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# RUNNING RUMINATIONS 

Remembering the Past: A Look at PET User Notes.

## GLORY Days

Although its roots are buried well in the past, the microcomputing industry began just ten short years ago. Most of us were not there at the outset, but each of us has a story to tell about how he became involved with microcomputers.

A decade ago, the two StevesWozniak and Jobs-were marketing their Apple II computer, Tandy had introduced its TRS-80 Model I, and 2001 (the computer, not the movie) was Commodore's entrant in the microcomputer market race.

The PET 2001 was announced in May 1977, and delivery of the product started in September of that year.
I recently uncovered a collection (courtesy of David St. John of High Springs, FL) of PET User Notes, which chronicles the travails and triumphs of those early PET owners.

While computer magazines of that time featured articles about the PET, PET User Notes, which premiered in November 1977, was the first publication dedicated to this machine.

Spearheaded by Gene Beals, a fulltime employee at A B Computers in Montgomeryville, PA (a distributor of early PET computers), PET User Notes was a bimonthly publication of the PET User Group and available to nonmembers for $\$ 5$ a year.

Although the early issues were mostly written by Beals, User Notes featured articles by other PET users. Most notably, Dan Fylstra, who later introduced the microcomputing world to VisiCalc, and Jim Butterfield, who, through his articles and programs, did (and still does) much to promote Commodore computing.

Most of the articles published in the first issues were tutorial, explaining how to use and program the machine. For example, "CHAINING, or How To RUN Programs Too Large For Your Memory" by Dan Fylstra, "Using the PET's 8 Bit Parallel I/O Port" by Dan Fylstra, "PET Cassette File Usage" by Gene Beals and "PET's FOR-NEXT Loops, Arrays, and a Simple Sort Program" by Jim Butterfield.

The issues also contained program listings and played a very important role as a software exchange for PET users.

The concerns and interests facing these early users bear some resemblance to problems computerists face today:
-procuring software and hardware. There were a handful of software developers, including Commodore, who were encouraging authors to submit PET programs (on cassette, of course). Commodore was slow to market hardware support for the PET, but they eventually released peripherals such as printers, single- and double-disk drives and memory expansion. Commodore also later came out with 16 K and 32 K models of the PET.
-lack of documentation. Manuals were sketchy, and readers were starving for information on how to take advantage of their new machines. The PET came with an initial nine-page manual, which was replaced by a 38 -page "temporary" manual. Then Commodore introduced a "new and improved" 50 -page manual, with promises of a "real" manual. Supposedly, Chuck Peddle, the designer of the PET, left Commodore without finishing the PET manual.

The original PET computers were constructed with a metal case, and two versions were available-the PET 4 K for $\$ 595$ and the PET 8 K for $\$ 795$. Do-it-yourselfers-by adding a jumper and RAM chips-could upgrade their 4 K machines to 8 K at a cost of less than the $\$ 200$ difference. However, most people were apparently willing to pay more for the installed additional 4 K .

The computer came with a nine-inch black-and-white monitor ( $25 \times 40$ display), which featured good resolution, and the infamous square keyboard layout. Owners, particularly touch-typists, had a difficult time with this keyboard because the keys were lined up directly under one another-not offset as they are on a typewriter. (Subsequent PET units featured a full-size, standard keyboard.) User Notes also reported that keytop surfaces wore off on the more heavily used keys. At least one third-
party developer offered frustrated users an alternate keyboard to overcome these shortcomings. However, one nice feature of the PET keyboard was its numeric keypad.
The early marketing thrust of Commodore was toward users to develop software for the machines and "to educational institutions where the PET will receive large exposure." It was also thought that the PET would play an important role in the business community, while, in these early days, little attention was given to the potential for the home market. Purchasers could order machines either directly from Commodore (located in Palo Alto, CA, at the time) or from dealers.

While PET (which stood for Personal Electronic Transactor) was a cute name for a computer, writers-in ads and article headlines-took every liberty with the word: "House-Break Your PET," "Tame Your PET," "Tricks To Help Train Your PET," or, my favorite, "Teaching Your PET to Bark."

PET User Notes may have been the first, but other PET-specific publications soon followed. The PET Paper, which was later incorporated into the now defunct Midnight Software Gazette, started in May '78. The name was quickly changed to simply The Paper upon Commodore's insistence that the word PET is proprietary. Note that both PET User Notes and, later, PET Gazette were obviously not as compliant to Commodore's request and used the PET name with impunity.

As they do today, those early user groups and publications played a comforting role in nurturing the microcomputer market. They were a valuable source of information, programs and, yes, reassurance for those somewhat adventurous, although easily frustrated, pioneers who walked the microcomputing frontier.


Dennis Brisson
Editor-in-Chief

# Fith The lit 



No matter what kind of game you're in the mood for, you'll find that if it's in a box marked FIREBIRD, it's really hot!

Firebird offers the excitement of a whole range of challenges - Adventures and Strategies for long rainy weekends, Arcade games for exhilarating evenings, Simulations when you need to get away from it all, Productivity software when you're feeling well, productive.

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[^1]
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\author{

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}


## Compare hits for yourself!

Up Periscope! Silent Service

| Fire 1 | Suggested Retall Price | \$29.95 | \$34.95 |
| :---: | :---: | :---: | :---: |
| Fire 2 | 3-Dimenslonal Graphics | Yes | No |
| Fire 3 | Number of Scenarios | 6 | 3 |
| Fire 4 | Split-Screen Views | Yes | No |
| Fire 5 | Reality Levels | 11 | 7 |
| Fire 6 | Radar Screen | Yes | No |
| Fire 7 | Accu-Sound" reallsm | Yes | No |
| Fire 8 | Torpedo Types | 3 | 1 |
| Fire 9 | Auto or Manual Torpedo Launch | Yes | Yes |
| Fire 10 | TIme-Day-Month-Year Selection Capability | Yes | No |
| Fire 11 | Zoom Feature | Map or Ship Views | Map View Only |
| Fire 12 | Submarine Strategy \& Tactics Manual by John Patten, Capt. USN (Ret.) | Yes | No |
| Fire 13 | Auto-Load Feature on C128 | Yes | No |
| 5rimatc | dichitisk Fequired | No | Yes |

## N RIGHT OUT OF THE WATER



## ThunderChopper

And don't forget ThunderChopper! For true helicopter action and realism, nothing else even comes close. ThunderChopper incorporates the most advanced graphics, flight systems, and gameplaying factors to provide a sensational balance of strategy and fun.
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Or write or call for more information. Up Periscopel and ThunderChopper are available on disk for the Commodore 64/128, Apple II, and IBM PC line of personal computers for the suggested retail price of $\$ 29.95$. For direct orders please specify which computer version you want. Include $\$ 2.00$ for shipping (outside U.S. \$6.25) and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club charges accepted.

Simplify your disk loads; give your child a drawing program
that's easy to use; produce seven consecutive sprite sizes; toggle
between two 80-column screens; and more.

## Compiled by JIM BORDEN

## s43C C-128 Directory Name Array

I liked C-64 Directory Name Array (July 1987) so much that I wrote this version for the C -128. In the process, I added a variable, F , for pattern matching.

5 REM C1 28 DIR READ-JON R CURTIS
$1 \emptyset$ FORI $=3 \emptyset 72$ TO $3279:$ READX $\$: \mathrm{X}=\mathrm{DEC}(\mathrm{X} \$):$ POKEI, $\mathrm{X}: \mathrm{T}=\mathrm{T}+\mathrm{X}:$ NEXT
15 IFT<<>28ø41THENPRINT"DATA ERR.":END
$2 \emptyset$ POKE58, 243:CLR:F\$="\$": X=LEN(F\$)
25 FORI=1TOX:POKEI+3282,ASC(MID\$(F\$,I)):NE XT: POKE3ø82, X
$3 \emptyset$ DATA $169,14,162,8,16 \emptyset, \emptyset, 32,186,255,169$, $1,162,211,16 \emptyset, 12,32,189,255,32,192$
35 DATA $255,162,14,32,198,255,16 \emptyset, \emptyset, 14 \emptyset, 21$ $\emptyset, 12,132,25 \emptyset, 14 \emptyset, 2 \emptyset 9,12,165,5 \emptyset, 133$
$4 \emptyset$ DATA $254,24,165,49,1 \emptyset 5,7,144,2,23 \emptyset, 254$, $133,253,169, \emptyset, 133,251,169,243,133,252$
45 DATA $16 \emptyset, 1,32,2 \emptyset 7,255,166,144,24 \emptyset, 13,32$ $, 2 \emptyset 4,255,169,14,32,195,255,174,2 \emptyset 9,12$
$5 \emptyset$ DATA $2 \emptyset 2,96,192,6,144,54,2 \emptyset 1,34,2 \emptyset 8,1 \emptyset$, $173,21 \emptyset, 12,73,1,141,21 \emptyset, 12,16,4 \emptyset, 174$
55 DATA $21 \emptyset, 12,2 \emptyset 8,39,192,32,2 \emptyset 8,31,169,25$ $3,141,185,2,165,25 \emptyset, 162,1,16 \emptyset, \emptyset, 32$
$6 \emptyset$ DATA $119,255,132,25 \emptyset, 136,24,165,253,1 \emptyset 5$ , 3, 144, 2, 23ø, 254, 133,253, 76, 192, 12
65 DATA $2 \emptyset \emptyset, 76,61,12,14 \emptyset, 2 \emptyset 8,12,16 \emptyset, \emptyset, 162$, $251,142,185,2,162,1,32,119,255,165$

## S43D A Better Filename

Here's a time-saver that will simplify your disk loads. When you save your files, add a prefix of two characters and a shifted space to the beginning of the filename, keeping the prefix plus filename within the usual 16 -character limit.

Here's an example. Save the RUN Script boot program to disk with "WP<shifted space>RUNSCRIPT 128". It will appear as "WP"RUNSCRIPT 128 in the directory. As far as the disk is concerned, the file is named WP and can be loaded with LOAD "WP",8. Try it with several programs.
-Eric Pedersen, APO, NY

As with the C-64 version, the array that stores the directory must be the first array dimensioned. In my demo, $\mathrm{A} \$(0)$ contains the disk name, with the filenames starting in $\mathrm{A} \$(1)$. The number of filenames is passed to Basic with the RREG,N command. Be sure to use a comma before the variable.
-Jon R. Curtis, Central Point, OR

```
7\emptyset DATA 25\emptyset,2\emptyset8,25,16\emptyset,1,165,251,162,253,1
```

7\emptyset DATA 25\emptyset,2\emptyset8,25,16\emptyset,1,165,251,162,253,1
42,185,2,162,1,32,119,255,2\emptyset\emptyset,165,252
42,185,2,162,1,32,119,255,2\emptyset\emptyset,165,252
75 DATA 162,1,32,119,255,238,2\emptyset9,12,23\emptyset,25
75 DATA 162,1,32,119,255,238,2\emptyset9,12,23\emptyset,25
\emptyset,172,2\emptyset8,12,23\emptyset,251,2\emptyset8,2,23\emptyset,252
\emptyset,172,2\emptyset8,12,23\emptyset,251,2\emptyset8,2,23\emptyset,252
8\emptyset DATA 192,255,24\emptyset,3,76,1\emptyset4,12,2\emptyset\emptyset,24\emptyset,24
8\emptyset DATA 192,255,24\emptyset,3,76,1\emptyset4,12,2\emptyset\emptyset,24\emptyset,24
\emptyset
\emptyset
85:
85:
9\emptyset DIMA$(145):SYS3\emptyset72:RREG,N
9\emptyset DIMA$(145):SYS3\emptyset72:RREG,N
95 FORI=1TON:PRINTA\$(I):NEXT

```
95 FORI=1TON:PRINTA$(I):NEXT
```


## Trick of the Month

## S43E C-64 BSave Command

I frequently need to save parts of memory on the C-64, so I wrote the program below to add a BSave-type command to the 64 .

5 REM MEMORY SAVER-HAZEM JAUNI
$1 \emptyset$ REM SYNTAX = ! "NAME", START ADR, END ADR + 1
15 FOR N=512øøTO5133ø:READQ: POKEN, Q:C=C $+Q$
2 $\emptyset$ NEXT: IFC < > 16574 THENPRINT"ERROR!": END
25 DATA $12 \emptyset, 169,13,16 \emptyset, 2 \emptyset \emptyset, 141,8,3,14 \emptyset$, $9,3,88,96,12 \emptyset, 16 \emptyset, 1,177,122,2 \emptyset 1,33$
$3 \emptyset$ DATA $2 \emptyset 8,77,32,115, \emptyset, 32,115, \emptyset, 2 \emptyset 1,34$ ,2ø8,67,16ø,1,177,122,24ø,61,2ø1,34
35 DATA $24 \emptyset, 12,2 \emptyset 1,44,24 \emptyset, 53,153,239,2 \emptyset$ Ø, 2øø,192,17,2ø8,236,152,56,1ø1,122
$4 \emptyset$ DATA $133,122,169, \emptyset, 1 \emptyset 1,123,133,123,1$

```
    36,152,162,24\emptyset,16\emptyset,2\emptyset\emptyset,32,189,255
45 DATA 169,2,162,8,16\emptyset,1,32,186,255,32
    ,253,174,32,1\emptyset3,2\emptyset\emptyset,169,25\emptyset,32,216
5\emptyset DATA 255,88,76,174,167,88,76,228,167
    ,32,138,173,32,247,183,32,253,174
5 5 \text { DATA 165,2Ø,133,25Ø,165,21,133,251,3}
    2,138,173,32,247,183,166,2\emptyset,164,21
6\emptyset SYS512\emptyset\emptyset:NEW : DATA 96
```

If you want to use this routine to save memory to tape, add the following line to the listing:

## 25 POKE 51278,1

The syntax for the new command is !<filename>,<start address $>$,<end address>+1.
-Hazem Jauni, E. Jerusalem, Israel.

# AWARD WINNING GRAPHICS 

## Best Graphics: 16 Bit Division.—The Software Publishers Association, 1986

## Award For Special Artistic Achievement In A Computer Game. -Computer Gaming World, 1987

Stunning graphics, life-like animation, and a good soundtrack add to the feeling


Defender (of the Crown) is the most detailed, most graphically brilliant, most



NOW PLAYING AT A SOFTWAREDEALER NEAR YOU

## \$43F Variable Tabs for Any Printer

Tabs don't print out in hard copy the same way they appear on the screen. The following program will show how to align columns at the right or the left to get the tabs to print out right. It will work with any printer and computer.
$1 \emptyset$ REM PRINTER COLUMNS-GEORGE VOGLER
$2 \emptyset$ OPEN $4,4: H=2 \emptyset:$ REM COL WIDTH
$3 \emptyset$ FORI $=1$ TO8: READ DA $\$: H T=H-L E N(D A \$)$
$4 \emptyset$ PRINT\#4,SPC(HT)DA\$SPC(H)DA\$SPC(HT)"."
5Ø NEXT:PRINT\#4:CLOSE4
$6 \emptyset$ DATA $2,1 \emptyset \emptyset, 2 \emptyset \emptyset 2,393939,55,5335,8,4321$
The program prints four columns of data. The first column is left-justified, the second is blank, the third is right-justified, with the cursor ready for the fourth. The fourth column contains just a period to show that it's properly aligned.
-George W. Volger, Houston, TX

## $\$ 44064$ Input with Sound

This Get routine disables the cursor keys and other nonprinting keys and produces a soft beeping sound as each character is typed in.

```
9\emptyset REM INPUT WITH SOUND EFFECTS-JOSEPH R.
    CHARNETSKI
1\emptyset\emptysetR=54272:FORJ=RTOR+23:POKEJ, \emptyset:NEXT
11\emptyset POKER+5,28:POKER+24,15:PRINT"{SHFT CLR
        }
12\emptyset PRINT" [PROMPT HERE] ";
13\emptyset PRINT"{CTRL 9} {CRSR LF}{CTRL \emptyset}";
14\emptyset GETA$:IFA$=""GOTO14\emptyset
15\emptyset IFA$=CHR$(13) THENPOKER +1,32:POKER+4,21
        :PRINT" ":POKER+4,2\emptyset:GOTO22\emptyset
16\emptyset IFA$=CHR$ ( }2\emptyset\mathrm{ ) ANDLEN (C$) THENC$=LEFT$ (C$
        ,LEN(C$)-1):GOTO19\emptyset
17\emptyset IFA$<CHR$(32)ORA$>CHR$(127)ANDA$<CHR$(
    16\emptyset)GOTO14\emptyset
18\emptyset C$=C$+A$
19\emptyset POKER+1,28:POKER+4,17:PRINTA$;
2\emptyset\emptyset IFA$=CHR$ (34)THENPOKE212,\emptyset
21\emptyset POKER+4,16:GOTO1 3\emptyset
22\emptyset REM CONTINUE HERE...
```

-JOSEPH R. Charnetski, Dallas, PA

## \$441 Protect Your ML

Commodore 128 programmers who use the Graphic1: Graphic5 commands to relocate the start of Basic to $\$ 4000$ to open up a large area in shared RAM ( $\$ 1300-\$ 3 F F F)$ may be placing their programs in jeopardy!
Here's why: The Graphic5 command doesn't clear location \$D8 as Graphic0 does. \$D8 must be cleared to send text to the current screen, using the CHAR command, rather than to the bit-mapped screen where your code is stored. If the byte isn't cleared, CHAR will print the text over your ML code!

Always issue a Graphic0 command prior to Graphic5, or store a 0 in location \$D8 (216 decimal).
-Bob Kodadek, Aston, PA

## \$442 Customizer Program

Here's a program I use to automatically customize my C-128 in either C-128 or C- 64 mode. It will also load a menu
program for you, remind you what computer you're using when you're in 40 Column mode and display the function keys at the bottom of the 128 screen. (You should change these to match your own definitions.) If you use a C-64 only, eliminate the If statement at the end of line 40 . You don't need to enter lines 90-140.
$1 \emptyset$ REM C-64/128 CUSTOMIZER-BOB KNIBB
$2 \emptyset \mathrm{M} \$=$ "DO YOU WISH TO SEE A MENU (Y/N) \{CT RL O\}?"
$3 \emptyset$ POKE5328ø, $\emptyset:$ POKE53281, $\emptyset:$ PRINTCHR $\$(142) "$ \{2 HOMES\}\{SHFT CLR\}";
4ø FORS=55333TO55335: POKES, 1:NEXT:IF FRE( $\varnothing$ ) < >FRE (1) THEN9 $\emptyset$
$5 \emptyset$ POKE646,7: POKE1 $\emptyset 62,54$ : POKE1 $\emptyset 63,52:$ PRINT "\{CRSR DN\}"M\$;
6ø GETA\$:IFA\$=""THEN6 $\emptyset$
$7 \emptyset$ PRINT" 1 CRSR LF\}"A\$:IFA $\$=$ "N"THEN NEW
$8 \emptyset$ POKE46, PEEK (44) +8 :CLR:LOAD"MENU64", 8
9Ø KEY1,"DATA ":KEY4,"PRINT": KEY8,"RENUMBE R"+CHR\$(13): COLOR5,15: POKE235,22
$1 \emptyset \emptyset \operatorname{IFPEEK}(215)$ THENFAST:COLOR6, $1:$ PRINT: L=4 : GOSUB1 3 : WINDOW $\emptyset, \emptyset, 79,23$ : GOTO1 $2 \emptyset$
$11 \emptyset$ POKE1 $\emptyset 61,49:$ POKE1 $\emptyset 62,5 \emptyset:$ POKE1 $\emptyset 63,56: G O$ SUB1 $3 \emptyset$ : GOSUB1 $3 \emptyset$ :WINDOW $\emptyset, 1,39,22$
$12 \emptyset$ COLOR $4,8:$ PRINTM $\$$ : GETKEYA\$:PRINT" $\{$ SHFT CLR\}": IFA $\$=$ " $\mathrm{Y}^{\prime \prime}$ THENRUN"MENU128": ELSE NE W
$13 \emptyset$ PRINT:FORI=1TOL+4:READF\$,K\$:PRINT" $\{$ CTR L 9\}"F\$"\{CTRL Ø\} "K\$"\{2 SPACEs\}";: NEXT :RETURN
$14 \emptyset$ DATA F1, DATA,F2, LOAD,F3, DIREC,F4, PRINT ,F5, SAVE,F6,RUN ,F7,LIST ,F8, RENUM
-Bob Knibb, Walkersville, MD

## S443 ML Memory Transfer

Transferring large blocks of memory on the C-64 sometimes seems to take an eternity. Machine language routines can transfer them quickly, but why reinvent the wheel? Use the built-in Basic ROM routine at \$A3EC (41964). This routine will copy the character set ( 2 K of memory), for example, in less than a second.
You must provide a starting and ending address for the area to be copied and a new starting address to copy it to. These addresses are entered in lines 50 and 80 of the program below. This program demonstrates the transfer command by copying the character set (uppercaselgraphics only), and it customizes the character set with an underlined cursor. The subroutine at line 120 calculates the addresses required and does the actual transfer.

[^2]$13 \emptyset \mathrm{X}=\mathrm{INT}(\mathrm{L} / 256): \mathrm{Y}=\mathrm{L}-256 * \mathrm{X}$
$14 \emptyset \mathrm{~A}=\operatorname{INT}((\mathrm{NE}-\mathrm{Y}) / 256): \mathrm{B}=\mathrm{NE}-256 * \mathrm{~A}-\mathrm{Y}$
$15 \emptyset \mathrm{C}=\operatorname{INT}((\mathrm{EA}-\mathrm{Y}) / 256): \mathrm{D}=\mathrm{EA}-256 * \mathrm{C}-\mathrm{Y}$
$16 \emptyset \mathrm{POKE} 781, \mathrm{X}+1:$ POKE782, Y
$17 \emptyset$ POKE88, $+1:$ POKE89, A
$18 \emptyset$ POKE9 $\emptyset, \mathrm{D}+1:$ POKE91,C
$19 \emptyset$ SYS41964:RETURN

-Robert B. Cook, Braintree, MA

## $\$ 444$ Lo-Res Draw Program

My program lets you make simple drawings on the C-64's 40 -column screen, and it's easy enough for a child to use. Use a joystick in port 2 to control the cursor. The fire-button, or any key except home, changes the colors. Change the color to black to erase the drawing. Use the home key to clear the screen and start a new picture.

```
1\emptyset REM LO-RES DRAW - ADAM MILLER
2\emptyset POKE53281, \emptyset:POKE5328\emptyset, }:\textrm{C}=1:\textrm{X}=\emptyset:Y=\emptyset:PR
    NT"{SHFT CLR}"
3\emptyset J=PEEK(5632\emptyset):F=JAND16:J=15-(JAND15):IF
    J=1ORJ=5ORJ=9THENY=Y-1
4\emptyset IFJ = 2ORJ = 6ORJ = 1 \THENY=Y +1
5\emptyset IFJ=4ORJ=5ORJ = 6THENX = X - }
6\emptyset IFJ=8ORJ=9ORJ=1\emptysetTHENX=X +1
```

$7 \emptyset$ GETA\$:IFA\$>""OR F=ø THENC=C+1:IFC=16THE NC= $\emptyset: F O R J=1$ TO2 $\emptyset \emptyset: N E X T$
8 $\emptyset$ IFA $\$=$ " $\left\{\right.$ HOME ${ }^{\prime \prime}$ GOTO2 $\emptyset$
$9 \emptyset$ IFX $>39 \mathrm{THENX}=\emptyset$
$1 \emptyset \emptyset$ IFY $>24$ THENY $=\emptyset$
$11 \emptyset$ IFX<øTHENX=39
$12 \emptyset$ IFY $<\emptyset$ THENY $=24$
$13 \emptyset$ POKE1 $\emptyset 24+\mathrm{X}+4 \emptyset * \mathrm{Y}, 81:$ POKE55296+X+4Ø*Y, C
$14 \emptyset$ GOTO3 $\emptyset$

-Adam Miller, Brandon, SD

## \$445 C-128 Sprite Reduction

The following program produces seven consecutive reductions of any sprite you design, to give the illusion that the object is moving away. The program will ask for the sprite number of the sprite you want to reduce. Be sure that any other sprites are saved, since the new ones will be stored in the sprite area. After the reduction is complete, the sprites will be displayed on the screen for you to view.

```
1\emptyset REM SPRITE REDUCER-MARCO HAGELSIEB
2\emptyset INPUT "{SHFT CLR}{4 CRSR DNs} SPRITE NU
    MBER (1-8)";SN:IFSN<1ORSN>8THEN2\emptyset
3\emptyset COLOR \emptyset,7:COLOR4,7:COLOR1,8:GRAPHIC1,1:
                                Continued on p. }120
```



## LEAGUE SPORTS

SUPER SUNDAY - Armchair quarterbacks the world over have made SUPER SUNDAY the best selling computer football game. This we attribute to the right blend of graphics, game play and especially statistics, because that's what sets Avalon Hill sports games from the pack. The vicarious experience of coaching real-life players, second guessing your computer or human opponent and the feeling of BEING THERE will send you back to SUPER SUNDAY over and over again. Support of the game system also makes it distinct. You can get the entire ' 84 , ' 85 or ' 86 season disks with rosters and stats for all the big league team starters and interchange teams of the past and present. The all new General Manager's Disk (also available separately) allows you to create "dream teams" in setting up your own Pro Football draft. Available for Apple ${ }^{*}$ II, $C^{3} 64 / 128$, IBM ${ }^{3}$ PC for $\$ 35.00$
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# News and New Products 

## What's in store for personal computers of the future? Who won the 1988 presidential election? Give up trying to solve your computer game? What else is new?

Compiled by HAROLD R. BJORNSEN

## Sign On the Dotted Line

DENVER-MicroLawyer, a disk library of over 100 common legal documents for personal, business and corporate use, is intended as a do-it-yourself step saver to be used in conjunction with legal advice. You can prepare a complete range of legal documents and contracts, using your own word processor. Documents include power of attorney, premarital agreements, affidavits, leases, loan and mortgage forms, real estate contracts, wills, notary public forms, generic contracts for services and articles of incorporation. MicroLawyer, for the C-64, is available from Progressive Peripherals \& Software ( 464 Kalamath St., Denver, CO 80204) for $\$ 59.95$.

Check Reader Service number 410.

## Back in Time

REDWOOD CITY, CA-Epyx (PO Box 8020, Redwood City, CA 94063) has released Create a Calendar, a program that creates a variety of personal calendars for home, school or business use. The calendar can include a variety of text, graphics and borders; graphics for birthdays, dental appointments, haircuts, jury duty, New Year's Day and


Mother's Day. Graphics from Epyx's Graphics Scrapbook collection and other graphics disks compatible with The Print Shop can also be incorporated into the design. You can produce daily, weekly, monthly and annual calendars in sizes ranging from letters to a six-page horizontal annual banner. Create a Calendar is available for the C- 64 for $\$ 29.95$. Check Reader Service number 403.

## Васк то Kerovnia

RAHWAY, NJ-The Guild of Thieves, the illustrated adventure sequel to The Pawn, takes place in the mythical king. dom of Kerovnia. The adventure combines dialogue, graphics, humor and puzzles. A 40 -page novella, a Bank of Kerovnia credit card, an Indenture and Contract of Service Certificate, dice and play guide are also included in the package. It's available for the C-64 for $\$ 39.95$ from Firebird, PO Box 49, Ramsey, NJ 07446.

Check Reader Service number 404.

## Slay the Black Knight

CAMPBELL, CA-Set in medieval times, Dark Castle features a hero, controlled by the players, who must fight his way through 14 rooms of increasing difficulty against plague-infested rats, attacking bats and a fire-breathing dragon. He must also escape the clutches of the dungeon's torturer and the spells of a diabolical wizard to find and slay the notorious Black Knight. It's available for the C- 64 for $\$ 34.95$ from Three Sixty, Inc., 2105 S. Bascom Ave., Suite 290, Campbell, CA 95008.

Check Reader Service number 409.

## Lock or Uniock

ENGLEWOOD CLIFFS, NJ-Prentice Hall (Englewood Cliffs, NJ 07632) has released two computer books for popular computers, including the Commodore line.

Computer Cryptology explains how to provide a protective blanket to keep your information from prying eyes. The

300 -page softcover, with 83 illustrations, gives methods of disguising your data through encryption and enciphering so that only authorized deciphering can recover the original data. $\$ 21.95$.

Keys to Solving Computer Adventure Games has clues for all-text and for graphics/text adventures for players who have struggled so long to find the golden key to the dungeon door or to at last pry open the crypt. The 300 -page paperback contains 250 illustrations. \$19.95.

Check Reader Service number 413.

## George Bush by a Landslide

mountain view, CA-Strategic Simulations (1046 N. Rengstorff Ave., Mountain View, CA 94043) has announced that George Bush won the 1988 U.S. Presidential election with 499 electoral votes to runner-up Senator Albert Gore's (D-KY) 39 votes. Popular vote percentages were also highly skewed in Bush's favor, 55 percent to 45 percent. Observers termed the victory "a landslide."

SSI, maker of strategy war games for the C-64, used its computer-simulated election game, President Elect-1988 Edition, to conduct the race for President at a charity gaming event in the SSI suite at the Consumer Electronics Show in Chicago last June. The game allows players to simulate any election from 1960 to 1988, using actual figures from a large roster of historical or pres-ent-day candidates.

## 1991 PC

DALLAS-The editors of the Computer Industry Almanac, a 780 -page reference volume for the computer industry, have taken a look ahead to describe the capabilities of typical personal computer systems in the $\$ 1000-\$ 3000$ range in 1991.

The Almanac editors say that the $\$ 3000$ office system in 1991 will have ten times the computing power, 12 times the main memory and nearly 100 times the mass storage capability of today's typical personal computer, plus a high-speed mo-
dem and a built-in local area network interface to allow communication with colleagues and independent electronic information sources.

The $\$ 1000$ system will be a scaleddown version of today's office PC, with CD ROM for entertainment and recreation applications. It will have a 32 -bit microprocessor, four megabytes of main memory, one $31 / 2$-inch floppy disk, a color display, one CD ROM drive and a letterquality or near-letter-quality printer. Its performance will be between one and one-and-a-half million instructions per second.

## Makin' Bacon

COLORADO SPRINGS-Investment Simulation, for the C-64 and C-128, computes the internal and equity rates of return, present net worth, life-cycle costs and capitalized present value. The focus of the program is on limited equity investments and leveraging. A 51 -page handbook is included. Available for $\$ 36$ from Pyxis Software, PO Box 18016, Colorado Springs, CO 80935.

Check Reader Service number 407.

## The Key to Write protection

LYONS, CO-The DisKey, a plastic key that takes the place of write-protect tabs, snaps into place in the left side of your disk drive opening, above the floppy disk. It can be inserted any time after the disk is in place and only one key is needed for all your disks. DisKey fits most $5 \%$-inch disks and drives and is available from CroResearch (PO Box 129, Lyons, CO 80540) for $\$ 2.98$.

Check Reader Service number 408.

## Buying Software For Tots?

YPSILANTI—The 1987 Survey of Early Childhood Software rates 229 early childhood (for ages 3-6) programs published by popular software companies, including Commodore. A brief description and equipment requirements, cost and how to order are included for each pro-
gram. Listings are keyed to eight major curriculum areas to match the software to curriculum goals for your child. The catalog rates each program according to user friendliness, content, technical features, menu design, ease of use, reinforcement and other criteria. Order it from High/Scope Press, 600 N. River St., Ypsilanti, MI 48198 for $\$ 20$.

Check Reader Service number 402.

## What are You Eating?

MUSTANG, OK-Diet Analysis monitors your daily intake of food and drink, tracking 25 nutrients and eight amino acids to find the nutrient deficiencies in your diet pattern. Also included in the package are the Nutrient Finder program, which prints out the nutrition contents of foods you select, and Change or Add, which lets you remove, change or add records to fit your needs. Diet Analysis has data of 500 food and drink items and 165 available records for you to add new records. Available for the C- 64 for $\$ 29.95$. Diet, PO Box 649120 , Mustang, OK 73064.

Check Reader Service number 411.

## Can You Defeat the Russians?

McAllen, TX-Borodino: 1812, Napoleon in Russia, gives you the chance to accomplish what Napoleon Bonaparte could not: conquer Russia. The game covers the entire three days of the bloody battle. Eight historical and whatif scenarios take 15-20 minutes to complete, and the complete battle requires over four hours to finish. The joystickcontrolled system lets you control infantry lines, column formations and infantry stacking. You play Napoleon and the computer plays the Russians, or you can use the two-player option, which includes instructions for playing by mail. There are three levels of play, with Fatigue and Morale options. It's available for the C-64 for $\$ 59.95$ from Krentek Software, 5401 N. 10th, Suite 214, McAllen, TX 78504.
Check Reader Service number 412.


## Damsel in Distress

CAMBRIDGE-Your decisions determine your fate in Plundered Hearts, the first entry in the romance genre for Infocom (125 CambridgePark Drive, Cambridge, MA 02140). As heroine aboard the Helena Louise, you find adventure at every turn as you sail to your ailing father's side. But things are not as they seem. Scheming and deception abound. A damsel in distress could easily end up in Davey Jones' locker. It's available for the C-64 for \$34.95.

Check Reader Service number 405.

## Set Your Computer free

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Check Reader Service number 400.

## CAD-64/128

POCAHONTAS, AR-Weaselgraphics (606 Thomasville Rd., Pocahontas, AR 72455 ) has released several CAD disks for the C-64 and C-128 for $\$ 20$ each.

With the programs, hobbyists and engineers with technical background can design professional oscillators, amplifiers, power supplies, filters, impedancematching circuits and lay out circuit boards. In addition, the hobbyist can specify drift over exact temperature ranges the circuit will be used in, and the technician can replace tube circuits with solid state circuits. The programs can be used to design new devices, modify old ones and assist in making repairs.

Check Reader Service number 401.


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This month: an end to confusion on getting the NLQ Chip, a request for software for the physically disabled, and more.

## ESP Needed

I'm writing this letter to clear up any difficulty RUN readers may be having in reaching ESP Corporation about the NLQ Chip reviewed in last March's issue. The Chip module improves the typeface on Gemini 10X, 15X and Delta $10 / 15$ printers.

In September of 1986, the company, which is officially called ESP Rollshutter Corporation, moved from 7900 Tamiami Trail, Sarasota, FL, to Village Green Parkway, Bradenton, FL. When the RUN review appeared, it gave our old Sarasota address and phone number. Further complicating matters, there's another ESP Corporation in Sarasota, so people calling telephone information are given their number instead of ESP Rollshutter's. The review also generated a flood of inquiries and orders, and the owner, Hans Roth, contracted my secretarial services to help out.

We're sorry that many $R U N$ readers have been inconvenienced because of our move and the fact that there's another ESP in Sarasota.

## -Karen J. Ritter <br> ESP ROLlShutter Corporation 501 Village Green Parkway Bradenton, FL 33529 <br> 813.794.3876

We're also sorry that an incorrect address and phone number appeared in our pages, and we thank Ms. Ritter for clearing up this confusing situation.
-EDITORS

## Software for the Disabled?

I have multiple sclerosis and encounter a number of problems that make using a computer difficult. The problems include fatigue, tremor and spasms in my hands and visual disturbances. If you know of any sources of programs, especially public domain programs, that make using a Commodore easier for the physically handicapped, please let me know. Also, I know there are voice mod-
ules and light pens available to aid in entering information, but how about a magnification screen, similar to an antiglare screen, for reading output on the monitor?

-Catherine S. Firmin 3003 Louisiana Ave. Lake Charles, LA 70601

In last February's issue of RUN, the Resource Center column was devoted to this sub. ject. It specifically described the work of Don Peterson, a retired electronics engineer who's devoting his "second career" to developing C. 64 and VIC- 20 software and input and output devices for the handicapped. Don will send you his disks for only $\$ 3$ each, and he's donated the programs to QuantumLink for downloading. His address is 2645 E. Southern, A326, Tempe, AZ 85282, or you can call him at 602-831.3519. See also "The SpeechControlled 64," by Kent Patterson, in the June ' 87 issue of RUN.

You might also contact distributors of public domain software-both user's groups and commercial enterprises. RUN has published lists of such distributors in the past and hopes to include an expanded and updated list in an upcoming issue. We encourage purveyors of public domain software to send us their names and addresses, and to mention specifically if they have programs for the handicapped.

As for a magnifying screen overlay, does anyone know of such a device?
-Editors

## Playing Games with THE C-128

The $\mathrm{C}-128$ has the power to be a great game machine, as well as a productivity machine. At first, I thought 80 -column hi-res graphics wouldn't be possible on the 128, but RUN's Ultra Hi-Res Graphics (February 1986) and Patech Software's Basic 8.0 have changed that.

There are only two $\mathrm{C} \cdot 128$-specific games currently available that I know of-Infocom's Trinity and Bureaucracy, both of which are text adventures. Once I saw an Apple II version of Electronic Arts' adventure The Bard's Tale. The
program was designed for 64 K , but it also had an option to expand the scenario and landscape if you had 128 K .

Why can't publishers do this for the C-128? They couldn't put the enhanced version on the back of the disk, because the 1571 drive has trouble reading the back side. However, they could include it on a separate disk. This attractive feature probably wouldn't price the program out of sight (I expect I'd pay $\$ 5$ extra for it), and it would make C-128 owners happier with their purchase.
-Matthew Webster
Keymar, MD
Infocom has certainly made a start, and Access Software recently announced a C-128 version of Echelon. We also understand that a C-128 version of SubLogic's Stealth is in the works, and rumors are circulating that other C-128 games are being developed as well.
-EdITORS

## Q-Link Reservations

When you recommend QuantumLink to Commodore users, I believe a certain caveat is in order. After joining, if you don't access the network during a calendar month, they still bill you the $\$ 9.95$ monthly fee. According to their spokesperson, they consider Q-Link a service, which you pay for whether you use it or not. As I've discovered, the only way to get rid of the monthly charge is to cancel membership.
-Michael Schettler
Reseda, CA
We've received other letters this past month pointing out that many of the services offered on Q-Link incur plus time and that Q-Link is slow compared to other online services.
-EDITORS

## geos Question Goes Unanswered

GEOS products have been welcome additions to my software library, but, unfortunately, there are a number of frustrating bugs in them. Berkeley has

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AN HAR BLOCK COMPANY
apparently hurried these products to market without complete testing and thorough documentaion.

Even more surprising is their inadequate response when I recently contacted them with a simple formatting question about geoCalc. I was told they couldn't answer the question because the product was still new. If they can't answer questions about how their product operates, how can they expect me to buy more from them?

-Kenneth Bush<br>Indianapolis, IN

## RUN Script Features

I must commend Robert Rockefeller and RUN for an excellent product in RUN Script 64. I've tried several word processors and find this one efficient and easy to use. In particular, I'm pleased that it can use all the print options on my NLQ LPrinter, an Epson clone. As an additional bonus, RUN Script 64's Define Macros feature makes defining macros as easy as can be.
-Robert Fletcher Annandale, VA

## More That's Write For Run Readers

Bob Guerra's "What's Write for You?" article about new word processors in last August's issue was enjoyable and interesting. It's good to see people trying to make Commodore programs less stubborn and more versatile-sometimes successfully. The days when you needed to count your word processor's legs to see if it was a computer program or a mule may finally be past.

Some of the programs you reviewed sound pretty good, but others that have been around longer may be better. PaperClip, for instance, offers macros, which none of the "new" programs you reviewed do.

> -JoOST Vas Dias White Plains, NY

It's my opinion that Bob Guerra gave poor consideration to Timeworks in his August review of word processors. He reviewed their Word Writer 3 software, which is a C-64 product, instead of Word Writer 128 , when many of the other programs were reviewed in their C-128 version. I've used Word Writer 128 for more than six months and have found it to be excellent in the features used for comparison in the review, as well as in spe-
cialty features such as the Thesaurus and Dictionary. Also, it lets me incorporate data from Data Manager 128 and Swiftcalc 128.

## -R. J. Archambault Phoenix, AZ

We asked Bob Guerra to review Word Writer 3, because it's the latest version of the program on the market, and the goal of the article was to cover the latest. However, we're
glad you've written to tell other readers about Word Writer 128.
—EdITORS

## A Call to Readers

Send your letters to Mail RUN, 80 Elm St., Peterborough, NH 03458. Each letter must include the writer's name and complete address. RUN reserves the right to edit letters for style, clarity and space.

## RUNining Around the World

In last July's Mail RUN column, we intitiated a feature called RUNning Around the World, in which we periodically publish the names and addresses of readers who'd like to correspond with a Commodore user in another state or another country. Since then, we've received letters from more readers, from various countries, who would like computer pen pals. Write to one of the folks below, and you're sure to broaden your horizons.
If you'd like to be listed in RUNning Around the World sometime soon, drop a line to Mail RUN. Make sure your name and address are readable, and mention the machines and computing activities you're particularly interested in.

## Canada:

Lucien Gravelle
PO Box 373
Lazo, BC
Canada V0R 2K0
C-64; telecommunications
Lee Brian Hutchison
846 Clifton St.
Winnipeg, MB
Canada R3G 2Y1

## Malaysia:

Calvin Cheah
PO Box 1032
Penang 10840
Malaysia
C-64, C-128; CP/M

## Mexico:

Esteban Quijaro B.
Barcazas \#115
Fracc: Jose Colomo 86100. Villahermosa, Tabasco Mexico
C-128; programming, games


## United States:

Linda Nelsen
9599 Brayton Drive \#500
Anchorage, AK 99507
C-64, C-128; word
processing to games
Judah D. Hill
549 E. McKellips Rd. \#89
Mesa, AZ 85203
C-128; public domain software

## Sterling Peoples

223 Melrose Circle
Tryon, NC 28782
C-64; role-playing games
Leonard Arnold
Route 1, Box 33
Gladstone, VA 24553
C.64; games, programming, telecommunications
www.Commodore.ca



# Software Gallery 

## This month, we have graphics programs to tickle the creative funny bones of young and old alike, educational software for the elementary set and etiquette software for the adult social set! Compiled by BETH S. JALA

## Basic 8.0

$\qquad$ A
This New Graphics Language
Taps the Potential
Of Your C-128!
Basic 8.0 is a graphic illustration of the fact that the C-128 really can be programmed to run high-resolution color displays on its 80 -column screen. Adding 53 commands to the C-128's built-in programming language, Basic 8.0 provides your computer with what the developers call "the most powerful and productive graphics system ever developed for an 8 -bit machine." Sound impressive? It is.

It's also especially good news for all those graphics devotees who felt a little cheated to discover that Commodore intended for the C-128 to only display hi-res graphics with the VIC chip, which operates exclusively in 40 -Column mode.

Addressing that shortcoming, the same authors of the 80 -column monochrome graphics program, Ultra Hi Res, turned their talents toward making the C-128's powerful 8563 chip easily accessible to Basic programmers.

Without slowing other Basic operations, Basic 8.0 gives you the code that Commodore left out by installing a machine language wedge and a patch in the C-128's syntax error routine. The patch checks for the ampersand (@), which precedes every one of the 53 new commands. If the apparent syntax error begins with an ampersand, it's passed to a separate Basic 8.0 interpreter for processing. This efficient approach doesn't affect the speed at which the C-128's regular interpreter processes Basic commands.

