?	
	Mnemonic Operand	JSR \$B70B LDA #\$B0 TSTB BEQ \$8C42 LDA #\$2C DECB LBNE \$\$E44 STA \$\$C00 PSHS A LDA #\$FD	FULS A TST ,8+ BNE ,845C7 TSTB \$A5C7 TSTB \$A5C7 TSR \$A5C7 JMP \$A616	JSR			PSHS A BSR \$8 CBF PSR \$8 CBF PSR \$8 CBF A PSR \$8 CBF A PSR \$9 DJ X LDA \$1 CBF A PSR \$8 CBF A PSR	
10000	Line Code Object Numbr Addr Code	01492 8C33 BD B70B 01493 8C36 86 B0 01495 8C38 27 07 01496 8C38 86 2C 01497 8C3D 5A 01499 8C3E 1026 2808 01499 8C42 97 E6 01500 8C44 BD 8CD0 01501 8C47 34 02 01502 8C49 86 FD	8C4D 35 8C4F 6D 8C51 26 8C53 BD 8C56 5D 8C57 27 8C57 27 8C5C 7E	Extended CLOADM 01513 8C62 9D 9F 01514 8C64 81 4D 01515 8C66 1026 182E 01516 8C6A 0F 78 01517 8C6C 9D 9F 01518 8C6E BD A578 01519 8C71 BD A648 01520 8C74 7D 01E4	8C77 8C77 8C80 8C83 8C83 8C83 8C83 8C83 8C83	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	80 80 80 80 80 80 80 80 80	
	Jake's Comment	Current Basic mid line pointer Fild 5 chr fill? Yes, continue line scan Hold next byte pointer Get source to fill gap from Copy to crrnt posn til progend Restore next byte pointer Continue line scan """ Space/end	Get # < 65536 to FPAC1 >> HEX\$ string destination } hex digits to do = 4 Save # characters of hex Initialize hex digit bits per digit	into B ; not a bits; ; cont until done; ; cont until done; ; Any # in B? ; No, do ASCII ; # characters left to do; ; This last character? ; Yes, place in string; ; At start of string?	Yes, suppress leading zeroes convert # to ASCII 5.99. No, # is OK Flse convert to A-F into string & bump into string with zero is chrs left to do	nex etur ing- inf	Close files Init	
	Mnemonic Operand	BRA \$8BBE LEAX 'U TSTB BEQ LEAY 'U LEAY 'U LEAY 'V LEAY 'Y LEAX 'Y BRA \$8B8C LEAX 'Y BRA \$8BBC	JSR \$B740 LDX #\$03D9 LDB #4 PSHS B CLRB B CLRB A4 ASL <\$53	met m et te	BEQ \$8C0B ADDB #\$30 CMPB #\$39 BLS \$8C07 ADDB #7 STB ,X+ CLR ,X	m ro	USR 7-429 CLR 7-48 CMPA #54D BNE 58C25 STA 58 USR 59F USR 549F USR 54578 USR 54578 USR 58C44 USR 58C60 CMPA #52C BEQ 58C44	
P	Object Code	20 F5 330 C4 27 BE 31 C4 33 C5 33 C5 30 A4 20 B3 4C 20 B3	BD B740 8E 03D9 CG 04 34 04 5F 86 04 08 53	26 F8 26 F8 26 0A 26 0A 4A E4 4A E4 27 05 8C 03D9			6F B A429 6F B A429 81 40 70 604 70 604 70 604 70 604 70 604 70 604 70 606 70 606 70 606 70 606 70 606 70 606 70 70 70 70 70 70 70 70 70 70 70 70 70 7	

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200000	Jake's Comment	<pre>;# errs, chksm, spc for I/P adr ;Hold stack pointer in Y</pre>	Ore than 5 e // P byte // P specified e or I/O e to O/P haracter	;0/P RS232 chr with chksm ;Done all filename? ;1f not ;0/P chksm then I/P byte = \$C8 ;1f bad	yte with	;Save file mode ;Get checksum ;If bad checksum or I/O ;Pull # errors + checksum ;Pull type & mode	Bump # errors Get current # errors Less than 57 RTS if less than 5 Byte to 0/P O/P RS232 byte	;Save required input byte;Clear chksm, o/p then i/p byte;If bad I/O;This the byte required;Exit with I/O or cmpare status		;Clear Chrsm, o/p then 1/p byce ;RTS if bad I/O ;Set flags as per compare	Get RS232 input byte;RTS if bad I/O;Checksum should be zero	;Input RS232 byte ;Save status + input byte
3	Operand	A,B,X	\$8048 #\$8A \$8058 \$8018 #\$0102	\$8E04 #\$01DA \$8D26 \$8D62 \$8D62 \$8D1B	\$801B 2,Y \$8072 \$8072	3,Y \$8D6B \$8D1B 2,S A,B,PC	Y Y Y X 8 8 8 0 6 A 8 8 8 0 C S 8 6 1 9 \$ 8 6 1 9	A \$8DB8 \$8D60 , S A, PC	1,Y	\$806A \$806A #\$C8	\$8D72 \$8D6A 1,Y	\$8DBC CCR,A
R	Mnemonic	PSHS LEAY BRA	BSR LDA BSR BNE LDX LDX	JSR CMPX BNE BSR BNE	BNE STA BSR BNE	STA BSR BNE LEAS PULS	errors INC LDA CMPA BLO LDA JSR JMP	fied byte PSHS BSR BNE CMPA	input \$C8 LDA	BSK BNE CMPA RTS	BSR BNE LDA RTS	ksum BSR PSHS
100	Code Object Addr Code	8D15 34 16 8D17 31 E4 8D19 20 02	80 86 80 26 8E 8E	8D28 BD 8E04 8D2B 8C 01DA 8D2E 26 F6 8D30 8D 30 8D32 26 E7	26 A7 8D 26	803E A7 23 8040 8D 29 8042 26 D7 8044 32 62 8046 35 86	no more than 5 er 8D48 6C A4 8D48 6C A4 8D4C 81 05 8D4E 25 1A 8D52 BD 8EC 8D52 BD 8EC 8D52 BD 8E0C 8D57 7E A619	ing 34 80 26 A1 35	ssum then A6 21	8D64 8D 52 8D66 26 02 8D68 81 C8 8D6A 39	Get RS232 checksum byte 01635 8D6B 8D 05 01636 8D6D 26 FB 01637 8D6F A6 21 01638 8D71 39	Get RS232 byte, do checksum 01639 8D72 8D 48 01640 8D74 34 03
B	Line Numbr	01594 01595 01596	01597 01598 01599 01600 01601	01603 01604 01605 01606 01607	01609 01610 01611 01611	01613 01614 01615 01616 01617	Check 01618 01619 01620 01621 01622 01623	Output 01625 01626 01627 01628 01628	Output 01630	01632 01633 01633 01634	Get RS: 01635 01636 01637 01638	Get RS: 01639 01640
00000000	Operand Jake's Comment	\$8CCD ;210 Error if not -1,Y ;Done all? \$8CB1 ;Continue if not \$8CB1 ;Do next block	;Get #1 ;Get I/P	\$A176 ;Get I/P chr <\$70 ;Buffer empty? \$8CC5 ;RTS if not \$A619 ;Else ?10 Error	; TYP ; TYP ; = \$F;	RS2 RS2 YPe e cess	<pre> <\$7E ;= I/O address 1, U ;Add one 6;7E ;Restore I/O address #\$01DA ;=> input buffer \$8D7C ;Read R232 block to buffer \$A644 ;Setup # bytes, k refrsh I/P ptr \$</pre>	\$A176 <\$6F ; Jovice number \$58D1 ; J3 \$8D01 ; RTS if not \$101 return <\$70 ; Set I/O buffer unflushed <\$79 ; More chrs to extrct frm buffr?	DDO2 ;Yes :70 ;Else flag buffer = empty	B,X,Y,U (1/0 buffer pointer (574) Get chr from hiffer. himn ntr	; Hold chr; Save new ptr; ; Save new ptr; ; 1 less chr in buffer ; If buffer has more ; Fead next RS232 I/P block x.v.n.pc	; Initialize # errors
B	Mnemonic	BNE SE LEAY - BNE SE BRA SE		JSR \$1 TST <\$ BEQ \$8 JMP \$1	rn et	LDU <\$ BSR \$8 PULS A LDB #\$	LDU <\$ LEAX 1, STX <\$ LDX #\$ USR \$8	mo A S	BNE COM COM CS	buffer PSHS LDX LDX	to to	type CLRA
1000	Line Code Object Numbr Addr Code	01548 8CB7 26 14 01549 8CB9 31 3F 01550 8CBB 26 F4 01551 8CBD 20 DC	2-byte address to 8CBF 8D 00 8CC3 1E 89 8CC5 39	01556 8CC6 BD A176 01557 8CC9 0D 70 01558 8CCB 27 F8 01559 8CCD 7E A619	8CD0 8D 8CD2 34 8CD4 4C 8CD5 27			Called during character 1 01575 8CF1 96 6F 01576 8CF3 81 FD 01577 8CF5 26 0A 01579 8CF9 0F 70 01580 8CF9 0F	8CFD 26 8CFF 03 8D01 39	8D02 3 8D02 3 8D04 9	01587 8D08 34 02 01588 8D0A 9F 7A 01589 8D0C 0A 79 01590 8D0E 26 02 01591 8D10 8D D0 01592 8D12 35 P6	filena 8D14 4

SUPER SCREEN



- A big 51 character by 24 line screen.
- Full upper and lower case characters.
- · Easily combine text with hi-res graphics.
- PRINT @ is completely functional on
- the big screen.

 The powerful ON ERROR GOTO is fully implemented.
- · Auto-key repeat for greater keyboard convenience.
- Control codes for additional functions. · Works with 16K, 32K or 64K computers.
- Available on disc or cassette
- Works with extended and/or disc BASIC.