Totally compatible with Basic 7.0, Basic 8.0 lets you program 80 column graphics at a resolution of $640 \times 200$ pixels, twice that of the C-128's $40 \cdot \mathrm{col}$ umn screen. Basic 8.0 features one monochrome and four different color display modes. All have a bit-mapped density of $640 \times 200$ screen pixels but vary with regard to color resolution.
The mode you select determines the
size of each color cell-the group of pixels that share the same foreground and background colors. Cells can be as small as $8 \times 2$ pixels or as large as 8 $\times 16$, with two other sizes in between. Naturally, the smaller cells give the greatest color resolution. In addition, Basic 8.0 lets you display all 16 colors on the screen at the same time, in any of the four color modes.

As you might expect, these high-density screens require a large amount of memory. A single Mode 2 image consisting of 128,000 pixels with 8000 associated bytes of color information requires almost 24 K of random access memory for storage. To store these screens, Basic 8.0 doesn't steal space allocated to program memory, expecting instead to find 64 K screen memory chips serving the 8563 video display processor. At this writing, only Commodore's 128D machine is delivered to you with 64 K of screen RAM already installed.

Since most C-128s were built with only 16 K of screen RAM, you might conclude that the great majority of these computers can't handle even a single 80 -column hi-res image. That's not the case at all: Basic 8.0 will run just fine on any C-128. You are, however, restricted to creating graphics that will fit within the existing 16 K screen mem-
ory. If you elect to upgrade your C-128 to 64 K , you'll be able to store multiple $640 \times 200$ images in screen RAM as well as create virtual screens that are so large they can't be viewed without scrolling.

While the display capabilities are impressive, they don't even hint at what the entire Basic 8.0 package can do. The single unprotected disk contains three independent modules-the extended programming language, a run-time module and a comprehensive drawing program. In addition, the authors provide utility programs to convert images created with their earlier effort, Ultra Hi-Res, as well as standard 40 -column fonts to a format that Basic 8.0 can read.

As a programming language, Basic 8.0's commands introduce entirely new ways of creating, storing and manipulating high-resolution color images on your C-128. The program establishes a graphics system that utilizes structures, a term that applies to almost any pattern, design, font or instructions that you create and store for later use, even within another program.

You can define two dimensional and color patterns. Under program control, Basic 8.0 will make multi-drawn images by incrementing the height parameter of a structure. You can even use this extended language to enter the world

## Report Card

## A Superb!

An exceptional program that outshines all others.

## B Good.

One of the better programs available in its category. A worthy addition to your software library.

## C Average.

 Lives up to its billing. No major hassles, headaches or disappointments here.
## D Poor.

This program has some problems. There are better on the market.
E Failure.
Many problems; should be deep-sixed! PUPE POWER

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of three-dimensional imagery. Basic 8.0 provides an environment within which you can control perspective, rotation, viewing angle, origin and depth of view.

The excellent user's manual explains each new command and offers several sample programs to get you started programming in Basic 8.0. Commands include @Stash, which lets you store several graphic screens in RAM banks 0 and 1 ; ©Scroll, which moves the image in any of eight directions; © Hcopy to send screen graphic displays to your printer; and @Font to assign the character sets available in Text mode.

Other commands that are new include @Windowopen to open a window within which Basic 8.0 can continue to work; @Flash, which reverses the image; and @Zoom to enlarge a previously stored graphic to the screen. The (a)Scale command even allows for pro-gram-controlled compensation for nonsymmetrical pixel shapes.

To ensure that a program written in Basic 8.0 will run on any $\mathrm{C} \cdot 128$, the authors supply a run time system that can be given away or even sold by reg. istered Basic 8.0 owners. This means that you are free to share or sell programs created with Basic 8.0 without paying additional fees or royalties. The compiler includes Workbench, a slick graphics interface that autoboots, controls up to four disk drives and lets users easily enter your program(s).
Another part of this package is Basic Paint, a stand-alone drawing program that lets you access a host of drawing functions in any of the five Graphics modes. A wonderful tool for creating screens and patterns that can be used by any Basic 8.0 program, Basic Paint is reason enough to buy the whole package.

Controlled by mouse or joystick (although I recommend the 1351 mouse), this comprehensive program for paint ing electronic pictures also takes full advantage of RAM expanders with high speed screen storage and provides an image lock to prevent accidental era sure of your work. Drawing functions available at the click of a mouse include zoom, cut and paste, erase, freehand draw, lines and fill.
Basic Paint is a fun program that lets you automatically create boxes, circles, ellipses and other polygons that can be integrated with multiple-type fonts of adjustable size and proportion. A grid can be superimposed on the screen as an alignment aid when cutting and pasting.
Incidentally, Basic Paint is the first program I've used that demonstrates "mouse flicker," a problem apparently peculiar to certain 1351 production
runs. The screen pointer flickers annoyingly but does not otherwise seem to interfere with program execution.

As mentioned earlier, making full use of the potential of Basic 8.0 requires additional screen memory. Upgrading to 64 K requires swapping your machine's 4416 or 4164 RAM chips for a pair of 4464 s . This would ordinarily be a simple operation, if it weren't for the fact that these chips are soldered to the computer's circuit board. Instead of simply unplugging the old RAM, you must unsolder the existing chips and replace them with sockets.


Eighty columns, a variety of fonts and so much more at your fingertips with Basic 8.0.

While plugging in the new chips is child's play, the soldering is best left to an experienced technician. Even so, the upgrade shouldn't cost more than $\$ 50$. Remember that opening the case of your computer voids the warranty. You might want to wait until the 91st day before you make this change.

Also, since hi-res color graphics have heretofore been restricted to the 40 column screen, many users have been getting along fine with a composite color monitor. Lacking an RGB monitor when Basic 8.0 first arrived in the mail, I was dismayed to discover that I couldn't even see Basic Paint's critical configuration screen when I connected a monochrome monitor to my C-128's 80 -column side.

Although the manual doesn't mention it, a simple modification to your 80 -column monochrome monitor cable gives you sharp and clear images until you take the plunge and invest in an RGB monitor. Just open the cover of the nine-pin plug and carefully solder a jumper wire between pins six and seven. This adds the intensity signal to the monochrome video signal, allowing the Basic Paint screens to be seen.

My only complaint with Basic 8.0 is
that there's no way to adjust the default settings. Users should be able to change the screen colors of Basic Paint and run it on a monochrome monitor without pulling out the soldering iron. In addition, while the program supports 11 different printers, there's no provision for changing the default printer driver. If you don't have an Epson or Epsoncompatible printer, you'll have to load the appropriate driver every time you run the program.

If you really fall in love with Basic 8.0 , you'll be happy to know that the program is also available on a user installable chip (\$19.95) that plugs into the empty socket in your C-128 or 128D.

Sales of Basic 8.0 should be brisk. I suspect a lot of graphics enthusiasts will want Basic 8.0 available every time they turn on their computer. (Distributed by Patech Software, Inc., PO Box 5208, Somerset, NJ 08873; C-128/\$39.95.)

> -JOHN Premack
> LEXINGTON, MA

## WordPro 64 with Turbo Load and Save $\mathbf{B +}$

## For the Serious User,

## WordPro 64 Offers

Many New Features
The WordPro series has been on the market for a number of years. It has stayed competitive because it truly is a sophisticated tool.

If you're serious about learning a word processor and are willing to devote the time and energy to learning how to use this product, then WordPro 64 is for you.

After you insert the cartridge (which works with many other programs) and disk, the WordPro 64 word processor with Spinnaker's new Turbo Load and Save package loads in 17 seconds. The program and corresponding files load and save at five times the normal speed.

The disk comes with the word processor and spell checker on one side and the SpellPro dictionary of 100,000 words on the other. You're encouraged to copy the unprotected disk, but you must have the cartridge in order for the main program to work.

After loading WordPro, you must load a printer module. The program supports 25 different printers. Chances are, yours will work with one of them.

WordPro uses combinations of keys to issue commands and to imbed printer controls in the text. There are some standard codes like "lm" for left margin and some non-standard codes


## SOFTWAREGALLERY

like "pp" for page length. A checkmark begins all code lines. All the terms are listed on one page of the manual.

WordPro 64 has all the traditional features of most word processors: margin settings, line spacing, insert, erase, and copy blocks, to name a few. But, WordPro can do much more. For example, you can link text, search and replace in memory or through the linked text, print out in different lettering styles, align columns on your sheet, print in two columns, make form letters and print your own graphics. After saving a completed document, you can swiftly check your spelling from within the main program.

However, there are some shortcomings with WordPro. While the manual is well organized, I found myself searching through the booklet on a number of occasions. Many of the commands and imbedded characters are not easy to remember. Plan to make a cheatsheet and keep it nearby.

You should expect to take some time to learn WordPro 64. I found several sample disk files to be very helpful in this process. This isn't a child's toy, but a sophisticated package for the serious user. WordPro 64 with Turbo Load and Save is a good value for the money and the package is highly recommended. (Spinnaker Software, One Kendall Square, Cambridge, MA 02139; C.64/\$39.95.)
-SaUl COHEN
AMbler, PA

## Teddy Bear.rels

 Of FunThis Easy-to-Learn Drawing Program Keeps Kids
Entertained for Hours
Teddy Bear.rels of Fun is by far the easiest way to draw graphics on your C-64 that I've seen in a long time! It's designed for use as a learning activity, but can also be used by children to easily create their own pictures. This program is excellent for teachers and classroom settings, and should be kept in mind by parents searching for educational, yet fun and entertaining, activities for their children.

Included with the program is a booklet that contains 100 activity ideas. Sug. gestions cover creative art, math, logical thinking, language ability, basic science and social studies. In fact, adults will breathe a sigh of relief when setting up teaching aids with this software: Even if you have no artistic ability, you will
find that you're able to generate excellent drawings!

The package's two single-sided disks store libraries of sketches for use in your pictures. The artwork is excellent-the sketches are simple, yet colorful and appealing. The colors on the screen are sharp and distinct, and don't run into each other where objects meet. You can overlap objects and the color of the front object will take precedence, which is great for teaching spatial relationships.

The color combinations of the objects are one of the program's outstanding features; there has clearly been a lot of artistic energy put into the manufacture of this program. Different backgrounds and borders are supplied, as well as the ability to insert captions and a choice of eight typefaces.
The user's guide is well written and clearly organized. Each disk is labelled to make getting started simple and easy.

There's a section in the user's guide that illustrates the sketches that are stored in the disk libraries. One quick look and you immediately know which disk and library contains the sketch you want. In fact, the program runs so smoothly and simply that you should have no trouble following the prompts and will only occasionally need the guide for reference.

The drawing procedure begins with choosing a background, then choosing stick-ons that are cut-outs of various objects to be placed on the background and moved around. If you don't like where you put it-erase it! It's simple with just a few keystrokes and clear, wellwritten prompts. Captions can be edited before final placement.

When you're done, you can save your creation to disk or print it out. If you forgot to format a disk before you started, don't worry-the software does it for you from within the program. If you forgot to switch a disk, the program alerts you with a picture of a disk drive and a bell.
Your final picture can be printed as a label, a poster in two sizes or as a picture with or without shading, in case you'd like to have an outline that you can color in later.
If you have a KoalaPad and KoalaPainter, you can combine those drawings with Teddy Bear's sketches. You can also automatically display a series of ten pictures with the electronic slide-show feature. In addition, the software is compatible with Epyx' Fast Load cartridge.

Both adults and children will enjoy this software. While the children are using it, they're having fun and learning at the same time! All in all, a superb
product! (DLM, One DLM Park, Allen, TX 75002; C.64/\$39.95.)

## -Edith Chasen <br> WOODHAVEN, NY

## RSVP

B-
How Would Your Manners

## Rate If You Were Invited to

## Dinner at the White House?

Almost all competitions require certain basic skills. In hockey, skating is essential. In polo, horsemanship is a must. And in the quests for business and social success-the real-life situations that most people actually compete in-acceptable manners are mandatory.

RSVP explores the role and effects of etiquette in a variety of settings. In addition to its basic game scenario, the software offers a practice mode. Its "international" section lists 18 countries as choices. There are also 17 "national" categories, with features ranging from "business meals" and "correspondence" to "parties" and "weekend out."

Approximately 20 multiple-choice questions regarding manners and social behavior are available for each subject. Many questions are very concrete; for example, how snails should be eaten


RSVP presents some competition to Amy Vanderbilt for etiquette rights!
without snail tongs. Others are more subjective and thought-provoking, like what type of recommendation letter is appropriate for a colleague about whom a businessman has mixed feelings. The face of a supposedly well-mannered individual appears on the screen with each question. A change in his or her expression indicates whether the response is correct.

The Game mode offers a selection of eight different career paths. Among


But remember, flying a stealth aircraft takes more than just fighter pilot reflexes. The real challenge is mastering the jet's electromagnetic profile to avoid enemy radar, while executing a deep-strike mission into North Africa or conducting delicate photo reconnaissance over Eastern Block seaports. Also featured are carrier and land-based takeoffs and landings, as well as land, sea, and air targets and threats.
PROJECT: STEALTH FIGHHER combines the combat action thrills of the best-selling F-15 STRIKE EAGLE with the sophisticated flight environment pioneered in GUNSHIP. Add the danger and suspense of clandestine missions in an innovative "invisible aircraft" and you have PROJECT: STEALTH FIGHTER, the latest flying challenge from MicroProse!
PROJECT: STEALTH FICHTER is available from a "Valued MicroProse Retailer" (VMR) near you. Call us for locations!
For Commodore 64/128, IBM-PC/compatibles and Apple II/e/c. Call or write for specific machine availability, and for MC/VISA orders if product not found locally.

them are global banking and U.S. journalism and politics. To win, the player must correctly answer a high percentage of questions, including some about characters and situations that were previously encountered. While the program furnishes positive progress reports when the game is going well, it also announces the decline of a career when too many errors are made.

The software does have some minor problems. A few typos cause confusion at times. Also, some players may not agree with the "proper" responses to some of the more abstract questions. In addition, if someone is interested in only a few of the practice categories, he or she will soon know the answers to all of their questions.

However, the program more than makes up for its limitations. Its best feature is its humor. A number of rather odd alternative responses to the mul-tiple-choice questions and some of the facial expressions indicating incorrect answers can be very amusing.

Though RSVP does have educational
value, most players will enjoy it as a pleasant, low-key recreation. It should appeal to individuals who are interested in the way they present themselves in social situations. That audience, of course, could include practically every. one. (Blue Lion Software, 90 Sherman St., Cambridge, MA 02140; C.64/\$29.95.)
-Walt Latocha
OAK PARK, IL

## Video Title Shop;

Graphics Companion ... C +

## Imagine the Titles You

Can Create for Those

## Old Family Movies!

If anything is more popular than home computers it would surely be VCRs. Now you can put your Commodore to work making pictures for your videotapes.

The computer to VCR connection is fairly simple: It can be done in one of
several ways and is no more difficult than connecting an outside antenna.

Video Title Shop is a tool that lets you create one or more video slides or title screens to enhance your home video tapes. Or, can you use it to create attractive displays for your business or civic group. The Graphics Companion disk (sold separately) provides you with 16 pre-drawn backgrounds to ease the creation of individualized screens. Video Title Shop only comes with two backgrounds.
You'll find a 48 -page instruction manual to master, plus an addendum and several other inserts. It seems that after printing the manual, Datasoft made some program changes and realized that some items were not clearly explained. Initially, I still found it difficult to maneuver through the program.

But, looking at the features first, Video Title Shop consists of two main portions. The Video Titler section is where the action takes place. MicroPainter Plus is a drawing program that you can use to create your own back.


Circle 8 on Reader Service card.

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grounds. It is adequate as drawing programs go, but I prefer several of the other commercial products.
Video Titler lets you choose predrawn backgrounds and place text on top of them. You have your choice of fonts, colors and pen strokes.

Multiple pages are available to make it easy to sequence your creations. You can then use a variety of title effects to move from one picture to another.

To create an entire video sequence, you must select the pictures you want to use, create a sequence file and save them all on a single disk if you wish to use them again in the future.

The end result can be a very attractive video sequence that'll greatly enhance your video tapes. However, getting the results you want is going to take a lot of time and patience.

Video Title Shop uses a sometimes confusing series of terms and keystrokes to get the job done. For example, selections are finalized by pressing the run-stop key rather than return. Say, for instance, that you want to place some large letters on a blank background. First you press Commodore/F to select the font. You choose the font you want by using the cursor up-down key and pressing run-stop. To select the color of the font, you press Commodore/C, once again scrolling through the available colors, using the cursor up-down key.

To finally enter the text, you press run-stop again, then Commodore/E. Once you've entered your text, you'll also have to remove an obnoxious asterisk at the end. It's not difficult, but it does take extra keystrokes.

The rest of the features are just as awkward to access. Incidentally, the manual constantly refers to tasks and objects. They're explained, but why make it so difficult to begin with?

On a positive note, you can import pictures from KoalaPainter, Paint Magic, Quickdraw and Micro Illustrator for use with Video Title Shop. That greatly adds to the versatility of the program. I highly recommend the Graphics Companion disk for anyone who isn't an artist. It'll give you some beautiful backdrops covering most major and annual events like Christmas, weddings, birthdays, graduations and more.

It's important to stress that Video Title Shop does absolutely everything it claims to do. The final results are beautiful scenes with appealing effects that you can be very proud of. There is little doubt that the longer you work with the program, the easier it'll become to create the videos you want. I feel strongly that the program's features could have
been made much easier to access. At the very least, a step-by-step discussion of how to create a simple sequence would have helped tremendously.

If you are a video nut and want to use your Commodore to spice up your home productions, Video Title Shop should be a welcome addition to your software collection. However, be prepared to spend some long hours learning how to get the most out of it. (Manufactured by Datasoft; distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404; C.64/\$29.95 Video Title Shop; $\$ 19.95$ Graphics Companion.)
-Jim Grubbs
Springfield, IL

## Stickybear Math 2 ... A+ Stickybear Reading Comprehension

## Stick to the Bear

## Basics with Your

School-Age Youngsters
For over six decades, grammar school teachers have distributed the Weekly Reader newspaper in their classrooms. It has proven to be not only a treat for students, but also a valuable learning aid.

The company that publishes the newspaper has added two more titles to its series of educational software programs, which feature a now-famous family of bruins. The first, Stickybear Math 2, continues the firm's tradition of instruction and entertainment, while the second, Stickybear Reading Comprehension, offers little in either area.

Math 2 is a sequel to the popular original Stickybear Math program, which dealt with addition and subtraction. The new software covers multiplication and division.

Math 2 begins by recording a child's name; the program can tailor lessons for and track the progress of 40 different students.

Recommended for children of ages seven and up, this program provides drills and practice sessions. The child answers problems that range from multiplying single digits by one to dividing by two digit numbers. When a correct answer is given, a high-resolution animated scene with amusing sounds appears as a reward. At lower levels, groups of objects dance to illustrate the solutions to certain questions. The program automatically adjusts its difficulty based on the success a child has had with previous questions.

Math 2 lets parents and teachers se-
lect any one of the 37 levels that best matches the ability and needs of a particular child. An adult can also choose the number of tries allowed for a correct answer and the format required for responses. Math 2 can even issue a report card for each child.

Stickybear Math 2 is an example of educational software at its finest. Its sounds and animation will compel a youngster to continue playing and, thus, learning; its automatic reaction to a child's performance helps to avoid frustration; and its options for levels and formats are powerful tools for individualized learning. The instructions are excellent, not only presenting the software's benefits, but also indicating both its limitations and the effort that's needed for a parent to use it effectively. All in all, it's an excellent product.

Stickybear Reading Comprehension has a structure similar to Math 2. It, too, automatically adjusts its difficulty to a child's capabilities. It also offers parents or teachers the option of setting the number of tries and the starting level for each of up to 40 children.

The Reading disk contains 27 brief stories intended for children ages eight to eleven. They answer from one to nine questions on each, and parents or teachers can create as many as five of their own compositions for personalized instruction.

Reading is much less effective than Math 2. The most obvious problem is that its packaging mentions "a handy practical printout feature," yet neither the instructions nor the program itself indicates how printing can be done. The absence of a sophisticated editing function can make the individually written stories, which could have been the software's strong point, difficult to enter. In addition, a wavy scrolling mechanism and an odd lettering style cause problems when reading the text. Worst of all is the near absence of graphics. Without them, Reading offers little more appeal to children than a printed piece of paper.

Stickybear Reading Comprehension suggests that even an experienced company can sometimes falter in the demanding educational software market. However, the excellence of Stickybear Math 2 offers hope that the Reading Stickybears might learn something from their calculating cousins. (Weekly Reader Family Software, 245 Long Hill Road, Middletown, CT 06457; C-64/\$29.95 each.)

## -Marilou Latocha OAK Park, IL



USEFUL HINTS AND TIPS from the "Magical" world of Commodore computing.

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# FRONT 



Text can be printed in every font available through GEOS. These documents were printed on an Apple Laser Writer

## VANISHING TIMES <br> A Berkeley Softworks Publication <br> Vbl XLMIV Namber 4567

## EARTH TO BEGIN SPINNING IN

 OPPOSITE DIRECTION

A shocked consortium of scientists confirmed the worlds worst suspicions Tuesday, when they announced that the Earth was indeed slowing down. They expect the planet to grind to a halt early Thursday, reversing its direction and getting back up to speed by Monday night.
Although the research was startling, the scientists urged people not to panic.
"I suppose I'd lock all the breakables in your cabinets:" offers Dr Lee Levano, "but outside of that, I'd just tell people to hold on and enjoy the ride"

Apparently we're in for quite a ride. Dr. Dennis Rowland demonstrated the effect of the sudden


BERKEL EY - Dozens of citizens watched in horror today as a man, who described himself as an animal lover, actually bit a miniature teacup poodle.

Donald Anderson, of Studio City. California, dismissed the incident as a case of mistaken identity.
reversal by dropping a raw egg into a Mix Master blender set on "purec:"
"If we assume people have the consistency of this egg: Rowland asserted, "I think it's safe to say that the effect of this phenomenon will leave them in a state somewhat similar to finely ground beef:

Asked if there were anything the public could do to prepare for the
"I'd just tell people to hold on and enjoy the ride!"
catastrophe, Dr. Rowland thought a while and offered, "I always recommend fastening your seat belt. It just makes so much sense, don't you think?"

Analyst Staci Glovsky was less distressed with the news, asking "What's the big deal? Jecz, you guys are acting like a bunch of
"Somebody asked me if I wanted a dog with mustard, and since it was close to lunchtime anyway, I just took a bite without looking:"

The dog, responding to the name "Knockwurst", then gave out a yelp that bystanders recalled as sounding like "a cross between a gun shot and
"Sure it was my mustard, but that doesn't prove a thing!"
an air raid siren:" In the process, the pinched pooch set a world record in the long jump of thirty feet, two

## inches.

Anderson was booked on felony charges of dog munching, poodle endangerment and assaulting a canine with intent to commit relish He was later released on his own recognizance. The man who offered him the poodle has also been charged with attempting to apply mustard to a mutt, a misdemeanor in Alameda County
"It's a smear tactic", yelled Rob Siegel, the man still being sought by police. "Sure it was my mustard, but that doesn't prove a thing. Besides, they have to prove with contion her 4

## Television

Highlights

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## Maty: (A) Csertove Licy

Lacy pal batd bath a phe wo pet Ley
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## Weather

Local weather: Look for clowds throughout the morning, burning off near miday Tempcratures should soar to the mid zooy by late afernoon with beavy eloctrical activity and thunderstorms appearing around, oh, syy


These days, the biggest story in the news is geoPublish. The page-making program for GEOS-equipped 64's and 128's that replaces lifeless layouts with page after page of powerful, punchy professionalism.

## Freedom of the press.

Actually, geoPublish is very patriotic software. After all, what other application guarantees your freedom of selfexpression? Well, geoPublish sure does. In fact, every piece it prints is dedicated to the preservation of your personality on paper.

Which means that finally, your newsletters never need to look like anyone else's, ever again.

All you do is draw a bunch of columns for your master layout.They could be two, four or sixteen across the page. They could be short and squat, or long and skinny. It's your call. After that, you just "pour" your geoWrite document, text, graphics and all-into column after column. Page after page.

Everything fills up automatically until it fits firmly into your
finely fashioned format.

Extras! Extras! Read all about 'em!

As every editor knows, even the best stories need punching up before they go to press. Which is why geoPublish features an array of artistic appliances designed to earn your pages a place in the history books.

You can resize text. Change fonts. Even insert or delete graphics anywhere on the page. You can lay text over graphics. Graphics over text. Or even wrap text around graphics.

And if your image doesn't fit, no problem. The proportional scaling tool can shrink or
 enlarge any art, be it your original or the stuff you find in Print Shop. ${ }^{\text {TM }}$ Finally, those of you intent on making banner headlines should know that geoPublish doesn't wimp out

## It Berkeley Softworks

 ing, hollow, horrible
question that every computer owner must inevitably face:
"Is my computer up to date —or out of date?" If you use GEOS 128, that's a question youor your grandchildren's chil-dren-won't ever have to worry about. Because GEOS 128 is the revolutionary software system designed to push your hardware to new limits. Unleash its full power across a full 80 column screen. And expand its capabilities for years to come.

## We should have installed disk brakes.

Loading up with GEOS turns your 128 into a mousedriven maniac that loads, processes and saves everything up


to seven times faster than normal. Part of that's due to the GEOS diskTurbo, but most of it's due to the fact that GEOS 128 doesn't treat your 128 like a C64.

You see, by recognizing your machine as a 128 , GEOS 128 operates at a full 2 MHz , instead of 1 MHz . So you get twice the speed. Twice the power. And since GEOS 128 also supports the quicker 1571 and 1581 double-sided disk drives and the 1750 RAM expansion unit-there's no telling how much faster that puppy will fly.

## Fast and slick with mouse or stick.

Using GEOS is ridiculously simple. All you need is a mouse or joystick, and a keen ability to point and click. Everything else is pretty much a matter of reading menus (a technical term for "little lists of things"), or selecting icons (a technical term for "little pictures of things"). It's
sort of like talking in sign language.

For example, if you want a document for word-processing, you point to the icon that looks like a stack of papers. Click your mouse and bingo-you're in the file. If you want to erase the file, you drag the stack of papers over to the little waste basket and click your mouse.

Poof. That's about as tough as it gets.

## Working within the system.

Learning where things are in GEOS is pretty simple, especially if you've ever sat behind a desk. Because that's exactly how we designed


GEOS 128.
You keep your documents and graphics in files; everything else stays right on the desktop: the notepad, the calculatorthere's even an alarm clock. In fact, the only thing our desktop

# GROWNG UP <br>  <br> Now, we realize that's a lot to pack into one GEOS package. But as long as we're packing it in, we might as well let you know something else: There's more. 

doesn't have is a place to put your feet when the boss isn't around.

But not only does GEOS give you a place to write and draw, it actually helps you write and draw better. Because unlike your basic office model, our desktop comes with geoWrite and geoPaint built right in.

With geoWrite, your way with words leaves people speechless, as they watch you effortlessly cut, paste and move entire blocks of copy anywhere on the page. And since geoWrite comes with different fonts in a variety of styles and sizes, your documents become even more dazzling.

With geoPaint, you can draw designs. Create with colors. And tantalize your tastes with tons of tones and textures. Invert, rotate or mirror images.

## 




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always get to view it on a beautiful, 80 column-wide screen. No more scrolling left to right. With GEOS 128, what you see really is what you get.

## The more you put into your system, the more you get out of it.

Of course, when we say that GEOS 128 has far-reaching implications, we're not kidding around. Every GEOS 128 package includes free QuantumLink software, which hooks you (via modem) into a nationwide network of Commodore people just like you. There's even a service that will Laserprint your documents for you.


## The older it gets the better it looks.

It's true. Because there are always new GEOS applications just waiting to jump off the shelves and into your 128. Packages like geoDex and geoFile, for keeping addresses and data straight. Fontpack and Writer's Workshop, for tweaking text with that special, extra touch. And, of course, geoCalc, a full-featured graphics spreadsheet for all you number freaks.

They're just the first in a long line of GEOS applications that are constantly being developed to keep your 128 up to date.

So if you'd rather have your 128 grow up than grow old, load up with GEOS. You owe it to yourself. You owe it to your 128.

Heck, you owe it to your grandchildren.

To order call 1-800-443-0100 ext. 234 GEOS 128 \$69.95
(California residents add $7 \%$ sales tax.) $\$ 2.50$ US/ $\$ 5.50$ Foreign for shipping and handling. Allow six weeks for delivery.

Then place them wherever you want: either in your geoWrite document, or in your GEOS Photo Album for later use.

But no matter what kind of masterpiece you create, you

# COMMODORE Party Animal 

# With the emergence of group entertainment games, your Commodore computer can be the life of your next social gathering. 

## By LONNIE BROWN


ne Saturday this past summer, a friend of mine turned his computer room into a bowling alley. A few days before, he had purchased 10th Frame, the bowling simulation program from Access Software. He could have plopped down in front of the computer and practiced until he hit 300 , then invited his friends over. But noooo. He called and said to come early Saturday afternoon.

By the time I got to his house, the neighbors were there, too, and he had divided them into bowling leagues. The snacks were out, the soft drinks and beer were on ice and the computer was hooked up to the wide-screen, rear-projection television set.

People who normally have only a passing interest in computers were actually enjoying themselves! My friend, far from the party animal suggested by this scenario, had hit upon a recent phenomenon in computer software: competition among human beings-not just man vs. machine. The party personality of your Commodore has been lurking within its beige case all along, but only lately has there been software available to draw it out.

## Serfs Become Surfers

The reasons for this are varied. A few years ago, programmers were just learning what the computer could do. Then, as programming matured, so did the programs. In game software, players were given choices: play against the com-
puter or against another player-or even a number of other players.

People who didn't own a computer often used to view both computer hobbyists and their machines as boring or suspect. The hobbyist was a loner who might very well be up to no good-tapping into bank accounts or experimenting with the mainframe at the Pentagon's War Room. Computers were either mysterious entities that wrought havoc with your charge account or something you used at work and wanted to get away from at home. However, as people have become more familiar with them, the atmosphere has changed, and now party software is turning serfs into surfers.

## Keyboards and Cheese Boards

Perhaps another reason more people haven't partied with their computers until recently is that a party calls for food and drink, two things a computer doesn't need. Which brings up a word of caution: Be careful when mingling potato chips, dip and cheese boards with ROM chips, DIP switches and keyboards.

My friend's 10th Frame, golf simulations, Scrabble and other games lend themselves to group play. Most people already know the rules, and the computer can usually handicap players individually, so old pros can't automatically beat a newcomer who plays on the novice level. The controls used in group entertainment games are generally easy to master, and many games allow at least four participants. Some handle as many as eight.

Oh, sure, you can still dig yourself silly with Boulder Dash or go on a solo hustle for Lode Runner's treasure. But doesn't it get a little lonely?

## Gaming Online

"We are finding more and more people are downloading games that can be played by two or more people," says Renato Graziano, a spokesman for CompuServe. "Games that pit player against player-instead of player against com-puter-are becoming increasingly popular. The computer as an opponent generally plays a game the same way every time. You can detect a pattern. There's no telling what a human opponent is going to do."

QuantumLink will let you and your friends play games with people in other states. If you've upgraded to Rabbit Jack's Casino, gather around the poker table. Friends love to give advice when you're trying to fill an inside straight.

Don't forget QuantumLink's People to People connection when you and your friends are sitting around the computer, and your friends might be interested in the hodge-podge town meeting that convenes nightly in the Q-Link lobby. "The computer," says Q-Link spokesman Dan Janal, "is a great equalizer. On QuantumLink, you don't know who you're talking to."

## The Name of the Game

No one at a party wants to sit around reading a 15 -page manual on how to sink the Bismarck or memorize 17 joystick/fire-button combinations to play computerized football. Those true-to-life simulations are fine for computer buffs, but we're after the load-and-play games that will attract people who hate computers.

A game that turns a computer into the life of a party needs four main attributes: It should accommodate at least four players; it should be short, probably taking no more than 15 minutes and certainly no more than a half-hour; the rules should be easy; and it should let players be assigned individual skill levels.

"Murder parties
have been popular in

> Europe for a hundred years . . . Now they're undergoing a resurgence here."

Take Scrabble, for instance. Electronic Arts is distributing a fine computer version of this popular crossword game, developed more than 40 years ago by Selchow \& Righter and converted for the computer by Leisure Genius. Nearly everyone knows how to play, but the program provides on-screen prompts for novices. Up to four can play, with the computer taking on the boring task of passing out tiles and keeping score (and, in a pinch, providing hints).

If you're home alone, you can play a computer opponent-or even three computer opponents, with each assigned a different skill level. If you don't have enough players for a foursome, the computer will gladly fill in the vacant slots.

## Such Trivia!

Selchow \& Righter also gave the world its bestselling board game, Trivial Pursuit. Once again, nearly everybody knows how to play or can easily pick up the rules, and there are a number of computer versions on the market.

Quizam, put out by Interstel and distributed by Electronic Arts, is a version in which players can control how many spaces tokens move by timing answers. There are several game boards on the disk, and Quizam offers a rare feature for a trivia game: It lets you make up your own questions.

Suncom's Party Quiz Game comes with four controllers that plug into the joystick ports. The controllers each have four buttons, and the computer recognizes which player was first with the correct answer. Even with such sophisticated controllers, I've seen the set sell for under $\$ 20$ in catalog-type stores. Some reviews of the game point out that the questions get repetitious after several rounds, but if you can pick it up on sale, this is a good buy. (A hacker friend of mine bought Party Quiz Game just for the controls.)

Professional Software, Inc.'s, Trivia Fever is probably the only computer trivia game that can be used when the power goes off-because it can be played without the computer. The game offers three difficulty levels in seven categories. With-


Survey says
you're on Family Feud!

Scrabble-an on-screen version of the popular board game.


out the computer, players use an inch-thick book of questions and a spinner to determine the categories. Although PSI doesn't market Trivia Fever anymore, a company spokesman says there are still many of them floating through the distribution pipeline. These, too, are available at discounted prices.

## Whodunit?

Make Your Own Murder Party, from Electronic Arts, may transport computer partying to its ultimate: The computer literally becomes your social director, staging a party for five to seven friends. Murder parties have been popular in Europe for a hundred years, and they were once popular in the United States (there hasn't always been television, you know). Now they're undergoing a resurgence here.

In a professionally produced murder party, actors portray a mock murder, leaving clues along the way. The guests try to solve the crime by observing, asking questions and examining props.

Now, a computer can provide the script. You and your friends read the script aloud from computer-generated copies, purposely revealing some clues and withholding others, unless directly asked by another player. The computer can also print out the party invitations.
The Murder Party game booklet suggests a menu of appropriate snacks and main courses, and even includes recipes. Once all the preparations are done, the computer drops out of the picture; you don't even need to turn it on during your party.

Although there are only two basic scripts on the disk, the computer randomly assigns a player as the murderer and rewrites the script accordingly, so the guilty party changes from game to game. Even if you're doing the printing, you won't know the criminal until the plot unfolds (unless, of course, you sneak a peek at the ending).

One of the murders takes place in an upscale neighborhood (the butler did it?), while another harks back to the days of beanbag chairs and incense. If your guests dress appropriately and
> "You can offer your friends an evening's entertainment
> and send them home with. . .an analysis of their personality."
you don't overcook the lobster thermidor, your murder party should be an event to remember!

## Spinning the Wheel

If the people you'd like to lure into your computer room have the slightest interest in television game shows, then the trap is waiting to be sprung. ShareData has produced a well-done series of television game take-offs, including Wheel of Fortune, Jeopardy! and Family Feud.

All three are faithful reproductions of the television programs, but Wheel of Fortune is the one I keep coming back to play. As on the popular show, players take turns spinning a wheel to win money and a chance to guess the letters in a hidden-word puzzle. There are more than 400 phrases on the disk, according to a ShareData spokesman. Friends of mine have worked this program over for days without coming across the same phrase twice. The spritely letter-turner doesn't exactly look like Vanna, but she does clap her hands when the wheel spins and utter "Oh, darn!" when it lands on the bankrupt space.

Up to three can participate in Wheel of Fortune, and any noncomatose person in the house will probably want to. However, if you should be unable to find a second or third player to fill out the panel, the computer will gladly supply letter-guessers. Politely enough, they will even guess wrong letters.

The program keeps a list of winners, so high scorers can come back as returning champions. Game winners go on to the final round, in which they must guess five consonants and a vowel to solve the puzzle within 30 seconds.

Jeopardy! can be played by up to three players. Again, the computer will supply competitors if human ones aren't available. This game and Family Feud each have about 30 sets of questions on the program disk, and you'll play many games before coming across a duplicate board. Jeopardy! questions are tough, too.

Robot Rascals, from Ozark Softscape (M.U.L.E., Heart of Africa and The Seven Cities of Gold) and distributed by Electronic Arts, weds the com-


This is the start of your life-long experience with Alter Ego.

Join Vanna, Pat and your C-64 on Wheel of Fortune.
puter and specially designed playing cards. Twu or four players search for artifacts pictured on the cards. On the monitor screen, player-controlled robots search for the artifacts hidden on the planet Laustenfownd. Meanwhile, luck cards give the players a chance to improve their hand, or the Killer Kard may make it impossible to win. Robots can steal items from other robots by bumping into them.

The game's rules are simple, but it takes some time to play proficiently without constantly referring to the rule book. Robot Rascals is best used for a family evening around the computer or at a party where the players are familiar with the game.

## Personality Pus

You can offer your friends an evening's entertainment and send them home with a twopage analysis of their personality by booting up Luscher Profile. Developed by Dr. Max Luscher, this Mindscape program is like an ink-blot test on disk-and every bit as easy to use. The sevenpart test simply asks the subject to list shades of gray in order of preference, or pick which of two colors is the more attractive. The questions take only a few minutes to complete, and then the computer quickly compiles the answers and prints out an analysis.

For added fun, you can have everyone take the


Personal Preference lets others try to guess your likes and dislikes.
test and save the results to disk. Later, while they're sitting around hypnotized by the television, you can read the results and see if they can match each analysis with the proper person.

Mind Prober, from Human Edge Software, produces a similar report, but it uses a different method to come up with the analysis. You pick a person to evaluate, then have him or her leave the room while the other players go through a list of about five dozen adjectives and answer "agree" or "disagree." The result is usually a pretty accurate description of the person under the computer microscope-although the subject will probably disagree. After all, few of us see ourselves as others do.

> "The computer can usually handicap players individually, so old pros can't automatically beat a newcomer."

While we're on the subject of personality games, Broderbund, the software people, are now putting out noncomputer games as well. Their Personal Preference is a board game in which players take turns guessing one another's order of preference among four cards dealt onto the table. The game comes with 400 double-sided cards, divided into four categories-people, food and drink, activities and potpourri-and each four card hand comes from one of the categories. One player is "it" for each round, and the closer the other players come to guessing his or her ranking of the cards, the faster their pieces move around the board. Personal Preference has few rules to learn, and it can also be played by one person alone.

Activision puts out Alter Ego, a computer program that can take you from the cradle to the grave. Versions are sold separately for male and female players of this three-disk game. No, make that "experience." This game is really a text program, where you assume a role and make choices throughout the course of your life in that role.

If it were a movie, Alter Ego would be PG. rated. There are adult situations, including one in the male version where you meet this very attractive woman and she asks you up to her place, even though she notices the wedding band on your finger. You make the decision, and the story line continues from there. But remember, your actions may precipitate undesirable consequences.

While Alter Ego is geared for one player, there's nothing to keep several players from sitting around the computer and making decisions jointly, then watching the results. Players might take turns, each leading the character through one of the seven stages of life.

It's a tall order, but to become really engrossed in Alter Ego, you should set aside a four- or fivehour block of time to spend alone with it. You may be able to go from birth to death in one sitting, but if not, the program can be saved between the major stages of life.

At the close of an evening with my Alter Ego, I found myself making sad choices as my eyesight, hearing and health failed. At the end, when the Great Sleep came. . . well, I'd rather not talk about it. Even a jaded old adventure-gamer like myself turned off his computer feeling a bit melancholy.

## SEX Drive for <br> Your Disk Drive

As long as we're passing out movie ratings for computer games, Dr. Ruth's Game of Good Sex is definitely rated R. Surprisingly, this lively game comes from Avalon Hill, best-known for its highly realistic (but somewhat staid) war-simulation games.

Dr. Ruth figures the more the merrier, so up to seven players can be embarrassed at once. They answer multiple-choice questions about sex, relationships and love. Quick answers gain more points, and players familiar with the game
can be handicapped by assigning them a shorter answer time. Each game takes about 15 to 20 minutes to complete and includes a face-off round that pits the two high scorers against each other.

A word of caution: Dr. Ruth's questions are frank. It would be wise to go through the game a few times before asking Bob and Ted and Carol and Alice over, just to make sure things aren't going to get too personal.

So, the next time your friends get together, have them gather around the computer monitor. Tell them it's just like television, except it's interactive. If that doesn't get their attention, tell them the best part: There are no commercial interruptions.

## A WORD FROM THE SPONSOR

Wait! Did I say commercials? If your guests insist on an evening glued to the television, bring out The Couch Potato Game from TDC Games. This is no computer game; you play it while you watch commercials. The idea is to spot in the commercials items pictured on the cards you're holding. The game comes complete with four invitations printed on a television screen, and a final instruction suggests, "B.Y.O.B. (bring your own bicarbonate)."

When you find one of your objects in a commercial, you toss away that card. One of your
cards, incidentally, is placed face up in front of you. Should a neighboring player spot that item first, he or she gets to pawn off a card on you, since you weren't watching closely enough.

There are 94 game cards, covering such commonly commercialized items as hamburgers, hats, belts, babies, wheels, soda pop and cars. The cleverly illustrated instruction booklet lists the finds that fall into the "legitimate," "stretching it" and "totally outrageous" classifications.

For example, a throw rug or carpet would be a legitimate find for a carpet card. Stretching it would be calling a doormat a carpet. And outrageous? A toupee (or scalp rug).

The Couch Potato Game, says the instruction booklet, "is not a VCR game, because we didn't charge you enough for it." To make it one, just record your own video. Doing this will also provide a variation on the game: trying to spot objects while fast-forwarding through the commercials.

This game does have some relationship to the computer: After an hour or so of commercials, the most anticomputer person in the world will be gleeful at seeing ?SYNTAX ERROR on a pale blue screen.

Lonnie Brown is an editorial writer and computer columnist for a New York Times-owned newspaper in central Florida.

Table 1. Manufacturers, prices and online services.

## 10th Frame

Access Software
\#A 2561 South 1560 West
Woods Cross, UT 84087
\$39.95

## Scrabble, Quizam,

Make Your Own Murder Party and
Robot Rascals

## Electronic Arts

1820 Gateway Drive
San Mateo, CA 94404
\$32.95, \$29.95, \$39.95
and $\$ 39.95$, respectively

## Party Quiz Game

## Suncom

260 Holbrook Drive
Wheeling, IL 60090
\$29.95

## Trivia Fever

Professional Software
No longer being marketed, but still in the "distribution pipeline," often at discount prices.

Wheel of Fortune, Jeopardy! and
Family Feud
ShareData
7400 West Detroit St., Suite 170
Chandler, AZ 85226
$\$ 9.95$ each
Luscher Profile
Mindscape
3444 Dundee Rd.
Northbrook, IL 60062
\$29.95
Mind Prober
Human Edge Software
No longer being marketed,
but still in the "distribution
pipeline," often at
discount prices.

## Personal Preference

Broderbund
17 Paul Drive
San Rafael, CA 94903
\$28.95

Alter Ego
Activision
2350 Bayshore Parkway
Mountain View, CA 94043
$\$ 49.95$
Dr. Ruth's Game of Good Sex
Avalon Hill Game Co.
4517 Harford Rd.
Baltimore, MD 21214
\$29.95

## The Couch Potato Game

TDC Games
4N240 Cavalry Drive, Unit D
Bloomingdale, IL 60108
\$14.95

## CompuServe

PO Box 20212
5000 Arlington Centre Blvd.
Columbus, OH 43220

## QuantumLink

Quantum Computer Services 8619 Westwood Center Drive Vienna, VA 22180

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isk adventures...
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# The Tale Of the RAM And the Mouse 

## Discover the available software that takes advantage of Commodore's RAM expansion cartridges and proportional mouse.

COMMODORE'S NEWEST HARDWARE options, the 1700,1750 and 1764 RAM expansion cartridges and the 1351 mouse, make the C-64 and C-128 easier to use and more productive. Do you really need one of these products? Probably not, but a number of software developers are betting that once you've seen them in action, you'll want them. In this article, I'll describe these peripherals and survey the software being written to use them.

## Commodore's RAM Expanders

RAM expansion cartridges appeal to Commodore owners conceptually. Add 256 K of RAM to the C-64 or up to 512 K to the C-128 and you have one humongous computer. Right? Well. . . yes and no.

Commodore's memory expansion has more in common with disk storage than it does with your computer's resident RAM. You can exchange blocks of memory between memory and a RAM expander, which isn't terribly interesting until you realize that those memory transfers, using direct memory access, occur at the rate of 250,000 bytes per second. For comparison, the 1541 transfers at about 256 bytes per second and the 1571 at about 3000 .

Using demo programs found on Commodore's

RAM cartridge disks, direct memory access moves a series of screens from the expander into screen memory at blazing speed. One screen follows another so rapidly that the effect is like watching a movie.

The 1700,1750 and 1764 can all be accessed from either 64 or 128 mode on a C-128. They are visible at the same addresses in both the $\mathrm{C}-128$ and the C-64, and they share the same set of instructions.

Also, all three are physically much alike. The major difference is the number of 64 K memory banks each one holds. The 1700 holds 128 K in two banks, the 1750 holds 512 K in eight banks and the 1764 is in between with 256 K in four banks. (When programming these cartridges yourself, you must specify which bank you want to store to or recall from.)

Since the cartridges share power with the computer, the 1764 includes a beefed-up replacement for the C-64's limp-wristed power supply. If you'd like a larger cartridge for your C-64 than the 1764 and you already own a beefed-up power supply, get a 1750 , open the case and clip out the resistor marked R4. You can also install a switch to disconnect the R4. A knowledgeable friend installed such a switch for me, so I can use my 1750 with either a C- 64 or a C-128.

By BARBARA MINTZ

Programming the RAM expansion cartridges is a nuisance unless you have Basic 7.0's Stash, Swap and Fetch commands. This is especially true with the C-64, which doesn't contain any commands you can use to access the cartridge from Basic. Instead, you have to write to ten different registers in computer memory via Peeks and Pokes. If you can't write your own programs to use the new cartridges, some interesting software already exists for that purpose.

## RAMDOS SOFTWARE

One of these programs, Commodore's RAM DOS for the C-64, works with the 1764 cartridge and comes on the demo disk with the cartridge. RAMDOS lets you assign a device number to the cartridge, so you can use it as a disk drive, "Amazing" best describes the speed at which this RAM

drive performs: It will load a 100 -block program from RAM disk into computer memory in about one second. It's also startling to see, for the first time, " 2013 blocks free" at the end of your RAM disk directory.

Unfortunately, not all programs recognize RAMDOS as a disk drive, and copy-protected programs can't be copied into RAMDOS. Also, you can't use the RAM expansion cartridge with programs that require all cartridges to be un plugged. Otherwise, the device is transparent when not in use.

RAMDOS manages to use a minimum of computer memory by using the "now you see me, now you don't" technique. The disk drive emu lation program stores itself in the RAM cartridge
and activates only when it's needed. Then it uses the RAM expansion's Swap command to move memory-resident code into safe storage in the cartridge, does its own job and then swaps again, putting the original program back into place in computer memory. The program does make continuous use of 255 bytes of memory starting at 52992 , an area that's little used. If you need that space, you can select another address for the RAMDOS interface before installing it.

To make RAMDOS-to disk copies, you must use Jim Butterfield's File Copy program (provided in the package), and you must rerun the RAMDOS program. Unfortunately, this solution is less than satisfactory.
There are several precautions you should heed in using RAMDOS. First, keep in mind that anything in RAM expansion disappears when the power disappears, so it's important to save files to disk often. Second, since a RAM disk doesn't have a flashing light to indicate disk errors, always check to make sure jobs have been performed correctly. Third, remember that system resets performed by some programs change RAMDOS's vectors, and some programs may overwrite its interface area in memory. If that happens, your programs and data will remain in RAM expansion, but you won't be able to access them. The only way you can get out of this predicament requires reinstalling RAMDOS in memory.
My company, Brown Boxes, has adapted Commodore's RAMDOS for use with its battery-supported cartridge, the Double Quick Brown Box. When using the Box, you can restore RAMDOS after a reset with two keystrokes, without having to reload your files. You need an extender board with extra cartridge slots to use our product, since it and the RAM expansion cartridge both occupy the expansion port.
Commodore-128 owners needn't feel ne-glected-Progressive Peripherals' RAMDOS 128, an English import, is available for their machine. RAMDOS 128 offers user-selectable banks and duplicates disk drive operations. Also, it can be recovered after a system reset and offers parti tioning of RAM expansion memory. Partitioning lets you use part of the cartridge as a RAM disk and another part for other direct-memory-access jobs, such as the screen-switching demos I mentioned earlier. An extended Copy command permits file copying between the RAMDOS 128 disk and the disk drive.

A C-128 version of Commodore's RAMDOS should be along any day now. It'll probably be distributed through QuantumLink and Commodore BBSs and should appear in user's group public domain libraries shortly thereafter.

## Applications Software

Since RAM disks don't duplicate the disk drive down to the track and sector level, nor do they respond to direct-access disk commands, most
commercial programs won't function with them. Such programs rely on pretty esoteric programming to speed up disk access, and even the simplest machine language programs bypass some of the Kernal routines for loading and saving, if only to shorten the program code.
Professional Software and Digital Solutions, however, have incorporated versions of RAMDOS into Fleet System 4 and the Pocket series of programs, respectively, to provide all the speed of a RAM disk.

Fleet System 4, for the C-128, uses a RAM expansion cartridge for its word processor. It accepts the cartridge as device 3 after you've accessed the program's Format function to prepare the RAM disk. Once set up, the RAM disk uses all the normal file access commands.

Digital Solutions' Pocket Writer 2, Pocket Filer 2 and Pocket Planner 2 for the C-128 automatically configure an expansion cartridge as device 2 , with an empty directory listing showing 2045 blocks free with the 1750 or 510 blocks with the 1700 .
For fast access, both Professional Software and Digital Solutions suggest copying their dictionary and, in Fleet System's case, the thesaurus, into the RAM disk. This makes spell-checking about 33 percent faster and thesaurus accesses easier.
Documents can be saved and loaded in a second or less using the RAM disk. Copying Pocket 2's 546 -block dictionary into the RAM disk takes only about one minute, but copying those 546 blocks back to disk takes long enough to enjoy a cup of coffee.
RAMDOS applications aren't limited to RAM expansion. Several graphics programs, including Basic 8 and GEOS, can use a cartridge's direct memory access to swap blocks of data. Several public domain terminal programs will soon be able to use a cartridge for instantaneous storage of a full communication buffer, so online time isn't wasted saving the buffer contents to disk. (Although details aren't yet available, I'm told that a new version of Precision Software's Superbase will use a RAM expansion cartridge.)

## The 1351 Mouse

The 1351 is a true proportional mouse for the C-64 and the C-128, not just another joystick, as the 1350 mouse was. It's just as accurate and effective (with proper software) as the mice designed for the Amiga and the Macintosh. Pointing and clicking to specify what you want your computer to do is a natural, intuitive form of control, and it saves time you'd spend on searching through manuals for commands and typing in combinations of keys.

The 1351 inspires even more respect if you surrender to temptation and open the case. At its center you'll find a small ball resting on two metal rollers. When you move the mouse, you're actually moving the ball. Two windowed disks, one mounted on each roller, turn in response WWW.Commodore.ca WWW.Commodore.Ca


The 1700 Ram Expansion Unit adds 128 K of RAM to your C-128, for a total of 256 K .


The 1750 Ram Expansion Unit increases the C. 128 by 512 K , for a total of 640 K .
to the ball's movement and interrupt rays of light emitted by tiny diodes. Optical receptors register the pulses of light, which are then translated into signals read into registers in the computer. Software that recognizes those signals positions a pointer on the computer screen accordingly. The subjective experience, provided the software is
 manually move the pointer.

## SOFTWARE FOR THE MOUSE

Electronic Arts uses that feeling of immediacy in its Instant Music program, which should be available by the time you read this. Instant Music lets you create musical compositions by using color and line, as well as perform what Electronic Arts calls "mouse jamming."

Commodore had the foresight to build a Joystick mode into the 1351, and many joystickcontrolled programs (such as the Advanced OCP Art Studio from Firebird) work nicely with it. Unfortunately, the mouseljoystick may be too sensitive for games that require moving objects through mazes and grids. If the program loop that checks the joystick switches is timed for very frequent repeats, the mouse's tiniest movements are registered as a change of direction. You'll probably find it difficult to move your hand steadily enough unless you guide the mouse
along the edge of a ruler. The mouse/joystick does offer good control for games and applications requiring fast, wide maneuvers or movement in a straight line, and I expect new games and applications that take advantage of this device's unique characteristics will be appearing.

Digital Solutions' Pocket Writer 2, Pocket Planner 2 and Pocket Filer 2 support the mouse by providing pull-down windows that remain invisible unless a mouse is in use and the mouse pointer is moved to the top of the screen. The mouse performs the same functions with these programs as the keyboard does, and it's handy both for the novice and for the expert who prefers the point-and-click method of making choices.
The pull-down windows are especially helpful in creating more text area by eliminating the Help screens. For rapid editing, you can use the mouse to scroll back and forth through documents, move the cursor, mark ranges and enter commands. What's best about this arrangement is that you can either use the mouse or ignore it.

## Graphics

Graphics applications that offer mouse support generally retain other forms of input, but few mouse users willingly go back to them. Not even the heralded light pen, once considered the best choice for computer-aided design, offers more accuracy, convenience and ease of use. So, it's no surprise that the Cadpak graphics program (from Abacus) and Flexidraw (from Inkwell) come in updates that support the 1351.

If Cadpak is your favorite design program, you're sure to enjoy it even more in its latest guise. New users, however, may find that some of the features that work well with the keyboard and the light pen are unnecessary and confusing with the mouse. The Accupoint function, for example, which positions the cursor, requires an extra command after the mouse moves the cursor to the correct position. Note that when you use the mouse with Cadpak, you can't use any other peripherals beyond a single disk drive, a printer and a monitor.
T.H.I.S., a C-128, 40 -column graphics program, adds a mouse driver to software previously designed for a light pen. You can make one-pixel adjustments of the light pen cursor, but the mouse moves accurately and responsively without need for fine tuning. You can use the mouse to select, from a set of four pull-down windows, all the amenities you'd expect in an up-to-date graphics program. Unfortunately, if the pointer isn't centered on the word you want, you get the wrong selection. Micro Aided Designs planned to offer modular options, including screen animation, that would've had a set of function-keyselectable menus, but according to a spokesperson, they're now planning to just sell out their stock of T.H.I.S. and the light pens.
Basic 8.0, a C-128, 80 -column color graphics package from Patech requires neither a mouse nor a RAM expansion cartridge, but it uses both


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in a programming environment-the easiest way to accommodate the language's many features. As an extension to Basic 7.0, Basic 8.0 lets you program graphics that were previously inconceivable on the C-128.

As a novice, you can use the language's 53 new commands to create color graphics on the 80 column screen, for twice the resolution of the normal 40 columns. You can create three-dimensional figures and mouse-driven programs with windows. There are commands to track the mouse, position pointers, define and control windows, and stash and fetch screen areas in the RAM expansion cartridge. Also, thanks to Basic 8.0's RunTime Module, you can freely

## Table 1. Manufacturers and prices.

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## 1351 Mouse

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With the 1764 RAM expansion cartridge

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Progressive Peripherals \& Software 464 Kalamath St.
Denver, CO 80204
\$29.95

## Fleet System 4

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Needham, MA 02194
$\$ 79.95$
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Digital Solutions
2.30 Wertheim Court

Richmond Hill, Ontario
Canada L4B 1B9
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Superpak, \$99.95

## Instant Music

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
\$29.95

## Cadpak

Abacus
PO Box 7211
Grand Rapids, MI 49510
C-64, \$39.95; C-128, \$59.95

## T.H.I.S.

Micro Aided Designs
215 East Orangethorpe
PO Box 345
Fullerton, CA 92632
$\$ 25$ without light pen;
$\$ 85$ with Flexidraw light pen

Basic 8.0
Patech Software, Inc.
PO Box 5208
Somerset, NJ 08873
$\$ 39.95$

## Power Mouse, the Mouse

Tool Box
Sumware Soft
72 Pearl St.
S. Portland, ME 04106
\$15

## GEOS

Berkeley Softworks 2150 Shattuck Ave.
Berkeley, CA 94704
C-64, \$59.95;
C-128, \$69.95
distribute your finished programs.
Basic Paint, a hi-res multicolor paint program that comes with Basic 8.0 and uses the mouse as well as a joystick, demonstrates the power of Basic 8.0. It's the only paint program I've ever seen that has a command for creating spheres. Although Basic Paint is a huge program, it operates smoothly even without RAM expansion. However, it's better with RAM expansion present.

Power Mouse, the Mouse Toolbox, from Sumware Soft offers a simplistic approach to programming the 1351 mouse. It lets you create a "mouse environment" with up to four predefined windows for pull-down menus. The Toolbox program creates a pointer sprite and supplies the commands used in the program to track the mouse in Joystick or Proportional mode. The disk contains a Toolbox for the C-64 and one for the C-128, plus a separate utility to convert the mouse environment to Proportional mode. Power Mouse is a clever program and less demanding than Basic 8, but it requires Basic programming skills, and I find the Edit-mode windows tiresome.

GEOS, RAM expansion and the 1351 mouse seem made for each other. In fact, used together, they create a synergistic effect.

GEOS theoretically makes the C-64 a more impressive and easier-to-use machine. However, if you've got a balky joystick that has to be held in two hands, the system loses a lot of appeal. With the 1351 mouse and RAM expansion, GEOS takes off and flies. The mouse darts about with great accuracy, and the RAM expansion used as a second disk drive speeds up operation.

GEOS lets you move the contents of your work disk into drive B (the RAM disk) as if drive B were another 1541, but the speed of the transfer is remarkable. Applications pop onto the screen, and the slow, hesitant page-scrolling of lengthy documents is gone. All the data GEOS needs is now in the RAM expansion, instantly available thanks to the speed of direct memory access.

The GEOS manual claims an improvement in loading and saving speed of ten to 100 times with a RAM expansion cartridge. That figure makes the RAM expansion a pretty good investment.

If you don't need the programs that support the RAM expansion cartridges and mouse now, then perhaps you should wait before purchasing the peripherals. However, if you use any of these programs on a regular basis, you'll find that the hardware makes your work go faster and better.

As you can see, there are already many software applications available for the Commodore RAM expansion cartridges and the 1351 mouse. These programs make a Commodore computer more powerful, versatile and friendly than was thought possible only a year or two ago. If this is any indication of what the next two years will bring, I, for one, can't wait!

Barbara Mintz is director of the Boston Computer Society's Commodore user's group and director of software development for Brown Boxes, Inc.

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## C64/128 SOFTWARE



# 64DOS Shell 

## Now C-64 users can have the equivalent of the useful 1571 DOS Shell that C-128 owners have been enjoying for some time.

Commodore owners who have purchased the 1571 disk drive received with it a most useful and versatile disk utility-the 1571 DOS (Disk Operating System) Shell. Unfortunately, C-64 users were out of luck, because the 1571 Shell works only in 128 mode. My answer to the problem is a C-64 DOS alternative, which I call the C-64 DOS Shell. (For a basic discussion of the attributes of a "shell," see Tim Walsh's sidebar to this article.)

This program offers most of the features found in the 128 version, plus a few extras. Like its C-128 counterpart, you operate the 64 DOS Shell primarily with the space bar and cursor and function keys. The screen format and key functions perform almost identically to those of the 128 version, so if you're a 1571 DOS Shell user, you should feel right at home.

## Preparations and NOTES

The 64 DOS Shell is a rather lengthy program, encompassing almost 6 K of machine language, so typing it in will take a few hours. I think you'll find the effort well rewarded, however. After typing is completed, save the data statements under any filename and then run 64 DOS Shell.

It takes a few moments for Basic to poke the program into memory, but this need be done only once. After the ready prompt, load and run the short, fiveline program in Listing 2. This program compresses the 64 DOS Shell program to a small ML object-file saved on disk. Once you've done this, you can load 64 DOS Shell with LOAD "filename", 8,1 . Type NEW and enter SYS 34500. The program will then be installed into the operating system.

## Getting Started

The 64 DOS Shell program is virtually transparent to the 64 operating

system, and accessing it is as simple as tapping the restore key. Keep in mind that doing this while another program is running stops that program's execution and displays the 64 DOS Shell main menu, which appears as follows:

| Disk Setup | Copy Files |
| :--- | :--- |
| Run a Program | Rename Files |
| Format a Disk | Delete Files |
| Clean up a Disk | Function Keys |
| Mode Selection | Directory |

Use the cursor keys to move through the menu, highlighting the options. You select and execute your choice by pressing the space bar when the option you want is highlighted. Then follow the prompts as they appear. To exit the DOS Shell, press the stop key while in the main menu.
DISk SETUP-The 64 DOS Shell works with either the 1571 or 1541 disk drive. Although two drives may be used at one time, dual drives (drive numbers 0 and 1 ) are not supported. The 64 DOS Shell uses
drives "A" and "B". These are logical drives, meaning that they are controlled entirely from within the DOS Shell.

You may assign devices 8,9 or 10 to either the " A " or " B " drive. To change the settings, simply use the cursor keys and press the space bar. After you select the second drive, the program automatically returns you to the main menu. To get there without changing device numbers, press the stop key.

Keep in mind that the 64 DOS Shell looks for a second drive, even when not accessing it. If it doesn't detect a second drive on the serial bus, strange things may occur (see Error section, below).

When using two drives, the 64 DOS Shell prompts you for the logical drive number you wish to use for an operation. Make that choice by using the cursor keys and space bar. As with most 64 DOS Shell operations, pressing the stop key returns you to the main menu or verification menu, depending on the option you are using at the time.


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# Commodore's C-128 DOS Shell 

By TIM WALSH

THE C-128 DOS SHELL is probably the best disk utility developed to date for the $\mathrm{C}-128$. When you need to copy a variety of disk-based files quickly and effortlessly, rearrange files in a disk directory or restore a scratched file, you won't find many programs better suited for the job.

## A Brief History

To understand a C-128 user's appreciation of the DOS Shell, it helps to know the program's background and how it works. Fred Bowen, a key developer of the C- 128 who still enjoys employment at Commodore, recently related the following account of the Shell's history.

It was under development from late 1984 through early 1985, when Commodore, caught up in the excitement and anticipation of the C-128's release, was testing and refining peripherals and software to complement and enhance the computer's abilities.

Programmer Dave Middleton, under the watchful eye of Senior Programmer, Eric Cotton, was involved in writing the C-128 DOS Shell disk utility program when he abruptly left the scene at Commodore. Programmers Fred Bowen and Terry Ryan rescued the abandoned project, and by June of 1985 they had made it worthy of packaging-on a demo disk-with the new 1571 disk drive. By making this program available to every new 1571 user, Commodore shaped the way many thousands of C-128 owners view their computer.

## USING THE Shell

Although the background of the C-128 DOS Shell's development is interesting, it's the program, not its story, that wins friends and influences people. You'll find instructions for using it in the 1571 user's manual, but you'll only learn its capabilities and limitations through repeated use.

As mentioned above, the Shell is on the 1571's test/demo disk. It also accompanies the C-128D computer, which features a built-in 1571 drive. Although it's packaged for use with the 1571, it also works with the 1541, and I have yet to


## Copying files with the C-128 DOS Shell.

find a third-party Commodore disk drive that objects to it.

To activate the Shell, place the demo disk in your drive and turn your computer on; or, if the computer is already on, just type "boot" and press the return key. The program formats itself to either a 40 or 80 column screen, so it doesn't matter which mode you're in. At a length of over 17 K ( 67 disk blocks), the program is substantial enough to keep the 1571 busy for almost 12 seconds as it loads. Once it's loaded, you're greeted with the statement, "D.O.S. Shell on F-1 Key."

Press F1 and you have seven seconds to press the space bar to select English as your language of choice for the program's menu. If you don't press the space bar soon enough, French, German and Italian options appear at seven-second intervals. Unless you can decipher prompts such as "Inserire disco nuovo e premere spazio," don't press the space bar until the program cycles back to English.

After selecting a language, you're greeted by a menu of ten disk oper-ations-everything from validating a disk to copying an entire disk to rearranging the order of the files in a disk directory. Press F1 again and you're in Basic 7.0, just as if the DOS Shell had never been activated. All the function keys revert to their default definitions with the exception of F1, which places the DOS Shell back in service.

To see where the program resides
in your C-128's memory, exit to Basic with the F1 key, then press F8 to go to the computer's machine language monitor. Next, enter "M 1900" and press return, and in the rightmost columns of the screen you'll see the words "C128 DOS Shell" and the version number you're using, followed by Dave Middleton's name. Press M <return> again to view the contents of location $\$ 1 \mathrm{~A} 00$, which is the Shell's starting address.

Now, exit the monitor by typing " X " <return>, then return to the DOS Shell by pressing F1. Once in the Shell's menu, use the cursor keys to move about and highlight the menu choices. Unlike most menu-driven programs, the C-128 DOS Shell responds to the space bar instead of the return key when you're making menu selections, so highlight a selection and then press the space bar. When you're ready to activate the selected operation, press F7. To change your file selection, press F5, or to reset the menu, press the stop key.

## Typical Applications

I typically use the DOS Shell for two purposes-copying files and reordering directories. Although I could copy entire disks sector by sector with this program, I never use that option because there's a faster way-by selecting the File Copy option and highlighting every file on the disk. In this way, in less than five minutes I can make an error-free copy of an entire disk containing a smorgasbord of Ba sic 2.0 , Basic 7.0 and machine language program files, along with scores of word processing, database and spreadsheet files.

Copies of files can be made using one or two drives. Single-drive copies usually require only one disk swap, but there are times when two swaps are necessary.

While the C-128 DOS Shell would be a fantastic program if all it did was copy files, it's also invaluable for restoring scratched files. Just activate the Shell, put the work disk in the drive and select the Restore File option. Ninety-nine times out of one hundred,
you'll instantly retrieve a Basic program without a hitch.

## Program Limitations

The C-128 DOS Shell does have its limitations. First of all, while it can copy many different files, it's not a substitute for a "disk cracker." Files that save with nary a trace of copy protection, such as Newsroom graphics, cannot be copied properly using the DOS Shell.
Next, while it can restore many types of deleted files, you'll be hard pressed to retrieve scratched program files originally created with screen codes. For example, scratch a RUN Script program file, then try restoring it with the DOS Shell. Very little, if any, of your file will be recovered.

Finally, if you press run-stop/restore while the program is activated, all the function key definitions are wiped c t. When this happens, it's best to reb, it the DOS Shell than to try salvaging ' unless you're sure you know what you e doing.

## New Shell. ${ }^{\text {N }}$ the Horizon?

Commodore s. ay have miscalculated the C-128 DOS Shell's popularity when they recently began shipping the 1581 disk drive. They were quickly swamped with protests from C-128 users who discovered that no DOS Shell existed for the new $31 / 2$-inch disk drive.

Commodore was caught off guard, primarily because of its own low regard for the C-128 DOS Shell. I'm told the program sees little use back at the home office for several reasons: because it uses the boot sector on its disk, because it resides in a section of memory popular with other programs and because it redefines the function keys.

Talks with our sources at Commodore lead us to believe that a DOS Shell for the 1581 is in the works, so we may see one in the near future. With the 128 version for a template, the result should border on perfection. $\mathbb{R}$

RUN's Technical Editor Tim Walsh is a die-hard DOS Shell advocate.

Run a Program-When you select this option, the drive reads the disk directory and displays it in the directory window. You'll notice that this is only a partial listing. To display the rest of the directory, use the cursor keys to scroll up or down.

To select a program to run, move the red arrow to the desired filename and press the space bar. The filename then appears in reverse. To run it, press F7. To change the selection, press F5. (The latter two operations hold true for all of the 64 DOS Shell's selection processes.)

While this option runs most Basic and ML programs, you may experience problems with some ML programs. If you can't get the file to run, it probably means that the program is trying to occupy the same memory space as 64 DOS Shell.

Format a Disk-This option prompts you to input a filename for the format. As with most of the Shell's file operations, the program also asks you to verify your selection prior to formatting a disk. To format the disk, enter a header name ( 16 characters or less in length), a comma and a unique two-letter ID; then press return. For example: "filename", "ID" (standard format) or "filename" (short format).

By omitting the two-letter ID, you accomplish a short format that erases all files and renames the disk header. Whenever you use an ID, a full disk format will result.

Clean Upa Disk-Cleaning up a disk involves the Validate command. Once you've chosen the option, the validation begins immediately, so be sure you have inserted a disk into the desired drive.

Mode Selection-This option, for 1571 disk drive users only, allows you to toggle between 1541 and 1571 modes. This option can be useful within the DOS Shell for formatting, copying programs, and so on. The selected mode remains in effect until you reset the drives or select another mode. Use the cursor and space bar to choose the desired mode.
File COPY-This option allows you to easily copy files from one disk to another. The option works best with two disk drives, although it may be used with one. (If you're using a 1571 in 1571 mode and get a Drive-not-Ready error, set the drive to 1541 mode and try again.)
If you enter the option with two disk drives, the Shell will ask you which drive you wish to copy from. From then on, the selected drive will be the "Source," while the second logical drive will be the "Target" drive. Using the cursor,
space bar and function keys, you may select one or several dozen files to copy. Pressing F7 will begin the copy sequence. Once the copy is complete, the main menu will reappear.

If only one drive is used, respond to the prompt as it asks you to insert either a "Source" or "Target" disk in the drive. The program differs from the 1571 DOS Shell at this point in that you need to format a target disk before beginning this procedure.
The 64 DOS Shell won't allow you to copy over 130 disk blocks. For files over 125 blocks, you may have to reinitialize the program. Also, the File Copy option will not reproduce relative files.
Rename Files-This option will allow you to rename a whole directory of files. Again, select from the directory listing the file you want to rename. A highlight bar appears and prompts you to enter a new filename. Do so and then press return. Repeat this process for as many files as you wish. But rename files carefully; duplicating a filename will result in a File Exists error.
Delete Files-This option allows you to highlight and scratch files you no longer need. Use F5 to deselect or the stop key to abort. Pressing F7 begins the scratch operation. Be very careful with this option, since you can't restore some scratched files with even the best disk-restoring utility.

Function Keys-This versatile option allows you to program any one of the function keys by assigning Basic keywords and short commands to the function keys in the same manner as the $\mathrm{C}-128$ 's Key command. Once you're into the function key option, select Define Function Keys. Use the cursor to select the key you want to define. If that key has already been programmed, the assignment will appear in the input window. Pressing the space bar will erase the prior definition, allowing you to enter the new assignment. If the key is not already defined, you still need to press the space bar to begin entering the definition. Pressing the stop key aborts the procedure without changes.
Each key definition is limited to 30 characters, so use keyword abbreviations whenever possible to conserve line space. Once you've entered the line, press the return key or F7 to process it. Pressing the return key adds a carriage return to the definition, while pressing F7 adds no carriage return.

To enable the functions keys, select the Enable option from within the Shell. The function keys will not work until you exit the Shell program, nor will they work while you're in Quote mode. You

## 64 DOSSHELL

may disable the keys by tapping the runstop/restore combination, or by selecting the Disable option. You may also "turn off" individual keys by entering the Define option, pressing the space bar and then pressing F7. This assigns a null value to the key. Function key definitions remain in effect until the program is reinitialized (see below).

Directory-This option displays disk filenames in the directory window. No selection process is available. Press the stop key to exit.

## Errors and Other Things

The 64 DOS Shell was designed to be as user-friendly as possible, and it will catch almost any error you'll ever make. However, to squeeze the program into 6 K , I had to make certain trade-offs. A definite program-crasher is the Device-not-Present error, which causes the program to freeze up and may also garble the screen. To get out of it, turn on
the drive that is not present, press the return key and then the stop key twice to exit the Shell. Then reinitialize the program by entering SYS 34500 .

For any standard disk error, 64 DOS Shell displays the error in the message window. When this happens, you need to press the space bar to get back to the main menu. Look at the light on your drive. It will remain green (red on 1541s) until you press the space bar.

The 64 DOS Shell protects the area in which it resides; however, a large Basic program might sneak some variable storage into the Shell's program area (34500-40859 decimal; \$86C4\$9F9B hex). Keep this in mind when running or copying large programs, for you may want to protect this area with the following statement:

10 POKE 51, 44: POKE 52, 135: POKE 55, 44: POKE 56, 135: CLR

If the restore key will not reactivate the

DOS Shell, try reinitializing the program.
If you encounter an error that the program did not detect, the display may scroll from the screen during directory access. If this ever occurs, press the stop key to return you to the main menu. Also, remember that once you set up the Shell for two disk drives, it will always look for the second drive, whether accessing it or not. If your screen seems to freeze up, it's a good indication that a drive is not turned on. You may reset the DOS Shell for one-drive operation by reinitializing the program.
If you do as much file maintenance as I do, then the 64 DOS Shell can save you a lot of time and effort. Have fun! $\mathbb{R}$

John Ryan, an air traffic controller, is in charge of computer-based instruction for his section. An advanced machine language programmer, he is experienced on a number of computer systems, including, of course, the Commodore.

## Listing 1. The 64 DOS Shell program.

1Ø PRINT" \{SHFT CLR\} \{HOME\}\{CRSR DN $\}\{2$ CRSR RTS $\}$ IT WILL TAKE 2.11 MINS TO READ DATA" :REM*152
2Ø PRINT " $(C R S R ~ D N) " S P C(13) " P L E$ ASE WAIT...' :REM*6
$3 \emptyset \mathrm{I}=345 \emptyset \emptyset: \mathrm{X}=\emptyset \quad$ :REM*154
$4 \emptyset$ READ A: IF $A=256$ THEN $6 \emptyset$ :REM*44
$5 \emptyset$ POKE $I, A: I=I+1: X=X+A:$ GOTO $4 \emptyset$ :REM*16ø
$6 \emptyset$ IF $X<>697524$ THEN PRINTSPC( 8)" (CRSR DN \} (CTRL 9)ERROR IN DATA STATEMENTS": STOP
:REM*246
$7 \emptyset$ PRINT SPC(7)"\{CRSR DN\}NOW LO AD AND RUN ML SAVER": END :REM*198
$1 \emptyset \emptyset$ DATA $169,8,141,2 \emptyset \emptyset, 2,141,18$ $\emptyset, 2,169, \emptyset, 141,2 \emptyset 1,2,141,221$ ,2,141,235,2 :REM*166
$1 \emptyset 5$ DATA $141,238,2,162, \emptyset, 157, \emptyset$, $161,232,2 \emptyset 8,25 \emptyset, 162,196,16 \emptyset$ $, 134,134,51,134,55$ :REM*19
$11 \emptyset$ DATA $132,52,132,56,32,94,16$ $6,12 \emptyset, 169,11,141,2,128,169$, 135,141,3,128,162 :REM*38
115 DATA $\emptyset, 189,7,155,157,4,128$, $232,224,5,2 \emptyset 8,245,88,96,1 \emptyset 4$ $, 168,1 \emptyset 4,17 \emptyset, 1 \emptyset 4 \quad:$ REM*231
$12 \emptyset$ DATA $88,32,234,255,32,225,2$ $55,2 \emptyset 8,3,76,1 \emptyset 2,254,169,193$ $, 141,24,3,169,1 \quad:$ REM*228
125 DATA $133,2 \emptyset 4,169, \emptyset, 32,144,2$ $55,76,137,15 \emptyset, 173,188,2,162$ ,6Ø,16Ø,3,32,189 :REM*31
$13 \emptyset$ DATA $255,169,1,174,18 \emptyset, 2,16$ $\emptyset, 5,32,186,255,32,192,255,9$ $6,32,231,255,32:$ REM $^{*} 19 \emptyset$

135 DATA $12,147,32,110,145,32,1$ $2 \emptyset, 145,144,3,76,199,137,173$ $, 2 \emptyset 1,2,24 \emptyset, 35,173:$ REM*159 $14 \emptyset$ DATA $18 \emptyset, 2,2 \emptyset 5,2 \emptyset \emptyset, 2,24 \emptyset, 15$ $, 173,2 \emptyset 1,2,141,233,2,173,2 \emptyset$ Ø, 2,141,234,2 : REM*2 26
145 DATA $76,135,135,141,233,2,1$ $73,2 \emptyset 1,2,141,234,2,76,135,1$ 35,173,189,2,141 :REM*1
$15 \emptyset$ DATA $233,2,141,234,2,32,244$ $, 146,169,58,32,21 \emptyset, 148,174$, $221,2,189,28,155$ :REM*28
155 DATA $32,21 \emptyset, 255,169,62,32,2$ $1 \emptyset, 148,32,231,146,32,244,14$ $6,32,2,139,32,94 \quad:$ REM*55 $16 \emptyset$ DATA $152,32,176,144,32,2 \emptyset 4$, $255,32,25,139,173,53,3,24 \emptyset$, 3,76,199,137,32 :REM*112
165 DATA $98,15 \emptyset, 32,1 \emptyset 6,15 \emptyset, 32,1$ $1 \emptyset, 145,173,2 \emptyset 7,2,141,219,2$, $162, \emptyset, 142,22 \emptyset, 2 \quad:$ REM 21
$17 \emptyset$ DATA $232,142,218,2,32,2 \emptyset 2,1$ $53,169, \emptyset, 141,218,2,32,244,1$ $46,169,66,32,21 \emptyset \quad:$ REM*78
175 DATA $148,169,7 \emptyset, 32,21 \emptyset, 148$, $238,23 \emptyset, 2,32,67,141,169, \emptyset, 1$ 41,23Ø,2,173,186 : REM*239
$18 \emptyset$ DATA $2,2 \emptyset 1,1,2 \emptyset 8,3,76,199,1$ $37,173,233,2,141,18 \emptyset, 2,173$, $2 \emptyset 1,2,24 \emptyset, 8:$ REM*16
185 DATA $2 \emptyset 5,2 \emptyset \emptyset, 2,24 \emptyset, 3,76,2 \emptyset 2$ , 137, 32, 164, 137,174,241,2,3 $2,15,145,144,8 \quad:$ REM $^{*} 171$
$19 \emptyset$ DATA $173,242,2,2 \emptyset 8,5 \emptyset, 76,19$ $9,137,142,241,2,32,59,137,1$ 73,239,2,2ゆ1,116 :REM*84
195 DATA $144,11,174,241,2,169, \emptyset$ , 157, $, 16 \emptyset, 76,18,136,24,173$ ,246,2,1Ø9,239 : REM*89
$2 \emptyset \emptyset$ DATA $2,2 \emptyset 1,116,176,12,141,2$ $46,2,238,241,2,238,242,2,76$ $, 18,136,174,245 \quad:$ REM*32 $2 \emptyset 5$ DATA $2,165,158,157, \emptyset, 166,16$ $5,159,157, \emptyset, 167,174,243,2,3$ $2,15,145,142,243 \quad:$ REM*33
21Ø DATA $2,32,59,137,32,114,137$ $, 162,1,32,198,255,16 \emptyset, \emptyset, 32$, 2ø7,255,145,158 : REM*138
215 DATA $32,183,255,2 \emptyset 8,6,32,14$ $3,137,76,114,136,32,2 \emptyset 4,255$ $, 32,123,137,32,2 \quad:$ REM*5
$22 \emptyset$ DATA $145,174,245,2,165,158$, $157, \emptyset, 168,165,159,157, \emptyset, 169$ ,32,143,137,238,243:REM*28
225 DATA $2,238,245,2,173,245,2$, $2 \emptyset 5,242,2,24 \emptyset, 3,76,81,136,3$ 2,244,146,169 :REM*221
$23 \emptyset$ DATA $15 \emptyset, 32,21 \emptyset, 148,32,231$, $146,32,244,146,32,32,137,32$ , 13, 145, 169, $\emptyset, 157 \quad:$ REM $^{*} 42$
235 DATA $\emptyset, 16 \emptyset, 32,59,137,32,151$ , 137,32,114,137,174,244,2,1 $89, \emptyset, 166,133,158 \quad:$ REM*2 25 $24 \emptyset$ DATA $189, \emptyset, 167,133,159,162$, $1,32,2 \emptyset 1,255,16 \emptyset, \emptyset, 177,158$, $32,21 \emptyset, 255,174,244 \quad:$ REM*1 $\emptyset$
245 DATA $2,189, \emptyset, 168,197,158,2 \emptyset$ 8,7,189, $, 169,197,159,24 \emptyset, 6$ ,32,143,137,76 :REM*1
$25 \emptyset$ DATA $228,136,32,2 \emptyset 4,255,32$, $123,137,32,2,145,238,244,2$, $173,244,2,2 \emptyset 5,245 \quad:$ REM $^{4} 4$
255 DATA $2,24 \emptyset, 3,76,191,136,32$, $47,137,32,164,137,76,18,136$ ,169,74,32,21ゆ :REM*93
$26 \emptyset$ DATA $148,174,221,2,189,28,1$ $55,32,21 \emptyset, 255,96,32,244,146$

Continued on p. 108.


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## Wordman

# The word is out: This vocabulary and spelling game is fuin and educational for all. 

Wordman, a computer game that teaches vocabulary and spelling skills, will make learning fun. While it's based on the traditional Hangman game, mistakes produce a picture of a character called "the wordman" rather than a gallows scene. Word skills are developed not only by playing the game, but by creating the word lists that the game employs.

Extensive error-trapping and onscreen directions make Wordman easy to use, yet it's flexible enough to meet a variety of instructional needs. The program uses the Kernal Plot routine extensively to move around the screen, particularly in drawing the wordman character. The disk directory is displayed by a machine language routine.

The Wordman menu screen offers six options: 1) choose a word, 2) end session/game, 3) create/edit word file, 4) load word file, 5) delete word file and 6) print word file. The options are accessed by typing their numbers and pressing the return key.

## Creating a Word File

Before play can begin, at least one word file must be created and saved to disk, using option 3. Press 3 and the return key at the menu, then indicate you want to create a new word file by pressing C. Next, type the number of words you intend to put into the file, press return and state whether definitions will be included.

A screen for typing in your words will follow. Type each one, and press return. Do not use hyphenated words. After you have entered all your words, the program will ask if they are okay. If not, they will be redisplayed for acceptance or correction.

When you finish with your list, and if you chose to include definitions, the program displays the first word in your

list and asks you to enter a definition up to 36 characters long. The definition appears at the bottom of the screen as you type; then, after you press return, it moves into the box just below the word. If you're satisfied with the definition, press return again; if not, press shift/return for a chance to change it.

You can bypass entering a definition for a particular word by pressing the return key twice. Then a period, instead of a definition, will appear in the area below the word.

After you've finished entering all your words and definitions, you must enter a filename for saving the list, then press return. The filename can be no more than 13 characters long, because Wordman will automatically add the prefix WM, followed by a space, to it. When the file is safely on disk, the menu reappears.

## Other File Operations

When you want to edit an existing word list, choose option 3 at the menu, then press E, for edit, type the name of the file you want to work on and press return. The file will load, and the program will take you through the list, one word at a time. At each word, make any changes you wish and press return. When you're done with the words, you'll


Can you guess the word in this picture?
have a chance to change the definitions or add definitions if there were none before. Then save the file under its previous name or a new one. If the latter, limit the filename to 13 characters to avoid an error.
Option 4 is used to load a word file. All you have to do is type the name of the file you want and press return. If you don't know which file you want, or you're unsure of the spelling, you can type $\$$ and press return to view the disk directory. The filenames in the directory include the WM-space prefix, but you don't need to type that when entering the name of the file to load. Press return to leave the directory. After the file has loaded, the program goes back to the menu.
Option 5 is for deleting a word file. This time you do have to include the prefix when entering the filename. You can use wild cards in the filenames, but be careful you don't accidentally delete any files you wanted to keep. After typing the filename and pressing return, you must verify that the program should go ahead and delete the file you've named. If not, you can reenter the filename. Should you want to abort the deletion process altogether and go back to the menu, press return without entering a filename.