51 CHARACTERS BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications so Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a confusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The difference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax

ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities

CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home Up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

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The MDP order entry system is a family of programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
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- In capable of future expandability

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. For just \$99.95.

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Next scan bit left No crry flg if not done 8 bits; Pull scan bit ptr

;Else current scan bit = on

;...into carry flag; If zero

Jake's Comment

Decrement main timeout count; RTS if still time; Pull return

;Align stack ;Set I/O flag = bad ;Entry point for delay*2

;Get baud rate delay

;NOP ;Finished? ;Go again if not

;=> RS232 input in bit 0; Received bit to carry flag

;Bump timeout sub-count;RTS if OK

Operand	\$8DDE	\$8DD4 1,S CCR,B,X,PC	\$FF22	1, X \$8DF6	\$8DF6	CCR, B, X		\$8DF9 A	\$8DFD	\$8DFD	2110	A	1, Y	A CCR, A, B	\$8DF7	\$8DF7	#1 B	2,5	\$8E25	\$8DF7	\$8E1D #2	SFF20 1,S CCR,A,B,PC	
Mnemonic	RORB BHS ORA ASL	BHS LEAS PULS	LDB	LEAX BNE	DECA BNE LEAS	PULS INCA RTS		BSR PSHS	BRN	BNE		PSHS	STA	PULS	BSR	BSR CLR BSR	LDB	ANDA	LDA	BSR	BHS	STA LEAS PULS	
Code Object Addr Code	56 24 AA 68	8DE0 24 F2 8DE2 32 61 8DE4 35 95	Get RS232 input level 01699 8DE6 F6 FF22		8DEE 4A 8DEF 26 05 8DF1 32 62		100	BDF7 8D 8DF9 34		8DFF 4A 8E00 26 FB 8E02 35 82	20 60 7070	34	A7 A7	8E0A 35 02 8E0C 34 07 8E0F 1A 50	88	7F 8D	34	8EIF A4 E4		89	24 86	8E33 32 61 8E35 35 87	
Line Numbr		01696 01697 01698	Get RS2 01699		01703 01704 01705			T		01713 01714 01715		L		01719		01/23 01724 01725						01/3/ 01738 01739	
Operand Jake's Comment	1,Y ;Checksum with total 1,Y ;New checksum CCR,A,PC	;Init # errors A,B,X,Y,U ;#errs, cksm,=>i/p buf,blklen,0 7,S	6,8 7,8 V oi reta trans thou v	BB ;Check no more than 5 errors	#597 ;Required byte \$8D58 ;O/P then I/P specified byte 1.15 bad byte or I/O		\$8E04 ;0/P RS232 byte with checksum	; If I) TI	2,Y ;=> input buffer #\$80 ;= 128 bytes to input \$8772 .Ga+ RS/32 byte with checkenm	36		Get RS232 checksum	\$8D89 ;II I/O Or checksum error 4.S ;Pull #errs, chksm,=> I/P buffr A.R.PC :a=hlklen			x, x	#\$50 ;Disable interrupts <\$E7 ;Timeout counter	<pre><>&A</pre>		8DF9 ;		\$FF22 ;Get RS232 input bit
Mnemonic	EORA STA PULS	buffer CLRA PSHS ASL	ROLLSR	BRABSR	LDA BSR BNE	LDA BSR LDA	BSR	BNE	STA	LDB	BNE	DECB	BSR	LEAS		CLR	PSHS	LDA	BSR	BSR	BSR	CLRA	LDB
e Code Object br Addr Code	41 8D76 A8 21 42 8D78 A7 21 43 8D7A 35 83	to	8D81 69 8D83 64	8D87 20 8D89 8D	8D8B 8D8D 8D8F	8D91 A6 8D93 8D 8D95 A6	8D97 8D	809B 26 809D 80	8D9F 26 8DA1 A7	8DA3 AE 8DA5 C6 8DA7 8D	8DA9 26	8DAD 5A	8DB0 8D B	8DB4 32 8DB4 32 8DB6 35	De222 but	8DBA 8D 50	8DBC 4F 8DBD 34	8DC1 96	8DC5 8D 8DC7 24	8DC9 8DCB	8DCD 8D 8DCF C6		
Line	999	Read 016, 016,	016	016	016	016	016	016	016	016	016(010	010	016		016	016	910	016	016	016	0168	910

Disable interrupts
Baud delay*2
Baud delay*2
Drop voltge level for strt bit
Baud delay*2
Initialize B to point at bit 0

Scan next bit to the left If not done 8 bits

;...for mark;Pull bit pointer

Raise level ...

Byte to O/P; Current bit=1?; No O/P zero bit; Flse O/P a one bit; RS232 data O/P; Baud delay*2

;Save bit pointer

E.P. to O/P byte & form chksm ;Update checksum

Restore it Realign stack SEND FOR FREE CATALOG



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The word is pronounced vocally and it is up to you to type in the correct spelling. If wrong, the computer will be your friend and flash the word on the screen for just an instant. OK! Try typing the word in again. STILL WRONG! The computer wants success and allows you to see the word again this time a little longer. If you just can't spell the word, the computer realizes you need to learn to spell the word and leaves the word on the screen for you to copy. Try your best and the computer has a surprise for your reward!

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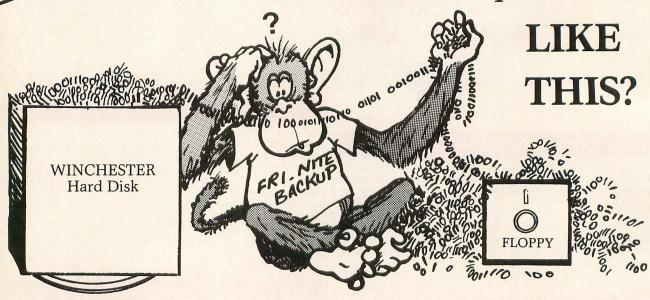
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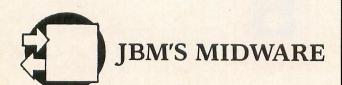
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Part IV in a series on disks.

The Devil's Disk Editor

Eds. Note: In March Bill presented the first part of The Devil's Editor. This month he explains how it works. Refer to the March, 1984 issue for the program.

WON'T GO INTO A LENGTHY discussion of the program here, but will give you a thumbnail sketch of how it works.

The file dump portion of the program assembles the file name from the user input and then reads in the nine sectors of the directory from disk, one sector at a time. A search is made of each directory sector to find the file named. If the file name is found, the file location is picked up from the fourteenth byte of the directory entry. The FAT (File Allocation Table) is then read into memory as string variable P\$. The first sector of the file is then read and displayed.

The sector dump portion of the program assembles the drive number, track number, and sector number and then reads and displays the desired sector.

The GOTO next block portion of the program increments the offset by 64 bytes, reads in the next sector if necessary (every fourth display), and displays the next block. If a named file is involved, the process is similar, but the next granule is found if necessary.

The GOTO previous block portion of the program decrements the offset by 64 bytes, reads in the previous sector if necessary (every fourth display), and displays the previous block. If a named file is involved, the process is similar, but the previous granule is found if necessary.

The modify memory mode portion of the program uses variables CL (current line) and CC (current character position) to display the cursor. Checks are made of digits entered to make certain they are valid hexadecimal digits. Pushing the Enter key causes a write to the current by William Barden, Jr.







16K Disk Extended Color Basic

sector after the data is assembled from the screen display.

The read in and display current sector subroutine uses DSKI\$ to read in two strings of 128 bytes each, representing the current sector. 64 bytes of one of the strings is displayed, depending upon the current offset.

The list of variables and their use follows:

A\$= temporary string variable

A= temporary variable

AC = character in modify mode

AL = left character in modify mode

AR = right character in modify mode

C= column in modify mode, others

CC= current character position — used in modify mode

CL= current line — used in modify mode CM = temporary variable — holds CP in

modify mode CP= cursor position — used in modify

mode

D= disk drive number, 0 to 3

F\$= file name for named file

F1\$= name of file in start file

F2\$ = extension of file in start file

FT = holds FAT index

I= temporary variable

J= temporary variable

LS = -1 if no current sector NS= number of sectors in current gran-



ule of named file — 9 if not last granule, 0 – 9 if last granule

 $\mathbf{O} = \text{offset}, 0 \text{ to } 3$

OF = original FAT index

P\$ = portion of FAT for named file

R= row in modify, others

RN = record number of named file

\$\$= current directory sector in start file

S0\$ – S3\$ = hold 64 bytes each of current sector read in

S = sector number, 1 to 18

SH\$= holds first 128 bytes in modify, others

SL\$= holds last 128 bytes in modify, others

T= track number, 0 to 34

About That Killed File

I have a description of file formats and also hints and kinks about using Devil's Disk Editor in its manual, but let's tackle the problem of killed files here. How to restore a killed file?

The Disk Operating System kills a file by "zeroing out" the first byte of the directory entry, as shown in Figure 1. It also deallocates the FAT entries, changing them from links to \$FF. The \$FF indicates that the granule is unused.

Before doing anything, back up the disk containing the killed file and use the back-up disk for the following operations. By the way, the killed file is still intact only if you haven't done any other disk writes after killing the file. If you have done disk writes after the kill, all or a portion of the file may have been overwritten!

To restore a killed file, you must first find every granule that contains the file. This must be done by searching the disk sectors, but here's a hint of where to begin: Using the Devil's Disk Editor, look in the directory entry for your killed file. You should be able to recognize the

name. Change the first character of the name back to the original, making certain that the proper name is shown in the ASCII portion of the display. Rewrite the directory sector with an Enter after the modify mode.

Now find the "location" value from the fourteenth byte of the directory entry. Divide this value by two. The quotient is the track number and the remainder of zero or one defines the granule in the track, either the granule starting at

"Remember that the Devil's Disk Editor is a two-edged utility."

sector one or the granule starting at sector ten. Add one to the track number if the track is above track 16 to compensate for the two directory granules.

Now display the granule in the track and sector you've found. There's a good chance the granule may hold the entire file if the file is a short Basic program or other short file. Use a listing of your program for comparison. If you're looking for a Basic program, remember that the Basic commands will be "tokenized" to one-byte form, so you won't be able to recognize the commands. (See my IJG book, How to Do It On the TRS-80, for more information on tokens.)

If the first granule does not contain the entire program, you'll have to continue the search in other granules. Jot down the track, sector number of the first granule and then look at all FAT entries (track

17, sector 2) that contain an \$FF. Divide by two as before to find the corresponding track and sector number, remembering that values for tracks should have one added if the track is greater than 16. Remember that granules start on sector one or ten of each track; you should be able to investigate only the first block of the first sector of a granule to see if the data there looks like your killed file. Jot down every granule that is used by track and sector number.

When you have found every granule that was previously used in your file, you have one more chore: Look at the last granule and find the last sector used to hold your file. You should be able to do this by comparison with a Basic or other listing. You'll have from one to nine sectors that are used in this last granule.

You'll now have a list similar to this:

track 20, sector 1 track 22, sector 10 track 27, sector 1, 5 sectors used

The first granule used should already be in the directory entry, so you'll be working only with FAT entries. Read in the FAT. Now convert the track, sector number to granule numbers by subtracting one from any track over 17; and multiplying the adjusted track number by two and adding the sector number.

Now modify the FAT so that each FAT entry points to the next granule. In the example above, track 20 sector 1 is granule 38, or the thirty-eighth byte of the FAT, counting from zero. Change the thirty-eighth byte to hold 43, the granule encoding for track 22, sector 10. Now change granule 44, the forty-fourth byte of the FAT, to hold 52, the granule encoding for track 27, sector 1. Now go to FAT entry 52, the last granule, and make the last entry of \$C5. The \$C portion of the code says that this is the last granule of the file, while the numeral five says that there are five sectors in the file. For one-granule files, only this last step has to be performed, to denote how many sectors are in the last portion of the file.

You should now be able to read in the file normally under Basic. Good luck!

There are other tricks that can be done with DDE or similar disk editors, including formatting data as ASCII files, allocating large file areas, and repairing unloadable programs. Get some practice before attempting these operations and remember that DDE is a two-edged utility.

And now for Cesar Frank's famous Second Symphony, the so-called "Computational Symphony." Let's see...oops, I forgot the first violinist in Line 3430...

Figure 1. Kill Action

	#:0 REC#		± : 17	SECT	OR#:	3			
00	41	47	49	43	53	51	20	AGICSQ	THIS BYTE IS ZEROED FOR A KILL
42	51	53	00	00	24	00	52	BAS\$.R	and the later of t
00	00	00	00	00	00	00	00		THIS BYTE STILL DEFINES THE FIRST
00	00	00	00	00	00	00	00	·	FAT ENTRY AND
40	41	42	45	4C	53	20	20	LABELS	GRANULE (TRACK 12
42	41	53	00	00	25	00	AB	BAS%	SECTOR 1)
00	00	00	00	00	00	00	00		
00	00	00	00	00	00	00	00		

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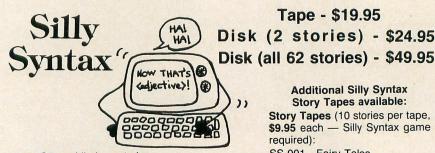
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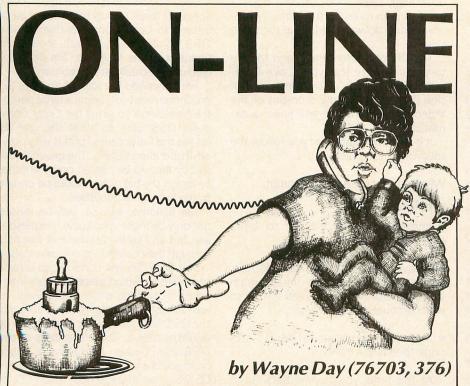
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NE MOST POPULAR FEATURE of the Color Computer Special Interest Group (CCSIG) on CompuServe is the SIG/Access database where you'll find hundreds of programs already programmed, ready to run as soon as you retrieve them from the database. This month, we'll get acquainted with the Access procedures.

Think of SIG/Access as a gigantic electronic library containing books (text files and program documentation), paintings (graphics screens and picture generating programs), records (music files), as well as general programs. Your membership in the SIG is your library card, since no additional fees are charged by CompuServe for access to any of the CCSIG's features.

SIG/Access can be reached by using the XA command either at the SIG menu, or at the FUNCTION: prompt. The system will then ask you which database you want to go to. Select from one of these, depending on your interests:

XA 0 General programs and files

XA1 Reviews

XA2 Graphics and pictures

XA3 Music files

XA4 Club news and information

XA5 Reserved for future use

XA6 OS/9, Basic 09, and Flex

For this example, let's say we're interested in the General program section,

XAO, because it contains the largest number of programs and files.

Enter XA at the SIG menu to go into the SIG/Access section of the SIG. You'll then be asked to select one of the databases. Select 0 to enter the XAO database.

Since CIS accepts commands that are chained together, you could have entered XAO at the main SIG menu to accomplish the same thing, bypassing the second selection menu.

Once in XAO, we need to know what's in the library before we can check anything out, so let's do some exploring.

The CAT command will print out a listing of file names of programs in the database, along with the user ID of the person who submitted them, as well as the date the file was submitted and the length of the file. Files are named in two parts: the file name itself, and the extension, i.e., PROGRAM.BAS. Those users with disk systems are already familiar with the concept of an extension, but for cassette users who haven't had any experience with extensions, just think of them as an additional three-letter description not of the program *itself*, but describing how the program is stored or to be used.

For example, we have a set of standardized extensions for use on the CCSIG:

.CC denotes a Radio Shack Basic program designed to be run on a Color Computer.

.BIN denotes a binary file, usually a machine code program, but could be any block of memory such as a graphics screen.

.DOC documentation: a text file containing the instructions for using a particular program or programs.

.TXT denotes a text file. This could be documentation or a file that gives you instructions on how to modify your Color Computer to 64K.

.SRC denotes an assembler source file. This file must be run through an assembler such as Macro-80C or EDTASM+ and will produce an assembly language program.

.PIX a picture generating program. These can be files which are self-contained Basic programs which, loaded and run, will produce a high-resolution graphics page on your screen, or they can be "line printer art" — series of data statements which must be read and printed on a printer.

.MUS are musical data files which, when used with the KOMPOS.CC program in SIG/Access, will produce fourpart harmony music on your Color Computer. Unlike hardware music generators, the KOMPOS series of music files are all under software control, and require no additional hardware to use.

Back To Business

Back in XAO we're still not getting a clear picture of what's available in the database since the file names by themselves can be a bit cryptic, so let's check out the index in a different way.

Enter the command BRO (for BROwse), and you will start receiving a list of all of the files available in the particular database you're in, a complete description of the file, and an option to read or download the file at the end of the description.

If you want to read the file, enter R and the file will be typed out for you (without the system opening or closing your buffer, should your particular terminal program have a settable buffer).

The D (for Download — which means to transfer to your terminal) option will start a series of events that varies depending on which terminal program you are using. For example, users of Compu-Serve's Vidtex program will be prompted to supply a file name for the program that's about to be saved on the user's tape or disk, and then the program is automatically saved for the user.

If you are using one of the smart terminal programs available for the Color Computer that does not support the CompuServe B protocol (used to guaran-

tee error-free uploading and downloading of files), CIS will send you two special control characters, used to mark the beginning and the end of the file you're downloading.

On COLORCOM/E, for example, the CONTRL-R (\$12) character sent by CIS marks the start of an area in the received data buffer, which is then followed by the file itself. This character is used by the program to automatically find the program when you attempt to save it later.

After the file is sent, CIS will send a CONTRL-T (\$14) that marks the end of the file. Again, as an example, COLORCOM/E uses this character to denote the end of

the file that is being saved.

Most of the so-called smart terminal programs use some sort of control characters to mark the start and end of a file, and the CONTRL-R / CONTRL-T set of control characters used by CIS is the most common, found not only on CIS but on most Color Computer bulletin board systems as well. You might keep that in mind if you're in the market for a terminal program that has a few more "smarts" than Videotex, which most folks start out with because it is sold at all Radio Shack stores.

Since Tandy did not write Videotex to easily support downloading of data to a cassette, there are some special considerations to keep in mind when using Videotex:

- Videotex will not download binary files (those with the extension of .BIN or .IMG)
- 32K Color Computer users should be using Videotex Ver. 1.2, otherwise they will not be able to download files from Access. This is because Ver. 1.0 and Ver. 1.1 of the Videotex ROMpak recognize only a 4K or a 16K Color Computer. If you have a 32K or 64K Color Computer and have Ver. 1.0 or Ver. 1.1 of the Videotex ROMpak, check with your local Radio Shack store about acquiring the current Ver. 1.2.
- 16K Color Computer Videotex users will only be able to download files of up to 6,400 bytes. 32K or 64K Color Computer users with Videotex Ver. 1.2 will be able to download files of up to 22.7K bytes.

Videotex users who want to download files may browse through the files just as do other users. When you decide to download a file there will be a pause while your computer is checked by the CIS system, then you will be asked if your computer has at least 16K of memory. You must have at least 16K of RAM to

download, since a 4K machine doesn't have enough room for the Videotex program and a downloaded file at the same time.

The CIS computers then send the file to you in a form that your Color Computer understands. After the transmission is complete, you'll drop out of the Videotex program and into Basic, automatically.

It is very important that you follow the following steps precisely:

When you get the Basic ox prompt:

- enter EXEC &H8000
- immediately save the file to tape: CSAVE"FILENAME",A

This saves the file in the ASCII format, and is required to have the program saved in a form you can read back into your computer! Do not forget ,A!!