## WORDMAN

Option 6 prints a copy of the word file currently in memory．After you se－ lect this option，the program will ask you to confirm that the file in memory is indeed the one you want printed．You can exclude definitions from the print－ out if you like．

## Playing Wordman

To play Wordman，choose option 1 after loading a word file from disk．The program will randomly select a word from the file and display a line of as many equals signs as there are letters in the word．The display will also in－ dicate how many words you＇ve already used out of the file and whether there＇s a definition available for the current
word．If there is a definition，you can view it by pressing F1．

Type your first guess for a letter in the word．If you＇re right，the program will place the letter in its respective position or positions in the line of equals signs．If you＇re wrong，the letter will be displayed near the top of the screen，as a reminder not to try it again．
Each time you make an incorrect guess，part of the Wordman picture is drawn．After seven incorrect guesses，a tone also sounds，and after ten，the word is shown along with the completed picture of the wordman．
Every time you finish with a word， the program goes back to the menu， and you must choose option 1 again to
guess another word．Once you＇ve used all the words in the file，totals for the file are displayed，and the program asks if you want to play again．If so，it takes you back to the menu；if not，it exits to Basic．
You can also exit Wordman by select－ ing option 2 in the menu．Your score will be displayed，and you＇ll be asked to verify that you want to leave the program．If you change your mind and say no，you＇ll return to the menu for another round of ．．Wordman． $\mathbb{R}$

William Tumbleson developed this pro－ gram to increase his daughter＇s vocabulary and computing skills．He is a computer tech． nician for Wang Laboratories．

Listing 1．Wordman program．
$\emptyset$ REM WORDMAN BY W．TUMBLESON
：REM＊126
5 POKE788，52：POKE82 $\emptyset, 6:$ POKE5 328 $\emptyset, 3:$ POKE53281，$\emptyset:$ PRINT＂$\{$ CTRL 4 \}\{SHFT CLR\}\{CRSR DN\}\{CRSR RT\} ＂；
：REM＊ 1 Ø 9
$1 \emptyset \operatorname{DEFFNA}(\mathrm{X})=\operatorname{INT}(\operatorname{RND}(\emptyset) *(25)+65$ ）： $\operatorname{DEFFNB}(Y)=\operatorname{INT}(\operatorname{RND}(\emptyset) *(9)+2$ ） ：REM＊114
15 FORJ $=19 \mathrm{TO} 1 \mathrm{STEP}-1: \operatorname{PRINTTAB}(\mathrm{J})$ ：GOSUB4 $\emptyset:$ PRINTTAB $(39-J):$ GOSU B4 $\emptyset:$ PRINT＂$\{\text { CRSR UP }\}^{\prime \prime}:$ NEXT
：REM＊63
2Ø $\mathrm{FORI}=1 \mathrm{TO} 23: \operatorname{POKE} 646, \mathrm{FNB}(\mathrm{Y}): \mathrm{PR}$ INT＂＂CHR\＄（FNA（X））TAB（38）；：G OSUB4 $\emptyset$ ：REM＊114
25 PRINT：NEXT：PRINT＂$\{$ CRSR RT\} \{C RSR UP ${ }^{\prime \prime}$ ；
：REM＊221
$3 \emptyset$ FORJ $=1$ TO19STEP1：PRINTTAB（J）： GOSUB4 $\emptyset:$ PRINTTAB（39－J）：GOSUB $4 \emptyset$ ：REM＊1 $\emptyset_{2}$
35 PRINT＂（CRSR UP\}": NEXT:GOTO45 ：REM＊145
$4 \emptyset$ POKE646，FNB $(Y):$ PRINTCHR \＄（FNA （X））；：RETURN ：REM＊252
45 A \＄＝＂＂：N\＄＝＂\｛7 SPACEs \}W O R D M A N $\{6$ SPACEs $\} ":$ REM＊ $1 \emptyset 3$
5＠ $\mathrm{A}=1: \mathrm{B}=26: \mathrm{Z}=32: \mathrm{D}=1: \mathrm{K}=\mathrm{Z}: \mathrm{L}=\mathrm{Z}: M=$ $\mathrm{Z}: \mathrm{N}=\mathrm{Z}: \mathrm{P}=41: \mathrm{R}=39 \quad: \mathrm{REM} * 58$
55 IFA $>$ BTHEN $12 \emptyset \quad:$ REM＊231
6Ø $\mathrm{G}=1 \emptyset 23+\mathrm{E}: \mathrm{H}=1 \emptyset 64-\mathrm{F}: \mathrm{I}=1663+\mathrm{E}: \mathrm{J}$ $=17 \emptyset 4-\mathrm{F}: \mathrm{N} 1 \$=\mathrm{MID} \$(\mathrm{~N} \$, \mathrm{~A}, \mathrm{D}): \mathrm{N} 2 \$$ ＝MID\＄（N\＄，B，D）：REM＊174
65 IFN 1 \＄$=\mathrm{A}$ \＄THENA $=\mathrm{A}+\mathrm{D}: \mathrm{E}=\mathrm{E}+\mathrm{D}$ ：GOTO 55
：REM＊69
7 （FN $2 \$=A \$$ THENB $=\mathrm{B}-\mathrm{D}: \mathrm{F}=\mathrm{F}+\mathrm{D}:$ GOTO $55 \quad:$ REM＊146
75 POKEG， $\mathrm{K}: \mathrm{G}=\mathrm{G}+\mathrm{P}: \mathrm{K}=\operatorname{PEEK}(\mathrm{G}): \operatorname{POKE}$ G，ASC（N1\＄）－64：POKEH，L：H＝H＋R： $\mathrm{L}=\operatorname{PEEK}(\mathrm{H}) \quad$ ：REM＊185
8 $9 \mathrm{POKEH}, \mathrm{ASC}(\mathrm{N} 2 \$)-64$ ：REM＊34
85 POKEI， $\mathrm{M}: \mathrm{I}=\mathrm{I}-\mathrm{R}: \mathrm{M}=\operatorname{PEEK}(\mathrm{I}): \operatorname{POKE}$ I，ASC（N1\＄）－64：POKEJ，N：J＝J－P： $\mathrm{N}=\operatorname{PEEK}(\mathrm{J}) \quad:$ REM＊119
$9 \emptyset$ POKEJ，ASC（N2\＄）－64 ：REM＊6 ${ }^{2}$

95 IFG $>=$ ITHENA $=A+D: B=B-D: E=E+D$ ： $\mathrm{F}=\mathrm{F}+\mathrm{D}: \mathrm{K}=\mathrm{Z}: \mathrm{L}=\mathrm{Z}: \mathrm{M}=\mathrm{Z}: \mathrm{N}=\mathrm{Z}:$ GOTO55 ：REM＊93
1 Gの GOTO75 ：REM＊152
$1 \emptyset 5$ PRINT＂${ }^{(S H F T}$ CLR\}" ${ }^{\prime}$ DIMW（2ø）， ER\＄（16），WD\＄（2ø），DF\＄（2ø），G\＄（ 16） ：REM＊35
11 SP\＄＝＂\｛36 SPACES $\} ": C R \$=C H R \$($ 13）：REM＊216
115 LL\＄＝＂\｛CTRL 2\}NAME TOO LONG （MAX OF 13 CHARACTERS）（CTRL 8）＂：REM＊117
$12 \emptyset \mathrm{P} \$=$＂PRESS \｛CTRL 9\}ANY\{CTRL
Ø）$K E Y^{\prime \prime}: S=54272: S 1=54296: I F$ RW $=1$ THENRW $=\emptyset:$ RETURN：REM＊ $22 \emptyset$
125 PRINT＂$\{H O M E\}\left\{5\right.$ CRSR DNs ${ }^{\prime \prime}$ ：G OSUB725：FORI＝ 1 TO3：GOSUB73 9 ： NEXT：GOSUB725
：REM＊21
$13 \emptyset$ FORT $=1$ TO1 $\emptyset \emptyset \emptyset:$ NEXT：PRINTTAB（ 19）＂$\{2$ CRSR DNs $\}\{C O M D ~ 6\} B Y\{$ CRSR DN\}" :REM*34
135 PRINTTAB（12）＂WILLIAM TUMBLE SON＂：PRINTTAB（16）＂\｛CRSR DN\} （C）1987＂：FORA $=830 \mathrm{TO} 45$ ：REM＊179
$14 \emptyset$ READB：POKEA，B：NEXT $: X=2 \emptyset$ $:$ REM＊2 ${ }^{\text {Ø } 2}$
$145 \mathrm{Y}=14: \mathrm{Z} \$={ }^{\prime \prime}\{\text { CTRL 8 }\}^{\prime \prime}+\mathrm{P} \$:$ GOSUB $72 \emptyset: X=21: Y=11: Z \$="\{$ COMD 5\} ( F8）＝BLACK BACKGROUND＂：POKE1 98，$\emptyset$
：REM＊97
$15 \emptyset$ GOSUB72 0 ：GETA\＄：ON $\left(\left(\mathrm{A} \$={ }^{\prime \prime \prime \prime}\right)+2\right.$ ）GOTO15 $\emptyset:$ IFA $\$=$ CHR $\$(14 \emptyset)$ THEN POKE82 $\emptyset, \emptyset$
：REM＊78
155 PRINT＂（SHFT CLR\}":POKE53281 ，1：PRINT＂ （COMD 2\}": POKE198, $\emptyset: \operatorname{PRINTTAB}(16) "\{$ CRSR DN \}M E $\mathrm{N} \mathrm{U'}^{\prime \prime} \quad:$ REM＊185
$16 \emptyset \operatorname{PRINTTAB}(16) "\{7$ COMD Us $\}\{C R$ SR DN \}"
：REM＊168
165 PRINTTAB（1ø）＂（\｛CTRL 9\}1 (CTR L $\emptyset\})$ CHOOSE A WORD\｛CRSR DN $\}^{\prime \prime}: \operatorname{PRINTTAB}(1 \emptyset) "(\{C T R L 9\} 2\{$ CTRL Ø\}) END SESSION / GAME （CRSR DN \}"
$17 \emptyset \operatorname{PRINTTAB}(1 \emptyset) "(\{C T R L 9\} 3\{C T R$ L Ø\}) CREATE / EDIT WORD FI LE\｛CRSR DN）＂：REM＊4 ${ }^{\prime \prime}$ 175 PRINTTAB（1 $)^{\prime \prime}(\{$ CTRL 9\} 4 \｛CTR L Ø\}) LOAD WORD FILE\{CRSR D N ）＂
：REM＊153
$18 \emptyset \operatorname{PRINTTAB}(1 \emptyset) "(\{C T R L 9\} 5\{C T R$ L Ø\}) DELETE WORD FILE\{CRSR DN\}": PRINTTAB(1申)"(\{CTRL 9 \} $6(C T R L \emptyset\})$ PRINT WORD FILE \｛2 CRSR DNs \}" :REM*18 1
185 PRINTTAB（18）＂ENTER\｛CRSR DN\} ＂：PRINTTAB（13）＂\＃OF YOUR CH OICE $\{C R S R \text { DN })^{\prime \prime}:$ IFOP $\langle>1$ THENO P\＄＝＂$\quad$ ：REM＊79
$19 \emptyset$ INPUT＂$\{19$ SPACEs $\} " ; O P \$: O P=V$ AL（OP\＄）：IFOP＜ 1 OROP＞6THENGOT 0735 ：REM＊ $6 \emptyset$
195 PRINT＂$\{$ SHFT CLR\}": POKE53281 ， $\operatorname{PEEK}(82 \emptyset)$ ：PRINT＂$\{$ CTRL 8 \}" ：REM＊15
$2 \emptyset$ ONOPGOTO2 $25,33 \emptyset, 375,52 \emptyset, 595$ ，99 ：REM＊242
$2 \emptyset 5$ PRINT＂ SHFT CLR $^{\prime \prime}:$ IFC $=\emptyset$ ORWC ＝CTHEN745
：REM＊195
$21 \emptyset \mathrm{R}=\operatorname{INT}(\operatorname{RND}(\emptyset) *(\mathrm{C}))+1: \operatorname{IFW}(\mathrm{R})=$ 99THEN21 $\quad$ ：REM＊1 22
$215 \mathrm{~W}(\mathrm{R})=99: W C=W C+1: R R=\emptyset:$ IFDF $\$($ R）$=$＂．＂THENRR＝1 ：REM＊139
$22 \emptyset \mathrm{~L}=\mathrm{LEN}(\mathrm{WD} \$(\mathrm{R})):$ FORP＝1TOL：ER\＄ $(P)=\operatorname{MDD}(W D \$(R), P,(1)): N E X T$ ：PRINT＂$\{$ HOME $\}\{6 \text { CRSR DNs }\}^{\prime \prime}$ ：REM＊8 $\emptyset$
225 FORG＝1TOL：PRINT＂$=$＂；：NEXT：IF RR＝1THEN24 $\emptyset$ ：REM＊21
23＠ $\mathrm{X}=18: \mathrm{Y}=9: \mathrm{Z} \$=$＂\｛CTRL 2\}\{2 COM D＠s）\｛CTRL 8\}": GOSUB72 $\emptyset: \mathrm{X}=1$ 9： $\mathrm{Y}=1: \mathrm{Z} \$=$＂$\{2$ SPACEs $\}$ PRESS $\{$ CTRL 9\}\{CTRL 2\}F1 \{CTRL Ø\}\{C TRL 8）KEY＂：GOSUB72 $\varnothing: \mathrm{X}=2 \emptyset$ ：REM＊78
$235 \mathrm{Z} \$=$＂FOR DEFINITION＂：GOSUB7 $2 \emptyset: L E=1: D O=18: W I=16: D E=4: G O$ SUB91ø
：REM＊ 215
24のCT＝$\quad: \mathrm{X}=12: \mathrm{Y}=1: \mathrm{Z} \$={ }^{\prime \prime}($ COMD 6）＂


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[^5]64\mathrm{ PERFECT TY
PIST IS NOW ACTIVE{2 SPACEs}**"
1\emptyset\emptyset PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACES
}SYS"ML+3\emptyset"=OFF **"
1\emptyset1 PRINT"{CRSR RT}***********************
***************"'NEW

```

\section*{Listing 2. 128 Perfect Typist program.}

1 REM \(4 \emptyset / 8 \emptyset\) COL C1 28 PERFECT TYPIST
2 REM BY: JAMES E BORDEN
\(1 \emptyset\) FORX \(=512 \emptyset T O 5379:\) READD: \(\mathrm{T}=\mathrm{T}+\mathrm{D}:\) POKEX, D
\(2 \emptyset\) NEXT:IFT \(<>28312\) THENPRINT" \(\{2\) CRSR DNs \(\} E\) RROR IN DATA...": END
25 A\$="": IFPEEK (215) THENA\$=" \(2 \emptyset\) SPACEs \(\} "\)
3ø PRINT"\{SHFT CLR\}"A\$" ****************** ********************"
\(4 \emptyset\) PRINTA\$" ** 128 PERFECT TYPIST IS NOW A CTIVE **"
\(5 \emptyset\) PRINTA\$" **\{2 SPACEs \(\}\) SYS \(512 \emptyset=0 \mathrm{~N}\{7\) SPAC Es \(\}\) SYS \(515 \emptyset=\mathrm{OFF}\{2\) SPACEs \(\} * * "\)
\(6 \emptyset\) PRINTA\$" ****************************** ********":SYS512ø: NEW
\(7 \emptyset\) DATA \(173,5,3,2 \emptyset 1,2 \emptyset, 2 \emptyset 8,1,96,141,45,2 \emptyset\), \(173,4,3,141,44,2 \emptyset, 162,43,16 \emptyset, 2 \emptyset\)
\(8 \emptyset\) DATA \(142,4,3,14 \emptyset, 5,3,96,234,234,173,44\), \(2 \emptyset, 141,4,3,173,45,2 \emptyset, 141,5,3,96\)
\(9 \emptyset\) DATA \(32,13,67,14 \emptyset, 255,19,162, \emptyset, 142,252\), \(19,142,253,19,142,254,19,189, \emptyset, 2\)
\(1 \emptyset \emptyset\) DATA \(2 \emptyset 1,32,24 \emptyset, 8,2 \emptyset 1,48,144,7,2 \emptyset 1,58\),
\(11 \emptyset\) DATA \(173, \emptyset \emptyset 5, \emptyset \emptyset 3,2 \emptyset 1, \emptyset \emptyset 3,2 \emptyset 8, \emptyset \emptyset 1, \emptyset 96\)
\(12 \emptyset\) DATA \(141,1 \emptyset 5, \emptyset \emptyset 3,173, \emptyset \emptyset 4, \emptyset \emptyset 3,141,1 \emptyset 4\)
\(13 \emptyset\) DATA \(\emptyset \emptyset 3,162,1 \emptyset 3,16 \emptyset, \emptyset \emptyset 3,142, \emptyset \emptyset 4, \emptyset \emptyset 3\)
\(14 \emptyset\) DATA \(14 \emptyset, \emptyset \emptyset 5, \emptyset \emptyset 3, \emptyset 96,234,234,173,1 \emptyset 4\)
\(15 \emptyset\) DATA \(\emptyset \emptyset 3,141, \emptyset \emptyset 4, \emptyset \emptyset 3,173,1 \emptyset 5, \emptyset \emptyset 3,141\)
\(16 \emptyset\) DATA \(\emptyset \emptyset 5, \emptyset \emptyset 3, \emptyset 96, \emptyset 32,124,165,132, \emptyset 11\)
\(17 \emptyset\) DATA \(162, \emptyset \emptyset \emptyset, 142,24 \emptyset, \emptyset \emptyset 3,142,241, \emptyset \emptyset 3\)
\(18 \emptyset\) DATA \(189, \emptyset \emptyset \emptyset, \emptyset \emptyset 2,24 \emptyset, \emptyset 51,2 \emptyset 1, \emptyset 32,2 \emptyset 8\)
\(19 \emptyset\) DATA \(\emptyset \emptyset 4,164,212,24 \emptyset, \emptyset 4 \emptyset, 2 \emptyset 1, \emptyset 34,2 \emptyset 8\)
\(2 \emptyset \emptyset\) DATA \(\emptyset \emptyset 8, \emptyset 72,165,212, \emptyset 73, \emptyset \emptyset 1,133,212\)
\(21 \emptyset\) DATA \(1 \emptyset 4, \emptyset 72,238,241, \emptyset \emptyset 3,173,241, \emptyset \emptyset 3\)
\(22 \emptyset\) DATA \(\emptyset 41, \emptyset \emptyset 7,168,1 \emptyset 4, \emptyset 24, \emptyset 72, \emptyset 24,1 \emptyset 4\)
\(23 \emptyset\) DATA \(\emptyset 16, \emptyset \emptyset 1, \emptyset 56, \emptyset 42,136, \emptyset 16,246,1 \emptyset 9\)
\(24 \emptyset\) DATA \(24 \emptyset, \emptyset \emptyset 3,141,24 \emptyset, \emptyset \emptyset 3,232,2 \emptyset 8,2 \emptyset \emptyset\)
\(25 \emptyset\) DATA \(173,24 \emptyset, \emptyset \emptyset 3, \emptyset 24,1 \emptyset 1, \emptyset 2 \emptyset, \emptyset 24,1 \emptyset 1\)
\(26 \emptyset\) DATA \(\emptyset 21,141,24 \emptyset, \emptyset \emptyset 3,169, \emptyset 42, \emptyset 32,21 \emptyset\)
\(27 \emptyset\) DATA \(255,169, \emptyset \emptyset \emptyset, 174,24 \emptyset, \emptyset \emptyset 3, \emptyset 32,2 \emptyset 5\)
\(28 \emptyset\) DATA \(189,162, \emptyset \emptyset 3,189,211, \emptyset \emptyset 3, \emptyset 32,21 \emptyset\)
\(29 \emptyset\) DATA \(255,2 \emptyset 2, \emptyset 16,247,164, \emptyset 11, \emptyset 96,145\)
3øø DATA Ø13, \(032, \emptyset 32\)
\(176,3,232,2 \emptyset 8,238,189, \emptyset, 2,24 \emptyset, 54\)
\(11 \emptyset\) DATA \(2 \emptyset 1,32,2 \emptyset 8,5,172,254,19,24 \emptyset, 42,2 \emptyset\) \(1,34,2 \emptyset 8,1 \emptyset, 72,173,254,19,73,1\)
\(12 \emptyset\) DATA \(141,254,19,1 \emptyset 4,72,238,253,19,173\), \(253,19,41,7,168,1 \emptyset 4,24,72,24,1 \emptyset 4\)
\(13 \emptyset\) DATA \(16,1,56,42,136,16,246,1 \emptyset 9,252,19\), \(141,252,19,232,2 \emptyset 8,197,173,252\)
\(14 \emptyset\) DATA \(19,24,1 \emptyset 1,22,24,1 \emptyset 1,23,141,252,19\) , 169, 42, 32, 241, 2ф, 32,188,2ø,16ф
\(15 \emptyset\) DATA 2,185,185,2ø,32,241,2ø,136,16,247 , 165, 116, 2ø8,9,165,117,2ø8,5,169
\(16 \emptyset\) DATA \(145,32,241,2 \emptyset, 172,255,19,96,13,32\) \(, 32,162, \emptyset, 173,252,19,232,56,233\)
\(17 \emptyset\) DATA \(1 \emptyset \emptyset, 176,25 \emptyset, 1 \emptyset 5,1 \emptyset \emptyset, 2 \emptyset 2,24 \emptyset, 3,32\), \(232,2 \emptyset, 2 \emptyset 1,1 \emptyset, 176,5,2 \emptyset 5,252,19\)
\(18 \emptyset\) DATA \(24 \emptyset, 15,162, \emptyset, 232,56,233,1 \emptyset, 16,25 \emptyset\) \(, 24,1 \emptyset 5,1 \emptyset, 2 \emptyset 2,32,232,2 \emptyset, 17 \emptyset, 72\)
\(19 \emptyset\) DATA \(138,9,48,32,241,2 \emptyset, 1 \emptyset 4,96,17 \emptyset, 173\) \(, \emptyset, 255,72,169, \emptyset, 141, \emptyset, 255,138,32\)
\(2 \emptyset \emptyset\) DATA \(21 \emptyset, 255,1 \emptyset 4,141, \emptyset, 255,96\)


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\section*{MAGIC}

From p. 15.
\(E S=1: S P R S A V S N, A \$: G S H A P E \quad A \$, 2 \emptyset, 2 \emptyset\)
\(4 \emptyset\) CHAR \(1,9,13\), CHR \(\$(14)+"\{S H F T \quad W\} O R K I N G .\). \{SHFT P\}LEASE \{SHFT W\}AIT"
```

5\emptyset FOR I=1TO7:ES=ES-.1:EY=ES+.\emptyset6:PX=1:PY=1

```
\(6 \emptyset\) FOR \(\mathrm{XX}=\emptyset \mathrm{TO} 24: \mathrm{FORYY}=\emptyset \mathrm{TO} 21\)
\(7 \emptyset\) LOCATE \(\mathrm{XX}+2 \emptyset, \mathrm{YY}+2 \emptyset: \operatorname{IFRDOT}(2)<>\) THEN GOS UB \(12 \emptyset\)
\(8 \emptyset\) NEXTYY, XX, I:SPRSAVA\$, \(1:\) PRINT" \(\{\) SHFT CLR\} "
\(9 \emptyset\) FOR \(I=1\) TO7:SSHAPE \(B \$(I+1), I * 25+21,5 \emptyset, I *\) \(25+43,71:\) NEXT: GRAPHIC \(\emptyset\)
\(1 \emptyset \emptyset\) FOR \(I=1\) TO8:SPRITE \(I, 1,1,1: \operatorname{MOVSPR} I, 5 \phi_{+}\) \(3 \emptyset * I, 115: S P R S A V B \$(I), I\)
\(11 \emptyset\) NEXT: END
\(12 \emptyset \mathrm{X} 1=\left(\left(I^{*} 25\right)+((\mathrm{XX} * \mathrm{ES})+(12-(12 * E S)))\right)+2 \emptyset:\) \(\mathrm{Y} 1=5 \emptyset+((\mathrm{YY} * \mathrm{EY})+(1 \emptyset-(1 \emptyset * E Y)))\)
\(13 \emptyset\) DRAW \(1, \mathrm{X} 1, \mathrm{Y} 1:\) RETURN
-Marco Hagelsieb, Guadalajara, Jalisco, Mexico

\section*{S446 Magic 80-Column Cursor}

Unlike on the C-64, it's easy to program a blinking cursor on your C-128's 80 -column screen. You need only turn the 8563 video display chip's Cursor mode on, then off when you're done.

To turn it on, enter BANK15:SYS49182,70. This prints an escape/F through the escape character routine at \(\$ \mathrm{CO} 01 \mathrm{E}\). The accumulator contains the value for the character \(F\). Use SYS \(52684,16,10\) to turn the Cursor mode off. This writes to register 10 in the 8563 by calling the screen editor routine at \(\$ C D C C\) in bank 15 . The X register must contain the value for the 8563 's register, while the accumulator holds the data you wish to write (in this case, 16). The demo program below shows how to put the magic cursor to work in your own programs.
\(1 \emptyset\) REM MAGIC CURSOR DEMO-BOB KODADEK
\(2 \emptyset \operatorname{IFPEEK}(215)=\emptyset T H E N P R I N T " 8 \emptyset\) COL ONLY!": EN D
3ø PRINT:PRINT"1. VIEW DIRECTORY"
\(4 \emptyset\) PRINT"2. LIST PROGRAM"
5 \(\emptyset\) PRINT"3. QUIT DEMO": PRINT
\(6 \emptyset\) PRINT"ENTER CHOICE: ";
\(7 \emptyset\) BANK \(15: S Y S 49182,7 \emptyset:\) REM CURSOR ON
\(8 \emptyset\) GETKEY A\$:K=VAL (A\$):IFK<1ORK>3THEN8 \(\emptyset\)
\(9 \emptyset\) PRINT A\$:SYS52684,16,1 \(\emptyset:\) REM CURSOR OFF
\(1 \emptyset \emptyset\) ON K GOSUB \(12 \emptyset, 13 \emptyset, 14 \emptyset\)
\(11 \emptyset\) IF \(K<>3\) THEN \(3 \emptyset:\) ELSE END
\(12 \emptyset\) CATALOG:RETURN
\(13 \emptyset\) LIST:RETURN
\(14 \emptyset\) PRINT"ALL DONE!":RETURN
-Bob Kodadek, Aston, PA

\section*{S447 80-Column Toggler}

Use this simple ML program to toggle between two 80 column screens. Type in the listing below and run it for a brief demo. Note that you should always clear the second screen the first time it's accessed. One warning: If you have

\section*{MAGIC}
any bankswitching in your program, remember that my routine will always exit in bank 15 .
\(1 \emptyset\) REM TOGGLER \(8 \emptyset\)-EDWARD B SULLIVAN
\(2 \emptyset \mathrm{PA}=4864: \mathrm{FORX}=\mathrm{PATOPA}+51:\) READE: POKEX, \(\mathrm{E}: \mathrm{C}=\) C+E:NEXT
\(3 \emptyset\) IFC < > 5611THENPRINT"ERROR!": STOP
\(4 \emptyset\) DATA \(169, \emptyset, 141, \emptyset, 255,162,12,32,2 \emptyset 4,2 \emptyset 5\), \(141,46,1 \emptyset, 169,8,162,2 \emptyset, 32,2 \emptyset 4,2 \emptyset 5\)
\(5 \emptyset\) DATA \(141,47,1 \emptyset, 96,234,169, \emptyset, 141, \emptyset, 255,1\) \(69,16,162,12,32,2 \emptyset 4,2 \emptyset 5,141,46,1 \emptyset\)
\(6 \emptyset\) DATA \(169,24,162,2 \emptyset, 32,2 \emptyset 4,2 \emptyset 5,141,47,1 \emptyset\) ,96,234
\(7 \emptyset \mathrm{~S} 1=\mathrm{PA}: \mathrm{S} 2=\mathrm{PA}+25\) : REM ** DEMO
8 \(\emptyset\) PRINT" \(\{\) SHFT CLR\}": KEY1, "SYS" + STR\$ (S1) +C HR \$ (13): KEY2,"SYS"+STR\$(S2) +CHR\$ (13)
\(9 \emptyset\) DIRECTORY: PRINT"SCREEN \#1 IS THE DEFAUL T SCREEN":GETKEYA\$
\(1 \emptyset \emptyset\) SYS S2:PRINT" \({ }^{(S H F T}\) CLR\}ALWAYS CLEAR SC REEN \# 2 THE FIRST TIME ACCESSED":LIST : GETKEYA\$
\(11 \emptyset\) SYSS1:GETKEYA\$:SYSS2:GETKEYA\$:GOTO11ø -Edward B. Sullivan, Branson, MO

\section*{\$448 C-64 Metronome}

Here's a program that will transform your C-64 into an instrument for marking time. The program produces an animated screen display with a metronome-like sound and runs until you press any key.
```

1\emptyset PRINT"{SHFT CLR}C-64 METRONOME - JOSEPH
R. CHARNETSKI"
2\emptyset INPUT "{CRSR DN}BEATS PER MINUTE (4\emptyset-2\emptyset
8)";N
3\emptyset IFN<4\emptyset OR N>2\emptyset8THEN END
4\emptyset FORI=1TO9
5\emptyset B$=B$+"{SHFT M}{CRSR DN}":C$=C$+"{CRSR
UP} "
6\emptyset D$=D$+" {CRSR DN}":E$=E$+"{CRSR UP}{SHF
T N}"
7\emptyset NEXT
8\emptyset H$="{HOME}{9 CRSR DNs}{1\emptyset CRSR RTs}"
9\emptysetA$(\emptyset)=H$+B$+"*"+C$:A$(1)=H$+D$+"*"+E\$
1\emptyset\emptysetS=54272:FORJ=STOS+23: POKEJ, }\emptyset:NEXT
11\emptyset POKES +1,84:POKES +6,9:POKES +24,15
12\emptyset Y=1:Z=INT(1299/N*45-N/2)
13\emptyset PRINT A$(XANDY): POKES+4,21
14\emptyset FOR T=1TOZ:NEXT:POKES + 4, 2\emptyset
15\emptyset GETK$:IFK\$=""THEN X=Y-X:GOTO13\emptyset
16\emptyset PRINT"{SHFT CLR}":POKES+24,\emptyset
-JOSEPH R. Charnetski, Dallas, PA

```

\section*{\$449 C-128 Three-Pointer}

My program will show football fans a perfect field goal every time, on their C-128!
\(1 \emptyset\) PRINT" \(\{\) SHFT CLR\}FIELD GOAL BY MICHAEL B LACKMON": FORG=3584TO3839:POKEG, .: NEXT
\(2 \emptyset\) FORX=1TO4: READS,A:FORG=S TO A:READP:POK EG,P:NEXT:NEXT
\(3 \emptyset\) COLOR \(\emptyset, 6:\) SPRCOLOR3, 7: GRAPHIC3, 1: COLOR1, 8: COLOR2, 2:WIDTH1

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}

\section*{MAGIC}
```

4\emptyset DRAW2, }\varnothing,12\emptyset\textrm{TO28\emptyset,12\emptyset:FORG=\emptysetTO6:DRAW1,G*
2\emptyset,12\emptysetTO+4\emptyset,199:NEXT:COLOR1,1\varnothing
5\emptyset DRAW1,15\emptyset,14\emptysetTO15\emptyset,16\emptyset:DRAW1,145,12\emptysetTO1
45,135TO155,145TO155,13\emptyset:SPRSAV1,A\$
6\emptyset SPRITE1,1,2,,,,1:SPRITE4,1,1\emptyset:MOVSPR1,2
\emptyset,18\emptyset:MOVSPR4,95,18\emptyset:MOVSPR1,9\emptyset\#1
7\emptyset FORG=1TO6:GOSUB1\varnothing\varnothing:SPRSAV2,1:GOSUB1\emptyset\emptyset:S
PRSAVA\$,1:NEXT:MOVSPR1,9\emptyset\#\emptyset:SPRSAV3,1
8\emptyset FORX=45TO1 35STEP15:MOVSPR4,X\#2:FORZ =1 TO
265:NEXTZ,X:SLEEP2:GRAPHIC\emptyset
9\emptyset SPRITE1, }\emptyset:SPRITE4,\emptyset:MOVSPR4,\emptyset\#\emptyset:END
1\emptyset\emptyset FORX=1TO1 \emptyset\emptyset:NEXT:RETURN
11\emptyset DATA 3597,3645,2\emptyset,,,2\emptyset,,,21,,,2\emptyset,,,16,,
,168,,,17\emptyset,,2,42,,2,4\emptyset,128,2,4\emptyset,128
12\emptyset DATA,2\emptyset,,,6\emptyset,,,252,,,252,,,2\emptyset4,,,2\emptyset4,,
,255,3661,371\emptyset,2\emptyset,,,2\emptyset,,,21,,,2\emptyset,,,16
13\emptyset DATA\emptyset,,1\emptyset4,,,17\emptyset,,2,42,,2,4\emptyset,128,2,4\emptyset,
128,,2\emptyset,,,63,,,51,,,51,,,51,,,51,,,63
14\emptyset DATA192,3725,3773,2\emptyset,\emptyset,\emptyset,2\emptyset,\emptyset,\emptyset,21,32,
,2\emptyset,128,,16,128,,17\emptyset,48,,168,48,2,4\emptyset
15\emptyset DATA24\emptyset,2,4\emptyset,192,2,43,192,,23,,,63,,,6
\emptyset,,,12,,,12,,,12,,,15,3825,3837,32
16\emptyset DATA\emptyset,,112,,,112,,,112,,,32

```

\author{
-Michael Blackmon, Palestine, TX
}

\section*{\$44A Simple C-64 Piano}

I programmed this short top-row keyboard piano for quick key response. I find it nice to play simple tunes on. The number row is for sharps and flats, and the second row is for regular notes.
```

1\emptyset REM 64 PIANO-ANDREW SENFT
2\emptysetS=54272:FORZ=STOS+27:POKEZ, }\emptyset:NEXT:POKE
+24,15:POKES+6,127:POKES+4,35
3\emptyset F%=1145:DATA62,59,9,8,14,17,16,22,19,25
,24,3\emptyset,33,32,38,35,41,46,43,49,48,54
4\emptyset FORZ=\emptysetTO127:POKE49152+Z,\emptyset:NEXT:FORZ=1TO
22: READK%:T%=2{UP ARROW}(1/12)*F%+.5
5\emptyset F%=T%:POKE49152+K%,T%/256:POKE49216+K%,
(T%/256-PEEK(49152+K%))*256:NEXT
6\emptyset DATA 166,197,189,\emptyset,192,2\emptyset1,\emptyset,24\emptyset,247,14
1,1,212,189,64,192,141
7\emptyset DATA \emptyset,212,228,197,24\emptyset,252,169,\emptyset,141,1,
212,141,\emptyset,212,76,128,192,\emptyset
8\emptyset FORZ=\emptysetTO32:READA%:POKE4928\emptyset + 2,A%:NEXT
9\emptyset PRINT"{2 CRSR DNs}SIMPLE PIANO BY ANDRE
W SENFT":SYS4928\emptyset

```

\author{
-Andrew Senft, Auburn, NY
}

\section*{S44B Reflections on the C-128}

This program lets you create some interesting graphics displays by creating "reflections" of your drawings. Use a joystick in port 1 to draw by moving the cursor around the hi-res screen. Draw in the lower-left corner, so the cursor directions will seem correct. The display will be reflected four times around the screen. Clear the screen with the fire-button.
```

1\emptyset REM REFLECTIONS - JON ALLEN
2\emptyset SLOW:GRAPHIC1,1: COLOR\emptyset,1:COLOR1,8

```

\section*{MAGIC}

\section*{\(3 \emptyset\) COLOR 4, 1:SCALE1: \(\mathrm{X}=75 \emptyset: \mathrm{Y}=25 \emptyset\)}
\(4 \emptyset \mathrm{~J}=\mathrm{JOY}(1):\) IFJ \(=128\) THENSCNCLR
\(5 \emptyset \quad\) IFJ \(=1\) ORJ \(=2 O\) RJ \(=8\) THEN \(Y=Y+1 \emptyset\)
\(6 \emptyset\) IFJ \(=60\) RJ \(=50\) RJ \(=4\) THENY \(=Y-1 \emptyset\)
\(7 \emptyset\) IFJ \(=80\) RJ \(=70\) RJ \(=6\) THENX \(=X-1 \emptyset\)
\(8 \emptyset\) IFJ \(=2 O R J=30 R J=4\) THENX \(=X+1 \emptyset\)
\(9 \emptyset\) IFX \(<\emptyset\) THENX \(=\varnothing\)
\(1 \emptyset \emptyset\) IFX \(<\emptyset\) THENX \(=\varnothing\)
\(11 \emptyset\) IFY< \(\emptyset\) THENY \(=\emptyset\)
\(12 \emptyset\) IFX \(>1 \emptyset \emptyset \emptyset\) THENX \(=1 \emptyset \emptyset \emptyset\)
\(13 \emptyset\) IFY \(>1 \emptyset \emptyset \emptyset\) THENY \(=1 \emptyset \emptyset \emptyset\)
\(14 \emptyset\) DRAW1, \(\mathrm{X}, \mathrm{Y}:\) DRAW1, \(1 \emptyset \emptyset \emptyset-\mathrm{X}, \mathrm{Y}\)
\(15 \emptyset\) DRAW1, \(\mathrm{X}, 1 \emptyset \emptyset \emptyset-\mathrm{Y}:\) DRAW1, 1 \(\emptyset \emptyset-\mathrm{X}, 1 \emptyset \emptyset \emptyset-\mathrm{Y}\)
\(16 \emptyset\) GETAS:IFA\$="\{LB.\}"THENGRAPHIC \(\emptyset: P R I N T "\{\) CTRL 2\(\}^{\prime \prime}: E N D\)
17ø GOTO4ø
-Jon Allen, Newfane, NY

\section*{\$44C Basic Scrambler}

Sometimes a need for program security arises, and my Basic Scrambler program offers some measure of protection. To use it, just load it and run it to poke the machine language into memory. Then load the program you want to protect and enter SYS49152,<code1>,<code2>. The codes can be any two different numbers from 0 to 255 (for example, SYS49152,10,20).

After a program is scrambled, save it to disk. It can be loaded as usual, but when you list it, only garbage will be printed to the screen. To unscramble the program, follow the same procedure used to scramble it, using the same codes.

5 REM 64 BASIC SCRAMBLER - RICHARD PENN
\(1 \emptyset\) FORU \(=49152\) TO49346: READQ: POKEU, \(\mathrm{Q}: \mathrm{C}=\mathrm{C}+\mathrm{Q}: \mathrm{N}\) EXT
15 IFC<>26195THENPRINT"CHECK DATA!":STOP
\(2 \emptyset\) POKE5 \(\emptyset \emptyset \emptyset, ~ \emptyset:\) POKE5 \(\emptyset \emptyset 1, ~ \emptyset:\) POKE77 \(\varnothing, 164:\) POK E771,192
25 PRINT" \(\{\) SHFT CLR\} \{CRSR DN\}BASIC SCRAMBLE R ENABLED": PRINT" \(\{\) CRSR DN\}SYS 49152, \(\emptyset \emptyset\) -255], [ \(\emptyset\)-255] - TO USE"
\(3 \emptyset\) DATA \(32,241,183,142,82,195,32,241,183,1\) \(42,83,195,165,43,133,251,165,44\)
35 DATA \(133,252,16 \emptyset, \emptyset, 32,38,192,177,251,77\) ,82,195,77,83,195,145,251,76
\(4 \emptyset\) DATA \(22,192,165,251,197,45,2 \emptyset 8,6,165,25\) \(2,197,46,24 \emptyset, 12,23 \emptyset, 251,165,251\)
45 DATA \(2 \emptyset 1, \emptyset, 24 \emptyset, 1,96,23 \emptyset, 252,96,152,145\), \(251,32,5 \emptyset, 192,145,251,32,5 \emptyset\)
\(5 \emptyset\) DATA \(192,145,251,165,43,133,251,165,44\), \(133,252,32,5 \emptyset, 192,32,5 \emptyset, 192,32\)
55 DATA \(5 \emptyset, 192,32,5 \emptyset, 192,177,251,2 \emptyset 1, \emptyset, 2 \emptyset 8\) , 247, 32, 5ø,192,165,252,72,165
\(6 \emptyset\) DATA \(251,72,165,43,133,251,165,44,133,2\) \(52,1 \emptyset 4,145,251,32,5 \emptyset, 192,1 \emptyset 4,145\)
65 DATA \(251,76,123,227,215,72,152,72,8,16 \emptyset\) , \(\emptyset, 177,187,2 \emptyset 1,36,24 \emptyset, 14,165\)
\(7 \emptyset\) DATA \(44,141,8 \emptyset, 195,169,255,133,44,169,1\) \(, 141,81,195,4 \emptyset, 1 \emptyset 4,168,1 \emptyset 4,76\)
75 DATA \(165,244,169,131,141,48,3,169,192,1\) \(41,49,3,173,81,195,2 \emptyset 1,1,2 \emptyset 8\)


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\section*{MAGIC}
\(8 \emptyset\) DATA \(1 \emptyset, 173,8 \emptyset, 195,133,44,169, \emptyset, 141,81\), \(195,76,131,164,8 \emptyset\)
-Richard Penn, Montreal, Quebec, Canada

\section*{S44D Directory Printer}

The following program reads each filename in a directory into an array and sorts the filenames alphabetically. You can then print out the directory in one- or two-column format with any Commodore computer and any printer.

1 REM DIRECTORY PRINTER-J.R.CHARNETSKI
2 PRINT" (SHFT CLR)WHEN READY PRESS RETURN"
3 GETA\$:ON-(A\$<>CHR\$(13))GOTO3:PRINT" \(\{\) SHFT CLR\}WORKING..."
4 DIML \(\$(146):\) OPEN \(1,8, \emptyset, " \$ \emptyset ":\) GET\#1,A \(\$, B \$\)
5 GET\#1, A\$, B\$:IFB\$=""THENCLOSE1: GOTO12
6 GET\#1, A\$, B\$:N=N+1
\(7 \mathrm{LB}=\operatorname{ASC}(\mathrm{A} \$+\operatorname{CHR} \$(\emptyset)): \operatorname{HB}=\operatorname{ASC}(\mathrm{B} \$+\operatorname{CHR} \$(\emptyset))\)
\(8 \mathrm{C}=\mathrm{MID} \$(\mathrm{STR} \$(\mathrm{LB}+256 * \mathrm{HB}), 2)+" \quad "\)
9 GET\#1,D\$:IFD\$<>""THENC\$=C\$+D\$:GOTO9
\(1 \emptyset\) IFN \(>1\) THENL \(\$=\) LEFT \(\$(C \$, 27):\) GOTO 5
\(11 \mathrm{~L} \$(\mathrm{~N})=" \emptyset\{2\) SPACES \(\} " M I D \$(\mathrm{C} \$, 4):\) GOTO5
12 FORI \(=2\) TON \(-2: F O R J=I+1\) TON -1
\(13 \operatorname{IFMID} \$(L \$(I), 7,16)>M I D \$(L \$(J), 7,16)\) THEN \(\mathrm{T} \$=\mathrm{L} \$(\mathrm{I}): \mathrm{L} \$(\mathrm{I})=\mathrm{L} \$(\mathrm{~J}): \mathrm{L} \$(\mathrm{~J})=\mathrm{T} \$\)
14 NEXT:NEXT:X=INT(N/2):PRINT"\{SHFT CLR\}";
15 INPUT" \(\{\) CTRL 9\}1-2-PRINT 3-DISPLAY 4-END ": ; A: ONA +1 GOTO15, 16, 17, : END
16 OPEN4, 4: CMD4:IFA=2THEN18
17 FORI=1TON:PRINTL\$(I):NEXT:GOTO2 \(\varnothing\)
18 FORI \(=1\) TOX: \(\operatorname{PRINTL} \$ \operatorname{SPC}(7) \mathrm{L} \$(\mathrm{X}+\mathrm{I})\)
19 NEXT:IFN=XTHENPRINTSPC(34)L\$(N)
\(2 \emptyset \mathrm{ON}-(\mathrm{A}=3)\) GOTO15: PRINT\#4:CLOSE4:GOTO15
-Joseph R. Charnetski, Dallas, PA -

Magic is the original column of reader-submitted hints and tips. Each month we present brief, useful computer tricks to help you get the most out of your Commodore system-whether you're a beginning or advanced computerist, a C. 64 or C-128 owner. Magic is a forum for RUN's imaginative and inventive readers to share their programming tips, brief software or hardware modifications, shortcuts or items of general interest. If you have an idea to make computing easier, faster, more exciting or more enjoyable, send it to:

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\section*{Delete 64}

Few programming procedures are as monotonous as manually deleting lines from a C-64 program. Although some computers have a block delete command for erasing lines in- a specified range, the \(\mathrm{C}-64\) does not.

My program, Delete 64, eliminates this headache. You can append it (it's only 13 lines long) to any program you're developing, then use it to delete dozens, even hundreds, of lines quickly and easily when the need arises. I always load Delete 64 into memory before I start writing a new program, so it's there when I need it.

After you've saved a copy of this utility, load it, then activate it by typing in RUN 63980 in Direct mode. You'll be prompted for the block you want deleted and the increment. If the line numbers are irregularly incremented, use an increment of 1 .

While Delete 64 is working, line numbers will quickly flash by in the upper-left corner of your screen as the lines in your program are deleted. A message will advise you when the operation is finished. Then list the program to make sure all the lines in the target range were erased. The whole process occurs with remarkable speed and is fully automatic. \(\mathbb{R}\)

\author{
-Richard De A'Morelli, arleta, CA
}

\section*{Listing 1. Delete 64 program.}

6398 REM DELETE 64 BY RICHARD DE A'MORELL I
63981 POKE53281, 1: POKE5328 \(\emptyset, 6: \mathrm{B}=82 \emptyset: \mathrm{H}=256\) : PRINT" \({ }^{\text {SHFT CLR\} }}\) \{CRSR DN\}\{CTRL 7\}";
63982 INPUT"ERASE FROM LINE\# ";F:INPUT" \(\{8\) SPACES\}TO LINE\# ";T
63983 INPUT"INCREMENT (1-255)";I:IFI<1ORI> H-1ORF < 1ORF > 6398ØORF > TTHEN63991
63984 PRINT" \({ }^{(S H F T}\) CLR \}\{3 CRSR DNs\} \{UP ARR OW\}ERASING": POKEB +4 , I
63985 POKEB, \(\mathrm{F} / \mathrm{H}: \mathrm{POKEB}+1, \mathrm{~F}-\mathrm{PEEK}(\mathrm{B}) * \mathrm{H}:\) POKEB + 2,T/H: POKEB \(+3, \mathrm{~T}-\operatorname{PEEK}(\mathrm{B}+2) * \mathrm{H}\)
\(63986 \mathrm{H}=256: \mathrm{B}=82 \emptyset: \mathrm{D}=\operatorname{PEEK}(\mathrm{B}) * \mathrm{H}+\operatorname{PEEK}(\mathrm{B}+1)\)
63987 PRINT" \(\{H O M E\}\{C R S R\) DN\}\{CTRL 7\}"D"\{CTR L 2\}": \(\operatorname{IFD} \Rightarrow \operatorname{PEEK}(\mathrm{B}+2) * \mathrm{H}+\operatorname{PEEK}(\mathrm{B}+3)\) THEN 63991
\(63988 \mathrm{~L}=\operatorname{PEEK}(\mathrm{B}+1)+\operatorname{PEEK}(\mathrm{B}+4):\) IFL \(>\mathrm{H}-1\) THENPOK \(\operatorname{EB}, \operatorname{PEEK}(\mathrm{B})+1: \mathrm{L}=\mathrm{L}-\mathrm{H}\)
63989 POKEB+1, L
6399ø PRINT"GOTO63986": POKE631, 19:FORX= \(\varnothing\) TO 2: POKE632+X,13:NEXT: POKE198, 4: END
63991 PRINT"\{SHFT CLR\}\{2 CRSR DNs\}\{CTRL 7\} DELETE 64 FINISHED!": FORJ=BTOB+4:POK EJ, \(\varnothing\) : NEXT: END \\ \title{
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[^0]:    Reading Comprehension

    - RSVP
    - Video Title Shop; Graphics Companion

[^1]:    Firebird sofiware for Commodore 64 systems, including the popular Golden Path, Pawn, Colossus Chess IV, Cholo, Talking Teacher, Concise Music System and Advanced Music System, is available from $\$ 24.95$ to $\$ 59.95$.

[^2]:    $1 \emptyset$ REM MEMORY XFER-ROBERT B COOK
    $2 \emptyset$ REM -XFER CHAR ROM-
    3ø POKE52,56: POKE55, $\emptyset:$ POKE56,56:CLR
    $4 \emptyset$ POKE56334, $\emptyset:$ POKE1,51
    $5 \emptyset S A=53248: E A=55296: N S=14336:$ GOSUB1 $2 \emptyset$
    6Ø POKE1,55: POKE56334,1:POKE53272,3Ø
    $7 \emptyset$ REM -REV TO U.LINE-
    $8 \emptyset S A=14336: E A=15359: N S=1536 \emptyset: G O S U B 12 \emptyset$
    9 $\emptyset$ FORI $=15367$ TO1639 1 STEP8: POKEI, 255 : NEXT
    $1 \emptyset \emptyset$ END
    $11 \emptyset$ REM -TRANSFER MEMORY SUB-
    $12 \emptyset E A=E A+1: L=E A-S A: N E=L+N S$

[^3]:    Offer valid in the continental U.S. and Canada for new members only. Expires 6/30/88. Prices subject to change without notice. There is a communications surcharge for connection to Q-Link from Canada: 6 cents (U.S.) per minute from Montreal, Vancouver, Ottawa, Toronto, Quebec, Windsor, Kitchener and Calgary using the Tymnet network, and 15 cents (U.S.) per minute from over 85 other locations using the DATAPAC network.

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    # Color Hi-Res Graphics 

    > Draw in all 16 colors in 80-Column mode with this C-128 graphics utility.

    ## By DANIEL MONTES

    The excellent Ultra Hi-Res program by Louis Wallace and David Darus in the February and May 1986 issues of RUN gave the $\mathrm{C}-128$ a set of commands for high-resolution ( $640 \times 200$ pixels) drawing in 80 -Column mode. However, this mode won't let you use all 16 C-128 colors simultaneously. To make this possible, I've written a graphics utility called Color Hi-Res Graphics, which does what you might call pseudo-hi-res drawing in 80 -Column mode.
    Color Hi-Res Graphics lets you define a new character and update the corresponding attribute address for that character's position. The result: a 256 $\times 112$ pixel frame with colorful highresolution graphics. The program's only limitation is that it allows just one color inside each $8 \times 8$-pixel character.

    Type in Listing 1 carefully and save it. When you run it, a machine language program called CHR.Graph is written to disk. Your own applications program can then load CHR.Graph with the BLoad command. Listing 2, a demonstration program, presents some ideas for applications programs.

    If you use other machine language utilities with Color Hi-Res Graphics, make sure each Color Hi-Res command is used in bank-15 configuration. Also, the pi symbol ( $\pi$ ) and all control characters with a screen code higher than 63 won't appear in your listings until the original shapes and characters are restored.

    ## New Commands

    Color Hi-Res Graphics provides seven new drawing commands. They're activated with a SYS command, followed by an address and any necessary parameters. The address of each command can be given in either numeric or variable form. See line 20 of the demonstration program for an example of the latter.
    In this pseudo-hi-res mode, the text
    

    Various graphics created with the Color Hi-Res program.
    screen is displayed. You can use the Print command if printing occurs outside the borders of the window, so a "black hole" won't appear in your hard copy. After each command is issued, the cursor position for printing text or numbers is preserved.
    All commands requiring parameters check the range of the parameters and produce an Illegal Quantity error if your input is out of range.

    A list of the new commands follows:

    1. Set up hi-res area: SYS HR,XS,YS. HR equals 4864 ; XS is the column number of the upper-left border of the hires window $(0-48)$; and YS is the row number of the upper-left border of the hi-res window ( $0-11$ ).

    This hi-res window can be placed anywhere on the screen, as reflected in the ranges allowed for the coordinates. You can't see the window, since it's the same color as the background. After this routine is called, all the standard character shapes are cleared from the window.
    2. Plot a point: SYS PL,XP,YP,CP. PL equals 4867 ; XP is the X -coordinate of the point $(0-255)$; YP is the Y-coordinate of the point $(0-111)$; and CP is the color of the point $(0-15)$.

    A point is plotted at the given coordinate. If another point is located nearby, and if both points are involved in the same character, they share the last color defined.
    3. UnPlot (ERASE) A POINT: SYS UP, XP,YP. UP equals 4870 ; XP is the X coordinate of the point $(0-255)$; and YP is the Y -coordinate of the point $(0-111)$.
    This command erases a point at the given coordinate, giving it the same color as the background.
    4. Draw a line: SYS DR,XD,YD,CD. DR equals 4873; XD is the destination X -coordinate of the line $(0-255)$; YD is the destination Y -coordinate of the line $(0-111)$; and CD is the line color $(0-15)$.

    Every line is drawn using this method. First, the origin coordinates must be set, usually by plotting a point at that location. Then you must issue a Draw command. The same rules for color zones that apply to the Plot command are applicable here. If this command is the first encountered after the hi-res area has been defined, a default origin of 0,0 is used.
    5. Undraw (ERASE) A Line: SYS UD, XD,YD. UD equals 4876; XD is the destination $X$-coordinate of the line $(0-255)$; and YD is the destination Y-coordinate of the line $(0-111)$.

    The line between the last coordinates and the ones specified is erased.
    6. Clear hirres area: BSYS CS. CS equals 4879 .
    All the shapes and characters are cleared, but the hi-res area is still intact. 7. Restore character shapes: SYS RS. RS equals 4882.

    The character shapes are restored, and the entire screen is cleared.

    ## 80-Column Memory Configuration

    Color Hi-Res Graphics creates designs by redefining the shapes of characters instead of using Hi -Res mode (setting bit 7 of register 25). I wrote it
    "PIRATES! is excellent . . a great swashbuckling game, enor mously good fun. . . it should keep you playing for months (Popular Computing Weekly, U.K.)
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    this way because the shapes are stored in the 80 -column chip's 16 K RAM. Here's a brief outline of the memory configuration of this chip:

    1. $\$ 0000-\$ 07 \mathrm{CF}$. Video RAM-2000 bytes used to display screen characters.
    2. $\$ 07 \mathrm{D} 0-\$ 07 \mathrm{FF} .48$ unused bytes.
    3. $\$ 0800-\$ 0 \mathrm{FCF}$. Attribute RAM-a 2000 -byte area that holds the attributes of the corresponding video RAM, including character color, underlining and flashing.
    4. \$0FD0-\$1FFF. 48 unused bytes.
    5. \$2000-\$3FFF. CHARRAM (character generator RAM)-an 8 K area where character shapes are defined.

    In 80 -Column mode, you can define characters and display them anywhere on the screen by just poking them into video RAM. However, not all the shapes
    
    and characters can be modified. I preserved the first 64 definitions, including all the letters in uppercase, numbers $0-9$, all the punctuation marks and
    some others, so you can include text with your graphics.

    Here's how I calculated the number of characters available for redefinition. There is a total of 512 characters (256 each for upper- and lowercase). I subtracted 64 (the number of characters not modified), leaving 448. This allows for a $32 \times 14$-character window anywhere on the screen, where you can put the available shapes and characters, one after the other.

    The net result is a "pseudo" hi-res frame of $256 \times 112$ pixels. The frame occupies about one quarter of the screen, which is adequate for many applications. $\mathbb{R}$

    Daniel Montes is an aeronautical engineer at a research institute in Argentina. He is also president of his local Commodore user's group.

    ## Listing 1. Color Hi-Res Graphics program.

    $1 \emptyset$ REM COLOR HIRES GRAPHICS LOA DER :REM*234
    2ø REM BY DANIEL MONTES :REM*52
    $3 \emptyset C K=\emptyset: S C N C L R: P R I N T " R E A D I N G$ DA TA..."
    :REM*1 $\emptyset$
    $4 \emptyset$ FOR $I=4864$ TO 5526: READ A:PO KE I, $\mathrm{A}: \mathrm{CK}=\mathrm{CK}+\mathrm{A}:$ NEXT $:$ REM*192
    $5 \emptyset$ IF CK<>8232 $\quad$ THEN PRINT"ERRO R IN DATA STATEMENTS": STOP
    : REM*174
    6Ø PRINT"PUT THE DISK IN THE DR IVE AND PRESS ANY KEY TO CRE ATE CHR.GRAPH" :REM*72
    $7 \emptyset$ GETKEY A\$:BSAVE "CHR.GRAPH", B $\emptyset$, P4864 TO P5527 :REM*86
    8Ø IF DS $\rangle$ THEN PRINT"DISK ERR OR:";DS\$:STOP : REM*2ø6
    $9 \emptyset$ PRINT"CHR.GRAPH CREATED": END :REM*76
    $1 \emptyset \emptyset$ DATA $76,25,19,76,81,19,76,1$ $\emptyset 2,19,76,3,2 \emptyset, 76,24,2 \emptyset, 76,1$ $1,21,76,135,21, \emptyset \quad:$ REM $~ ¢ ~ 58 ~$
    $11 \emptyset$ DATA $\emptyset, \emptyset, \emptyset, 32,1 \emptyset 9,21,2 \emptyset 1,49$ $, 176,87,224,12,176,83,141,2$ 3,19,142,24,19 :REM*2 $\emptyset$
    $12 \emptyset$ DATA $165,215,48,3,32,95,255$ $, 32,222,1 \emptyset 6,32,11,21,32,159$ ,2øø,169,64,32 : REM*178
    $13 \emptyset$ DATA $56,21,32,139,2 \emptyset \emptyset, 169, \emptyset$ $, 32,56,21,32,143,21,169, \emptyset, 1$ $33,251,133,252$ :REM*86
    $14 \emptyset$ DATA $96,32,1 \emptyset 9,21,224,112,1$ $76,31,192,16,176,27,169,1,1$ $33,119,32,122,19 \quad:$ REM*26
    $15 \emptyset$ DATA $76,143,21,32,1 \emptyset 9,21,22$ $4,112,176,1 \emptyset, 169, \emptyset, 133,119$, $32,122,19,76,143 \quad:$ REM*2 $\emptyset$
    $16 \emptyset$ DATA $21,76,4 \emptyset, 125,169, \emptyset, 133$ $, 2 \emptyset 2,169,36,133,2 \emptyset 3,165,251$ $, 16 \emptyset, 3,32,223,2 \emptyset \quad:$ REM*74
    $17 \emptyset$ DATA $165,252,16 \emptyset, 8,32,223,2$ $\emptyset, 165,252,41,7,133,9,169, \emptyset$, $133,1 \emptyset, 32,24 \emptyset, 2 \emptyset \quad:$ REM*156
    $18 \emptyset$ DATA $165,251,41,7,168,185,1$ $\emptyset 8,2 \emptyset 6,133,114,73,255,133,1$ $15,32,254,2 \emptyset, 32$ :REM*1 28
    $19 \emptyset$ DATA $216,2 \emptyset 5,166,119,24 \emptyset, 4$, $5,114,2 \emptyset 8,2,37,115,72,32,25$ $4,2 \emptyset, 1 \emptyset 4,32,2 \emptyset 2 \quad:$ REM*124
    $2 \emptyset$ DATA $2 \emptyset 5,165,119,24 \emptyset, 56,165$ , 251, 74, 74, 74, 24,1Ø9,23,19, $168,132,6,165:$ REM*2ø6 $21 \emptyset$ DATA $252,74,74,74,24,1 \emptyset 9,24$ $, 19,17 \emptyset, 32,24 \emptyset, 255,164,6,32$ $, 249,2 \emptyset 5,164,113 \quad:$ REM* 4
    $22 \emptyset$ DATA $185,92,2 \emptyset 6,133,17,32,2$ $16,2 \emptyset 5,41,224,5,17,133,17,1$ 64,6,32,249,2ø5: REM*134
    23@ DATA $165,17,32,2 \emptyset 2,2 \emptyset 5,96,7$ $6,4 \emptyset, 125,224,112,176,249,19$ $2,16,176,245,32 \quad:$ REM $^{*} 6 \emptyset$ $24 \emptyset$ DATA $118,21,169,1,133,119,3$ $2,41,2 \emptyset, 76,143,21,224,112,1$ $76,228,32,118,21:$ REM*21 $\varnothing$
    $25 \emptyset$ DATA $169, \emptyset, 133,119,32,41,2 \emptyset$ , 76, 143, 21, 165,253,141,21,1 $9,165,254,141,22 \quad:$ REM $* 22$
    $26 \emptyset$ DATA $19,16 \emptyset, \emptyset, 132,25 \emptyset, 132,2$ ø申, 132, 2ø1, 165, 253, 197,251, $176,16,166,251$ :REM*143
    27ø DATA $164,252,165,253,133,25$ $1,165,254,133,252,134,253,1$ 32,254,56,165 :REM*149
    $28 \emptyset$ DATA $253,229,251,133,7,56,1$ $65,254,229,252,133,8,16,11$, $56,165,252,229$ :REM*167
    29@ DATA $254,133,8,169,1,133,25$ $\emptyset, 32,122,19,165,7,197,8,144$ ,58,165,251,197:REM*129
    $3 \emptyset \emptyset$ DATA $253,24 \emptyset, 89,24,165,2 \emptyset \emptyset$, $1 \emptyset 1,8,133,2 \emptyset \emptyset, 165,2 \emptyset 1,1 \emptyset 5, \emptyset$ $, 133,2 \emptyset 1,165,2 \emptyset 1:$ REM*13 31ø DATA $2 \emptyset 8,6,165,2 \emptyset \emptyset, 197,7,14$ $4,24,56,165,2 \emptyset \emptyset, 229,7,133,2$ $\emptyset \emptyset, 165,2 \emptyset 1,233, \emptyset:$ REM*3
    $32 \emptyset$ DATA $133,2 \emptyset 1,165,25 \emptyset, 24 \emptyset, 5$,
    $198,252,76,17 \emptyset, 2 \emptyset, 23 \emptyset, 252,2$ $3 \emptyset, 251,76,1 \emptyset 8,2 \emptyset:$ REM*139
    $33 \emptyset$ DATA $165,252,197,254,24 \emptyset, 31$ $, 24,165,2 \emptyset \emptyset, 1 \emptyset 1,7,133,2 \emptyset \emptyset, 1$ $97,8,144,6,229,8 \quad:$ REM*125
    $34 \emptyset$ DATA $133,2 \emptyset \emptyset, 23 \emptyset, 251,165,25$ $\emptyset, 24 \emptyset, 5,198,252,76,1 \emptyset 8,2 \emptyset, 2$ $3 \emptyset, 252,76,1 \emptyset 8,2 \emptyset \quad:$ REM*191
    $35 \emptyset$ DATA $172,21,19,132,251,172$, $22,19,132,252,96,74,74,74,1$ $33,9,169, \emptyset, 133 \quad:$ REM*91
    $36 \emptyset$ DATA $1 \emptyset, 24,6,9,38,1 \emptyset, 136,16$ $, 248,24,165,9,1 \emptyset 1,2 \emptyset 2,133,2$ Ø2,165,1ф,1ø1 : REM*197
    $37 \emptyset$ DATA $2 \emptyset 3,133,2 \emptyset 3,96,162,18$, $165,2 \emptyset 3,32,2 \emptyset 4,2 \emptyset 5,232,165$, $2 \emptyset 2,76,2 \emptyset 4,2 \emptyset 5 \quad:$ REM*177
    $38 \emptyset$ DATA $162,18,169,36,133,219$, $32,2 \emptyset 4,2 \emptyset 5,232,169, \emptyset, 133,21$ 8,32,2ø4,2Ø5,169 : REM*63
    $39 \emptyset$ DATA $\emptyset, 16 \emptyset, 15,32,2 \emptyset 2,2 \emptyset 5,13$ $6,16,25 \emptyset, 24,165,218,1 \emptyset 5,16$, 133,218,144,237 :REM*233
    $4 \emptyset \emptyset$ DATA $23 \emptyset, 219,165,219,2 \emptyset 1,64$ ,144,229,96,133,112,166,252 , 164,251,24,32:REM*93
    $41 \emptyset$ DATA $24 \emptyset, 255,32,93,21,164,2$ $51,32,23 \emptyset, 2 \emptyset 5,16 \emptyset, 31,165,11$ $2,32,2 \emptyset 2,2 \emptyset 5,23 \emptyset \quad:$ REM*29
    $42 \emptyset$ DATA $112,136,16,246,23 \emptyset, 252$ $, 165,112,2 \emptyset 8,222,96,164,251$ , 32,249,2ø5,165 :REM*2ø7 $43 \emptyset$ DATA $241,16 \emptyset, 31,32,2 \emptyset 2,2 \emptyset 5$, $136,16,25 \emptyset, 96,133,251,134,2$ $52,132,113,76 \quad:$ REM $^{2} 225$
    $44 \emptyset$ DATA $124,21,133,253,134,254$ $, 132,113,72,165,236,133,142$ $, 165,235,133,143 \quad:$ REM $^{*} 237$
    $45 \emptyset$ DATA $1 \emptyset 4,96,169,147,32,21 \emptyset$, $255,76,98,255,166,143,164,1$ 42,24,76,24 $\quad 255$ :REM*87

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    # Snowflake 

    ## Get those snowshovels out-it's a winter wonderland in your C-128.

    Program by IAN ADAM; Article by TIM WALSH

    an Adam wrote the article that orig. inally accompanied the Snowflake 128 program (Listing 1). Unfortunately, the original manuscript and disk vanished, and we can't contact Mr. Adam, who, according to his office colleagues, is vacationing in "the islands." Rather than postpone publication of the program until Ian Adam can be reached, your technical editor has undertaken to write this documentation.

    A program without equal, Snowflake 128 lets you design snowflakes in 40 Column mode on the C-128. Type it in, using 128 Perfect Typist, and save it to disk before running it. Next, run it and, after the introductory snowflake appears, try your hand at custom designing snowflakes on the screen. A menu at the bottom of the screen lets you print them out on any Star Micronics or Epson-compatible printer.

    Snowflake 128 also has the advantage of letting you enjoy the beauty of snowflakes any time of the year, regardless of where you live. If you live in a snow-
    

    Sample screen from Snowflake 128.
    belt region, you can hold contests to see who can design the most elegant snowflake. The prize could be a day off from shoveling.

    Of course, if you live in Hawaii or Bermuda, such contests aren't very practical. In that case, on a warm January afternoon, when the tropical breezes are gently swaying the palm
    
    trees, go inside and boot up Snowflake 128. And, as you're creating those lovely snowflakes, picture the RUN staff up in New Hampshire, buried under tons of white stuff, and try not to laugh. $\mathbb{R}$

    Ian Adam has authored several programs for RUN; Technical Editor Tim Walsh spends days and evenings with computers.

    ## Listing 1. Snowflake 128 program.

    $\emptyset$ REM SNOWFLAKE 128 BY IAN ADAM :REM*7
    $1 \emptyset$ PRINT" ${ }^{\prime \prime}$ SHFT CLR\}" :REM* ${ }^{\prime \prime}$
    $2 \emptyset$ GOSUB $111 \emptyset$, SETUP: GOSUB $7 \emptyset \emptyset, D$ EMO :REM*14
    $3 \emptyset$ DO :REM*2ø6
    $4 \emptyset$ TRAP $7 \emptyset:$ GOSUB $8 \emptyset: R^{\circ}$ * 62
    $5 \emptyset$ ON INSTR("ACPQ",M\$) GOSUB 12 Ø, 26 $\quad$ : $65 \emptyset, 67 \emptyset$ REM*246
    $6 \emptyset$ LOOP :REM*24
    $7 \emptyset$ CLR: GOSUB $122 \emptyset:$ GOTO $3 \emptyset$ :REM*15
    $8 \emptyset$ GRAPHIC $2,23:$ REM*2 24
    $9 \emptyset$ PRINT"A AUTOMATIC\{3 SPACEs\}C CUSTOM FLAKE" :REM*2ø8
    $1 \emptyset \emptyset$ PRINT"P PRINT THIS $\{2$ SPACES \}Q CANCEL ORDER $\{2$ SPACEs $\} C H$ OICE"; :REM*19Ø
    

    ```
    24\emptyset IF SP(I)+SZ(I)>LA THEN SP(I
    )=\emptyset :REM*212
    25\emptyset BEND :REM*19\emptyset
    255 NEXT:GOTO 76\emptyset :REM*255
    26\emptyset GRAPHIC 2,1,13:SCALE 1,999,
    8\emptyset\emptyset :REM*43
    27\emptyset PRINT"CUSTOM SNOWFLAKE DESI
    GN" :REM*255
    28\emptyset PRINT"{CRSR DN}DESCRIBE THE
        SHAPES THAT" :REM*135
    29\emptyset PRINT"YOU WANT ON EACH ARM:
                            :REM*193
    3\emptyset\emptyset COLOR 1,4:NS=\emptyset :REM*2\emptyset7
    31\emptyset FOR I=-3 TO 3:LOCATE X+I,Y:
        DRAW TO LA;\emptyset:NEXT :REM*251
    32\emptyset FOR I=1 TO 9 :REM*169
    33\emptyset TRAP 33\emptyset:PRINT" {CRSR DN}SHA
        PE #"I :REM*187
    ```


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    34ø PRINT＂1 12 SPACEs \} CHEVRON": P RINT＂2（2 SPACES）HEXAGON＂：PR INT＂3（2 SPACEs）BRANCHES＂：PR INT＂4\｛2 SPACES\}STAR"
    ：REM＊177
    35 $\emptyset$ PRINT＂$\emptyset(2$ SPACES $\}$ FINISHED＂： INPUT＂ENTER Ø TO 4＂；D
    ：REM＊97
    $36 \emptyset \operatorname{SD}(\mathrm{I})=\mathrm{D}: \mathrm{IF}$ D＜1 THEN $\mathrm{I}=9:$ GOT －49ø ：REM＊241
    $37 \emptyset$ INPUT＂$\{$ CRSR DN $\}$ DISTANCE FRO M MIDDLE $\emptyset-28 \emptyset^{\prime \prime}$ ；A ：REM＊79
    $38 \emptyset \mathrm{SP}(\mathrm{I})=\mathrm{ABS}(\mathrm{A}): \mathrm{IF} \quad \mathrm{A}>28 \emptyset$ THEN $37 \emptyset$
    ：REM＊247
    39ø PRINT＂$\{$ CRSR DN $\}$ COLOR OF THI S SHAPE， 1 TO 16：＂：REM＊163
    $4 \emptyset \emptyset$ INPUT＂$\left(\begin{array}{llllll}2 & 4 & 7 & 14 & 15 & \text { ARE BEST }\end{array}\right.$ ）＂；A ：REM＊225
    $41 \emptyset \operatorname{SC}(I)=((A-1)$ AND 15$)+1$ ：REM＊169
    $42 \emptyset B=L A-S P(I): I F B>2 \emptyset \emptyset$ THEN $B=$ 4ø日－B ：REM＊21
    $43 \emptyset$ PRINT＂$\{$ CRSR DN $\}$ SIZE，RANGE＂ 2め＂TO＂В ：REM＊87
    $44 \emptyset$ INPUTL：$S Z(I)=L: I F L<2 \emptyset$ OR L $>B$ THEN $43 \emptyset$
    ：REM＊1 ${ }^{\text {® }}$
    45 ON D GOSUB $54 \emptyset, 57 \emptyset, 61 \emptyset, 61 \emptyset$ ：REM＊141
    $46 \emptyset \mathrm{LL}=\mathrm{SV}(\mathrm{I}): \mathrm{D}=\emptyset: \mathrm{B}=\mathrm{L} / 2: \mathrm{NS}=\mathrm{I}: \mathrm{COL}$ OR 1，SC（I）：LOCATE X，Y
    ：REM＊1 $\emptyset 9$
    47ø LOCATE SP（I）；D ：REM＊195
    $48 \emptyset$ ON SD（I）GOSUB $9 \emptyset \emptyset, 93 \emptyset, 1 \emptyset 2 \emptyset$ ，1ø7ø
    49Ø NEXT
    ：REM＊1 ${ }^{\text {® }} 3$
    ：REM＊245
    $5 \emptyset$ IF NS $=\emptyset$ THEN RETURN：REM＊143
    $51 \emptyset$ INPUT＂（CRSR DN\}SNOWY BACKDR OP Y／N＂；M\＄
    ：REM＊167
    $52 \emptyset \mathrm{BG}=\mathrm{M} \$=$＂ $\mathrm{Y} " \quad:$ REM＊228
    $53 \emptyset$ GOTO $76 \emptyset \quad:$ REM＊9 4
    $54 \emptyset$ INPUT＂$\{$ CRSR DN\}LENGTH OF CH EVRON＂；A ：REM＊186
    55＠ $\operatorname{SV}(I)=\operatorname{ABS}(A): I F A>B$ THEN 54 $\emptyset$
    56 RETURN ：REM＊24

    57日 INPUT＂（CRSR OR 2＂；A

    REM＊126
    $58 \emptyset \operatorname{SV}(\mathrm{I})=\mathrm{L} /(1-(\mathrm{A}) 1)):$ REM＊12 $\emptyset$
    59ø L＝L＊3：SZ（I）$=\mathrm{L}$
    $6 \emptyset$ RETURN
    ：REM＊74
    610 PRINT＂（CRSR HOW MANY OF THESE＂：REM＊2
    $62 \emptyset$ INPUT＂1 TO $3^{\prime \prime}$ ；A ：REM＊1 $\varnothing 4$
    630 $\operatorname{SV}(I)=A$ AND $3:$ REM＊54
    $64 \emptyset$ RETURN
    65 GRAPHIC 1 ：REM＊188
    $66 \emptyset$ OPEN 4，4，5：CMD4：PRINTCHR $\$ 1$ ø）：SYS29øø：PRINT\＃4：CLOSE4：R ETURN
    ：REM＊5 $\emptyset$
    $67 \emptyset$ GRAPHIC $\emptyset, 1$ ：REM＊134
    $68 \emptyset \mathrm{M} \$=$＂HAPPY SHOVELING！＂：GOSUB $146 \emptyset:$ REM＊23 $\varnothing$
    69 END ：REM＊182
    $7 \emptyset \mathrm{NS}=3: \mathrm{BG}=1 \quad: \mathrm{REM} * 7 \emptyset$
    $71 \emptyset \operatorname{SD}(1)=1: S D(2)=2: S D(3)=3$ ：REM＊22 ${ }^{\text {R }}$
    $72 \emptyset \mathrm{SP}(1)=55: \mathrm{SP}(2)=4 \emptyset: \mathrm{SP}(3)=25 \emptyset$ ：REM＊21 $\emptyset$
    $73 \emptyset \mathrm{SZ}(1)=55: \mathrm{SZ}(2)=28 \emptyset: \mathrm{SZ}(3)=9 \emptyset$
    ：REM＊1 32
    $74 \emptyset \operatorname{SV}(1)=25: \operatorname{SV}(2)=5 \emptyset: \operatorname{SV}(3)=2$
    ：REM＊134
    $75 \emptyset \operatorname{SC}(1)=4: \operatorname{SC}(2)=4: \operatorname{SC}(3)=2$
    ：REM＊238
    $76 \emptyset$ GRAPHIC 1，1：SCALE 1，999，8øø ：REM＊18
    $77 \emptyset$ IF BG THEN COLOR 1，2：FOR $I=$ ø TO 24：CHAR，RND（ $\varnothing$ ）＊39， $1,{ }^{\prime *}$ ＂：NEXT ：REM＊127
    $78 \emptyset$ FOR HEADING $=\emptyset$ TO $3 \emptyset \emptyset$ STEP 6 $\emptyset$
    790 COLOR 1,4
    $8 \emptyset \emptyset$ FOR $I=\emptyset$ TO 3：LOCATE $X, Y$ ：DRA W TO $3 ; I * 9 \emptyset:$ DRAW TO LA；HE：N EXT
    ：REM＊71
    81ø FOR SHAPE＝1 TO NS ：REM＊125
    $82 \emptyset \mathrm{~L}=\mathrm{SZ}(\mathrm{SH}): \mathrm{LL}=\mathrm{SV}(\mathrm{SH}):$ REM＊1 $\emptyset 9$
    $83 \emptyset D=H E: B=L / 2$
    840 COLOR 1 SC（SH）
    850 ：REM＊
    86Ø LOCATE SP（SH）；D：REM＊75
    $87 \emptyset$ ON SD（SH）GOSUB $9 \emptyset \emptyset, 93 \emptyset, 1 \emptyset 2$ $\emptyset, 1 \varnothing 7 \emptyset$
    ：REM＊163
    88ø NEXT：NEXT ：REM＊119
    89ø RETURN ：REM＊183
    9øø DRAW TO L；D＋3øø：DRAW TO LL； D：DRAW TO L；D＋12ø：DRAW TO L ；D＋6 $\emptyset$
    ：REM＊245
    $91 \emptyset$ DRAW TO LL；D＋18 $\quad$ DRAW TO L； $\mathrm{D}+24 \emptyset \quad:$ REM＊245
    $92 \emptyset$ RETURN ：REM＊213
    $93 \emptyset$ IF L＜LL THEN DRAW TO L；D：RE TURN ：REM＊79
    $94 \emptyset \mathrm{~L}=\mathrm{L} / 4: \mathrm{D} 2=\mathrm{D}$ ：REM＊177
    95ø GOSUB 93ø ：REM＊243
    $96 \emptyset$ FOR $D=D+3 \emptyset \emptyset$ TO $D+3 \emptyset \emptyset$ STEP 6 $\emptyset$
    97ه COSUB 930
    970 930
    980 NEXT ：REM＊225
    99ø DRAW TO L＊3；D＋6Ø ：REM＊87
    1 （ø L＝L＊4：D＝D2 ：REM＊135
    $1 \emptyset 1 \emptyset$ RETURN ：REM＊47
    $1 \emptyset 2 \emptyset$ FOR $J=1$ TO LL：$D=D+6 \emptyset:$ GOSUB $1 \emptyset 4 \emptyset: \mathrm{D}=\mathrm{D}+24 \emptyset:$ GOSUB $1 \emptyset 4 \emptyset$ ：D $=D-3 \emptyset \emptyset:$ DRAW TO B；D：REM＊237
    1 1 $3 \emptyset$ NEXT：RETURN
    ：REM＊2ø6
    $1 \emptyset 4 \emptyset$ DRAW TO L；D：DRAW TO B；D－6 $\emptyset$ ：DRAW TO B；D＋12ø：DRAW TO B ；D＋6ø：DRAW TO B；D＋24ø
    ：REM＊198
    $1 \emptyset 5 \emptyset$ DRAW TO B；D：DRAW TO L＋B；D＋ $18 \emptyset$
    ：REM＊166
    $1 \emptyset 6 \emptyset$ RETURN ：REM＊98
    $1 \varnothing 7 \emptyset$ LOCATE L；D＋6ø：WIDTH 2
    ：REM＊214
    $1 \emptyset 8 \emptyset$ FOR $J=1$ TO LL：DRAW TO L＊2； D＋24ø：LOCATE L；D：DRAW TO L ＊2；D＋12ø：LOCATE L＋B；D ：REM＊76
    $1 \emptyset 9 \emptyset$ NEXT
    $11 \emptyset$ WIDTH 1：RETURN
    $111 \varnothing$ GOSUB $122 \emptyset$ ：REM＊8 $\emptyset$ ：REM＊44
    $113 \emptyset$ GOSUB $146 \varnothing$ ，MESSAGE：REM＊1 $\varnothing 4$
    $114 \emptyset$ LOOP UNTIL LEFT\＄（MS，3）＝＂EN D＂
    ：REM＊122
    $115 \emptyset$ FOR I＝29øø TO 2981 ：REM＊96
    $116 \emptyset$ READ A：POKE I，A：NEXT
    $17 \emptyset$ INPUT MS ：REM＊114
    $118 \emptyset$ FOR $\mathrm{I}=1$ TO 25 ：REM＊188
    $119 \emptyset$ PRINTCHR\＄（27）＂W（HOME）＂TAB（ RND（申）＊39）＂＊＂
    ：REM＊6
    $12 \emptyset \emptyset$ NEXT
    ：REM＊19ø
    $121 \emptyset$ CHAR，$\varnothing, 24:$ RETURN $:$ REM＊44
    $122 \emptyset$ COLOR $\emptyset, 1$ ：COLOR 4，7
    ：REM＊188
    $123 \emptyset \mathrm{X}=499: \mathrm{Y}=4 \emptyset \emptyset: \mathrm{LA}=33$ ด ：REM＊26
    $124 \emptyset \mathrm{G} \$=\mathrm{CHR} \$(7):$ PRINTG $\$:$ REM＊ 1 （ 2
    $125 \emptyset$ FOR $I=\emptyset$ TO $4:$ READ C（I）
    ：REM＊$\emptyset$
    $126 \emptyset$ NEXT：RETURN ：REM＊18 1
    $127 \emptyset$ DATA $2,4,7,14,15$ ：REM＊ 4
    $128 \emptyset$ DATA＂$(C R S R$ DN $)$ DATELINE：＂
    ：REM＊211
    $129 \emptyset$ DATA＂$(3$ SPACEs $\}$ BAFFIN ISLA ND，NORTHWEST TERRITORIES＂
    ：REM＊1 11
    $13 \emptyset$ DATA＂$(3$ SPACES）DECEMBER 25 1987＂
    ：REM＊123
    $131 \emptyset$ DATA＂$\{$ CTRL 4\}\{CRSR DN\}YOUR ORDER OF SNOWFLAKES IS AL MOST＂
    ：REM＊87
    $132 \emptyset$ DATA＂READY．DUE TO PRODUCT ION LIMITATIONS，＂：REM＊2ø5
    $133 \emptyset$ DATA＂NO TWO WILL BE ALIKE． ：REM＊243
    $134 \emptyset$ DATA＂ （CRSR DN $\}$ YOU CAN DESI GN CUSTOM FLAKES，OR＂
    ：REM＊189
    $135 \emptyset$ DATA＂SELECT A RANDOM AVALA NCHE．＂
    ：REM＊119
    $136 \emptyset$ DATA＂（CRSR DN $\}$ SNOWFLAKES C AN BE DELIVERED TO AN＂ ：REM＊187
    $137 \emptyset$ DATA＂EPSON／STAR COMPATIBLE PRINTER，＂：REM＊251
    $138 \emptyset$ DATA＂TO CUT OUT \＆COLOR．＂
    ：REM＊121
    $139 \emptyset$ DATA＂$\{$ CTRL 2$\}\{$ CRSR DN $\}$ PRES S RETURN FOR SNOW．．．＂
    ：REM＊137
    $14 \emptyset \emptyset$ DATA＂END OF MESSAGE．＂
    ：REM＊113
    $141 \emptyset$ DATA $16 \emptyset, 32,132,251,16 \emptyset, \emptyset, 1$ $32,25 \emptyset, 16 \emptyset, 25,132,252,16 \emptyset$ ， $\emptyset, 185,157,11,32,21 \emptyset:$ REM＊57
    142ø DATA255，2øø，192，9，2ø8，245， $16 \emptyset, 4 \emptyset, 132,253,16 \emptyset, 7,177,2$ $5 \emptyset, 162,7,42,118,166$
    ：REM＊177
    $143 \emptyset$ DATA2ø2，16，25ø，136，16，243， $169,7,17 \emptyset, 56,1 \varnothing 1,25 \emptyset, 133,2$ 5ø，144，2，23ø，251 ：REM＊37
    $144 \emptyset$ DATA $181,166,32,21 \emptyset, 255,2 \emptyset 2$ ，16，248，198，253，2ø8，217，19 8，252，2ø8，196，96 ：REM＊147
    $145 \emptyset$ DATA $27,65,8,13,1 \emptyset, 27,75,64$ ， 1
    ：REM＊197
    $146 \emptyset$ FOR $\mathrm{I}=1$ TO LEN（M\＄）：REM＊3
    $147 \emptyset$ PRINT＂ （CTRL 9\}* （CRSR LF $\}$（C TRL $\emptyset)^{\prime \prime} ;:$ SOUND1， $6 \emptyset \emptyset \emptyset \emptyset, 1$, ， ，3 ：REM＊235
    $148 \emptyset$ PRINTMID $\$(M \$, I, 1) ;: J=4:$ NEX $T$ ：REM＊31
    $149 \emptyset$ PRINT G $\$: J=81:$ RETURN
    ：REM＊227

    # Superscript Solution <br> If your printer could not produce superscripts with RUN Script before, it can do so now with this technique. 

    ## By CHARLES LEWIS

    0ne of the advantages of RUN Script, RUN's word processor for the C-64 and C-128 (March and December 1986 issues), is its provision for sending special formatting commands to the printer, using macro characters. These characters are created by the Define Macros accessory program to RUN Script (April 1986 and January 1987 issues).

    One application of this feature is printing superscripts-characters raised above the baseline of the type, as in footnote references. However, Define Macros can't produce superscripts if your printer doesn't support superscripts and subscripts, which is true of many letter quality printers and some of the less expensive dot matrix printers.
    When you need to print out a document that includes footnotes, this limitation is a real problem, because it leaves no way to include the footnote reference numbers in the text. There is a way around this problem, however, using RUN Script's option to print to disk rather than to the printer. Printing your document to disk will create a sequential file with blank lines between the text lines. When you read the file back into memory, the blank lines will appear on the screen, and you can use them to set up footnote reference numbers, using the procedure described below. The final printout of your document will be double-spaced, with the footnote numbers located in the intervening lines. This technique works with RUN Script and virtually any printer.

    ## The Procedure

    To create the footnote numbers, first type in the text of your document with the numbers included as normal numbers in the text lines. Place each number immediately after the preceding letter or punctuation mark; don't leave any space between.

    When you've finished entering the - www.Commodore.ca
    
    
    document, use the RUN Script dot commands to set the margins as you normally would and to specify double spacing (i.e., .ls1).
    Now print out your document and proofread it. Be sure to read carefully so you'll catch everything you might want to change, because making any changes later will be difficult.

    Once you're satisfied with the document, press F1 and P to print. Normally you'd print to device 4 or 5 , the printer, but this time you must print to device 8 or 9 , the disk drive. When prompted for a filename, add, w to the name (filename,w), so RUN Script won't try to read the file instead of writing it and give you a File Not Found error. You'll end up with a "printed" sequential file on disk.
    Now enter F1 and R to read the file back into memory. If you're using RUN Script 128 and an 80 -column screen, the document will appear as it will print out-double-spaced, with the left and right margins set properly. If you're using RUN Script 64, the display won't resemble the printout, because the screen is only 40 columns wide. However, there will be a blank line between each two display lines of text.

    Move the cursor to the carriage re-
    turn on the blank line above the first text line containing a footnote number. Switch to Insert mode and use the space bar to insert spaces until the cursor is immediately above the number. Then type the number on the blank line.