• Turn your computer off for 15 seconds, then turn it back on.

At this time, you'll come back up in Videotex, if you do not have the autostart defeated on your Videotex ROMpak. Hit the Break key a couple of times and you'll be back on-line with CIS at the SIG/Access prompt.

If you have the autostart defeated (see Steve Wegert's article in the March 1984 issue of **The Color Computer Magazine**, page 62) you will come back up in Basic once you turn the power back on. Enter EXEC &HC000 to re-start Videotex.

Should you run into problems downloading with Videotex, check your downloading steps very carefully. Most errors seem to be when folks forget to save the program originally in the ASCII format (i.e., CSAVE "FILENAME",A).

Need more help learning to download with Videotex? There is a special help file on the CCSIG with an expanded set of instructions, located in the X0 datafile. Just enter x0 at the main SIG menu and you'll be able to read the file.

Once you've downloaded a file, regardless of whatever terminal program you're using, you'll see the file name described again, along with the (R D T) prompt. Again, the R lets you read the file, D lets you download, and the T returns you to the top, the SIG/Access prompt.

That should get you started exploring the SIG/Access database system. In the next edition of this column, we'll look at some ways to make your excursions into the SIG library a bit more flexible, and save you some time and money.

I had planned to give a plug for a new Special Interest Group that should be of interest to Color Computer owners: the OS/9 Sig. Tragically, though, the system operator of the OS/9 Sig, Jim Bellomo, died unexpectedly late in February.

Jim conceived the idea of an OS/9 Sig on CompuServe intending a large part of the framework to assist the Color Computer OS/9 user, to assist the user to realize the full potential of this very powerful operating system. The groundwork laid by Jim will be carried on by another Sysop on the Sig, who should be on-line by the time this is published.

Jim Bellomo, age 34, will be missed not only by those who knew him personally, but also by those who met him only through their computers and terminals.

The OS/9 Sig will continue to offer a specialized meeting place for those interested in meeting other OS/9 users, as well as hosting the membership library of the OS/9 User Group, Inc., which will be available only to those members of the OS/9 User Group. An extensive public domain library is in place. To access the OS/9 Sig, go to page PCS-18 on CIS, or enter the command R OS9UG from the CCSIG menu or FUNCTION: prompt.

SIG Suggestions

Finally, a reminder about your CIS User ID and password.

The User ID and password you have is your key to the system, and just as you wouldn't leave the key to your house where anyone could get at it easily, you should also protect your password.

Never give your password except when you first log into the system. If for some reason you get "bumped" from the system, the safest thing to do would be to hang up and re-dial your access number.

Additionally, we recommend that you change your password frequently...once a month is not too often. Simply go to page CIS-175 and follow the prompts.

Remember, CIS holds you responsible for the security of your password, so

guard it carefully.

Should you have problems accessing the SIG, or questions about Compu-Serve's operations, you may call the CIS Customer Services office at (800) 848-8990 between the hours of 8 am and midnight (Eastern time), or leave a message for me on the SIG.

Enjoy the summer!

Ed. Note — Wayne wrote this column just after the birth of his first baby — a boy. Congratulations, Wayne!

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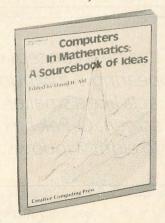
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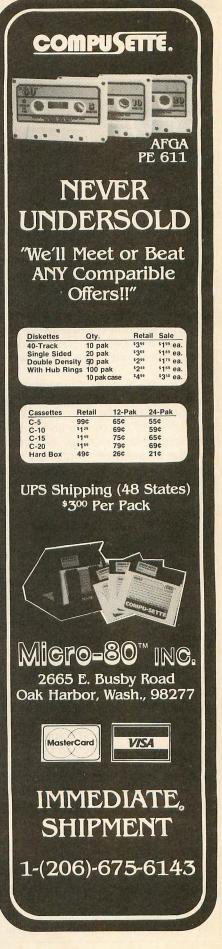


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PAK OFFERS THREE improvements to the OS-9 operating system. It lets your television set display many more columns and rows of text and block graphic symbols than the standard screen format. It has a character set editor for the dynamic creation or change of fonts, and it has a set of conversion utilities that accomplishes the bi-directional transfer of text files between OS-9 and Flex and between OS-9 and the Radio Shack disk operating system (DOS).

Microware Systems Corporation designed OS-9 and defined its standard output device on the Color Computer to be a screen of 32 columns and 16 rows. This specification allowed fast scrolling and the conservation of memory space because it was implemented using the alphanumeric mode and internal memory of the video display generator chip. Unfortunately, it also resulted in compromises which reduced the utility of OS-9. The standard screen limits many serious applications because of its smallness and its inverse (light on a dark background) video rather than true lowercase characters. These limitations are unpleasant for word processing applications since what appears on the screen looks different than what gets printed. Rather than changing the Color Computer hardware, Frank Hogg has introduced in O-Pak an improved screen driver that actually plots all text and graphic symbols on a grid of 256 by 192 pixels (dots). Now you can display information in formats like 51 columns by 24 rows, 64 by 27, and even 85 by 24. One simple command call from the OS-9 Shell is all that's required to change to a high resolution screen for text and block graphics:

OS9: HiRes [<character set name>]

There are twenty character sets, all variable in terms of character width, height, and foreground and background color.

Color options are the same as those OS-9 allows in its graphics mode. Each

character is displayed within a cell. The cell is usually larger than the character to allow for borders between adjacent characters. With a special O-Pak command this space can be reduced or eliminated. O-Pak permits spontaneous changes to the amount of vertical and horizontal cell space, too. Since inter-character spacing and inter-line spacing can be set independently, more characters and more lines can be placed on the screen virtually at will. Some sets, the very dense ones, are not readable on the screen, but have been supplied because they are useful for showing page format — which areas of a page contain information and which are blank.

There are also character sets that are rich in block graphic symbols, sets that are convenient, versatile tools for producing simple art. Graphics can be mixed with text since HiRes is in the graphics

"... a new concept is appearing... a window acts like a smaller screen. O-Pak has up to eight windows..."

display mode. Consequently, it's possible to construct, say, a fancy form on the screen that contains a logo, italicized field names, horizontal and vertical lines to separate rows and columns, and a simulated signature. Imagination is the only limit to this capability. Furthermore, if you had an Okidata Microline 82A printer and used the graphic symbols from the character set "mi82a," a close replica of the form on the screen could be printed on the Microline 82A. Suppose you have a different printer with different block graphic symbols. Described later is a technique that helps you define these block graphic symbols (in fact, any of the characters) for display on the screen.

Three other features of the HiRes screen are scroll rate, cursor selection, and windowing. Since the screen is fully controlled by software, display scroll speed can be changed at will from as little as one pixel at a time (smooth scrolling) to as much as 16 pixels at a time (jump scrolling). The style and blink rate of the cursor can also be selected. The cursor may be either an underline symbol

or a block symbol, and may be continuously displayed or blinked. The blink rate may vary from 1/60 of a second to over 40 seconds.

Windowing

Windowing, a relatively new concept in the computer field, is making its appearance on rather expensive microcomputer systems. A window is part of the screen that acts like a separate, smaller screen. There can be up to eight windows on an O-Pak screen, and each may be scrolled and manipulated independently. Each window has the line width defined by the character set and is divided from an adjacent window by an imaginary horizontal line.

One practical application for two windows is in word processing. Suppose you want to keep a help menu at the top of the screen while text is being developed below. The top area would be a small window that would be changed infrequently. The larger window below would contain text to be scrolled and moved as needed. There would be no need to recreate unchanged information when another area of the screen had to be changed. I expect to see many clever applications of the window concept for the Color Computer as HiRes gains wider acceptance.

Function Control

The many different functions of HiRes are controlled by the forwarding of special code bytes to the standard output path. For example, the hexadecimal character sequence 1B 43 creates a new window. An application program merely directs the appropriate code bytes to the standard output path using an OS-9 system call for line output. At the command level, it is customary to send code bytes from the shell by way of the Display command, such as:

OS9: DISPLAY 1B 43

Here is a summary of control functions for HiRes. OS-9 itself also defines controls for alphanumeric and graphic modes. Those controls are complementary to the HiRes functions and may be found in the OS-9 Commands manual from Tandy. Display Control Functions are:

1B 41: erase from cursor to end-of-line

1B 42: erase from cursor to end-of-window

1B 43: create a window boundary above current line

- 1B 44: combine current window with one above
- 1B 45: insert a line at cursor
- 1B 46: delete the line at the cursor, compress screen
- 1B 47: shift current line right by 8 character widths
- 1B 48: shift current line left by 8 character widths
- 1B 49: shift cursor one pixel right
- 1B 4A: change to character set whose name follows
- 1B 4B: shift cursor one pixel up
- 1B 4C: shift cusor one pixel down
- 1B 4D: shift cursor one pixel left
- 1B 4E: revert to a single window
- 1B 51: enable overstrike mode
- 1B 52: change to specified foreground color
- 1B 53: change to specified background color
- 1B 54: change spacing between characters
- 1B 55: change spacing between lines
- 1B 56: select block cursor
- 1B 57: change to specified blink rate
- 1B 58: change to specified scroll rate
- 1B 71: disable overstrike mode
- 1B 76: select underline cursor
- 1C: ignore all control codes but 1E 1E 1E and 1F 1F 1F
- 1E 1E 1E: accept all of the above control codes
- 1F 1F 1F: terminate HiRes and resume with standard 32x16 mode

Character Sets: What You See Is What You Get

If you do not find a character set to suit you, you can make your own with CSEdit, a utility that changes any of the given character sets and can add new ones. The beauty of this editor is that it is not necessary to sketch each character on paper, decompose it into pixels, and translate the pixel pattern into hexadecimal numbers. That old, cumbersome method now seems as archaic as finding square roots with pencil and paper instead of a calculator.