    Now switch out of Insert mode, move the cursor to the original number and use the space bar to erase it. Don't use the delete key, or you might change the margins and end up with the footnote number over a letter rather than over a space.
    RUN Script 64 users must bear in mind that if the original number appears in the second line of text, after the wraparound, enough spaces must be inserted to create a second blank line, as below:

    1

    ## 2-

    This is material that has been printed in the manner indicated. When it is

    ## 3

    $$
    4-
    $$

    printed, footnotes will be located in the right places.
    Continue this process for each footnote number. Unless you have a lot of numbers in the text itself, you can save time by using the F2 search-and-replace function to locate the original numbers.

    Once you've finished making the changes, move to the top of the document and set the margins as follows:
    . $\mathrm{m} 1 . \mathrm{rml}$.tml.bml
    These settings will keep RUN Script from changing the margins that were set when you printed to disk earlier.

    Now save the revised document and print it. The footnote numbers will be placed in their correct locations, above the text lines.

    Charles Lewis is a high school English teacher. He programs computers and writes in his free time.

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    # The Commodore 1351 mouse, Berkeley's geoPrint Cable and the Tymac Connection all work with GEOS—to varying degrees. 

    By MATTHEW STERN

    Ihad hoped to review a new GEOS. compatible education program this month, but my computer system had other ideas-both my 1541 disk drive and my RGB monitor called in sick. I depend on my computer a lot, so it's frustrating when it doesn't work right.

    With hardware problems on my mind, I decided to show you how to avoid difficulties with the new Commodore 1351 mouse. I'll also review Berkeley Softworks' first hardware product, the geoPrint Cable, and dip into the geoWatch mail bag for information from a reader on another GEOS-compatible printer interface.

    ## GEOS AND THE 1351 MOUSE

    I bought my Commodore 1351 mouse two months ago, and so far, I've been quite pleased with it. It's very responsive, and its sculpted case fits well in my hand.

    As you'd expect, the mouse's proportional movement helps me create better geoPaint pictures, but I've also found that its design helps me with geoWrite. Instead of taking both hands off the keyboard to reach for the joystick, I can keep one hand on the keys and move the mouse with the other. Since I've used other mouse-controlled machines like the Apple Macintosh and the Atari ST, I'm accustomed to this technique and find it a more comfortable way to write.

    I have only one warning about the 1351 and GEOS: Don't use the driver installation program included with the mouse! That program has bugs, and some users have told me it can render a GEOS boot disk useless. A safer and easier way to configure GEOS for the 1351 is to copy the drivers to your boot disk, using the following procedure:

    1. Check the back of your newer GEOS disks (Writer's Workshop, geoFile, and so forth) for the Commodore 1351 mouse driver and deskTop 1.3. (These files are also available on QuantumLink.) You need deskTop 1.3 to use the 1351; the mouse driver won't work with deskTop 1.2 .
    2. Plug your joystick into port 1 and boot GEOS, then use the Backup pro-
    gram to copy the files on your GEOS boot disk to another disk. Backup is designed especially for this purpose. You can't boot the copy, but you can use it to restore the files back to your boot disk, if necessary. You should always make a copy of the files on your boot disk before modifying them.
    3. Throw the old deskTop icon into the trash can icon and copy the deskTop 1.3 icon to your boot disk.
    4. Copy the Commodore 1351 driver to your boot disk, so it's the first input device driver listed in your disk notepad.
    5. Quit GEOS and turn off your machine, then plug your 1351 mouse into port 1. (Never plug or unplug any peripherals while the computer is on.) Then run GEOS. The 1351 driver will come up as the default, and your mouse will be ready to go.

    ## The geoprint Cable

    So far, I've been generally impressed with Berkeley's software. However, I have reservations about their first hardware release-the geoPrint Cable.

    The cable arrived in my mailbox just as my three-year-old Cardco Card?/G + interface decided to take an extended convalescence. Since I was stuck without a printer interface, I decided to give the geoPrint Cable a try.

    The cable itself seems well made. It's six feet long, so your printer doesn't have to be right next to your computer. There's a metal Centronics parallel printer connector at one end and a plastic connector for Commodore's user port at the other. The user port connector has a plastic tab, so it fits only one way and you can't accidentally stick it into your computer upside down. There's no interface box, so you don't have to worry about any circuitry failing on you, either.

    The geoPrint Cable comes with a disk of printer drivers. You select the appropriate driver for your printer and copy it to your boot and work disks. A one-page sheet serves as the user's manual, but I didn't really need it to set up the cable with GEOS. There's no need to fiddle with switch settings, nor
    to turn the linefeed on or off.
    The cable works well with GEOS, printing my files flawlessly. As for Berkeley's claim that it "speeds up your printing process," my data seems to go to the printer slightly faster with the geoPrint cable than with my Cardco $G+$, but not much. (If the cable had a printer buffer on it, the story would be different.)

    If GEOS were the only program I used on my Commodore, I might be completely satisfied with the geoPrint Cable. However, this is not the case. For example, I do word processing with PaperClip II.

    Here, the documentation sheet leaves me completely on my own, and I've found that I can't just choose parallel as my printer port selection and start printing. I first have to initialize the user port by selecting RS- 232 for printer type and pressing the Print command. At this point, the file will preview on the screen, but it still won't print, so I have to go back and change the printer port to parallel and print again. This configuration routine is a kludge, but it's the only way I can use the geoPrint Cable with PaperClip II.
    The cable won't work at all with programs that send printer output only to device 4 . Also, if your program requires Commodore 1525/MPS-801 printer commands and characters, forget it. The geoPrint Cable can't do 1525 emulation.

    You can't use the cable with programs that call for a modem, either, since both devices plug into the user port. Therefore, you can't use your printer with geoDex and QuantumLink. Whenever you have the geoPrint Cable plugged in and need to use your modem, you have to unplug the cable and plug in your modem interface. Not only is this inconvenient, but it can wear out the user port connectors.

    The geoPrint Cable's redeeming features are that it's easy to install, it works well with GEOS and it seems a little faster and more reliable than the average printer interface. However, I don't recommend it if you're an average

    Commodore user, especially if you have a modem. A better choice would be a serial printer interface with a buffer.

    ## An Interface Alternative

    One printer interface you might want to consider is the Tymac Connection.

    SteveE4 on QuantumLink reports that this interface is compatible with GEOS, and he explains that to use it, you need to "send some commands to take care of some defaults." Steve wrote this short program to set up the necessary configuration:

    ## 1 REM TYMAC CONNECTION INTER FACE PROGRAM FOR GEOS <br> 2 REM BY STEVEE4

    10 OPEN 1,4: REM OPEN PRINTER CHANNEL FOR DEVICE 4
    20 PRINT \#1,CHR\$(27)"W"CHR\$(00): REM TURN OFF WIDTH DEFAULT
    30 PRINT \#1,CHR\$(27)"L": REM TURN OFF AUTO LINEFEED
    40 PRINT \#1,CHR\$(27)"*6": REM LOCK INTO TRANSPARENT MODE

    ## Coming Up: GEOS Holiday Shopping Guide

    Do you have a GEOS user on your holiday shopping list, or do you want to drop some hints for yourself? Next month, I'll give you some suggestions for distinctly GEOS gifts. You'll find
    stocking stuffers, books, hardware and last-minute holiday goodies. Keep watching!

    The monthly geoWatch column addresses the needs of RUN readers who use GEOS, Berkeley Softworks' alternative operating system for the C-64 and C-128. Your questions and comments are welcome. Send them to:

    Matthew Stern geoWatch<br>RUN Magazine<br>80 Elm St.<br>Peterborough, NH 03458

    You can also contact Matthew Stern on Q-Link. His online name is Matt S3.
    

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    # Easy Applications 

    ## SUPER SORT: Sort your string, floating point or integer arrays in the wink of an eye.

    By MICHAEL BROUSSARD

    If you write Basic programs, sooner or later you'll be faced with the chore of sorting arrays-lists of names, for example. My all-purpose sorter, called Super Sort, can be used as a subroutine in your own programs to sort any type of array.

    Super Sort is short (only 332 bytes) and fast, especially when sorting large numbers of strings. In one test I ran, Basic took nearly 29 minutes to sort 600 strings, while Super Sort did them in 41 seconds-42 times faster than Basic! Table 1 shows the relative speed of Su per Sort compared to Basic when sorting various lists of 600 elements.

    For a demonstration of Super Sort, type in the program in Listing 1, using 64 Perfect Typist. Be sure to save a copy to disk before you run it, because the program is sensitive to typing errors. A single mistake could lock up the computer, and you'd lose the program.

    Line 100 is the important part of the program; it pokes the machine language subroutine into the proper memory locations. The Data statements numbered $1000-1180$ define the subroutine. To use the sort, these lines must be included in your own program.

    Once it's been poked into memory, the sort is invoked with a SYS statement like this:

    ## SYS SRT,X(1),100

    SRT represents the starting address of the machine language subroutine (in either variable or numeric form); $\mathrm{X}(1)$ means the sort should start with the first element of the array; and 100 indicates the number of elements in the array.

    To sort only part of the array, use a statement like the following:

    ## SYS SRT,X(21),10

    This example would sort elements 21-30.

    For Super Sort to work properly, you must specify which element of the array
    
    it should start with, because X and $\mathrm{X}(1)$ are different variables as far as Basic is concerned. One is a single floating. point variable, and the other is an array. Attempting to sort a nonarray value may corrupt other variables in your program, and even lock up the computer.

    Similarly, don't try to sort 200 elements of an array dimensioned for 100 elements. Super Sort will obligingly attempt to sort past the end of the array, with potentially disastrous results.

    If you're sorting an array of strings, you can specify which character of the

    ## COMMODORE COMPUTERS

    

    ## $=1-800-345-5080$

    ## EASYAPPLICATIONS

    string should be the starting point for comparison．For example，

    SYS SRT，X\＄（1），100，3
    specifies that the first 100 elements of array $\mathrm{X} \$$ are to be sorted，beginning with the third character of each string． Any strings less than three characters long are sorted to the beginning of the array in arbitrary order．If you don＇t specify a starting character position for the sort，Super Sort defaults to the first character．Bear in mind that the con－ cept of starting position holds true only for string arrays．The following state－ ment will generate a syntax error，be－ cause N is not a string array：

    Table 1．Speed comparison，in minutes and seconds，between Basic and Super Sort，sorting lists of $\mathbf{6 0 0}$ elements．

    | Element type | Basic | Super Sort |
    | :--- | :--- | :--- |
    |  |  |  |
    | String | $28: 42$ | $00: 41$ |
    | Floating Point | $25: 46$ | $02: 45$ |
    | Integer | $26: 58$ | $03: 34$ |

    ## SYS SRT，N（I），100，2

    As a bonus，Super Sort is completely
    relocatable．You can place it anywhere in memory just by changing the value assigned to SRT on line 100 ．Just be sure to use a memory location that doesn＇t interfere with Basic．

    To keep Super Sort as short as pos－ sible，I used many subroutines that are part of the C－64＇s Basic ROM．For this reason，the program will run only on a C－64（or a C－ 128 in 64 mode）．It uses the following zero－page locations for temporary storage： $7,8,20,21,25-32$ and 251－254．R

    Michael Broussard is a systems engineer for Stratus Computer，a manufacturer of fault－tolerant super－minicomputers．

    ## Listing 1．Super Sort program．

    $\emptyset$ REM SORTER PROGRAM BY M．BROU SSARD
    ：REM＊15 $\emptyset$
    1 $\emptyset$ SRT $=5 \emptyset \emptyset \emptyset \emptyset: F O R K=S R T T O S R T+331$
    ：READN： $\mathrm{C}=\mathrm{C}+\mathrm{N}$ ：POKEK， $\mathrm{N}:$ NEXT ：REM＊1 月 $^{4}$
    $11 \emptyset$ IF C $<>42632$ THEN PRINT＂ERRO R IN DATA STATEMENTS！＂：END ：REM＊234
    $12 \emptyset$ DIM X\＄（1申），X\％（1ф），X（1ø）
    ：REM＊134
    $13 \emptyset$ PRINT＂$\{$ SHFT CLR\}PRESS ANY K EY TO SEE STRING SORT＂ ：REM＊92
    $14 \emptyset$ GETA $:$ IF $A \$=" "$ THEN $14 \emptyset$ ：REM＊18
    $15 \emptyset$ PRINT＂$\{$ CRSR DN $\}$ THE UNSORTED STRINGS ARE：＂：REM＊62
    $16 \emptyset$ FOR K＝1 TO $1 \emptyset:$ READ $X \$(K)$ ：PRINT TAB $(1 \emptyset) ; \mathrm{X} \$(\mathrm{~K})$ ：NEX T K
    ：REM＊162
    $17 \emptyset \operatorname{SYS} \operatorname{SRT}, \mathrm{X} \$(1), 1 \emptyset: R E M * 28$
    $18 \emptyset$ PRINT＂THE SORTED STRINGS AR E：＂：REM＊54
    $19 \emptyset$ FOR $\mathrm{K}=1$ TO $1 \emptyset: \operatorname{PRINT}$ TAB（1 Ø）；X\＄（K）：NEXT K ：REM＊22
    $2 \emptyset \emptyset$ PRINT＂$\{C R S R$ DN\}PRESS ANY KE Y TO SEE INTEGER SORT＂ ：REM＊11ø
    $21 \emptyset$ GETA\＄：IF A\＄＝＂＂THEN $21 \emptyset$ ：REM＊182
    $22 \emptyset$ PRINT＂$\{$ CRSR DN $\}$ THE UNSORTED INTEGERS ARE：＂：REM＊166
    $23 \emptyset$ FOR K＝1 TO $1 \emptyset:$ READ X\％（K） ：PRINT TAB $(1 \emptyset) ; \mathrm{X} \mathrm{\&}(\mathrm{K}):$ NEX T K
    ：REM＊25
    $24 \emptyset$ SYS SRT，X\％（1），1ø：REM＊1 $\emptyset \emptyset$
    $25 \emptyset$ PRINT＂THE SORTED INTEGERS A RE：＂：REM＊66
    $26 \emptyset$ FOR $K=1$ TO $1 \emptyset: \operatorname{PRINT}$ TAB（1 （）；X\％（K）：NEXT K ：REM＊95
    $27 \emptyset$ PRINT＂$\{C R S R$ DN\}PRESS ANY KE Y TO SEE FLOAT NUMBER SORT＂ ：REM＊2め7
    28め GETA\＄：IF A\＄＝＂＂THEN $28 \emptyset$ ：REM＊191
    $29 \emptyset$ PRINT＂$\{$ CRSR DN $\}$ THE UNSORTED FLOAT VALUES ARE：＂：REM＊177
    $3 \emptyset \emptyset$ FOR $K=1$ TO $1 \emptyset: \operatorname{READ} X(K):$ PRINT TAB $(1 \emptyset) ; X(K): N E X T$ K
    ：REM＊19
    $31 \emptyset$ SYS SRT，X（1），1ø ：REM＊221
    $32 \emptyset$ PRINT＂THE SORTED FLOAT VALU ES ARE：＂
    ：REM＊69
    33Ø FOR $K=1$ TO $1 \emptyset: \operatorname{PRINT}$ TAB（1 $\emptyset) ; X(K): N E X T K \quad$ ：REM＊ $2 \emptyset 7$ $34 \emptyset$ PRINT＂$\{$ CRSR DN\}PRESS ANY KE Y TO SEE OFFSET STRING SORT ＂ ：REM＊19 $35 \emptyset$ GETA\＄：IF A\＄$=" \prime$＂THEN $35 \emptyset$ ：REM＊1ø1
    36 INPUT＂SORT ON WHICH CHARACT ER＂；N
    ：REM＊189
    $37 \emptyset$ PRINT＂$\{$ CRSR DN $\}$ THE UNSORTED STRINGS ARE：＂：REM＊27
    $38 \emptyset$ FOR K＝1 TO $1 \emptyset: \operatorname{READ} \mathrm{X} \$(\mathrm{~K})$ ：PRINT TAB（1 $) ; \mathrm{X} \$(\mathrm{~K}):$ NEX T K ：REM＊127 $39 \emptyset$ SYS SRT，X\＄（1），1ø，N：REM＊93
    $4 \emptyset \emptyset$ PRINT＂THE SORTED STRINGS AR E：＂：REM＊19 $41 \emptyset$ FOR $\mathrm{K}=1$ TO $1 \emptyset: \operatorname{PRINT}$ TAB（1 Ø）$; \mathrm{X} \$(\mathrm{~K}):$ NEXT $K$ ：REM＊243 $1 \emptyset \emptyset \emptyset$ DATA $32,253,174,32,139,176$ ，133，251，132，252，165，13，2ø $1,255,24 \emptyset, 12,165:$ REM＊1 17
    $1 \emptyset 1 \emptyset$ DATA $14,2 \emptyset 8,4,169,5,2 \emptyset 8,6$ ， $169,2,2 \emptyset 8,2,169,3,133,53,3$ $2,121, \emptyset, 2 \emptyset 1,44$ ：REM＊67
    $1 \emptyset 2 \emptyset$ DATA $24 \emptyset, 9,162,11,2 \emptyset 8,2,16$ $2,14,76,55,164,32,131,174$ ， $32,17 \emptyset, 177,2 \emptyset 1 \quad:$ REM＊81
    $1 \emptyset 3 \emptyset$ DATA $128,176,241,132,25,13$ $3,26,165,53,2 \emptyset 1,3,2 \emptyset 8,29,1$ 69，$, 133,2 \emptyset, 32 \quad:$ REM＊86
    $1 \emptyset 4 \emptyset$ DATA $121, \emptyset, 2 \emptyset 1,44,2 \emptyset 8,18,3$ $2,131,174,32,17 \emptyset, 177,132,2$ $\emptyset, 133,21,165,21:$ REM＊72
    $1 \emptyset 5 \emptyset$ DATA $2 \emptyset 8,2 \emptyset 6,132,2 \emptyset, 198,2 \emptyset$ $, 165,25,2 \emptyset 8,5,165,26,2 \emptyset 8,1$ $, 96,165,25,133,7 \quad:$ REM＊54 $1 \emptyset 6 \emptyset$ DATA $165,26,133,8,165,251$ ， $133,253,165,252,133,254,16$ 5，7，2ø8，2，198，8 ：REM＊228
    $1 \emptyset 7 \emptyset$ DATA $198,7,2 \emptyset 8,29,165,8,2 \emptyset$
    $8,25,165,25,2 \emptyset 8,2,198,26,1$ $98,25,24,165,251$ ：REM＊58
    $1 \emptyset 8 \emptyset$ DATA $1 \emptyset 1,53,133,251,165,25$ $2,1 \emptyset 5, \emptyset, 133,252,169,1,2 \emptyset 8$ ， 192，24，165，253 ：REM＊252
    $1 \emptyset 9 \emptyset$ DATA $1 \emptyset 1,53,133,253,165,25$ $4,1 \emptyset 5, \emptyset, 133,254,16 \emptyset, \emptyset, 165$ ， $53,2 \emptyset 1,5,2 \emptyset 8,2:$ REM＊96
    $11 \emptyset \emptyset$ DATA $24 \emptyset, 83,2 \emptyset 1,2,2 \emptyset 8,2,24$ Ø，1ø8，177，251，133，27，2ø9，2 $53,144,4,177,253$ ：REM＊144
    $111 \emptyset$ DATA $133,27,197,2 \emptyset, 144,186$ ，56，229，2ø，133，27，2øø，177， 251，133，29，177：REM＊232
    $112 \emptyset$ DATA $253,133,31,2 \emptyset \emptyset, 177,25$ $1,133,3 \emptyset, 177,253,133,32,16$ 4，2ø，177，29，2ø9 ：REM＊128
    $113 \emptyset$ DATA $31,144,7,176,9,2 \emptyset \emptyset, 19$ $8,27,2 \emptyset 8,243,169, \emptyset, 24 \emptyset, 13 \emptyset$ ，16 $\emptyset, \emptyset, 177,251:$ REM＊68
    $114 \emptyset$ DATA $72,177,253,145,251,1 \emptyset$ $4,145,253,2 \emptyset \emptyset, 196,53,144,2$ $41,176,233,165:$ REM＊25 $\emptyset$
    $115 \emptyset$ DATA $251,164,252,32,162,18$ $7,32,15,188,165,253,164,25$ $4,32,162,187,169$ ：REM＊12
    1160 DATA $4,133,18,24,32,22,176$ $, 165,98,24 \emptyset, 2 \emptyset 8,2 \emptyset 8,2 \emptyset 2,2 \emptyset$ $\emptyset, 177,251,133,2 \quad:$ REM $^{*} 1 \emptyset$
    $117 \emptyset$ DATA $136,177,251,164,2,32$ ， $145,179,32,15,188,2 \emptyset \emptyset, 177$ ， 253，133，2，136 ：REM＊1 $\emptyset 6$
    $118 \emptyset$ DATA $177,253,164,2,32,145$ ， $179,169,1,2 \emptyset 8,2 \emptyset 9,32$
    ：REM＊238
    $2 \emptyset \emptyset \emptyset$ DATA HORSE，ZEBRA，GORILLA，C AT，AARDVARK，QUAIL，SNAKE，CO W，DOG，HIPPOPOTAMUS：REM＊2ø1
    2ø1Ø DATA $123,789,456, ~ \emptyset,-23$ $45,999,6,12345,-1,1$ ：REM＊25
    2ø2ø DATA $1.23,78.9,2.13 \mathrm{E} 15$ ， $-46.443, \emptyset, 12,-55 \mathrm{E}-12,6$ $6.5,-66.5,213:$ REM＊5
    $2 \emptyset 3 \emptyset$ DATA HORSE，ZEBRA，GORILLA，C AT，AARDVARK，QUAIL，SNAKE，CO W，DOG，HIPPOPOTAMUS：REM＊231
    

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    # Telecomputing Workshop 

    This month: The Aprotek 12C, Mercury and TCM-1200H
    modems; compacting program time trials; fixing a modem cable with broken tabs; and more.

    By DAVID BRADLEY

    I'VE RECEIVED A NUMBER of letters asking for advice on using the Aprotek 12C modem (from A protek, 1071-A Avenida Acaso, Camarillo, CA 93010), but I haven't been able to help much, because I didn't have one. Now I finally do, and I've been checking it out. The Aprotek 12C is the same as the Volks 6480 , and it's a fine modem, but it simply doesn't work like any other modem on the market, so software support for it is sparse. Two public domain programs I've recently found for the Aprotek 12C/Volks 6480 are Multiterm 5.2, with a special boot program called 6480 Multiterm, and ST/R Terminal.
    -If you're looking for an inexpensive, good-quality Hayes-compatible $300 / 1200$ modem that will work with both a C-64 and a C-128 and also with an Amiga or PC-10, check out the Mercury modem from Computer Friends ( 14250 NW Science Park Drive, Portland, OR 97229). It sells for just $\$ 149$ and is 100 percent Hayes compatible.

    Computer Friends doesn't sell an RS. 232 interface for the C-64 and C-128, but Aprotek (address above) has a good one for just $\$ 39.95$, plus $\$ 3$ shipping and handling. I like the Aprotek interface, because, in addition to providing an RS. 232 port, it extends the user port. For some, this feature is very important.
    -Another inexpensive, good-quality Hayes-compatible $300 / 1200$ modem to use with a C-64 or C-128 is the TCM1200 H , from Trans Comm, Inc. (703 Annoreno, Suite 13, Addison, IL 60101). Unlike most Commodore-specific modems, this one doesn't stick out of the user port and take up a lot of desk space. Instead, it comes with a user port connector and a three-foot cable that goes into the back of the modem, so you can keep it on top of your monitor or disk drive, or anywhere else within three feet of the computer.

    The TCM- 1200 H also comes with eight LED indicators, plus eight DIP switches on the back, so you can get at them with ease. Most Hayes compatible modems have the DIP switches inside, under the front plate, so that making changes requires opening the case.

    Another important feature of the TCM 1200 H is its support of Bell 103/ 212 as well as CCITT V.22/V.21. If you ever spend time in a country that uses a CCITT phone system, all you have to do is flip one DIP switch or send one command, and you'll be ready to telecommunicate. Watch for more information about this gem of a modem in upcoming columns.
    -Many people who are tired of having to buffer incoming text and then save it to disk have written in asking for a terminal program for the C-64 and C-128 that will let them save data directly to disk. I know of no terminal programs that will do this, because the interrupts that handle sending and receiving via the modem and the interrupts that handle writing to disk will lock each other up if they try to work at the same time.
    The only solution to this problem I've found is to use a terminal program that sends an X.Off (stopping transmission from the computer you're calling in most cases), then saves the information stored in the buffer, and then sends an X.On to continue the flow of incoming text. A commercial program that does this is Sixth Sense, and a public domain program that does it is ThirdTerm. If this method won't work for you, the PET/CBM computers are capable of dumping information directly to disk. You'll need a PET, an IEEE disk drive (a Commodore 4040 or 8050 , for example), an RS. 232 modem, an Intel-Com-type cable and an IntelCom-type terminal program.

    ## Modem-Phone Line Security

    Disconnecting your modem from the phone line during electrical storms is an excellent idea, but there is one bad side effect of this constant plugging and unplugging. The little tabs on the ends of the cable tend to break off, and it's then all too easy to accidentally pull the phone line out of the modem or the wall when you're online. Of course, this usually happens when you've downloaded 99 percent of a 400 block file from a pay system.

    Before you get out the Scotch tape, go to your local hardware store and see if they have a modular-plug crimping tool and some modular outlet plugs. I just bought one of these tools, and it's a life saver! The model I got has a wirestripping section and a crimping section. One of the sweetest sounds I hear now is the "click" of a secure telephone connection before I go online.

    If you can't find one of these tools in your area, write to Gemini Industries, Inc., 215 Entin Rd., Clifton, NJ 07014. By the way, the crimper and ten outlet plugs cost me less than $\$ 10$.

    ## Internal Modems?

    A lot of people have left me mail on Q-Link recently, including many who want to know the difference between internal and external modems. I don't understand what has prompted all the questions, because I don't know of any internal modems for the C-64 or the C-128. I do know that computers like the PC-10 can be outfitted with an internal modem, and I know that some people have mounted modems inside their C-64s or 128 s , but I'm aware of no production internal $64 / 128$ modems.
    In any case, you'll get the same quality from an internal or external modem. Most internal modems take power from the computer, so you don't need to find another wall outlet, but, depending on your system, it's possible (although unlikely) that you'll need a stronger power supply.

    One nice thing about an external modem is that you can use it on various machines, as long as you have the proper interface. An internal modem for the PC-10 can be used with other IBM-compatibles, but not with a C. 64 or C-128.
    -In my "Plugging Into Telecommunications" article in last September's issue, I mentioned that Jo-Anne Park of Toronto had made an interface that enabled her to use her Commodore 1670 modem with her Amiga. At that time, I didn't know of a company that sold such a device, but now I do. LRA Enterprises (35615 Ave. D, Yucaipa, CA 92399) sells
    one for $\$ 44.95$. When ordering, be sure to tell them if you want a male or female RS- 232 connector on the interface, and make your check payable to Lawrence R. Anderson.
    -If you're looking for a VT100 terminal emulator for your C-64, an update to the public domain Kermit program I mentioned in last April's column offers this feature. When I wrote the April column, I thought the program already supported VT100, but I was mistaken; the current version at that time was only a VT52 emulator.
    -Prompted by all the discussions I've seen online about which file-compacting program is best, I've done some experiments with Arc, Lynx and Library (which I mentioned in the August issue). I tested all three programs for creating one file out of a 113 -block program file and a 74 -block sequential file that included documentation. Table 1 sum. marizes my findings.

    As you can see, Lynx won hands down for file-creation time. It beat Library by 6 minutes and 40 seconds and Arc by 7 minutes.

    Arc won in the compressing department, reducing the file by 55 blocks. At 300 baud and using Punter protocol, 55 blocks equals 9.16 minutes of download time. Using Arc and 300 baud, you could download and break up the file about 2 minutes and 20 seconds faster than you could with Lynx. However, at 1200 baud, that 55 blocks represents only 2.6 minutes of download time. So, using 1200 baud and Lynx, you could download and break up the file about 4 minutes and 20 seconds faster than you could with Arc.

    My opinion is that each of these pro-
    grams has its own strengths, and one can't be called generally superior to another. But I would like to hear what you have to say. If you use any of these programs, please write to tell me which one you prefer, and why. I'm also interested in your experiences, good or bad, with any of these programs. In a few months, I'll tabulate and post the results of my survey, as well as some of the comments I receive.
    -Alex Dominguez has written in response to a letter in the July issue from Dennis McNelis, who asked whether his 1541 disk drive could be burned out if a user on his BBS hung up at the wrong moment during a disk access. Mr. Dominguez reports that a couple of his friends had their drives damaged by thoughtless users. He offers no solution to the problem; he just urges users of BBSs to be responsible and treat the BBS equipment as if it were their own.

    Now on to this month's questions and answers.

    0
    On page 85 of the May issue of RUN,
    I saw an ad for the Aprotek 1200C, a Hayes/Commodore-compatible 1200. baud modem. It looked good, so I started saving up for it. Then, in the very next issue, Aprotek advertised another 1200 -baud modem, the 12C.
    In addition to being Hayes/Commodorecompatible, the 1200C was described as having a built-in speaker and eight status LEDs, and supporting direct connects, autodial and autoanswer, and tone/pulse switching. The $12 C$ was described as easy to set up; supporting autoanswer and autodial, tone/pulse switching and direct connects; and packaged with the ComTerm 64 terminal software.

    I'd like to know whether Aprotek still

    Table 1. Comparative performances of file-combining programs.

    | Program | Starting <br> Block Size | Ending <br> Block Size | Elapsed <br> Time |
    | :--- | :--- | :--- | :---: |
    | Lynx XI | 187 | 188 | 55 |
    | Arc 230 | 187 | 132 | 475 |
    | Library 9.0 | 187 | 187 | 455 |

    www.Commodore.ca
    Moy Not Reprint Withoul Pernission
    carries the 1200 C and, if not, whether a similar modem is available elsewhere. I'd also like to know if the $12 C$ is just another modem like the Volks 6480 (not compatible with anything).

    ## - MiCHAEL CHEU <br> Ridgeway, Ontario, Canada

    AThe Aprotek 12C is just like the Volks 6480 (as I mentioned above), and Aprotek no longer seems to have the 1200 C any more. Another modem that's similar to the 1200 C is the TCM1200 H , which I also mentioned above.
    (2) I want to use my Racal.Vadic I don't know where to get the RS-232C interface I need. It's an excellent modem, and I'd hate to replace it with one I probably wouldn't like as well, just because I can't get an interface.

    > -REYNOLD WONG
    > PACIFIC GROVE, CA

    AAprotek's (address above) universal RS- 232 interface, which costs $\$ 39.95$, should do the job. To make sure, before you buy it, write Aprotek and describe your requirements to them.

    I'm having trouble joining Q-Link. I called their 800 number (800-392. 8200) and ordered the $\$ 39.80$ package that includes a four-month membership and a Commodore 1660 modem. I charged it to my VISA card. Since then, I've received four calls from Q-Link. Each time they've told me that due to a computer error, they've lost my order.

    Is there any way to get the Q-Link software from another source, and, if so, is Q-Link worth the time, effort and money?
    -Lloyd J. Robinson, JR. Tuscaloosa, AL

    AIf you were to go out and buy a Commodore 1660 or 1670 modem from a dealer, you'd find the Q.Link software in it. That package would cost more than $\$ 39.80$, but at least you'd have what you need.

    Most manufacturers of Commodore-

    ## TELECOMPUTING WORKSHOP

    compatible modems bundle the Q-Link software these days. I know the TCM1200 H and Aprotek 12C come with it. Q -Link software also accompanies the Commodore 64 C , but it's not worth buy. ing another computer to get it.

    I think once you do get a modem and software and get on Q-Link, you'll find it worth the time, effort and money. Q-Link is easy to use, and when you're just starting out in the world of telecomputing, the easier the better.

    You might consider getting a 1200 . baud modem, such as the TCM-1200H, as Q-Link charges the same for 1200 as it does for 300 baud. If you downloaded files for ten hours at 1200 baud, you'd save about 30 hours of plus time, or about $\$ 108(30 \times \$ 3.60)$, over 300 baud.

    (a)When I bought my Mitey Mo modem, I remember the ad saying it would handle up to 1200 baud. I am, indeed, given the option of 1200 baud when I'm setting up the modem, but a note in the owner's manual says, "Mitey Mo can accommodate up to 300
    baud. Disregard the 600 and 1200 choices that appear." Can I upgrade my modem to handle 1200 baud?

    -Glenn Corbett<br>Visalia, CA

    AI haven't seen that ad, but I suspect they said the software included with the modem could handle 1200 baud, even though the modem cannot. Regardless, I know of no way for you to upgrade your Mitey Mo to 1200 baud.

    ## TIPS OF THE MONTH

    If you're new at telecomputing and there are things you don't know, don't be afraid of looking stupid-go ahead and ask for help. After all, everybody started out just where you are, and I find people love to share their telecomputing experiences. Besides, if you don't ask, you're the one who loses out. As I've mentioned in previous columns, when a thunderstorm may come your way, you should unplug your mo-
    dem from your phone line and unplug your computer system from the wall. I want to reemphasize that warning. Until I moved to Florida, I had no idea how many people suffer severe damage to their systems from lightning.
    Remember, besides questions, I appreciate getting your comments and constructive criticism about Telecomputing Workshop.

    Telecomputing Workshop is a monthly column dedicated to the needs of RUN readers who are using, or intend to use, a Commodore computer for telecommunications. We invite you to submit your questions and comments to:

    David Bradley
    Telecomputing Workshop
    RUN Magazine
    80 Elm St.
    Peterborough, NH 03458
    You can leave online messages for David Bradley on QuantumLink (DavBradley), American PeopleLink (DavBradley), Delphi (DavidBradley) or via the PunterNet to 13/ Sysop or 13/David Bradley.
    

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    # Resource Center 

    # The Resource Center responds to readers' requests for educational programs. 

    By MARGARET MORABITO

    SO MANY OF YOU have been writing to the Resource Center, I haven't been able to answer all of you personally. So, this month, I'm going to catch up on my mail.

    Q
    What happened to the disk I sent you a few months ago? I really want the public domain educational programs you of. fered in the September and November 1986 issues.

    ## -Everyone

    Hometown, USAAThis is the question I get most often. The answer is that, since I left my full-time position with $R U N$ last February, I haven't been able to keep up with the free education disk distribution project-mainly because I don't have the equipment at home or the finances to support it.

    I'd like to continue the project, however, so I've decided to change the conditions. I originally asked you to send a blank disk, on which I'd make a copy and return it for free. Now I must ask that you send, not a disk, but $\$ 10$ to cover duplication and mailing costs. This way, I can have the disks duplicated in bulk and continue this service.

    In Table 1 you'll find a list of the directories for both Volumes 1 and 2, so you can see what programs are on them. To order a disk, see the instructions at the end of this article.

    I have Volumes 1 and 2 of the Resource Center Education Disks and enjoy them very much. Will you be coming out with more volumes?

    ## -Almost Everyone Hometown, USA

    AYes. I plan on coming out with four education disks in 1988, one to be released each quarter. I'll let you know when the first one is ready, and at that time I'll list the directory of the disk in this column, so you'll know exactly what it contains before ordering.

    Table 1. Directories of the Resource Center Education Disks.
    Volume 1, Side 1:

    Spelling
    Menu (Lexikos)
    Phoncentration
    Brainstorm
    Speller
    Word Scrambler

    Findword
    Cell Quiz
    Graphic Math
    One Col Math
    Tictacarith
    Math Worksheet

    Volume 1, Side 2:
    Menu ( 23 math tutorials written by
    Ricky Brewer for his junior high students)
    Volume 2, Side 1:

    Menu
    USA
    Spell It
    Elem Add/Sub
    Alphabet
    Guess My Number
    Tree Tutor
    Robot Math
    Division Tutor
    Homonyms
    Munchmath
    Fast Reading
    Page Printer
    Spanish
    Volume 2, Side 2:
    Menu
    Flashquiz 64
    Typing Practice Letter Attack
    Keyboard Intro
    Keyboard
    Bilingual Spell
    New States/Caps
    New Zealand
    Name Records
    Mark Records
    Analogies

    Quick Check
    48 Add Prob (part of a math series
    by William Townsend)
    Add Special Ed
    Subt 3 Digits
    Decimal Adds
    Dec Div-1361
    Dec Mult Rd
    Fract Reduce
    Averages
    Percent Of
    Circle Circumference and Area
    Gradebook 128

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    Madison Sq. Garden, NY , MY. 10001
    (212) $594-7140$ ojpen Mon-Wied, $8: 30-8 /$ Thurs \& Fri, $8: 30-9 /$ Sat \& Sun, 10-7

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    COMMODORE $C-64 \mathrm{C}$ COMPUTER
    COMMODORE $1541 / \mathrm{C}$ DISK DRIVE
    COMMODORE $1541 / C$ DISK DRIVE
    COMMODORE COLOR PRINTER
    COLOR MONITOR

    | commo como |  |  |
    | :---: | :---: | :---: |
    |  |  |  |
    | C 6 <br> COMMODORE C-64C COMPUTER COMMODORE $1541 / \mathrm{C}$ DISK DRIVE COMMODORE COLOR PRINTER COLOR MONITOR GEOS SOFTWARE PROGRAM <br> COMMODORE C-64/C COMPUTER COMMODORE 1541 DISK DRIVE COMPUTER PRINTER 12" MONITOR GEOS SOFTWARE PROGRAM |  |  |
    |  |  |  |
    | $\text { it } 499 \quad \begin{gathered} \text { COLOR MONITOR } \\ \text { - ADD } \$ 110 \\ \hline \end{gathered}$ |  |  |

    

    ## commodore <br>  <br> CE BMC COMPLETE <br> COMMODORE C-64/C COMPUTER COMMODORE 1541 DISK DRIVE 12" MONITOR

    
    

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    Signature

    ## Name

    ## Address

    City State Zip

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    To place your order immediately call our 24-hour Toll-Free number 1-800-258-5473
    (in NH 1.924-9471)

    ## RESOURCECENTER

    QI'm a 5th grade teacher, and I'm looking for information on free or inexpensive software to use on the C-64s in my classroom.
    -Lynda Keller
    Paulina, LA

    AIn last April's issue, I devoted the entire column to answering this question. Order this back issue, and you will get suggestions for various sources of low-cost educational software, along with a list of names and addresses to contact.

    QThank you so much for mentioning KIDware in your recent article concerning low-cost educational software. Now we've moved our offices and would appreciate it if you'd publish our new address.
    -KIDWARE
    1380 156TH NE Suite H2
    Bellevue, WA 98007
    206-643.7645

    0
    Your article in the April issue on educational software was very good. I thought of running a national education user's group in another magazine this year, to help distribute teacher-written educational programs. However, with your distribution of educational material through RUN, I decided you and your column were in a much better position to carry out this function than I am as an individual.