CSEdit draws a large image of the cell that contains the symbol to be modified. The cell is shown as a mosaic of squares where each pixel of a symbol is represented by one shaded square. Unshaded areas represent blank areas, like the space inside a character or between adjacent characters. The cell is drawn on a grid with as many horizontal positions as the width of the cell and as many vertical positions as its height. Every pixel can be individually selected by positioning a cur-

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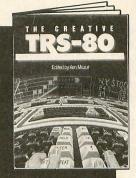
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sor at its location. Shading is toggled on or off by keyboard control. Presto, instant customization.

Character editing is fun and gives me kind of an artistic feeling, too. Next to the mosaic of the character is the same character shown in normal size. As squares are toggled on or off in the mosaic, the mirror image in normal size changes correspondingly. I had no doubt about how the final edited version would look because it was right there before me. From now on, what I see on the screen is what I get on the printer.

CSEdit uses several menus to simplify setting the editing options. A six-choice main menu establishes a "home base" from which more detailed menus are called. The choices let you edit a character set, write a file, write a file and exit, abandon current work, execute a shell command, and change the HiRes mode.

During editing of a character set the edit submenu offers the choices of changing cell and character width and height; changing color set, foreground color, background color, and graphics mode; changing character shapes (by the technique described above); renaming the module which contains the character set; and returning to the main menu.

When writing a file users are prompted for the file name to save the character set as a data module. The revision and edition numbers of the module may be changed. (The revision number is important if this new module is to dynamically replace an older module in memory). Then the file is written.

In the write a file and exit mode, after getting a file name and writing the file, CSEdit returns to OS-9.

The abandon current work option is a graceful way of retreating from your own disaster.

Any shell command may be called from within the edit process. After executing a shell command, editing control is restored as though no interruption took place.

When changing the HiRes mode users are prompted for changes to make to the character set in use, not the set being edited. Subject to change are the character set itself, foreground color, background color, graphics mode, colors, height, and width.

File Transfer Commands

Before O-Pak file utilities, there was no convenient method for inspecting a file on a Flex or Radio Shack disk. There was no way to convert a text file or to transfer a file to another operating system. These limitations have been removed with the arrival of four new OS-9 commands: XDIR, XDUMP, XLIST, and XCOPY. They operate on files created by the Radio Shack DOS, Flex, and OS-9.

Each command satisfies a fundamental, unadorned service requirement. XDIR displays on the standard OS-9 output device the directory of a designated Flex or Radio Shack disk. XDUMP produces a combined hexadecimal and ASCII file dump on the standard output device. Similarly, XLIST lists a text file. XCOPY is more versatile. It can convert and transfer a text file from a Radio Shack disk to an OS-9 disk, from a Flex disk to an OS-9 disk, or from an OS-9 disk to a Radio Shack or Flex disk.

The O-Pak file utilities need parameters that specify operating system file types. A new separator (the percent sign) and three new prefixes are used to designate target or recipient file types: Type rs% for any file in the Radio Shack DOS format; flex% for text files with space compression in the Flex operating system; and flexb% for uncompressed (binary) files in Flex. No special prefix for OS-9 is necessary.

Documentation

The O-Pak manual has 42 pages of well written, well organized information. It even stacks neatly with OS-9 manuals. It has four chapters, two appendices, and an index. After an overview of features are installation instructions and documentation on HiRes. Implementation strategy is summarized and, since a nonstandard approach was elected by the software designer, an understanding of that section is essential if you are to create new master OS-9 disks. The next chapter describes the character set editor. It can stand alone but is most useful as a companion to an interactive session on the Color Computer. Chapter four describes the file utilities, and appendices list display control codes and a glossary of terms found in the manual.

O-Pak text files also contain good reference material and probably should be listed on your printer for future study should you buy this product. There is also a description of each of the twenty HiRes character sets on the disk.

My review copy of O-Pak, Release 001, dated November 30, 1983, is quite robust and behaves correctly in nearly all instances. The only errors I found were in the processing of responses to two menus. Here, my clumsy fingers and malicious responses caused OS-9 to lock up. If you have this release of O-Pak, be careful not to hit the Break key while entering data in the menu to change character width. Attempting to change the graphics modes from the HiRes menu also creates a lock-up. You might want to use the alternate method with the Display command instead of the editing function. It would have been better if O-Pak had rejected invalid responses.

Performance

When you use O-Pak you trade free memory space and speed for high resolution displays and versatility. The speed at which the display scrolls is affected in the HiRes mode since 6144 bytes of symbol data must be manipulated by software rather than automatically by the computer hardware. Although HiRes allows various scroll rates, in my opinion the speeds range from "slow" to "very slow." For most applications, I find this "slow" pace is rather comfortable, though. If speed is a temporary concern, HiRes can be turned off and recalled later.

File commands also suffer from largeness. They are considerably larger than HiRes because they must recognize and process disk and file formats for three operating systems. These are not small tasks. Respectively, the module sizes of XDIR, XLIST, XDUMP, and XCOPY are 14659, 14862, 15133, and 20151. These commands take a large percentage of memory space and use many disk sectors. I would not indiscriminately load these commands in memory or place them on my master work disk. Forethought and planning is in order if you are to make the most of this system.

High resolution displays may not look very clear on a standard color television set or even on a high quality color set that's being used as a monitor. Expect to see multi-colored ghost images of the characters. The difficulty stems from video circuitry, not from O-Pak. To improve readability, turn the color control on the TV set down. Clarity is improved even though you lose your background and foreground colors. If you are using a monochrome display, this problem does not exist.

If you are the type who plans to make a copy of OS-9 or to modify the kernel (guts) of this operating system, beware. HiRes should be turned off before performing a Cobbler command. CCIO must be in its restored state before requesting a Save of its memory module. Failure to follow this precaution will result in a CRC error in the CCIO module and will prevent a correct boot of the new kernel. If future releases of OS-9 change the CCIO mod-

ule an updated release of O-Pak will, I suspect, be necessary to keep in step.

O-Pak is among the most useful additions to my OS-9 library. This package has transformed an unattractive 32x16 screen to a display medium of convenience, even beauty. Perhaps my highest praise for HiRes is that I take its features for granted now and rarely need to be aware of its presence. Add to that the value of transferring files to other operating systems and you can see what a powerful collection of tools I now have.

— Eugene Grunby

Autoterm

PXE Computing 11 Vicksburg Lane Richardson, TX 75080 (214)699-7273 \$39.95 cassette, \$49.95 disk 32K

N TERMS OF INTELLIGENCE, Autoterm is a cut above many other smart terminal programs. It does everything its ads say it does, too. What sets it apart from greatness are a couple of documentation problems and operational kinks. Still, it's a fine program that can do even more than what it was designed to do, if you've got enough imagination.

The program requires at least 16K of RAM, which yields a storage buffer space of slightly over 2K. A 32K Color Computer, however, lets the program store up to 18,474 bytes in the buffer, a much more usable amount.

The review copy program came on an auto-run cassette, so it overwrites the reset vectors within the computer's RAM, and you do not have to enter EXEC or GO ... it starts up by itself. The disadvantage to this approach is that you can't escape the program without turning off the power, nor can you make a back-up copy very easily.

Autoterm supports a wide range of baud, parity, full or half-duplex, and stop bits, making it adaptable to a whole spectrum of host computers. In the terminal mode, you may choose between several formatting options, and have the ability to turn on the "key-beep" that "plinks" each time you press a key, or the "key-bop" that lets you know when you've made a mistake.

Word wrap, the ability to prevent a word from being broken in half at the end of a line, may be manually enabled or disabled, as can a reversal of the normal screen of black letters on a light colored screen to light green letters on a dark screen.

Printers are supported off line, though with an RS-232 switcher the modem can be left connected to the phone line while Autoterm routes something to the printer, and you don't have to restart Autoterm if the carrier drops for some reason. Several options make using this program a joy. One is the special printer driver, which embeds printer control codes to modify how the printer acts. For example, you can change from normal print to double width print.

One unique feature is the program's ability to override the length of a line of received text and re-format it to whatever application you want. Since the format of a line from a bulletin board system (BBS) isn't often the length your printer can print on one line, you can save some paper with this feature.

A simple text editor is included in Autoterm. It may be used to prepare messages off-line for later transmission, or to generate or modify a series of user-programmed text files known as Key Stroke Multipliers (KSMs). With a KSM you can set up a certain procedure, such as logging on to CompuServe or another electronic message service, and have the Color Computer do most of the work for you, like entering your name and log-on information, automatically reading messages, and saving them.

A large number of sample KSMs are in the instructions, including one which lets you program Autoterm as a mini-BBS. That one lets you get electronic mail even when you aren't home. The possibilities of such applications are endless.

Overall, Autoterm is a valuable addition to the Color Computer's communications ability. It has its own problems though.

The instructions fail to mention that when the buffer becomes full, the screen display changes by dropping all its blank lines. And the documentation does not explain that the buffer doesn't overwrite itself once it becomes full, erasing the oldest material in the buffer like most terminal programs do. Instead, it requires you to delete a portion of the buffer to make room for new data.

Take away another point for the lack of any means for the host computer (the one you're calling) to automatically open and close, or even mark, a portion of your buffer when downloading. Most Color Computer bulletin boards have adopted the defacto standard of the CONTROL-R / CONTROL-T protocol (hex numbers 12 and 14) to mark the beginning and end of a downloaded file. Instead, you must manually go through the buffer and mark the start and stopping points yourself.

Finally, a warning to CompuServe users: don't be surprised if you get an Invalid Password error message if you're a fast typist when you log on to the system. Autoterm waits one-fifteenth of a second for an echo from the host computer before it sends out the next character. Fast typists may be typing passwords faster than they're being sent out, since Autoterm is waiting to get something back and the password is not echoed back to your computer. The cure is to slow down, at least when typing your password. This lesson was learned after quite a few hours on the phone with CompuServe trying to figure out why my password wouldn't work any more.