    Unfortunately, I've been disappointed, because for months there's been no additional mention in your column of public domain educational material. I wish you would devote at least a paragraph each month to covering the material available and encouraging educators to donate programs that they've written for their classes.

    ## -Ricky Brewer Midway, TX


    time-consuming proposition.
    However, at the urging of hundreds of readers like yourself to continue this service, I'm now renewing my offer for the Resource Center Education Disks, with the difference, as mentioned above, that I must ask for some money to cover my expenses. (By the way, Ricky, thanks again for your donation of the Math Series that I placed on Volume 1 last year!)

    If you're using Commodore computers for education at home or in school, write to me and share your experiences. Also, please donate public domain educational programs to the Resource Center for sharing with others. Send letters and programs on disk, with a brief description, to:

    Margaret Morabito
    Resource Center
    RUN Magazine
    80 Elm St.
    Peterborough, NH 03458
    To order a Resource Center Education Disk, send \$10 per disk and state the volume number you want.

    ## QUALITY SOFTWARE \$3 EACH!!

    Universal Software Association (USA) is a world-wide software organization specializing in the distribution of owner/user written software for the Commodore 64, 64C and 128 computers. We are not a public domain software company and our software is not available elsewhere. Members may purchase any program from our software catalog for ONLY $\$ 3.00$ PER PROGRAM ON DISKETTE.

    ## How can USA sell programs for only $\$ 3.00$ each?

    The name of the game in cutting costs is volume. Volume memberships (in the tens of thousands) and purchasing (also in the thousands). We also lower costs with the wide range of programs we offer.

    ## $\$ 3$ programs? Are they really quality programs?

    Any program submitted to us has to meet our high standards. We reject any program that does not meet high industry standards of quality and sophistication.

    ## How many programs are available?

    We currently have more than 800 programs in our Commodore software catalog with catagories as follows: GAMES, MUSIC, EDUCATIONAL, BUSINESS/FINANCIAL, HOME/PERSONAL, TECHNICAL. And you won't find these programs anywhere else.

    ## What else does membership provide?

    Membership entitles you to the bi-monthly newsletter REMarks at no extra cost. This newsletter offers you articles of interest, software reviews and programming information to help you get the most out of your Commodore.

    ## What does it cost to join?

    Only a low ONE-TIME membership fee of $\$ 15$. That entitles you to the newsletter, plus all the benefits mentioned above, and quality $\$ 3$ programs.

    ## HERE ARE A FEW SAMPLE TITLES:

    Motocross, Meteor, Space Patrol, Eliza, Exterminator, Boxing, Helicopter Rescue, French Tennis, Alien Ambush, Rear Assault, Vicous Vircle, Freeway Fox, Shark Hunt, Moon Base, Trench, Mystery, Candyland, Towers of Doom, Metrics, Math Tutor, Chemistry, Physics, Spanish, German, Planet Facts, Fireball, Preschool Learning Aids, World Geography, Trivia Quiz, Credit Card Management, Calorie Calculator, Recipe File, Auto Expenses, Garden Help, Weather Forecaster, Football Rating, Home Inventory, Investment Aids, Depreciation Schedule, Stock Trends, Bonds, Handicapper, Personal Banker, Mortgage Spreadsheet, Letter Writer, Budget Management, W-2 Form, 1040 Form, Annuities, Paycheck, Bowling Records, Conversions, Flow Chart, Statistical Analysis and much, much more!

    YYES I I want to get the most of my Commodore with the help of USA! Rush me your extensive software catalog and my membership card which entitles me to purchase programs for only $\$ 3.00$. Also rush me a current newsletter. My check or money order for $\$ 15$ is enclosed.
    

    ## Double Quick Brown Box

    ## You'll Never Lose Your Cool,

    Or Your Programs, With This UtilityWhile a computer's brain may be made of silicon, its lifeline is the power cord. Who hasn't experienced a stab of panic followed by a feeling of utter helplessness as you endured the instant evaporation of your electronic efforts? Everything in memory can be lost in an instant if the electrical power is even momentarily interrupted.

    Actually, it doesn't always take a power failure for amnesia to strike your computer. Even experienced users occasionally forget to back up newly entered programs before taking them for a test drive. Random Access Memory (RAM) might as well be called Readily Absent Memory when the program crashes and your keyboard locks up.

    How many times have you wished you could turn your computer off after a crash and not lose a byte of data? Wouldn't it also be handy to have your favorite telecommunications program or utility already loaded whenever you turn on your computer?

    Users of laptop computers already enjoy these conveniences, thanks to a special type of chip known as a CMOS (complementary metal oxide semiconductor) RAM. It consumes a lot less electrical power than a conventional chip, and it can be left on all the time.

    CMOS chips are considerably more expensive than the garden variety 8 K memory chips that populate the circuit boards of the C-64 and C-128. They also require an internal battery to keep them active when the computer is turned off.

    But while manufacturer's costs conspire to deny us non-volatile RAM, devices such as the Double Quick Brown Box are letting Commodore users enjoy some of the advantages previously restricted to owners of battery-powered portables.

    Actually, the Double Quick Brown Box probably needs a new name. It's not really a box, but a plug-in cartridge for the C-128 (in 128 mode) as well as the C-64. Made of brown plastic by a man with the first name of Brown, the device has double the capacity of his
    

    The Double Quick Brown Box plugged into the C-128's expansion port.
    original CMOS memory enhancement tool for the C-64 (see RUN, Hardware Gallery, July 1986).

    With a capacity of 16 K , the DQBB may appear feeble in comparison with the latest 128 K and 512 K RAM expanders, but this little box is unique. It converts RAM into ROM (Read Only Memory) by switching out 16 K of memory beginning at $\$ 8000$ and replacing it with CMOS RAM. Short of dropping it into the sink or waiting ten years for the internal lithium battery to wear out, the DQBB will never lose its memory, even when disconnected from the computer.
    Outwardly, the Double Quick Brown Box is identical to its 8 K predecessor. A red push-button generates a system reset for the C-64 that bails you out of a crash while your faulty program remains in memory. The two-position slide switch lets the DQBB switch between 64 and 128 modes. Your C-128 won't come up as a C.64, even though the cartridge port is occupied, when the switch is in the proper position.
    The designer's partner has written a series of utilities that let you put as many as eight programs into the DQBB at once. When loaded, each program is listed on a menu and can be called up with a two-character command. Machine language programs for the C- 128 that don't employ a Basic loader are the only ones that won't work in this fashion. Otherwise, the DQBB automatically figures out where in memory a

    ## REPORT CARD

    ## A Superb!

    An exceptional product that outshines all others.

    ## B Good.

    One of the better products available in its category. A worthy addition to your hardware collection.

    ## C Average.

    Lives up to its billing. No major hassles, headaches or disappointments here.

    ## D Poor.

    This product has some problems. There are better on the market.

    ## E Failure.

    Many problems; should be deep-sixed!

    ## WHAT AB SWITCHES DO

    $A B$ switches allow the user to share equipment rather than buy costly duplication. Many configurations may be arranged, two computers to one disk drive and printer or two printers to one computer etc.. In our office we share a printer between a PC clone and a C128 via a parallel switch. No need to ever plug and unplug cables again, just turn a knob to swich from one peripheral to another. Below are the types we have in stock, remem ber if you need extra cables, we carry a large selection to meet your needs.

    ## \$ SAVER AB

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    VIC-20, C16, Plus 4, C-64, OR C128 compatible. Three lemale 6 pin sockets, rotary switch, all metal case.

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    NEW LOW PRICE \$49.95
    VIC-20, C16, Plus 4, C-64, OR C128 compatible. Four computers to one printer and or disk drive. Five female 6 pin sockets, rotary switch

    ## PARALLEL or SERIAL AB

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    Now only \$39.95
    All pins switched. Has five female sockets, all gold pins guarantees positive contact, rotary switch, all metal case. Parallel $=36$ pins, serial $=25$ pins.

    ## PARALLEL CROSSOVER Aa X Bb

    nEw \$44.95All pins switched. Four female sockets, all gold pins rotary switch, sturdy metal case. Two computers share two printers, either computer can access printer A or B

    ## CABLES

    Drive/printer, 6 tt. 6 pin male/male B66 $\$ 5.95$ Drive/printer, 9 ft. 6 pin male/male B69 Drive/printer, 18 ft .6 pin male/male B618 Driver/printer, 6 ft .6 pin male/fem. A66 \$ 5.95 Monitor, 6 ft .5 pin to 4 RCA plugs M654 Monitor, 6 ft .5 pin to 2 RCA plugs M652 Monitor ext., 6 ft .5 pin male/female ME65 Joystick extension 12 ft . male/fem. JS12 Joystick Y, increase, 1 fem./2 male JSY Joystick $Y$, reducer, 1 male/2 fem RJSY Power disk/print male/right ang male PRS Parallel, 6 ft ., male to male C6MM $\$ 9.95$ Parallel, 10 ft ., male to male Parallel, 20 ft ., male to male Parallel, 6 ft., male to female Parallel, 10 ft ., male to female Serial, 6 ft ., male to male Serial, 6 ft ., male to female IBM printer, 6 ft ., male/male BM printer, 10 ft ., male/male IBM printer, 20 ft ., male/male Gender change, parallel, male/male CGMM \$ 9.95 Gender change, parallel, fem./fem. CGFF $\$ 9.95$ Gender change, serial, male/male RGMM \$ 7.95 Gender change, serial, fem./fem. RGFF \$ 7.95 INFORMATION: For technical information or Oregon buyers phone: 503-246-0924.
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    $\$ 3.00$ service charge on all COD orders (no personal checks). Foreign orders twice U.S. shipping charges. All payment must be in U.S. funds.
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    IBM PC XT Compatibility
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    Heat is a \#1 enemy to your disk drive. Reduce bad loads and costly repair bills with a fan, keep your 1541 or 1571 cool. Quiet. surge and spike
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    $64 \quad \$ 29.95$plugs into the cartridge port, has 4 switchable slots, fuse protected and a reset button.

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    12 in. cartridge port extension cable. Move boards and cartridges to the side of your computer. In stock.
    , our buyers ind one of those odd gadgets they ust can't resist. The Joy Stick Reducer is odd and low-priced. It allows one joystick to be plugged into both ports at the same time. I know you are saying, what's it good for. Stop and think, how many times have you had to try both ports before finding the right one?

    ## "THE STRIPPER"

    The "Stripper" removes perforated edges from print-outs. Insert 1 to 20 sheets, presto edges are gone. Clean, quick

    ## MODEMS, 1200 Baud

    Aprotek 12C, C64, C128, compatible Aprotek 12AM, AMIGA compatible
    Avatex 1200
    Avatex 1200 HC , Hayes compatible
    \$ 99.95

    ## 40/80 COL. CABLE

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    $\$ 6.95$
    The original! All metal
    Cuts an exact square notch in the disk.
    spot every time!
    

    READY RESET 64 new \$11.95 A reset button that you place where you want, not some out of the way place. Plugs into the serial port (of course he port is replaced for your disk drive), the button is on the end of a 15 inch cable.

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    hat makes the fire button of y gun action. Adjustable speed control.

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    CURTIS printer stand with paper catcher JASCO heavy duty wire printer stand PC CPU stand, adjustable, plastic Monitor, adjustable tilt and swivel stand
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    American Mouse Mat
    Light Pen by Tech Sketch C64/C128 Touch Point Graphics Tablet C64/C128

    BLACK BOOK of C128
    $\$ 37.95$ $\$ 89.95$ $\$ 79.95$ $\$ 6.95$ $\$ 7.95$ $\$ 44.95$ $\$ 29.95$
    
    he best friend a C128 user ever had . Includes C-64, C128, CPM, 1541, 1571. 261 pages of easy to find information. 75 easy to read charts and tables. The Black Book of C128 is very much like a dictionary, always ready to answer your questions.
    PROTECTION REVEALED C $64 \mathbf{\$ 1 5 . 9 5}$ A beginners guide to software protection. Written to give you a fundamental understanding of a disk and BASIC protection. Identify what you are seeing when examining a disk. Become a master of illusion. Reveals countless tricks and tips that mystify the user. The book is 141 pages and includes a free disk of 21 utility programs.

    ## SAM's BOOKS

    C64 Troubleshooting \& Repair Guide
    1541 Troubleshooting \& Repair Guide Computer facts VIC-20
    Computer facts C-64
    Computer facts C-128
    Computer facts 1541
    Computer facts 1571
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    "TOUCH ME BUTTON" \$9.95 Static can KILL your COMPUTER and your PROGRAMS. Touch Me rids your system of harmful static like MAGIC before you touch your computer peripherals or other devices. The controlled electrical resistance of Touch Me, drains static charges harmlessly away to ground at low energy levels. Touch Me can add years of life to your equipment.
    GROUND FAULT IND.
    \$5.95
    Computer equipment is very sensitive to ungrounded household wiring. Disk drives have a bizarre way of mixing up data. The Ground Fault Indicator tells you if your outlet is properly grounded.

    ## MISCELLANEOUS

    CARDCO numeric keypad $\$ 47.95$
    Disk Sleeves, white tyvek, 100 pack
    Write protect tabs, silver, 100 pack
    Floppy wallet, 3 1/2 in., holds 15
    Floppy wallet, $51 / 4 \mathrm{in}$., holds 15
    Disk pages, 2 pocket, 3 hole, 10 pack
    program wants to be and sends it to the proper location.
    Since a special boot utility activates the software-controlled write-protect tab and lets you reload the box with other programs in less than one minute, you'll probably develop a series of disk files, each containing one or more programs that are used together.
    The convenience of switching instantly from one program to another can't be overstated. My DQBB usually contains the two programs that I use while maintaining the Boston Computer Society's Commodore Bulletin Board-a machine language text editor and a compiled disk utility program. I've also saved this particular configuration as a single disk file, which allows me to empty the box for use as a crashproof Basic workspace and easily restores my utility programs when it's time to work on the BBS.

    The documentation provides step-bystep instructions for beginners and fairly thorough guidance for experienced programmers who want to plant some of their own ideas in the box's CMOS memory chips.

    With a one-year repair or replacement warranty and a 30 -day unconditional refund period, the Double Quick Brown Box is one of the safest computer investments you can make. (Brown Boxes, Inc., 26 Concord Rd., Bedford, MA 01730; \$69 plus \$3 shipping.)

    ## -JOHN Premack <br> Lexington, MA

    ## Blowup

    B

    ## Don't Let the Name

    Of This Product

    ## Deceive You!

    Honestly, would you plug anything into your computer that's called Blowup? Surely, it wouldn't really terminate the computer! Actually, Blowup is a nifty utility cartridge that just might be of use to you-read on!
    Blowup comes as a program cartridge rather than as a disk. That's important to its operation, as you'll soon see. Blowup simply sits in your computer's expansion port and waits for you to push the button on its top. When you do, it grabs control of the machine and lets you do some very special things.
    Have you ever wanted to obtain a printed copy of the screen from one of your favorite programs? I'm not talking about just dumping text screens or lowresolution graphics, I'm talking about
    bit-mapped, high-resolution pictures, including sprites! Perhaps you've thought it would be great to modify such a picture if you could only get it into a format that your drawing program could use.

    For a number of years, I've been borrowing pictures from programs to create my own images. It involves a pretty thorough knowledge of machine language programming and the inner workings of your computer. Once you locate the picture in memory, it has to be saved to disk and then modified so that it'll be loaded properly into the
    

    You can do a lot of maneuvering with Blowup.
    drawing program. If you can't find a separate picture file on the disk and the program won't let you break it once it's been started, you'll never be able to get at the picture. With Blowup, you don't have those problems.
    You begin by inserting Blowup in the memory expansion port of your computer. It doesn't work in 128 mode, and that's not made clear in the instruction manual. That's not too much of a restriction, though, since a lot of programs that employ pretty graphics run in 64 mode anyway.

    Next, you load whatever program you want to capture a picture from. You do everything just as you would without Blowup inserted. Since the Blowup program has its own memory, it shouldn't interfere with the main program.

    Once your program has finished loading, whenever you see a picture on the screen that you want to save, just hit the button and let Blowup take control. A detailed menu appears on the screen that lets you do several things. You can print the picture in either normal or reversed image. You can even rotate the picture-since your screen is horizontal and printer paper is usually
    vertical, this makes it easy to get the whole picture to print properly. You can crop a section of the picture and save it to disk in normal (bit-map), Koala or Doodle! format.

    You can enlarge or reduce the image in either the X or Y plane by using the magnify option; you can choose to include sprites in the printout or file; and you can reverse the picture by using mirror imaging.

    Another function lets you specify a delay after every printed line to keep you from overheating the print head. You can even use Blowup to load a previously stored text file. And, Blowup supports a wide variety of printers.

    Theoretically, by selecting the warmstart option after you capture the picture, you can return to the main program at the point where you stopped it. The coldstart option resets the computer to Basic.

    Sounds like a pretty dandy program, doesn't it? If everyone followed the same programming techniques, it probably would be possible for Blowup to do its job effectively every time. However, programmers seldom do things the same way each time, and that can result in some conflicts.

    Some of the problems I encountered include an inability to capture a picture on the screen while disk loading was still in progress. I also found the sound on many programs to be affected when Blowup was activated and not all programs operated correctly, if at all, after interrupting them with Blowup. The instructions include some possible solutions for these problems, but they didn't clear the difficulty in all cases. You can end up with a locked keyboard or other problems.

    It appears that Blowup comes about as close to being a universal "screen dump" as technology permits. I was generally pleased with the results and certainly don't mind having a tool that eliminates the need for me to perform computer gymnastics just to play with a high-resolution picture.

    I've graded this program slightly below excellent due to the omission of information on using it with the C-128. In addition, I think a short paragraph describing the problems you can encounter with some programs would also be appropriate.

    If you like to play with graphics or have a need to capture pictures for use elsewhere, consider Blowup as a good utility cartridge to have. (Data Share, Inc., 717 South Emporia, Wichita, KS 67211; $\$ 59.95$.
    -Jim Grubbs SpringField, IL

    # Learn To Walk Before You RUN 

    We receive many letters from new Commodore owners who want to type in program listings from RUN and need help in getting started. To answer many of the questions novice users have, we present the following guidelines.

    1. First, keep in mind that as a beginner you should enter only short Basic programs. Avoid machine language listings and lengthy Basic programs until you get the hang of what you're doing.
    2. To help you catch mistakes in typing in listings, we publish two checksum programs each month, called 64 Perfect Typist and 128 Perfect Typist. (Follow the directions in How To Type RUN Listings, elsewhere in this issue.)
    3. If you intend to save the program you're typing in on a brand new disk, you must format that disk. To do this, insert the disk in your drive and type:

    ## OPEN $15,8,15$ <press return> <br> PRINT\#15,"N0:NAME,\#\#" <press return>

    The \#\# is a two-character identifier that can be any combination of letters or digits. NAME can be any title for the disk that you choose, as long as it's 16 characters or less.
    After entering the above lines, wait for a few minutes while the disk spins inside the drive. When the disk stops, the formatting is done. Then type:

    ## CLOSE15 <press return>

    In 128 mode on a C-128, you can shorten this procedure by typing:

    ## HEADER "NAME,\#\#" <press return>

    Caution: The formatting process erases any material already on the disk, so if you're formatting a used disk, make sure it doesn't contain any programs you want to keep. See item 11 below, on reading the disk directory, if you need to find out what's on the disk.
    4. Before you start typing in a program listing, your computer's memory needs to be empty. To make sure it is, turn the computer off, wait a few seconds, and turn it on again.
    5. As you type in the listing, remember to press the return key after each line. The return enters the line into memory.
    6. If you want to review what you've entered, type LIST and press the return key; all the lines you've entered will scroll by. You can slow the scrolling on the $\mathrm{C} \cdot 64$ by holding down the control key, and on the C-128 by pressing the no scroll key. To view certain specific lines, type LIST, followed by the line numbers you want; then press the return key. For example, LIST 10-50 displays lines 10 through 50, and LIST 20 displays only line 20.
    7. If you find an error in a line, delete the incorrect characters with the insert-delete key, then retype that
    portion and press return to enter the new line in memory. 8. Be sure to save the program to disk fairly often during the typing process. Otherwise, you could lose all your work if a power glitch wipes out your computer's memory. To save a partial or complete Basic program listing, type:

    ## SAVE "NAME", 8 <press return>

    In 128 mode on a C-128, you can press F5, type in NAME and press the return key. Here, NAME is the filename you want the program to have, not the disk name you used when formatting.

    Each time you save a revised program to the same disk, you must change its filename, or a disk error will occur, even if only one character is changed. An easy way to vary the filename is by adding version numbers to the end of the basic name (Program. 1 and Program.2, for example). The numbers will also tell you which version is the latest.
    9. If you wish to erase (scratch) unwanted programs from a disk, type:
    OPEN $15,8,15$ <press return>
    PRINT\#15,"S0:filename" <press return and wait a few seconds> CLOSE15 <press return>

    In 128 mode on a C-128, you can type:
    SCRATCH "NAME" <press return>
    Be sure not to erase the final version!
    10. Always save the final version of a program to two disks, so you have a backup copy in case one of the disks gets damaged. When saving to two different disks, you can use the same program name in each case.
    11. To view a complete list of the filenames on a disk (i.e., read the disk directory), type:

    ## LOAD " $\$$ ", 8 <press return>

    LIST
    In 128 mode on a C-128, you can just press F3.
    12. When you know what program you want to load, next make sure you know exactly how its filename is spelled in the disk directory, including punctuation, special characters and spaces. A mistake in the filename will keep the load from working.

    If the disk directory is still on the screen when you enter the Load command, you can refer to that for the spelling. If the directory will be gone from the screen by the time you enter the Load command, jot down the exact spelling of the filename for reference. Once you're sure of the filename, load the program by typing:

    ## LOAD "NAME", 8 <press return>

    In 128 mode on a C-128, you can just press F2, type in the filename and press the return key.
    13. After you've loaded the program, enter RUN to use it.

    # Comimodore Clinic 

    # What happens to a program when it's abandoned by its vendor, and how can you use a laser printer with your Commodore? 

    By JIM STRASMA

    ## HARDWARE

    Are there any 1571-compatible, nonCommodore disk drives on the market yet, and will the 1581 work with both the C. 64 and C.128?
    -Ronald Pack Aurora, CO

    AI certainly haven't heard of any 1571-compatible disk drives yet and wouldn't expect to for a while. Even for Commodore, the 1571 provided many design challenges whose solutions will take some time to reverseengineer.
    As for the new 1581 microfloppy disk drive, yes, it works with both the C-64 and the $\mathrm{C}-128$, adding storage space to both.

    Q
    I've read that Commodore is developing a new ROM chip for the 1571 disk drive. Is this chip available yet, and if so, where can I get one?
    -Raymond Hyman
    Philadelphia, PA
    A ROM that upgrades the 1571 's performance is indeed now available. I got mine today, thanks to a group purchase by the Fox Valley 64 Users Group. The part number of the new chip is $310654-05$. With that information, any authorized Commodore service center should be able to order one for you.

    Fox Valley lists it as available from Microtech, 328 W. Hillside, N. Aurora, IL 60542; phone 312-892-3551. The upgraded ROM was also listed in a recent ad from K. Boufal Consulting Services (244 Fitzwater St., Philadelphia, PA 19147), so you won't have to go far to find it.

    ## SOFTWARE

    A while back you indicated that you and two other gentlemen had put to.
    gether a church package for the C-64. I would appreciate your sending me any information available regarding that software.
    -Stacy Hall Gray Court, SC

    - Unfortunately, sales of The Electric tions, and the author who was to provide support no longer has a C-64. Therefore, we no longer sell the program.

    Those who have The Electric Evangelist are welcome to share it with others for non-commercial use. I have also given our remaining copies to my local user's group (S.O.S.U.G., PO Box 6108, Macomb, IL 61455), which will be happy to provide copies. Contact them directly for details.

    QI'm looking for a C. 64 program that can save to disk pictures I draw with a program that came with an Edumate light pen. I bought the light pen about five years ago, and now the maker is out of business.

    ## -Kolman Glicksberg <br> 427 Woodlawn Ave. Glencoe, IL 60022

    AThe program you want is Peripheral Vision, from Futurehouse, the company that made your light pen. The last address I have for them is PO Box 3470, Chapel Hill, NC 27514; phone 919-967-0861.

    I've included your full address in case the program is still available from a source willing to contact you or other readers have copies they'd be willing to pass on.

    It's incorrect to assume that a product is abandoned by its authors merely because the vendor is out of business. On the other hand, when a good program truly is unavailable, it seems better to share copies with those who still need it than to allow it to disappear from the earth. Just be ready to pay for your copy if you later find the program available commercially.

    And, vendors, when abandoning a product, why not give a noncopy-protected shareware version to the nearest
    user's group? That will both benefit those who still need the program and possibly bring in added income as those who copy it send donations.

    Q
    I need a program that will list about 300 phonograph albums by publisher, album title, song title, composer, orchestra and conductor. Do you know of any software that can do this?

    > -Wade Jordan Macon, GA

    A If you treated each song as a sep. arate entry, almost any commercial data manager would meet your needs. However, you'd run out of storage on most Commodore disks long before you'd saved all of your data.

    A better solution is to use a relational data manager, such as Precision Software's Superbase (sold by Progressive Peripherals, 464 Kalamath St., Denver, CO 80204). That way you can have an entry for each album in one data file, with a separate entry in a second related file for each song on the album. The information shared by all the songs on an album is entered only once. (Depending on the number of songs per album, you may still need to use some abbreviations to get all your data on a 1541 data disk.)

    0Can you recommend a laser printer for use with our Plus/4 and 64 C com. puters? What interfaces would be required for small-business use?

    ## -Paul Heil

    Lancaster, PA

    - Jim Oldfield reports that his Midnite Press book How to Get the Most Out of GEOS was written using a Quadram Quadlaser printer, connected to a C-128 via a Xetec Super Graphix interface in Transparent mode and using WordPro 128/S, from Spinnaker Software.

    The Quadlaser comes with four builtin fonts and has a megabyte of RAM into which to load other fonts. The only
    obstacle to using this printer with a Commodore computer is that your favorite word processor may be unable to embed long sequences of control characters within a document.

    For a Plus/4, you may also want to consider using an MW350 printer interface. It is particularly recommended by the Plus Exchange, and it also works well with the C-64 and C-128.

    A far more costly but also more flexible laser printer is Apple's LaserWriter. You can use it with your 64C (but not the Plus/4) via the GEOS geoLaser driver and such GEOS programs as geoWrite and geoPublish. Since IBM has just joined Apple in endorsing the LaserWriter's Postscript page description language, the LaserWriter should be compatible with new products for years to come, making up for its relatively high price.

    ## PROGRAMMING

    Q
    I'm running out of array memory on my C-128. Is there a way to use idle Basic program memory for arrays?
    -Jim LyNCH
    St. Thomas, Virgin Islands

    A
    Yes, although it isn't very convenient and works best when all the data values in the array to be stored that way are small numbers or single characters, so each element can fit in a single byte of memory.

    The basic idea is to directly poke the data into, and peek it back out of, unneeded space in the Basic program bank of memory. You'll need to find a safe starting address within the unused space and then locate each element in the poked array relative to that address. It's also up to you to make sure nothing tampers with that memory, since Basic offers very few safeguards when using the Peek and Poke commands.
    Before going to that extreme, I'd remind you of integer arrays. If a numeric array variable name ends with a percent sign (\%), each of its elements take up
    three fewer bytes of memory than usual. The savings in a large array are sufficient to be worth a serious effort to limit data values to integers.

    I'm writing a program that accesses 30 relative files. Do I have to use 30 Open and Close statements, or can I make a subroutine using variables?

    ## -Ken Paolino <br> Pittsburgh, PA

    AHere's a program example for the C-64 that uses variables and a subroutine to open and close three previously existing relative files, one at a time. (The 1541 disk drive allows only one relative file to be open at a time.) The same technique should work for any reasonable number of files.

    99 REM INITIALIZATION
    100 DU $=8$ : REM DISK UNIT
    110 DDS $=" 0 "$ : REM DATA DRIVE
    120 OPEN 15, DU, 15 : REM DISK CMD CHANNEL
    199 REM FIRST CALL
    200 RFS $=$ "FIRSTFILE"
    210 GOSUB 1000
    220 REM FIRST FILE IS NOW OPEN
    299 REM SECOND CALL
    300 RFS $=$ "SECONDFILE"
    310 GOSUB 1000
    320 REM SECOND FILE IS NOW OPEN
    399 REM THIRD CALL
    400 RF $\$=$ "THIRDFILE"
    410 GOSUB 1000
    420 REM THIRD FILE IS NOW OPEN
    900 GOTO 9998
    996 REM S/R TO CLOSE A CURRENTLY OPEN
    997 REM FILE, THEN OPEN ANOTHER EXISTING
    998 REM RELATIVE FILE WHOSE NAME IS IN
    999 REM VARIABLE RF\$ ON DISK UNIT DU.
    1000 CLOSE 5
    1010 OPEN 5,DU,5,DDS + ":" + RFS
    1020 GOSUB 2000
    1030 RETURN
    1998 REM S/R TO CHECK DISK FOR ERRORS

    1999 REM USING VARIABLES EN, EM\$, ET \& ES.<br>2000 INPUT\#15,EN,EM\$,ET,ES<br>2010 IF EN $>0$ THEN PRINT<br>EN,EM\$,ET,ES: STOP<br>2020 RETURN<br>9998 CLOSE 15<br>9999 END

    couple of questions about using $F R E(X)$ to find the space used in RAM. First, what's the formula for the C.64? Also, some programs show no space used. Don't machine language programs use up space in RAM?
    -Wallace Edson
    LOMPOC, CA

    AThe FRE( ) function on the C. 64 finds your remaining Basic work space by subtracting the current contents of a pointer to the start of the Basic program work space from the contents of a pointer to the end of the current Basic program. The difference is the remaining number of free bytes, stored as a two-byte integer.

    Since two-byte integer values greater than 32767 are interpreted as negative and there are initially 38911 Basic bytes free on the C-64, if you try ? $\operatorname{FRE}(0) \mathrm{im}$ mediately after switching on your computer, the machine will report -26627 bytes free. When you get a negative number of bytes free, ? $65536+$ FRE $(0)$ shows the correct answer.
    If you give the latter command immediately after switching on, the response will be 38909, two bytes fewer than claimed by Commodore's sign-on message. The difference is due to two zero bytes that end each Basic program and are present even before a program is written or loaded. Commodore considers them initially free, but $\operatorname{FRE}(0)$ counts them as used.

    As for machine language programs, they do use space in RAM, but unless they emulate Basic in the way they allocate that space, $\operatorname{FRE}(0)$ may not even know they're in memory. Then, too, some machine language programs use -

    ## COMMODORECLINIC

    portions of memory unavailable to Ba sic and don't reduce Basic's work space.

    ## OTHER

    0Can you recommend any good sources of information on starting a home business, such as doing word processing or maintaining mail lists?
    -Diane Hiem
    Highland, IL

    AThe most helpful resource I ever found along those lines was the book The Incredible Secret Money Machine, by Don Lancaster. Don was a true pioneer in the microcomputer revolution and has been quite successful over the years in making a living working at home. This book details his methods, several of which I've found useful in my own work.

    A more recent resource specifically for Commodore owners with small busi-
    nesses is Money Machine, a bi-monthly magazine from Redwood Empire, PO Box 6609, San Mateo, CA 94403.

    ## UPDATE

    In the June Clinic, you gave reader Todo Brye an assembly language version of a small Basic program he sent in. However, the assembly code you published has a problem. The code should read:

    | Object <br> Code: | Source <br> Code: |
    | :--- | :--- |
    | AO 03 | LDY \#3 |
    | B1 2D | LDA $(\$ 2 D), Y$ |
    | 8514 | STA $\$ 14$ |
    | C8 | INY |
    | B1 2D | LDA $(\$ 2 D), Y$ |
    | 8515 | STA $\$ 14+1$ |
    | A9 00 | LDA \#O |
    | A8 | TAY |
    | 9114 LOOP | STA $\$ 14), Y$ |
    | C8 | INY |

    ## DO FB

    BNE LOOP
    RTS
    -Darren Spruyt
    Gravenhurst, Ontario, Canada

    ## You're absolutely right. Leaving out those first six lines is an ex-

    ample of an error I've had a good bit of trouble with over the years-overlooking a level of indirection in a problem that requires multiple levels of indirection. Thanks so much for the correction.Do you have a problem or question about your Commodore computer? Commodore Clinic can help. Just send your question on a postcard to:

    ## Commodore Clinic clo RUN Magazine

    80 Elm St.Peterborough NH 03458
    Queries are answered only through this column, and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