This program is protected but all is not lost since PXE offers something that may make other software distributors sit up and take notice. For an additional \$23, PXE will sell you a "registered" and unprotected version of Autoterm, a workalike version of the regular program except for the following differences.

The auto-run leader is not present, so the cassette version may be backed up, or loaded onto a disk.

The program is written in position independent code, meaning you can relocate it anywhere within your available RAM. Using PXE's instructions, a 64K Color Computer can wind up with about 39K of buffer.

"The possibilities ... are endless.

A set of technical notes accompanies the program, including a list of all jumps and calls to external routines, making modifications and customization much easier.

To get the "registered" version of Autoterm you must send in the application enclosed in the original Autoterm documentation. That way only authorized legitimate purchasers of Autoterm may buy the unprotected version.

- Wayne Day

TRS-80 Color Mouse

Radio Shack One Tandy Center Fort Worth, TX 76102 (817)390-3885 \$49.95



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which version of Basic or how much RAM size you have.

To use the Mouse, you push it around on any tabletop, within a 4.5-inch square. At the top left of the square the computer will read an X of 0 and a Y of 0. At bottom right the computer will read an X of 64 and a Y of 64. Other points in the square have appropriate X and Y coordinates. In that respect, the system is essentially the same as the joystick system.

To envision how Mouse works, imagine a trackball like the one on arcade versions of Centipede or Missile Command. Encase the trackball in a small black box, flip it over, and put a fire button on top. The trackball is spun by moving the box. The Mouse follows this basic plan, but its trackball is smaller and the cable comes out the back.

The Mouse is 3.5 inches long, 2.5 inches wide, and 1.3 inches high. The cable is five feet long with a joystick plug at the end. On top is the bright red bar of the fire button. The bar travel is about ½6 of an inch and clicks when it makes contact. The case is the same textured black plastic used on regular joysticks.

A look inside reveals sturdy construction, including a well-anchored cable, good solder connections, a steel trackball, and a heavy-duty momentary contact switch for the fire button.

The manual is a ten-page booklet that tells you how to set the Mouse up, how to use and care for it, and what its technical specifications are. It also suggests three Radio Shack program pak games the Mouse can make easier; Wildcatting, Polaris, and Galactic Attack. I don't have Wildcatting, but I did try this product on the other two. I found no improvement in Galactic Attack. Polaris, however, became a totally different game. I controlled the cursor much more easily, not only because of the larger movement area, but also because I could use one hand on the Mouse and the other on the keyboard.

The Color Mouse has three disadvantages. First, the cable tends to get in the way. I place my disk drive to the right of my computer and the Mouse cable tends to get caught under it. Second, it is nearly impossible to tell what the Mouse's X and Y coordinates are without a screen reference. To help, I drew a 4.5 inch square on a piece of paper and used the Mouse on that. Last, split-second movements sacrifice accuracy. The steel ball will slip instead of roll on the table when it is jerked or when directions are changed

quickly, so the Mouse simply can't match joysticks for speed. And the 4.5 inches of placement freedom make large fast movements necessary with some games, much more so than with the 2 inches of freedom allowed with joysticks.

There are things that can be done more easily with a Mouse than a joystick and vice versa. The Mouse is capable of very accurate and predictable placement, while joysticks are for registering reflex motions. But the Mouse does pretty much what Radio Shack says it will do. It's well-built, rolls smoothly, and adds zest to some games.

- L.R. Jansen

IntBasic

Spectrum Projects 93-15 86th Drive Woodhaven, NY 11421 (212)441-2807 16K to 64K cassette only \$39.95

NTBASIC IS AN INTEGER Basic compiler program written to run under Color Basic in 16K, 32K or 64K machines.

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It compiles programs into machine code so they can run faster than with the Basic interpreter. It uses many of the familiar Basic commands and the usual mathematical and logical operators. A new command, IBSHFT, lets you shift the bits in any variable to the left or right. This command is functionally similar to the 6809 assembly language LSL and LSR operators.

As its name implies, IntBasic works only with integers. If you need to work with floating point numbers you will have to write routines that keep up with exponents and signs. IntBasic allows 26 integer variables, A to Z, each of which can be a 16-bit value from 0 to 65,535. It also allows 26 dimensioned "string" variables A\$() to Z\$(). Each string variable is an array of one-byte integers with values from 0 to 255. For example, A\$(5) refers to the fifth byte of the A\$() array. The length of each array is set by the Dimension (DIM) statement. IntBasic does not distinguish data types, so integer and string variables can be manipulated and compared in the same statement; the value of the specified byte of the string variable and the lower (less significant) byte of the integer variable are used. For example, the assignment statements A

= B\$(35) and F\$(10) = C are valid. The usual string operators RIGHT\$, LEFT\$, MID\$ and INSTR cannot be used. If you need these functions, you will need to write your own routines.

Now, this sounds like work. But if you want the speed of machine language you have to sacrifice some of the Basic's conveniences. You will need to learn "memory management." Specifically, you will need to plan where in memory to put the compiled program and a table for any text strings. You must be careful not to overwrite any portion of the original Basic or compiler programs. In addition, a library of subroutines in the compiler for multiplication, division, input and so forth must be in memory when your compiled program is executed. More planning is involved than usual, but the experience will be good if you want to learn assembly language program-

IntBasic comes on cassette in 16K, 32K and 64K versions. The memory requirements for the compiler vary from approximately 13K to 22K. Unfortunately, the 16K version leaves only 1764 bytes for the original Basic program, the compiled program and the text table. The major disadvantage of IntBasic is that it is not a

disk based system. I had almost forgotten how much I hate to find and load programs on tape. IntBasic also does not perform disk or cassette input or output functions. The users manual says you can tailor the existing ROM routines to perform these I/O functions.

The manual, a 19 page document, describes clearly and thoroughly everything you need to know to use the compiler. It is not an easy read because of the moderate complexity of the subject. A table of contents would help. It does contain four sample programs that can be used to learn the compiler. The first two can be run with 16K (although they are examples for a 32K machine) if the compiled program starts at 2000 (decimal) and the text table starts at 2500. Line 24 of the second program should be corrected to read: FORJ = 2 TO C: I+I+1: Z=PEEK(I): X=A\$(J).

During compilation, the compiler can generate listings on the screen and line printer to reproduce the original Basic program, and give the memory location of: each line of the compiled program; the first and last address of the text table, compiled program and variable table; and the start address of every integer and string variable.

— Raymond D. Mosteller

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Timebound

by Children's Computer Workshop, Inc. Radio Shack One Tandy Center Fort Worth, TX 76102 (817)390-2842

16K, cassette joystick \$19.95

THE CHILDREN'S TELEVISION Workshop has filled our television screens with quality educational programming, fun, excitement, and challenge, for 13 years. So the creation of interesting educational software from its subsidiary, the Children's Computer Workshop (CCW), is hardly surprising. Timebound is part of that branch of the CCW family Tandy calls home-based educational programming; it's aimed at parents and children more than teachers and students.

The goal of any CCW game is to "encourage children to experiment and explore, to think and solve problems and to practice skills while they are having fun." Timebound, part of CCW's "Creative Ex-

ploration Series" for ages 10 and up, fulfills that goal but not in the cutesy tradition of Sesame Street nor with the comic book antics of The Electric Company. It's more reminiscent of the 3-2-1 Contact's intrigue

Timebound offers creative exploraton of a time loop between the years 0 and 2000. The game booklet is well-written and to the point, and within minutes I grasped my role as a scientist who must rescue a timebound assistant, Anacron. Despite my warnings to stay away from the Time Machine, Anacron didn't. He went tumbling out of control, frantically grasping historic events in an attempt to return to the present. I have only 15 minutes to retrieve him or my assistant will be timebound forever! So:

I am stationed at the Time Machine's viewing screen and in control of the Time Scanner (joystick). I check my starting year for this particular game on the calendar at the top of the screen — 1230. I take a deep breath, brace myself for action and begin traveling through time at high speed. The calendar changes rapidly as I pass through time bands. Events flash by, blurry with speed, as I move my scanner around the outer band hoping to

catch the event Anacron is clinging to.

My scanner catches an event and the view screen decides to freeze. The name of the event appears at the top of the screen and the calendar tells me what year I'm in. Anacron's location appears at the bottom of the screen and my heart starts beating faster! My event is "bicycle," the year is 1816, and Anacron is at "compass." The view screen divides the events in history into 11 categories so I check in the Timebound manual. I decide I'm in the "land transportation" category and that Anacron is in "scientific tools." I make a mental note of the position of the time scanner so I'll know where "land transportation" is. Category positions change with each game and I must discover and remember them so I can find Anacron's location. Now I concentrate on time sequence. Did we have compasses before we had bicycles? I feel pretty sure we did so I press the red button on the joystick to resume the search. I also press the spacebar to change direction.

Suddenly I'm plunging backward in time. Years are melting away as I frantically rotate the scanner around the view screen. The clock continues to display elapsed time. I've already used nearly five

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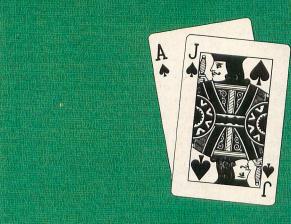


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minutes! I catch one event after another as I memorize the category positions and link events with their dates in history. I approach the year 1125 and hear a "beep." My scanner catches an event and the view screen freezes action once again. My heart sinks. I've caught Anacron's event, but as I've moved closer to him I've created a time wave that has caused him to lose his grip. I have "compass" in the year 1125 but Anacron is no longer there. He has tumbled to another event, perhaps even another category. I've used over nine minutes now.

I press the red button and the years fade back to 0. I hear a series of sound effects and the year 2000 appears. I'm through the time loop now. As the 1990s pass I catch another event. It's 1990 and I'm on "hot tub tennis"... no kidding! Now that's something to look forward to. Huh? Oh yes! Anacron, hang on, I'm on my way!

Timebound can be just that exciting in the hands of the right person, young or old. But since the graphics are limited and unvarying, and the reinforcements simply faster personal times and achievement of each of the 11 difficulty levels, I recommend Timebound for very curious children with above average attention spans. And since memory and reflex action will be developed while playing Timebound, beginning play with at least some skill in those areas is important.

Catching an event with the scanner is a matter of luck of being in the right place at the right time. Granted, the point of the exercise is to develop a sense of history, but I'd still like some control there and I'd also like some occasional hints when I get within a reasonable range of Anacron. If you don't know what an event is, you have no way of knowing how close to Anacron you are and you're left guessing through centuries until you catch a familiar event. And, when Anacron is on an event you're not familiar with you must simply play blindly until he changes events or you accidentally stumble upon him.

The higher the game level, the more categories Anacron will use and the faster the scanner will move. When you catch Anacron he appears on the screen as a large question mark with eyes, at the appropriate category position and with sound effects. If you fail to catch him in 15 minutes you'll hear a sound effect and the screen action will freeze. In either case, a new game can be started by pressing the Clear button.

The categories that divide the game's historical events are: air and space, time, communication, land transportation,

water transportation, architecture, fun and games, scientific tools, political leaders, household items, and sports. If you want to learn about a specific category you can keep the scanner in that particular spot on the screen to catch all the events offered in that game. Of course you may not catch Anacron that way, but it's a good way to get familiar with Timebound.

I enjoy playing Timebound but, more importantly, my ten-year-old son enjoys it, too. In fact, he read the manual on his own and was soon finding Anacron faster

Many names and events included in the game are a mystery to young minds, though. Genghis Khan, Hadrian, Eniac, and Carrrack, for example. Even things like a pressure cooker, candle clock, and sextant can be strange to them. My son learned to hold the scanner to catch an unrecognized event until further events identified the category. That solved some of the mystery. A dictionary and encyclopedia satisfy extreme curiosity when a game ends. Occasional adult participation will help children learn unfamiliar categories and will encourage activities like the riddle-solving at the end of Timebound's manual.

How well I remember agonizing for long, boring hours, trying desperately to memorize events, names and dates for school exams. Timebound... welcome.

- Jean Plesser

Factory

Sunburst Education 39 Washington Avenue Pleasantville, NY 10570 32K disk \$39.95, regular \$49.95, teacher's edition

S A COMPUTER-USING educator, I am constantly urging children to attack a large problem by breaking it down into small parts. By solving each part step by step, the larger problem can be solved. The Factory by Sunburst is a superb way to teach this problem-solving strategy. It requires mental dexterity, careful observation, and planning.

There are three levels in Factory. In the first, called "Test a Machine," students experiment with the three machines that are used in the factory. Students' creativity can emerge in the second level, "Build

a Factory," as they design products, program an assembly line, and challenge other students to produce the same product." In the third level students are asked to work backwards and determine what processes were needed to construct a product. In order to do that, they must know the function of each machine and devise a sequence that can make that product.

Test a Machine, level one, lets the kids try each machine to see what effect it has on the raw material, a plain, blank square. The three machines either PUNCH, ROTATE, or STRIPE. Each machine has its variations, too. For instance, ROTATE will let you turn the square 45, 90, 135, or 180 degrees before sending it on down the assembly line. Colorful graphics depict the machines in operation, and sounds are made each time actual "work" is done.

The second level allows up to eight machines to be set up in an assembly line. If the students PUNCH a square in the center, ROTATE it 45 degrees, and put a thin STRIPE on it, the finished product will be a diamond-shaped disk with a diamond hole in the middle and a horizontal stripe running through the mid-line.

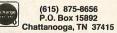
When students finish creating an assembly line, the gears in the factory move and the finished product is graphically produced. Then the computer asks if they want to challenge others to make their product. Students delight in devising elaborate products to challenge their friends.

In the final stage of Factory, students see a product that has been made by several machines. They are asked to reconstruct the sequence of machines and processes its creation required. The computer gives the choices of easy (two machines), medium (up to four), and hard (up to eight). Students must think backwards and assemble the required machines, then the product will be put through the new assembly line. It appears on the screen next to a depiction of the original. If the student-devised product varies from the original the computer declares, "YOUR PRODUCT HAS A FLAW." Students can then try again or start a new product.

There is no limit to the number of times the students may attempt reconstruction. This feature encourages the young engineers to take careful notes, learn from their mistakes, and discuss possibilities with others. At any time they can stop what they're doing and return to the main menu. The BACK UP choice is also constantly available, allowing them to return to their previous choice. Documentation is complete and useful.



* Also available on disk (32K) at extra charge. Send for free complete listings! TN residents add 7.25% sales tax, C.O.D. orders add \$2.00.





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--- REVIEW\$

One sixth grader suggested that Factory would be a good training device for the Olympics of the Mind Competition, a nationwide creative problem-solving event now in over 3000 schools. Many problems in this competition are of the mechanical type. Students must learn that mechanization is, in actuality, a series of parts with each part assigned one specific task. Factory teaches this concept as well as any activity I've seen. The versatility of Factory satisfies my expectations for good simulation. It can be used by fourth graders and adults, and is applicable for individual and for group instruction.

— J. Craig Dickinson

Video Plus

Computerware Box 668 Encinitas, CA 92024 (619)436-3512 **\$24.95**

TELEVISIONS ARE FINE for many computing applications, but if you do much word processing you probably suffer from occasional eye fatigue and headaches. A high resolution monitor is much better to work with, especially when you're using programs that generate video displays of up to 85 characters per line.

On a television, displays above 51 characters per line are next to impossible to read. With a high resolution monochrome monitor, such character display, even 86 character displays, can be more easily read. Unfortunately, one of the biggest drawbacks of the Color Computer is the fact that it does not, in its standard configuration, easily lend itself to a marriage with a high resolution monitor.

The problem arises when you try to connect a high resolution monitor to the Color Computer's video jack. That jack was designed for output to a television set and therefore uses radio frequencies. It will not work with a high resolution monitor. In order to use a monitor you need raw signals from inside your computer. Several articles that describe exactly how to do that have appeared, but they are technically oriented and require some degree of expertise to implement. I had almost resigned myself to the idea of living with unhealthy television displays when I heard about Video Plus.

Video Plus is a hardware device that gives you a connection for monochrome or color high resolution composite monitors. I was skeptical of the "installs in minutes" claim, as I have heard that one many time before. Video Plus, to my surprise, lives up to the claim.

I timed my installation, beginning with the first reading of the installation instructions. It took me 11 minutes, including time to read the directions twice, take the cover off the computer, install Video Plus, and reinstall the cover.

The instructions are completely clear and the package contains a preassembled and tested unit. To install, you simply remove one IC chip (easily identified in the instructions), install a socket and replace the chip in the socket. All the wiring and soldering has been done for you. Next, you simply stick the small Video Plus board (it comes with a self-adhesive bottom) somewhere convenient and you are finished. All cables are included and are prewired. Most of your thinking will center around finding a convenient place in the case through which you can route the cables.

Video Plus comes with a sound patch too, so you can capture signals from software that generates music, speech or other sounds.

When you are finished with installation you have about two feet of video cable with a male RCA jack on the end that plugs into your high resolution monitor. You also have another cable with a female RCA jack that connects the audio. Since most monochrome monitors do not have speakers, you may have to capture the audio output with an external amplifier such as a tape recorder or

"I leave my work station with eyeballs clear and wits intact."

radio, using an auxiliary input jack. I use a small, battery operated amplifier. You'll also need a patch cable with a male RCA jack on one end and a standard phono plug on the other.

All right, all right, I can hear you. You're saying, "So far so good, but what about our COLOR!?" Well, if you want to use a high resolution color monitor, you can, even though Video Plus comes set up for monochrome. What it normally does is strip the monochrome signal and

eliminate "irrelevant" color signal information, since monochrome monitors have no need for it. That gives you an outstanding monochrome display, complete with all shades of grey. If you want color, you cut one wire loop to preserve the necessary signals. If you wish, you can wire a small switch to the wire loop and locate it somewhere that lets you switch back and forth between color and monochrome signals.

The unit includes an adjustment that lets you find the optimum signal for your monitor. Another plus is the fact that your standard TV output is not disabled.

Video Plus is an outstanding product that does everything it lays claim to. I now enjoy the sharp, clear, and interference-free display that is possible only with a monitor. And I leave my work station with eyeballs clear and wits intact.

— Norman Garrett

Mailing List

Prickly Pear 9234 East 30th Street Tucson, AZ 85710 (602)886-1505 32K, disk drive \$49.95, disk only

FYOU HAVE NEVER used a label-making data-base program, Mailing List may be a good place to start. It's friendly and comes with instructions to customize it to your particular computer-printer combination. It is, however, less than flexible in setting up fields, and slow in sorting.

The main reason it's friendly and easy to customize is that it is a combination of two Basic programs and one assembly language program. The Basic programs are Mail and Alpha; the assembly language program is Screens, a high-resolution screen program that's automatically called in by the main program, Mail. You get a choice of two screen colors with Mailing List, a light one, which is a white background with black characters, and a dark one, which is a green background with black characters. The dark seems to produce the least amount of eye strain.

To start Mail, all you have to do is type in RUN "MAIL" and hit the Enter key. You will be asked if you intend to start a new file, the file name, and your screen selection. After you answer those questions you reach the main menu. The main menu has seven choices. They are, Start/

Add, Review/Edit, Print All, Print Particular, Print Phone Numbers, Load New File, and End Program.

The data base for this program is composed of six fields; Name, Address, City/State, Zip Code, Phone Number, and Code. One weakness in this program is its inability to have more than one Name

"Mailing List is friendly and easy to customize... but slow."

or Address field. Many times when you are preparing mailing labels you need to use more than one address line, and sometimes you need to mark a label to someone's attention. That can not be done neatly with this program.

Another hang-up that detracts from Mailing List catches you after you have started a new file and have entered a number of records. At that point you might want to edit them. The program won't let you do that unless you first end it and rerun it. This only happens the first time you start a new file, but it is annoying.

What Alpha does is let you copy or sort the data files produced by the Mail program. Alpha sorts the Name field either by the first or last names. All sorts are in ascending order. To change the sort field you must take the trouble to change Line 400.

To sort addresses you end the Mail program, turn the computer off and back on, type in RUN "ALPHA", and hit the Enter key. This clears the computer and removes the Screens program. Alpha will not run with Screens in place.

The sort is a modified bubble sort. It is very slow. It took 12 minutes to sort 60 records. Also, all sorting is done on the disk, so my disk ran for the full 12 minutes. Prickly Pear acknowledges the sort is slow and suggests that any large sorts (1000 or more) be done overnight. If your disk drive is like mine and is rated at 200 to 300 hours, it's not smart to run it for hours on end.

This program would make a good starter program for someone learning about data bases, but its price is what you'd expect to pay for a professional business program, not one in which you have to change a line in Basic to change the sort field. Perhaps at half the price, this would be a good buy!!!

- Bob Jack



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---NEW:PRODUCT\$

The TRS-80 User's Encyclopedia

by Gary Phillips and Guier S. Wright III The Book Company 11223 South Hindray Avenue Los Angeles, CA 90045 (213)410-9466

Okay, first things first. There are two of these publications, one for the Models I, III, and IV, and one for the Color Computer and MC-10. This announcement regards the latter. It's 241 large pages long and costs \$14.95. It's cross-referenced and includes listings of software houses and product information. It's written for beginners and experienced users.

Dragonfly Fan

Dragonfly Software 404 West Stafford Street Philadelphia, PA 19144

Dragonfly Software is offering its fan "while supplies last." The \$18 fan is a solid state unit. While its press release states it has "no wearing parts," it does have, instead of the traditional propeller, oscillating wings. The fan should "last forever" — some have run for over 30,600 hours, Dragonfly says.

Computer Novelties

Sweet Gum, Inc. 15490 NW Seventh Avenue Suite 204 North Miami, FL 33169 (800)237-9338 in Florida (305)687-9338

The Sweet Gum Catalog is an offering of novelties for computerists. Messages on the Tshirts range from "Byte My Bits" to "I'm Bilingual, I speak English and Basic." The message on the mug changes when hot liquid is poured in from "computer expert on duty" to "expert off duty." There's a wall clock with binary numerals, and a calculator chocolate bar. A microchip-patterned tie, a chip off the old block Lucite paperweight, a 600-piece puzzle of a microchip... Sweet Gum will send you the catalog

The Naked Computer

by Jack Rochester and John Gantz William Morrow & Co. 105 Madison Avenue New York, NY 10016 (212)889-3050

The Naked Computer promises to be an eclectic and entertaining compilation of computing fact and trivia. It's got history (like why Hal sang "Daisy, Daisy"). It's got the words to the "official IBM fight song, banned since 1957." It has a serious side, too, including chapters on robotics, artificial intelligence, and computer art. Produce \$15.95 and the 335-page hardcover book is yours.

The Whole Computer Catalog

Designs III Publishers 515 W. Commonwealth Avenue Fullerton, CA 92632 (714)871-9100

The Whole Computer Catalog sounds like it wants to be all things to users. The \$35, paperback, 400-plus page catalog offers information on a host of subjects. Some are: hardware, software, applications,

education, careers, stores, associations, magazines, government publications, books, manufacturers, consultants, the sociological impact of computers, and "sources to find solutions to immediate problems."

Quarterly Software Reviews

Whole Earth Software Review Box 27956 San Diego, CA 92128

From editor Stewart Brand, who brought you the Whole Earth Catalog, comes the Whole Earth Software Review, a research project/publishing venture that's to culminate later this year in yet another Whole Earth tome, you guessed it, the Whole Earth Software Catalog. Brand and staff are focusing on "the best" personal computer software, hardware, and books as objectively as possible and without, a promotional pamphlet says, any advertising whatsoever. They are winnowing the best from the rest by relying on reader opinion and experience, and an in-house research staff. The Review, its promo promises, will be enthusiastic in tone, not condescending or overly technical. It costs \$18 for four issues if subscribed to; the cover price is \$5 per issue.

Machine-Language Subroutines for the Color Computer

Wayne Green Books Peterborough, NH 03458 (603)924-9471

Machine-Language Subroutines for the Color Computer, by David D. McLeod, is a reference book, not a tutorial, for computer users already familiar with assembly language programming. Its four sections are titled Preliminary Information, ROM subroutines, RAM subroutines, and Appendices. Most routines in the book can be combined with Basic programs. Entry requirements, exit conditions, and error interpretation are discussed. Included is a cassette with the source codes. It is compatible with Radio Shack's EDTASM + and Micro-Works' Macro-80C disk editor/ assembler. The package sells for \$29.97.



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f a single goal throughout all of time can be determined for all mankind, it would be the desire to live a pleasant existence. Pleasure, happiness — more than mere survival — is what fuels our desire to live. Our history is full of wars and op-

pression that illustrate how far we've come and how much further we still need to go. Our attempts to attain that desired pleasant life have been wide-ranging, as evidenced by such diverse extremes as global organizations like the United Nations to localized debates over providing sufficient parking areas downtown.

The desire for a pleasant existence and our continuing search for methods to bring it about is what history is made of. Our search drives us to discovery and artistic expression. Co-existence, the first ingredient for a pleasant existence, would be impossible without an ability to communicate. The threat of all-out nuclear war seems more real today than it did a few years ago; not because our weapons are bigger and more powerful, but because the leaders of the US and USSR aren't talking together.

As society continues to elevate itself via newer, slicker, and faster technologies, our means of communication must keep pace. Until the microcomputer we depended on the telephone. Before that we used radio transmission, telegraph, fast horses, and slow boats.

Many people are asking, "Exactly what does one do with a microcomputer?" We use it to communicate with each other and with ourselves. We use it to store, manipulate and exchange information. People who dismiss the microcomputer as an adult toy are making a terrible mistake.

Reports of the multitude of privately-owned microcomputers that we hear so often are not marketing hype, nor is this a fad phenomenon that will soon die a death similar to the hoola hoop, home video systems, and Tony Orlando and Dawn. We are well into the beginning of another major epoch of human history. "The Information Revolution" will be viewed historically like the artistic Renaissance of the late 14th century and the Industrial Revolution that began in the late 1700s and continued until it collided head-on with the transistor.

In the overall scheme of things, microcomputers will probably become a subsection of a chapter on digital communication technology in a history text called *The Dawn of The Information Age*. In volume two of that yet-to-be-written historic text, microcomputer history may be compressed to a single paragraph or pair of sentences. Still, no matter how miniscule the microcomputer becomes in history's grand retrospective, its effect is quite the opposite in our daily existence. The way we conduct business, teach and learn, shop, correspond, etc., etc., has forever been changed because of the increasingly affordable microcomputer. We can watch that change happen on an almost daily basis.

Although the Information Age did not begin with microcomputers, microcomputers may prove to be the catalyst that brings the Age out of its infancy. The Information Age began with two relatively unrelated inventive feats: Daguerre's invention of photography in 1839, and Bell's telephone in 1876. Public radio broadcasting emerged in the 1920s, bringing events otherwise widely displaced by time and distance into radio listeners' present existence. In 1936 radio's sound broadcasting technology merged with the process of making pictures. The result was television, which made those faraway occurrences nearly as real and immediate to viewers as to participants. Many lesser, albeit important, advances continued to refine the art of transporting and communicating

information. Concurrently, industrial technology made individual ownership of communicating devices widely affordable. Soon few houses were without a radio, and not long after a TV, and then color TV.

Technology marched on, from the tube to the transistor to the printed circuit board to the silicon micro chip, depositing radios, TVs and computers in its wake. It's difficult to believe now, but when TV broadcasting was in its infancy few people foresaw a large public acceptance of the media. It wasn't long before that assumption was proven false. Soon everyone knew the voices of Uncle Milty, and Jack's Armstrong and Benny. As the voices became faces on the television screen, listeners became viewers. Soap operas, comedians and music made the technology easy for the public to absorb.

Then this pleasant form of communication began to get serious: we watched presidents talking to reporters, racial violence came into our living rooms, and a war from a far off corner of the world continued every evening at 6:00. The electronics did not always make us feel good now. Information, for better or for worse, was communicated to America live and in color. In 1963 America buried a president, and the whole world went to his funeral.

Although Bell's telephone invention seems to have taken place many more years in the past than it actually did, modern communications technology is *that* young — merely 108 years old. In a retrospective of historical events, it is easy to realize how few years of development led up to the microcomputer. The Renaissance lasted nearly 300 years. The Industrial Revolution put in close to 200 before the transistor was born. Epochs have no time length requirements to follow, they are at the mercy of history. Without a sure-fire way to look to the future, there is no way to determine at what point we are now in The Information Age.

Realize, though, how history will transform events into matter-of-fact happenstance. I condensed modern communications history to a pair of paragraphs, the transistor to an off-the-cuff remark exemplifying the end of the Industrial Revolution, and suggested that the microcomputer would be awarded even less space in tomorrow's history books.

People commonly make two mistakes when faced with today's focus on the microcomputer: they ignore it, hoping it will fade away, or become deathly afraid they'll sleep too late one morning and miss a brand new product announcement. Now that the microcomputer has arrived and dug itself into our lives, we need to be realistic about what it means. We have reached only a juncture in human history, not a concluding episode.

— K.L., Editor-in-Chief

---FOR...NEXT (07,84)-

THE JULY ISSUE of **The Color Computer Magazine** will take a look at operating systems. We'll have a review of one of the CP/M versions out for the Color Computer, and some articles that will help you understand what an operating system is and does. Jean Plesser will present the first of two special articles for kids on their summer school break, and we'll have the last winning game from last year's Summer Programming Project. And that's just the beginning...



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