    ## The Hot Shot PLUS <br> Advanced Graphics Printer Interface <br> The Hot Shot PLUS is the most advanced and useful printer interface ever created for the Commodore computer. The Hot Shot PLUS has the standard features you have come to expect in a printer interface, including Full Commodore Emulation and Transparent operating modes, givingyouthe maximum capability and performance possible from your printer! However, that is just the beginning! The Hot Shot PLUS <br>  comes with a built-in 8 K buffer, which you can expand to a $16 \mathrm{~K}, 32 \mathrm{~K}, 48 \mathrm{~K}$, or $\mathbf{6 4 K}$ buffer just by adding additional chips! A built-in Reset button allows you to clear the buffer. The Hot Shot PLUS has been designed to take complete advantage of your printers special graphics features! The Hot Shot PLUS has 6 Near Letter Quality Fonts built into its ROM, giving most popular printers greatly increased printing quality and versatility. Users can dosign and upload from 2 to 42 additional customized fonts into the Hot Shot PLUS memory. The Hot Shot PLUS comes complete with its Fantastic Font Editor built into its ROM. You load it into your computer just as if the Hot Shot PLUSwere a disk drivel The Fantastic Font Editor is compatible with the C64, C128 in 128 mode, and the Plus 4! A disk is included with many additional fonts, and fonts from the Xetec Super Graphics $\mathrm{Sr}^{\text {re }}$ can be converted to the Hot Shot PLUS format. The Hot Shot PLUShas been designed to eliminate print head Shuffling and maximize graphics printing speed. The Hot Shot PLUShas a unique Graphics Enhancement Mode which allows you to print standard graphics printouts in Double or Quadruple Density! Graphics quality with programs such as The Printshop**, Sideways ${ }^{* *}$, and Geos'* fonts are dramatically improved using this feature, which is compatible with most popular printers. No other interface has this great ieaturel The Hot Shot PLUS also has two sets of DIP switches, allowingyou to directly select and change all the above settings. CP/M Mode selection also. All this and more at a list price of only $\$ 99.95$.

    SO:
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    The original Final Cartridge took the place of 6 separate devices, but the FINAL CARTRIDGE III does all that plus much more.
    A partial listing of some of The Final Cartridge III's fea-
    tures: 1) Disk Turbo-25 times faster loading with special formatting, 15 times faster by direct loading and saving; Tape Turbo-10-15 times faster tape access; 2) Pre-programmed Function Keys-simple keystroke for most often used command sequences for RUN, LOAD, SAVE, CATALOG, Disk Commands, LIST (removes all protections); 3) Extended Machine Language Monitor-with relocated load-scrolling up or down, bankswitching, and more; 4) Built-in Printer Interface (cable op-tional)-prints all Commodore graphics and control codes with screendump utility; 5) Basic Tool Kit with many pre-programmed functions to help the serious programmer-

    Automatic Line Renumbering (includes Gotos and Gosubs), Delete, Old (recovers accidentally-deleted programs), Find (locate specific lines), Help (debugging utility), Disk Append (easily add new programs to existing files), and more; 6) Backup Capability-backup any memory resident software at any point after load; 7) Builtin 70 Column ( 80 Column printing) window driven word processor with proportional characters; 8 ) Built-in Clock/Calendar and Calculator; 9) Joystick Port Changer; 10) Keyboard Extras (scrolling up and down and re-start listings; 11) 24 K extra RAM available for basic programs; 12) Operates printer as a typewriter; plus much more.

    The Final Cartridge III has an improved Window driven Freezer with 16 sub menus, color changes, 4 resets, centronics/serial screendumps, print vector setting, reverse printing, stop and continue almost every program, make a total backup to disk or tape (backup will run without cartridge), does 50 K in 10 seconds, built-in sprite killer.
    The Screendump capability allows printing of low-res, high-res and multicolor in 12 shades of grey or full color, prints full page, Character mode, banner, small, large, color, sprites, searches automatically from memory address of picture.
    So many features that space does not allow full description. Call or write for complete information.
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    -Art Hunkins, Compute's Gazette 7/87
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    From p． 56.
    169，154，32，21ø，148：REM＊149
    265 DATA $32,231,146,96,169,1,14$ $1,226,2,32,188,151,32,29,14$ $5,2 \emptyset \emptyset, 177,253,2 \emptyset 1 \quad:$ REM＊78
    $27 \emptyset$ DATA $32,2 \emptyset 8,4,2 \emptyset \emptyset, 76,71,137$ ，72，174，188，2，169，44，157，6ø ，3，232，1ø4，157
    ：REM＊2ø9
    275 DATA $6 \emptyset, 3,232,169,44,157,6 \emptyset$ ，3，232，169，82，157，6ø，3，142， 223，2，142，188 ：REM＊1ø4
    28ø DATA $2,96,32,2 \emptyset 4,255,32,2,1$ $39,32,45,135,32,176,144,32$ ， 2ø4，255，173，53 ：REM＊177
    285 DATA $3,2 \emptyset 8,1,96,32,2,145,1 \emptyset$ $4,1 \emptyset 4,76,199,137,23 \emptyset, 158,24$ Ø，1，96，23, 159 ：REM＊252
    $29 \emptyset$ DATA $96,172,223,2,169,87,15$ $3,6 \emptyset, 3,2 \emptyset \emptyset, 14 \emptyset, 188,2,96,32$ ， 244，146，32，32 ：REM＊129
    295 DATA $137,169, \emptyset, 141,241,2,14$ $1,242,2,141,243,2,141,244,2$ ，141，246，2，141 ：REM＊182
    $3 \emptyset \emptyset$ DATA $245,2,169,1,133,158,16$ $9,8,133,159,96,76,137,15 \emptyset, 3$ 2，231，255，32，164 ：REM＊159
    $3 \emptyset 5$ DATA $137,32,13,145,144,3,76$ $, 137,15 \emptyset, 169, \emptyset, 157, \emptyset, 16 \emptyset, 14$ 2，243，2，32，59 ：REM＊242
    $31 \emptyset$ DATA $137,173,239,2,2 \emptyset 1,116$ ， $144,3,76,2 \emptyset 2,137,173,233,2$ ， 141，18ø，2，32，114 ：REM＊57
    315 DATA $137,162,1,32,198,255,1$ $6 \emptyset, \emptyset, 32,2 \emptyset 7,255,145,158,32$ ， $183,255,2 \emptyset 8,6,32$ ：REM＊142
    $32 \emptyset$ DATA $143,137,76,253,137,32$ ， $143,137,165,158,133,181,165$ ，159，133，182，32，2ø4 ：REM＊19
    325 DATA $255,32,123,137,32,2,14$ $5,32,19 \emptyset, 137,174,243,2,32,1$ $51,137,173,234,2,141$
    ：REM＊$\emptyset 8$
    $33 \emptyset$ DATA $18 \emptyset, 2,32,114,137,162,1$ ，32，2ø1，255，16ø，$, 177,158,3$ 2，21申，255，32，143 ：REM＊99
    335 DATA $137,165,158,197,181,2 \emptyset$ $8,242,165,159,197,182,2 \emptyset 8,2$ 36，32，2ø4，255，32，123：REM＊78
    $34 \emptyset$ DATA $137,32,2,145,76,2 \emptyset 2,13$ $7,169,184,133,253,133,171,1$ 69，5，133，254，169，217
    ：REM＊119
    345 DATA $133,172,169,4 \emptyset, 32,2 \emptyset 2$ ， $147,162,12,160,5,177,253,72$ ，177，171，72，169，40，32
    ：REM＊228
    $35 \emptyset$ DATA $17 \emptyset, 147,1 \emptyset 4,145,171,1 \varnothing$ $4,145,253,169,4 \emptyset, 32,2 \emptyset 2,147$ ，2ø申，192，4ø，2ø8，229：REM＊241
    355 DATA $169,4 \emptyset, 32,2 \emptyset 2,147,2 \emptyset 2$ ， $2 \emptyset 8,219,169,15,141,134,2,16$ $2,23,16 \emptyset, \emptyset, 24,32,24 \emptyset$

    REM＊1 62
    $36 \emptyset$ DATA $255,16 \emptyset, 6,169,32,32,21$ Ø，255，2申申，192，39，2ø8，246，16 9，6，141，134，2，96 ：REM＊23
    365 DATA $169,152,133,253,133,17$ $1,169,7,133,254,169,219,133$ ，172，169，4ø，32，17申 ：REM＊2ø
    $37 \emptyset$ DATA $147,162,12,16 \emptyset, 5,177,2$ $53,72,177,171,72,169,4 \emptyset, 32$ ， $2 \emptyset 2,147,1 \emptyset 4,145,171$ ：REM＊153
    375 DATA $1 \emptyset 4,145,253,169,4 \emptyset, 32$ ， $17 \emptyset, 147,2 \emptyset \emptyset, 192,4 \emptyset, 2 \emptyset 8,229$ ， $169,4 \emptyset, 32,17 \emptyset, 147,2 \emptyset 2$

    REM＊21ø

    $38 \emptyset$ DATA $2 \emptyset 8,219,162,11,16 \emptyset, 6,2$ $4,32,24 \emptyset, 255,16 \emptyset, 6,169,32,3$ 2，21ø，255，2ø日，192，38
    ：REM＊233
    385 DATA $2 \emptyset 8,246,96,169, \emptyset, 32,18$ $9,255,169,15,174,18 \emptyset, 2,168$ ， $32,186,255,32,192$ ：REM＊19 $\emptyset$
    $39 \emptyset$ DATA $255,96,169,1,32,195,25$ $5,169,15,32,195,255,96,32,1$ $2 \emptyset, 145,144,3,76$
    ：REM＊55
    395 DATA $137,15 \emptyset, 32,1 \emptyset 6,15 \emptyset, 32$ ， $11 \emptyset, 145,32,244,146,169, \emptyset, 32$ ，21 $\varnothing, 148,174,221,2:$ REM＊1 $\emptyset 4$ $4 \emptyset \emptyset$ DATA $189,28,155,32,21 \emptyset, 255$ ， $169,4,32,21 \varnothing, 148,32,78,149$ ， 173，177，2，2ø1，32 ：REM＊243 $4 \emptyset 5$ DATA $24 \emptyset, 8,32,36,147,144,24$ $1,76,137,15 \emptyset, 169,8,32,21 \emptyset, 1$ 48，32，115，145，169 ：REM＊112
    $41 \emptyset$ DATA $12,32,21 \emptyset, 148,169,3,14$ $1,225,2,141,228,2,169,22,14$ 1，227，2，162，1ø
    415 DATA $16 \emptyset, 17,32,176,139,144$ ， $3,76,137,15 \emptyset, 169,1,141,23 \emptyset$ ， 2，32，244，146，169 ：REM＊56 $42 \emptyset$ DATA $158,32,21 \emptyset, 148,32,67,1$ $41,2 \emptyset 6,23 \emptyset, 2,173,186,2,2 \emptyset 1$ ， $1,2 \emptyset 8,3,76,137 \quad:$ REM＊17
    425 DATA $15 \emptyset, 169,78,141,6 \emptyset, 3,16$ $9,48,141,61,3,169,58,141,62$ ，3，32，2ø8，146 ：REM＊66
    $43 \emptyset$ DATA $32,25,139,76,137,15 \emptyset, 2$ 4，32，24ø，255，169， $9,133,198$ ， 141，224，2，32，78 ：REM＊125
    435 DATA $149,32,36,147,144,2,56$ ， $96,32,228,255,24 \emptyset, 241,72,3$ 2，234，147，169，$\quad:$ REM＊19 $\emptyset$
    $44 \emptyset$ DATA $133,198,1 \emptyset 4,2 \emptyset 1,34,2 \emptyset 8$ ，11，72，165，212，73，128，133，2 $12,1 \emptyset 4,76,23,14 \emptyset, 2 \emptyset 1$
    ：REM＊117
    445 DATA $17,24 \emptyset, 15,2 \emptyset 1,29,24 \emptyset, 1$ $1,2 \emptyset 1,145,24 \emptyset, 7,2 \emptyset 1,157,24 \emptyset$ ，3，76，2，140，141 ：REM＊224
    45ø DATA $181,2,165,212,24 \emptyset, 191$ ， $173,181,2,76,23,14 \emptyset, 2 \emptyset 1,13$ ， $24 \emptyset, 97,2 \emptyset 1,136,24 \emptyset:$ REM＊237
    455 DATA $93,2 \emptyset 1,2 \emptyset, 24 \emptyset, 33,2 \emptyset 1,1$ 48，24曰，29，174，224，2，2ø8，164 ，32，21ø，255，174，225 ：REM＊62
    $46 \emptyset$ DATA $2,157,6 \emptyset, 3,232,142,225$ ，2，236，227，2，144，146，238，22 4，2，76，187，139

    REM＊2ø5
    465 DATA $169, \emptyset, 133,198,173,225$ ， $2,2 \emptyset 5,228,2,2 \emptyset 8,3,76,187,13$ 9，56，32，24ø，255 ：REM＊$\emptyset$
    47ø DATA $136,24,32,24 \emptyset, 255,169$ ， $32,32,21 \emptyset, 255,56,32,24 \emptyset, 255$ ，136，24，32，24申，255 ：REM＊193
    475 DATA $174,225,2,2 \emptyset 2,142,225$ ， $2,169, \emptyset, 157,6 \emptyset, 3,141,224,2$ ， 76，187，139，174
    ：REM＊68
    $48 \emptyset$ DATA $232,2,2 \emptyset 8,8,174,225,2$ ， $142,188,2,24,96,174,225,2,2$ ø1，13，2ø8，3
    ：REM＊1
    485 DATA $76,128,14 \emptyset, 169, \emptyset, 157,6$ $\emptyset, 3,76,111,14 \emptyset, 32,12 \emptyset, 145,1$ $44,3,76,137,15 \emptyset \quad:$ REM＊ $8 \emptyset$ 49ø DATA $32,1 \emptyset 6,15 \emptyset, 32,98,15 \emptyset, 3$ $2,11 \emptyset, 145,169,16,32,21 \emptyset, 148$ ，169，2ø，32，21ø，148 ：REM＊85 495 DATA $162, \emptyset, 142,2 \emptyset 3,2,142,2 \emptyset$ $2,2,169,1,141,195,2,169,8 \emptyset$ ， 141，198，2，169
    ：REM＊1 6
    $5 \emptyset$ DATA $197,133,253,169,5,133$ ， $254,169,13,141,2 \emptyset 4,2,162,1$, 32，244，147，32，36 ：REM＊217
    $5 \emptyset 5$ DATA $147,144,3,76,137,15 \emptyset, 1$ $73,186,2,2 \emptyset 1,1,2 \emptyset 8,13,169,7$ 7，141，63，3，169 ：REM＊118
    $51 \emptyset$ DATA $48,141,64,3,76,235,14 \emptyset$ ，169，77，141，63，3，169，49，141 64，3，162，$\varnothing$
    ：REM＊9
    515 DATA $189,18,155,157,6 \emptyset, 3,23$ $2,224,3,2 \emptyset 8,245,169,5,141,1$ $88,2,32,2 \emptyset 8,146 \quad:$ REM＊9
    52ø DATA $32,176,144,32,2 \emptyset 4,255$ ， $32,25,139,76,137,15 \emptyset, 162, \emptyset$ ， 142，22ø，2，232，142 ：REM＊72
    525 DATA $226,2,142,218,2,32,2,1$ $39,32,81,152,32,176,144,32$ ， $2 \emptyset 4,255,32,25 \quad:$ REM＊ 43
    53ø DATA $139,173,53,3,24 \emptyset, 3,76$ ， $132,141,173,2 \emptyset 7,2,141,219,2$ ，32，2ø2，153，32 ：REM＊2øø
    535 DATA $12,147,32,12,147,169,2$ $4,32,21 \varnothing, 148,169,3,141,2 \emptyset 4$ ， 2，141，199，2，169 ：REM＊71
    $54 \emptyset$ DATA $52,133,253,169,5,133,2$ $54,162, \emptyset, 142,198,2,232,142$ ， $2 \emptyset 3,2,142,2 \emptyset 2,2 \quad:$ REM＊186
    545 DATA $32,244,147,173,23 \emptyset, 2,2$ $4 \emptyset, 1,96,173,186,2,2 \emptyset 1,1,2 \emptyset 8$ ，3，76，132，141 ：REM＊143
    $55 \emptyset$ DATA $169,6,141,194,2,162, \emptyset$ ， $142,192,2,174,192,2,32,15,1$ 45，144，11，169
    ：REM＊12
    555 dATA $\emptyset, 141,218,2,141,226,2$ ， $76,137,15 \emptyset, 142,192,2,238,19$ $2,2,169, \emptyset, 133$
    ：REM＊177
    $56 \emptyset$ DATA $253,169,168,133,254,22$ $4, \emptyset, 24 \emptyset, 8,169,34,32,2 \emptyset 2,147$ ，2ø2，2ø8，248，162，3 ：REM＊194
    565 DATA $16 \emptyset, \emptyset, 177,253,24 \emptyset, 8,15$ $7,6 \emptyset, 3,2 \emptyset \emptyset, 232,76,173,141,1$ $42,188,2,169,82 \quad:$ REM＊2 $\varnothing 5$ $57 \varnothing$ DATA $141,6 \varnothing, 3,169,48,141,61$ ，3，169，58，141，62，3，32，2ø8，1 46，32，176，144
    ：REM＊16ø
    575 DATA $32,2 \emptyset 4,255,32,25,139,7$ $6,124,141,169, \emptyset, 133,253,169$ ，168，133，254，32，12 ：REM＊1 $\boldsymbol{R 1}_{1}$
    $58 \emptyset$ DATA $147,169,3 \emptyset, 32,21 \emptyset, 148$ ， $32,115,145,169,21,141,193,2$ ，162，7，16 19,19 ：REM＊126 585 DATA $236,148,169, \emptyset, 141,225$ ， $2,141,228,2,169,16,141,227$, $2,162,7,16 \emptyset, 19 \quad$ ：REM＊143
    59ø DATA $32,176,139,32,11 \emptyset, 145$ ， $174,211,2,240,8,169,34,32,2$ $\emptyset 2,147,2 \emptyset 2,2 \emptyset 8,248$ ：REM＊22ø

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    595 DATA $16 \emptyset, \emptyset, 185,6 \emptyset, 3,145,253$ ， $2 \emptyset 6,2 \emptyset 4,188,2,2 \emptyset 8,245,169$ ， 61，145，253，2øø，14ø ：REM＊185
    $6 \emptyset \emptyset$ DATA $192,2,165,253,72,165,2$ $54,72,174,211,2,32,188,151$ ， $32,29,145,1 \emptyset 4,133 \quad:$ REM＊2 $\varnothing$
    $6 \emptyset 5$ DATA $254,1 \varnothing 4,133,253,162, \emptyset$ ， $172,192,2,189,6 \emptyset, 3,145,253$ ， 2 日の，232，236，188，2 ：REM＊95
    $61 \emptyset$ DATA $2 \emptyset 8,244,169, \emptyset, 145,253$ ， $32,98,15 \emptyset, 24,96,162,1,142,2$ 18，2，142，231，2 ：REM＊72
    615 DATA $169, \emptyset, 141,22 \emptyset, 2,32,2,1$ $39,32,81,152,32,176,144,32$ ， 2ø4，255，32，25 ：REM＊81
    $62 \emptyset$ DATA $139,173,53,3,24 \varnothing, 3,76$ ， $168,142,173,2 \emptyset 7,2,141,219,2$ ，32，2ø2，153，32 ：REM＊224
    625 DATA $12,147,169,1,141,23 \emptyset, 2$ ，169，34，32，210，148，32，67，14 $1,2 \emptyset 6,23 \emptyset, 2,173 \quad:$ REM＊1 197
    $63 \emptyset$ DATA $186,2,2 \emptyset 1,1,2 \emptyset 8,11,169$ ，$\varnothing, 141,218,2,141,231,2,76,1$ 37，15ø，162，$\emptyset$
    ：REM＊6ø
    635 DATA $142,192,2,174,192,2,32$ ，15，145，144，3，76，168，142，14 2，192，2，238，192 ：REM＊193
    64ø DATA $2,32,188,151,169,3,141$ ，229，2，32，34，145，169，83，141 ， 6 6，3，169，48 REM＊ 64
    645 DATA $141,61,3,169,58,141,62$ ，3，32，2ø8，146，32，176，144，32 ，2ø4，255，32，25
    ：REM＊223
    65 DATA $139,76,184,142,32,244$ ， $146,32,98,15 \emptyset, 32,1 \emptyset 6,15 \emptyset, 32$ ，11申，145，169，38，32 ：REM＊124
    655 DATA $21 \emptyset, 148,169,42,32,21 \emptyset$ ， $148,169,46,32,21 \emptyset, 148,169,2$ 1，141，2ø4，2，169，8ø ：REM＊199
    $66 \emptyset$ DATA $141,198,2,169, \emptyset, 141,2 \emptyset$ $3,2,141,2 \emptyset 2,2,169,193,133,2$ $53,169,5,133,254$ ：REM＊ 148
    665 DATA $162,2,142,195,2,32,244$ ，147，32，36，147，144，3，76，137 ，15ø，173，186，2
    ：REM＊129
    67ø DATA $2 \emptyset 1,1,2 \emptyset 8,3,76,6 \emptyset, 144$ ， $2 \not 1,3,2 \emptyset 8,3,76,42,144,32,11$ $\emptyset, 145,169,5 \emptyset \quad:$ REM＊212
    675 DATA $32,21 \emptyset, 148,169,4,141,2$ Ø4，2，141，199，2，169，7，141，2ø $2,2,162, \varnothing, 142 \quad:$ REM＊49
    $68 \emptyset$ DATA $195,2,142,198,2,232,14$ $1,2 \emptyset 3,2,169,213,133,253,169$ $, 6,133,254,162, \emptyset \quad:$ REM＊192
    685 DATA $32,244,147,32,36,147,1$ $44,3,76,137,15 \emptyset, 32,12,147,1$ 69，54，32，21ø，148 ：REM＊211
    69＠DATA $169,1,141,232,2,2 \emptyset 6,18$ $6,2,169, \emptyset, 141,192,2,174,186$ ，2，24ø，12，24 ：REM＊122
    695 DATA $173,192,2,1 \varnothing 5,31,141,1$ $92,2,2 \emptyset 2,2 \emptyset 8,244,162,7,16 \emptyset$, 4，24，32，24 255 ：REM＊73
    $7 \emptyset \emptyset$ DATA $32,115,145,32,123,15 \emptyset$ ， $174,192,2,189, \emptyset, 161,24 \varnothing, 11$ ， 2ø1，13，24ø，7，32 ：REM＊96
    $7 \emptyset 5$ DATA $21 \emptyset, 255,232,76,181,143$ ，32，13ø，15申，32，78，149，173，1 77，2，24 $, 248,32,36$ ：REM＊51
    $71 \emptyset$ DATA $147,144,17,32,12,147,3$ $2,11 \emptyset, 145,32,98,15 \emptyset, 169, \emptyset, 1$ 41，232，2，76，72 ：REM＊18 $\emptyset$ 715 DATA $143,32,234,147,32,11 \emptyset$ ， $145,16 \emptyset, \emptyset, 14 \emptyset, 228,2,14 \emptyset, 225$ ，2，169，54，32，21ø ：REM＊255
    $72 \emptyset$ DATA $148,169,3 \emptyset, 141,227,2,1$ $62,7,16 \emptyset, 4,173,192,2,72,32$ ， 176，139，144，4 ：REM＊6
    725 DATA $1 \emptyset 4,76,213,143,1 \emptyset 4,17 \emptyset$ $, 16 \emptyset, \emptyset, 185,6 \emptyset, 3,24 \emptyset, 12,2 \emptyset 1$ ， 13，24 $, 8,157, \emptyset \quad:$ REM＊223 $73 \emptyset$ DATA $161,232,2 \emptyset \emptyset, 76,19,144$ ， $157, \emptyset, 161,76,213,143,12 \emptyset, 16$ $9,71,141,2 \emptyset, 3,169$ ：REM＊172 735 DATA $144,141,21,3,88,238,23$ $5,2,76,137,15 \emptyset, 32,138,255,1$ 69，$\varnothing, 141,235,2$
    ：REM＊9
    $74 \emptyset$ DATA $76,137,150,173,238,2,2$ Ø8，97，173，235，2，2ø8，3，76，17 $3,144,165,212,2 \emptyset 8$ ：REM＊192
    745 DATA $85,173,141,2,141,184,2$ $165,2 \emptyset 3,2 \emptyset 1,3,144,73,2 \emptyset 1,7$ 176，69，141，185 ：REM＊1ø1
    75＠DATA 2，32，234，147，173，185，2 ，56，233，3，141，185，2，173，184 ，2，2ø1，1，2ø8 ：REM＊182
    755 DATA $9,24,173,185,2,1 \emptyset 5,4,1$ $41,185,2,174,185,2,189,3 \emptyset, 1$ $55,17 \emptyset, 32,123$ ：REM＊89
    $76 \emptyset$ DATA $15 \emptyset, 189, \emptyset, 161,24 \emptyset, 2 \emptyset, 2$ ø1，13，24ø，7，32，21ø，255，232， 76，145，144，169，13 ：REM＊134
    765 DATA $141,119,2,169,1,133,19$ $8,32,13 \emptyset, 15 \emptyset, 76,49,234,32,2$ ゆ4，255，162，15，32 ：REM＊183
    $77 \emptyset$ DATA $198,255,32,2 \emptyset 7,255,2 \emptyset 1$ ， $5 \emptyset, 144,51,141,53,3,169,0,1$ 33，199，32，244，146 ：REM＊87
    775 DATA $169,2,141,134,2,24,162$ ，7，16ø，7，32，24ø，255，173，53， 3，32，21ø，255
    ：REM＊118
    $78 \emptyset$ DATA $32,2 \emptyset 7,255,2 \emptyset 1,13,24 \emptyset$ ， $6,32,21 \emptyset, 255,76,22 \emptyset, 144,169$ ，1，141，53，3，32 ：REM＊211 785 DATA $231,146,96,32,2 \emptyset 7,255$ ， $2 \emptyset 1,13,24 \emptyset, 3,76,242,144,169$ ，$\emptyset, 141,53,3,96 \quad:$ REM＊1 $\varnothing 6$
    79ø DATA $169,1,32,195,255,169,1$ $5,32,195,255,96,162, \emptyset, 189, \emptyset$ ，16ø，2ø8，7，232 ：REM＊79
    795 DATA $224,255,2 \emptyset 8,246,56,96$ ， $24,96,169, \emptyset, 141,229,2,16 \emptyset, 2$ $55,2 \emptyset \emptyset, 177,253,2 \emptyset 1$ ：REM＊48
    $8 \emptyset \emptyset$ DATA $34,2 \emptyset 8,249,2 \emptyset \emptyset, 174,229$ $, 2,177,253,2 \emptyset 1,34,24 \emptyset, 8,157$ ，6ø，3，2øø，232，76 ：REM＊11
    $8 \emptyset 5$ DATA $47,145,142,188,2,152,7$ $2,165,253,72,165,254,72,169$ ， $3,32,17 \emptyset, 147,16 \emptyset \quad:$ REM＊36
    $81 \emptyset$ DATA $\emptyset, 177,253,141,239,2,2 \emptyset$ Ø，177，253，141，24申，2，1ø4，133 ，254，1ø4，133，253，1ø4：REM＊49
    815 DATA $168,96,162, \emptyset, 169, \emptyset, 157$ ，$\varnothing, 16 \emptyset, 232,2 \emptyset 8,25 \emptyset, 96,169, \varnothing$ ，133，199，96，169 ：REM＊24ø 82ø DATA $1,133,199,96,173,2 \emptyset 1,2$ ，2ø8，7，169，8，141，18ø，2，24，9 6，32，244，146
    ：REM＊139

    825 DATA $32,1 \emptyset 6,15 \emptyset, 32,11 \emptyset, 145$ ， $169,78,32,21 \emptyset, 148,169,52,13$ 3，253，169，5，133，254 ：REM＊76 $83 \emptyset$ DATA $169,1,141,2 \emptyset 3,2,169,1$ ， $141,2 \emptyset 2,2,169,3,141,2 \emptyset 4,2,1$ 41，199，2，162 ：REM＊23
    835 DATA $1,32,244,147,32,36,147$ ，144，2，56，96，173，186，2，2ø1， 1，2ø8，13，169 ：REM＊8
    $84 \emptyset$ data $\emptyset, 141,221,2,173,2 \emptyset \emptyset, 2$ ， $141,18 \emptyset, 2,24,96,169,1,141,2$ 21，2，173，2ø1 ：REM＊183 845 DATA $2,141,18 \emptyset, 2,24,96,169$ ， $29,133,253,169,176,133,254$ ， $96,16 \emptyset, \emptyset, 185,25 \quad:$ REM＊2 $\varnothing \varnothing$ $85 \emptyset$ DATA $155,145,167,169,2,145$ ， $169,2 \emptyset \emptyset, 192,3,2 \emptyset 8,242,96,16$ $\emptyset, \emptyset, 169,32,145,167$ ：REM＊97 855 DATA $2 \emptyset \emptyset, 192,3,2 \emptyset 8,249,96,1$ $69,184,133,167,133,169,169$ ， $5,133,168,169,217,133$
    ：REM＊52
    $86 \emptyset$ DATA $17 \emptyset, 96,24,165,167,1 \emptyset 5$ ， $4 \emptyset, 133,167,165,168,1 \emptyset 5, \emptyset, 13$ 3，168，24，165，169，1ø5：REM＊41
    865 DATA $4 \emptyset, 133,169,165,17 \emptyset, 1 \emptyset 5$ ，$\varnothing, 133,17 \emptyset, 96,56,165,167,23$ $3,4 \emptyset, 133,167,165,168$
    ：REM＊144
    87ø DATA $233, \emptyset, 133,168,56,165,1$ $69,233,4 \emptyset, 133,169,165,17 \emptyset, 2$ $33, \emptyset, 133,17 \emptyset, 96,2 \emptyset 1:$ REM＊239
    875 DATA $1 \emptyset, 144,26,2 \emptyset 1,1 \emptyset \emptyset, 144$ ， 11，169，7，141，2ø9，2，169，25，1 $41,21 \varnothing, 2,96,169$
    ：REM＊ 242
    $88 \emptyset$ DATA $8,141,2 \emptyset 9,2,169,26,141$ $, 21 \emptyset, 2,96,169,9,141,2 \emptyset 9,2,1$ 69，27，141，21ø ：REM＊229
    885 DATA $2,96,174,222,2,134,253$ ，172，223，2，132，254，169，3ø，3 $2,17 \emptyset, 147,16 \emptyset, \emptyset \quad: R E M * 156$
    89ø DATA $177,253,141,2 \emptyset 5,2,2 \emptyset \emptyset$ ， $177,253,141,2 \emptyset 6,2,169,3,32$ ， 17ø，147，56，165，253 ：REM＊53
    895 DATA $233,29,141,2 \emptyset 7,2,165,2$ $54,233,176,141,2 \emptyset 8,2,162,5$ ， $78,2 \emptyset 8,2,11 \emptyset, 2 \emptyset 7 \quad:$ REM＊16ø
    $9 \emptyset \emptyset$ DATA $2,2 \emptyset 2,2 \emptyset 8,247,96,169, \emptyset$ ，174，18申，2，172，217，2，32，186 ，255，169，6ø，17め ：REM＊97
    $9 \emptyset 5$ DATA $169,3,168,173,188,2,32$ ，189，255，169， $0,166,155,164$ ， 156，32，213，255，142 ：REM＊62
    91ø DATA $222,2,14 \emptyset, 223,2,96,173$ ，188，2，162，6申，16Ø，3，32，189， 255，169，15，174 ：REM＊225
    915 DATA $18 \emptyset, 2,168,32,186,255,3$ $2,192,255,96,32,159,255,165$ ，2ø3，2ø1，6ø，2ø8，247 ：REM＊64
    $92 \emptyset$ DATA $32,234,147,96,32,11 \emptyset, 1$ $45,162, \emptyset, 169,32,157,144,5,1$ 57，128，6，232，2ø8 ：REM＊169
    925 dATA $247,157,112,7,232,224$ ， $8 \emptyset, 2 \emptyset 8,248,32,11 \varnothing, 145,162,7$ ， $16 \emptyset, \emptyset, 24,32,24 \varnothing \quad:$ REM＊22 $\varnothing$
    93ø DATA $255,16 \emptyset, \emptyset, 169,32,32,21$ $\emptyset, 255,2 \emptyset \emptyset, 192,39,2 \emptyset 8,246,96$ 173，177，2，2ø1，255 ：REM＊119
    935 DATA $2 \emptyset 8,2,56,96,24,96,169$ ，

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    ## 64 DOSSHELL

    $2 \emptyset 9,133,253,169,5,133,254,1$ 69，2，141，2ø2，2 ：REM＊56
    $94 \emptyset$ DATA $169,1,141,2 \emptyset 3,2,169,3$ ， $141,199,2,141,2 \varnothing 4,2,173,2 \emptyset \emptyset$ ，2，141，181，2
    ：REM＊1 $\varnothing 1$
    945 DATA $173,2 \emptyset 1,2,141,182,2,16$ $2,1,32,244,147,32,36,147,14$ 4，3，76，157，147 ：REM＊116
    95Ø DATA $24,169,7,1 \emptyset 9,186,2,141$ ，2ø日，2，141，18ø，2，173，177，2， $2 \not)_{1,7,2 \emptyset 8,1}$
    ：REM＊227
    955 DATA $96,169,33,133,253,169$ ， $6,133,254,162,1,32,244,147$, 32，36，147，144，3 ：REM＊36
    $96 \emptyset$ DATA $76,157,147,173,177,2,2$ ø1，7，2ø8，1，96，24，169，7，1ø9， 186，2，141，2ø1 ：REM＊93
    965 DATA $2,96,173,181,2,141,2 \emptyset \emptyset$ $, 2,173,182,2,141,2 \emptyset 1,2,96,1$ 41，171，2，56 ：REM＊17
    $97 \emptyset$ DATA $165,253,237,171,2,133$ ， $253,165,254,233, \emptyset, 133,254,5$ $6,165,171,237,171,2$ ：REM＊173
    975 DATA $133,171,165,172,233, \emptyset$ ， $133,172,96,141,171,2,24,165$ ，253，1ø9，171，2，133 ：REM＊62
    98ø DATA $253,165,254,1 \emptyset 5, \emptyset, 133$ ， $254,24,165,171,1 \varnothing 9,171,2,13$ $3,171,165,172,1 \emptyset 5, \emptyset:$ REM＊231
    985 DATA $133,172,96,32,159,255$ ， $165,2 \emptyset 3,2 \emptyset 1,64,2 \emptyset 8,247,96,1$ $42,195,2,32,186,148$ ：REM＊156
    $99 \emptyset$ DATA $169, \emptyset, 141,196,2,141,19$ $7,2,169,1,141,186,2,32,78,1$ 49，173，177，2 ：REM＊7
    995 DATA $24 \emptyset, 248,2 \emptyset 1,32,24 \emptyset, 35$ ， $2 \emptyset 1,2,24 \emptyset, 66,2 \emptyset 1,1,2 \emptyset 8,3,76$ $, 58,148,2 \emptyset 1,4$
    ：REM＊92
    $1 \emptyset \emptyset \emptyset$ DATA $2 \emptyset 8,3,76,131,148,2 \emptyset 1$ ， $3,2 \emptyset 8,3,76,16 \emptyset, 148,2 \emptyset 1,255$ ，2ø8，1，96，2ø1，7 ：REM＊1 ${ }^{2} 3$
    $1 \emptyset \emptyset 5$ DATA $2 \emptyset 8,21 \emptyset, 96,173,186,2$ ， $96,173,2 \emptyset 3,2,2 \emptyset 8,2 \emptyset \emptyset, 173,1$ 96，2，24ø，195，32，186
    ：REM＊188
    $1 \emptyset 1 \emptyset$ DATA $148,173,198,2,32,17 \varnothing$ ， $147,2 \emptyset 6,186,2,2 \emptyset 6,186,2,2 \emptyset$ $6,196,2,76,12 \emptyset, 148:$ REM＊2ø7
    $1 \emptyset 15$ DATA $173,2 \emptyset 3,2,2 \emptyset 8,169,173$ ，196，2，2ø5，195，2，24ø，26，32 ，186，148，173，198，2 ：REM＊54
    $1 \emptyset 2 \emptyset$ DATA $32,2 \emptyset 2,147,238,196,2$ ， $238,186,2,238,186,2,32,186$ ，148，16 $\varnothing, 75,32,2 \emptyset 1:$ REM＊229
    $1 \emptyset 25$ DATA $148,76,7,148,173,197$ ， $2,2 \emptyset 5,2 \emptyset 2,2,2 \emptyset 8,3,76,7,148$ ，238，197，2，32 ：REM＊39
    $1 \emptyset 3 \emptyset$ DATA $186,148,173,199,2,32$ ， $2 \emptyset 2,147,238,186,2,76,12 \emptyset, 1$ $48,173,197,2,2 \emptyset 8,3:$ REM＊2ø8 $1 \emptyset 35$ DATA $76,7,148,2 \emptyset 6,197,2,32$ ，186，148，173，199，2，32，17ø， 147，2ø6，186，2，76 ：REM＊5
    $1 \emptyset 4 \emptyset$ DATA $12 \emptyset, 148,16 \emptyset, \emptyset, 177,253$ ，73，128，145，253，2ø $, 2 \emptyset 4,2 \emptyset$ $4,2,2 \emptyset 8,244,96,162, \varnothing$
    ：REM＊19ø
    $1 \emptyset 45$ DATA $2 \emptyset 2,2 \emptyset 8,253,136,2 \emptyset 8,2$ $48,96,17 \emptyset, 189,25 \emptyset, 158,141$ ，

    193，2，232，189，250，158
    ：REM＊93
    $1 \emptyset 5 \emptyset$ DATA $141,194,2,232,189,25 \emptyset$ ，158，72，232，189，250，158，16 8，1ø4，17ø，14ø，179，2：REM＊46
    $1 \emptyset 55$ DATA $142,178,2,173,194,2,1$ $41,134,2,169,38,133,247,16$ $9,155,133,248,16 \emptyset, \emptyset$
    ：REM＊189
    $1 \emptyset 6 \emptyset$ DATA $177,247,2 \emptyset 5,193,2,24 \emptyset$ ， $6,32,64,149,76,2,149,24,1$ 74，178，2，172，179，2，32
    ：REM＊128
    $1 \emptyset 65$ DATA $24 \emptyset, 255,16 \emptyset, 1,177,247$ ，24ø，32，2ø1，255，24ø，7，32，2 $1 \emptyset, 255,2 \emptyset \emptyset, 76,27,149$
    ：REM＊83
    $1 \emptyset 7 \emptyset$ DATA $2 \emptyset \emptyset, 152,72,238,178,2$ ， $174,178,2,172,179,2,24,32$ ， $24 \emptyset, 255,1 \emptyset 4,168,76:$ REM＊1 $\emptyset 8$ $1 \emptyset 75$ DATA $27,149,96,24,165,247$ ， $1 \varnothing 5,1,133,247,165,248,1 \emptyset 5$ ， $\emptyset, 133,248,96,32,159$

    REM＊1 $\varnothing 3$
    $1 \emptyset 8 \emptyset$ DATA $255,173,141,2,141,187$ ，2，32，159，255，165，2ø3，2ø1， $6 \emptyset, 2 \emptyset 8,9,32,234,147$
    ：REM＊116
    $1 \emptyset 85$ DATA $169,32,141,177,2,96,2$ ゆ1，63，2ø8，9，169，255，141，17 7，2，32，234，147，96 ：REM＊95 $1 \emptyset 9 \emptyset$ DATA $2 \emptyset 1,3,2 \emptyset 8,9,169,7,141$ ，177，2，32，234，147，96，2ø1，6 ，2ø8，9，169，5 ：REM＊22ø $1 \emptyset 95$ DATA $141,177,2,32,234,147$ ， $96,2 \emptyset 1,7,24 \emptyset, 21,2 \emptyset 1,2,2 \emptyset 8$ ， 34，173，187，2，24ø ：REM＊47 $11 \emptyset \emptyset$ DATA $6,169,3,141,177,2,96$ ， $169,4,141,177,2,96,173,187$ ，2，24ø，6，169

    REM＊252
    $11 \emptyset 5$ DATA $1,141,177,2,96,169,2$ ， $141,177,2,96,169, \emptyset, 141,177$ ，2，96，169，147 ：REM＊117 $111 \emptyset$ DATA $32,21 \emptyset, 255,162, \emptyset, 169$ ， $6,157, \emptyset, 216,157, \emptyset, 217,157$ ， Ø，218，157，, 219 ：REM＊22
    1115 DATA $232,2 \emptyset 8,241,169,6,141$ ，194，2，169，15，141，33，2ø8， 1 69，14，141，32，2ø8，162
    ：REM＊73
    $112 \emptyset$ DATA $\emptyset, 169,16 \emptyset, 157, \emptyset, 4,169$ $, 11,157, \emptyset, 216,232,224,4 \emptyset, 2$申8，241，162，$\varnothing, 169$ ：REM＊14 $\varnothing$
    1125 DATA $121,157,64,5,169,16 \emptyset$ ， $157,1 \emptyset 4,5,169,11,157,1 \emptyset 4,2$ $17,157,64,217,232,224$
    ：REM＊89
    $113 \emptyset$ DATA $4 \emptyset, 2 \emptyset 8,233,162, \emptyset, 169$ ， $16 \emptyset, 157,4 \emptyset, 4,169,6,157,4 \emptyset$ ， $216,232,224,2 \emptyset \emptyset, 2 \emptyset 8$

    REM＊1 $\emptyset \varnothing$
    1135 DATA $241,169,12 \emptyset, 157,4 \emptyset, 4$ ， $169,6,157,4 \emptyset, 216,232,224,2$ $4 \emptyset, 2 \emptyset 8,241,32,115,145$
    ：REM＊143
    $114 \emptyset$ DATA $169,11 \emptyset, 32,21 \emptyset, 148,16$ $2, \emptyset, 169,16 \emptyset, 157,192,7,169$ ， $14,157,192,219,232,224$
    ：REM＊28

    1145 DATA $4 \emptyset, 2 \emptyset 8,241,169,114,32$ ，21申，148，169，118，32，21申，14 8，169，122，32，21申，148：REM＊9
    $115 \emptyset$ DATA $169,126,32,21 \emptyset, 148,32$ ，11申，145，96，32，11ø，145，169 ，13ø，32，21ø，148，32，115
    ：REM＊22ø
    1155 DATA $145,169,134,32,21 \emptyset, 14$ $8,96,32,11 \emptyset, 145,169,138,76$ ，21ø，148，165，1，41，254

    ## ：REM＊163

    $116 \emptyset$ DATA $133,1,96,165,1,9,1,13$ 3，1，96，32，123，150，173，12，1 55，2ø1，1，24ø，3 ：REM＊152 1165 DATA $1 \emptyset 8,14,155,32,192,149$ ，32，99，145，169，$\varnothing, 141,226,2$ ，141，218，2，141，232 ：REM＊31
    $117 \emptyset$ DATA $2,169,1,141,238,2,169$ ，42，133，253，169，4，133，254， 17ด，169，4申，141，198 ：REM＊38
    1175 DATA $2,169,22,141,199,2,16$ 9，1，141，2ø2，2，169，15，141，2 Ø $4,2,169, \emptyset, 141 \quad:$ REM＊21
    $118 \emptyset$ DATA $2 \emptyset 3,2,32,244,147,173$ ， 177，2，2ø1，255，2ø8，3，76，71， 151，173，186，2，2ø1 ：REM＊194
    1185 DATA $1,2 \emptyset 8,3,76,9,152,2 \emptyset 1$ ， $1 \emptyset, 2 \emptyset 8,32,32,2,139,32,81,1$ 52，32，176，144 ：REM＊163
    119ø DATA $32,2 \emptyset 4,255,32,25,139$ ， $173,53,3,24 \emptyset, 3,76,137,15 \emptyset$ ， $32,12,147,32,2 \emptyset 5$ ：REM＊48
    1195 DATA $153,76,137,15 \emptyset, 2 \emptyset 1,3$ ， $2 \emptyset 8,3,76,132,151,2 \emptyset 1,7,2 \emptyset 8$ ，3，76，26，152，2ø1 ：REM＊253
    $12 \emptyset \emptyset$ DATA $5,2 \emptyset 8,3,76,31,139,2 \emptyset 1$ $, 9,2 \emptyset 8,3,76,134,14 \emptyset, 2 \emptyset 1,6$, $2 \emptyset 8,3,76,12 \quad:$ REM＊2ø $\emptyset$
    $12 \emptyset 5$ DATA $141,2 \emptyset 1,4,2 \emptyset 8,3,76,97$ ，142，2ø1，8，2ø8，3，76，242，14 $2,2 \emptyset 1,2,2 \emptyset 8,3 \quad:$ REM＊11
    $121 \emptyset$ DATA $76,69,135,76,137,15 \emptyset$ ， $32,234,147,169, \emptyset, 133,198,1$ $41,238,2,169,71,141$
    ：REM＊128
    1215 DATA $24,3,169,147,32,21 \phi, 2$ $55,169,6,141,33,2 \emptyset 8,32,13 \emptyset$ ，150，169，14，141，32：REM＊195
    $122 \emptyset$ DATA $2 \emptyset 8,141,134,2,173,218$ ，2，2ø8，3，1ø8，2，16ø，32，89，1 66，32，51，165，169 ：REM＊186
    1225 DATA $\emptyset, 141,218,2,32,144,25$ $5,32,142,166,76,174,167,32$ ，2，139，32，81，152 ：REM＊77
    123Ø DATA $32,176,144,32,2 \emptyset 4,255$ $, 173,53,3,24 \emptyset, 6,32,2 \emptyset, 139$ ， 76，137，15 $1,32,2 \emptyset \quad:$ REM＊254 1235 DATA $139,162,1,142,218,2,1$ $62,1,142,219,2,2 \not 2,142,22 \emptyset$ ，2，32，2ø2，153，176 ：REM＊49 $124 \emptyset$ DATA $3,76,137,15 \emptyset, 32,13,14$ $5,144,3,76,137,15 \emptyset, 169,35$ ， $133,253,169,176,133$
    ：REM＊162
    1245 DATA $254,224, \emptyset, 24 \emptyset, 8,169,3$ $2,32,2 \emptyset 2,147,2 \emptyset 2,2 \emptyset 8,248,1$ 73，226，2，240，1，96 ：REM＊13 $125 \emptyset$ DATA $173,231,2,24 \emptyset, 1,96,32$ ，2，139，32，29，145，169，255，1

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    41,217,2,32,169 :REM*242
    1255 DATA $146,32,176,144,32,2 \emptyset 4$ ,255,173,53,3,24ø,6,32,2ø, $139,76,137,15 \emptyset, 32 \quad$ :REM*45
    $126 \emptyset$ DATA $2 \emptyset, 139,165,175,133,46$ , 165,174,133,45,76,71,151, $32,98,15 \emptyset, 32,115,15 \emptyset$ :REM*17ø
    1265 DATA $32,47,147,169, \emptyset, 141,2$ Ø $3,2,76,137,15 \emptyset, 32,12 \emptyset, 145$ ,144,3,76,137,15ø :REM*189
    $127 \emptyset$ DATA $32,244,146,169,142,32$ ,21ø,148,174,221,2,189,28, 155,32,21ø,255,169,2
    :REM*54
    1275 DATA $141,188,2,169,86,141$, $6 \emptyset, 3,169,48,141,61,3,32,2 \emptyset$ 8,146,32,176,144 :REM*65
    $128 \emptyset$ DATA $32,2 \emptyset 4,255,32,25,139$, $76,137,15 \emptyset, 32,12 \emptyset, 145,144$, $8,32,25,139,1 \emptyset 4,1 \emptyset 4:$ REM*5 1285 DATA $76,137,15 \emptyset, 169,239,14$ $1,4 \emptyset, 3,162, \emptyset, 189,16,155,15$ 7,6Ø,3,232,189,16 :REM*194 $129 \emptyset$ DATA $155,157,6 \emptyset, 3,169,2,14$ $1,188,2,169, \emptyset, 133,155,141$, 217,2,169,176,133 :REM*83
    1295 DATA $156,32,169,146,169,23$ $7,141,4 \emptyset, 3,32,1 \emptyset 9,146,169$, Ø, 141,215,2,141,211

    REM*148
    $13 \emptyset \emptyset$ DATA $2,141,212,2,173,2 \emptyset 7,2$ ,2ø8,8,169, $, 141,216,2,76$, 18ø,152,2ø1,14 : REM*191
    $13 \emptyset 5$ DATA $176,6,141,216,2,76,18$ Ø, 152,169,13,141,216,2,169 ,6,133,253,169,176:REM*12 $\varnothing$
    $131 \emptyset$ DATA $133,254,24,162,9,16 \emptyset$, $1 \emptyset, 32,24 \emptyset, 255,169,11,141,1$ 34,2,23ø,199,16ø, $\quad:$ REM*79 1315 DATA $177,253,32,21 \emptyset, 255,2 \emptyset$ $\emptyset, 192,16,2 \emptyset 8,246,24,162,9$, 16Ø, 7, 32,24 , 255, 174
    :REM*17ø
    $132 \emptyset$ DATA $221,2,189,28,155,32,2$ $1 \emptyset, 255,32,13 \emptyset, 15 \emptyset, 16 \emptyset, 28,1$ 62,9,24,32,24 ,255 :REM*61
    1325 DATA $173,2 \emptyset 6,2,174,2 \emptyset 5,2,3$ $2,2 \emptyset 5,189,32,123,15 \emptyset, 173,2$ $16,2,2 \emptyset 8,8,162, \emptyset \quad:$ REM*2ø2 $133 \emptyset$ DATA $2 \emptyset 2,2 \emptyset 8,253,76,137,15$ Ø, 23Ø, 199, 169, 29,133,253,1 $69,176,133,254,169,11$

    REM*171
    1335 DATA $141,181,2,169,6,141,1$ $82,2,169, \emptyset, 141,183,2,169,1$ $46,32,21 \emptyset, 148,32,11 \emptyset$

    REM*16ø
    $134 \emptyset$ DATA $145,169,6,141,134,2,3$ $2,76,153,238,183,2,173,183$ ,2,2ø5,216,2,2ø8 :REM*233
    1345 DATA $1,96,169,32,32,2 \emptyset 2,14$ $7,238,181,2,76,5 \emptyset, 153,32,1$ 1ø,145,169,6,141 :REM*56 $135 \emptyset$ DATA $134,2,24,174,181,2,17$ $2,182,2,32,24 \emptyset, 255,16 \emptyset, 3,1$ 77,253,72,17申,2øø:REM*211
    1355 DATA $177,253,72,32,13 \emptyset, 15 \emptyset$ ,1ø4,32,2ø5,189,169,13,32,
    $21 \emptyset, 255,32,123,15 \emptyset, 1 \emptyset 4$ REM*166 $136 \emptyset$ DATA $32,68,146,32,11 \emptyset, 145$, $32,251,154,144,3,32,115,14$ $5,24,16 \emptyset, 13,174,181:$ REM*47
    1365 DATA $2,32,24 \emptyset, 255,172,2 \emptyset 9$, $2,162, \emptyset, 177,253,2 \emptyset 1,34,24 \emptyset$ ,9,32,21ø,255,232 : REM*16
    $137 \emptyset$ DATA $2 \emptyset \emptyset, 192,25,2 \emptyset 8,241,22$ $4,16,24 \varnothing, 9,169,32,32,21 \emptyset, 2$ $55,232,76,163,153,32$
    :REM*163
    1375 DATA $11 \emptyset, 145,24,16 \emptyset, 32,174$ ,181,2,32,24ø,255,172,21ø. 2,177,253,32,21ø,255
    :REM*11ø
    $138 \emptyset$ DATA $2 \emptyset \emptyset, 192,3 \emptyset, 2 \emptyset 8,246,96$ , 32,98,15ø,32,1ø6,15ø,32,2 55,145,32,226,145,169 :REM*2ø9
    1385 DATA $6,141,134,2,32,78,149$ ,173,177,2,2ø1,1,2ø8,3,76, 65,154,2ø1,2 :REM*58
    $139 \emptyset$ DATA $2 \emptyset 8,3,76,121,154,2 \emptyset 1$, $255,2 \emptyset 8,2,24,96,2 \emptyset 1,7,2 \emptyset 8$, 2,56,96,2ø1,32 :REM*123 1395 DATA $2 \emptyset 8,4 \emptyset, 173,218,2,24 \emptyset$, $35,173,219,2,2 \emptyset 5,22 \emptyset, 2,24 \emptyset$ ,27,32,251,154,176 :REM*56 $14 \emptyset \emptyset$ DATA $22,174,211,2,169,1,15$ $7, \emptyset, 16 \emptyset, 238,22 \emptyset, 2,32,235,1$ $54,173,226,2,24 \emptyset:$ REM*183 $14 \emptyset 5$ DATA $3,32,218,141,173,177$, $2,2 \emptyset 1,5,2 \emptyset 8,16,32,251,154$, 144,11,169, $\emptyset, 157$ :REM*244 $141 \emptyset$ DATA $\emptyset, 16 \emptyset, 2 \emptyset 6,22 \emptyset, 2,32,23$ $5,154,76,219,153,173,215,2$ ,2ø8,23,173,211,2 : REM*2ø3 1415 DATA $24 \emptyset, 43,2 \emptyset 6,211,2,32,2$ $43,145,32,179,138,32,172,1$ $54,32,226,145,76,219$

    REM*188
    $142 \emptyset$ DATA $153,32,243,145,32,41$, $146,2 \emptyset 6,215,2,2 \emptyset 6,211,2,16$ Ø, 25, 32, 2ф1, 148, 32: REM*251
    1425 DATA $226,145,16 \emptyset, 25,32,2 \emptyset 1$ ,148,76,219,153,174,215,2, $232,236,216,2,144,27$
    :REM*36
    $143 \emptyset$ DATA $174,211,2,232,236,2 \emptyset 7$ $, 2,176,235,238,211,2,32,24$ $3,145,32,9 \emptyset, 138,32:$ REM*23 1435 DATA $2 \emptyset 2,154,32,226,145,76$ ,219,153,32,243,145,32,14, 146,238,215,2,238,211
    :REM*18
    $144 \emptyset$ DATA $2,76,1 \emptyset 5,154,32,217,1$ $45,174,211,2,24 \emptyset, 8,169,32$, 32,2ø2,147,2ø2,2ø8 :REM*33 1445 DATA $248,169,11,141,181,2$, $169,6,141,182,2,32,76,153$, 96,32,217,145,174 :REM*246 $145 \emptyset$ DATA $211,2,236,2 \emptyset 7,2,24 \emptyset, 8$ ,169,32,32,2ø2,147,2ø2,2ø8 ,248,169,23,141,181

    REM*199
    1455 DATA $2,169,6,141,182,2,32$, $76,153,96,16 \emptyset, 13,177,167,7$ 3,128,145,167,2øø :REM*254
    $146 \emptyset$ DATA $192,29,2 \emptyset 8,245,96,177$ 167,174,211,2,189, $, 16 \emptyset, 2$ $4 \emptyset, 2,56,96,24,96$ :REM*189
    1465 DATA $195,194,2 \emptyset 5,56,48,1, \emptyset$ , $\emptyset, \emptyset, 36,48,85,48,62,82,85$, 78,8,195
    $147 \emptyset$ DATA $195,19 \emptyset, 65,66,186, \emptyset, 6$ $2,124,217,31,93,155,1,77,7$ 9,86,69,32,67 :REM*183
    1475 DATA $85,82,83,79,82,32,84$, $72,69,78,32,8 \emptyset, 82,69,83,83$ ,32,83,8ø

    REM*22ø
    $148 \emptyset$ DATA $65,67,69,32,84,79,32$, $83,69,76,69,67,84, \emptyset, 2,68,8$ 2,73,86 :REM*97
    1485 DATA $69,58, \emptyset, 3,7 \emptyset, 82,69,69$ , $9,4,68,82,73,86,69,32,83$, 69,84
    :REM*242
    $149 \emptyset$ DATA $85,8 \emptyset, 255,82,85,78,32$ , $65,32,8 \emptyset, 82,79,71,82,65,7$ 7,255,7ø,79
    :REM*13
    1495 DATA $82,77,65,84,32,65,32$, $68,73,83,75,255,67,76,69,6$ $5,78,85,8 \emptyset$
    :REM*8
    $15 \emptyset \emptyset$ DATA $32,65,32,68,73,83,75$, $255,77,79,68,69,32,83,69,7$ $6,69,67,84$ :REM*177
    $15 \emptyset 5$ DATA $73,79,78, \emptyset, 5,67,79,8 \emptyset$ , 89, 32,7ø,73,76,69,83,255, 68,69,76
    :REM*234
    $151 \emptyset$ DATA $69,84,69,32,7 \emptyset, 73,76$, $69,83,255,82,69,78,65,77,6$ 9,32,7ø,73 : REM*1 $\mathbf{D}_{5}$
    1515 DATA $76,69,83,255,7 \emptyset, 85,78$ $, 67,84,73,79,78,32,75,69,8$ 9,83,255,68
    :REM*15ø
    $152 \emptyset$ DATA $73,82,69,67,84,79,82$, $89, \emptyset, 6,8 \emptyset, 82,69,83,83,32,1$ $46,7 \emptyset, 53$
    :REM*37
    1525 DATA $18,32,84,79,32,85,78$, $83,69,76,69,67,84,32,47,32$ ,146,83,84 : REM*238
    $153 \emptyset$ DATA $79,8 \emptyset, 18,32,84,79,32$, $67,65,78,67,69,76,32, \emptyset, 7,3$ 2,68,82 :REM*39
    1535 DATA $73,86,69,32,65,58,32$, $68,69,86,73,67,69,32,35,32$ ,61,32,56
    :REM*8
    $154 \emptyset$ DATA $32,32,57,32,32,49,48$, $255,255,32,68,82,73,86,69$, 32,66,58,32
    1545 DATA $68,69,86,73,67,69,32$, $35,32,61,32,56,32,32,57,32$ ,32,49,48 :REM*233
    $155 \emptyset$ DATA $\emptyset, 11,84,72,69,78,32,8$ $\emptyset, 82,69,83,83,32,83,8 \emptyset, 65$, 67,69, 0
    :REM*152
    1555 DATA $14,32,32,32,32,32,83$, $73,9 \emptyset, 69,32,32,32,32,32,32$ ,7申,73,76
    :REM*145
    156 DATA $69,32,78,65,77,69,32$, $32,32,32,32,32,32,32,84,89$ ,8ø,69,32
    :REM*182
    1565 DATA $32,32,32, \emptyset, 15,7 \emptyset, 82,7$ $9,77,32,87,72,73,67,72,32$, 68,82,73 $\quad$ :REM*45
    157 DATA $86,69,58,32,65,32,32$, $66,32, \emptyset, 16,68,73,83,75,32$, 67.76.69

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    ## 64 DOSSHELL

    1575 DATA $65,78,45,85,8 \emptyset, 32,87$, $79,82,75,73,78,71,32,79,78$ , 32,68, 82
    :REM*25
    $158 \emptyset$ DATA $73,86,69,32, \emptyset, 17,73,7$ $8,83,69,82,84,32,68,73,83$, 75,32,73
    :REM*178
    1585 DATA $78,32,68,82,73,86,69$, $32, \emptyset, 19,32,65,78,68,32,8 \emptyset$, 82,69,83
    : REM*25
    $159 \emptyset$ DATA $83,32,83,8 \emptyset, 65,67,69$, $\emptyset, 2 \emptyset, 69,78,84,69,82,32,68$, 73,83,75
    :REM*188
    1595 DATA $32,78,65,77,69,58,32$, $\emptyset, 21,32,32,32,32,32,32,32$, 32,32,32 : REM*251
    $16 \emptyset \emptyset$ DATA $32,32,32,32,32,32,32$, $32,32, \emptyset, 22,83,69,84,32,49$, 53,52,49 :REM*196
    $16 \emptyset 5$ DATA $32,77,79,68,69, \emptyset, 23,8$ $3,69,84,32,49,53,55,49,32$, $77,79,68$
    :REM*153
    $161 \emptyset$ DATA $69, \emptyset, 24,79,75,65,89,3$ $2,84,79,32,68,69,76,69,84$, 69,32,7ø
    :REM*8 $\emptyset$
    1615 DATA $73,76,69,45,76,73,83$, $84,32,32,78,32,32,89,32, \emptyset$, 26,79,75 :REM*5
    $162 \emptyset$ DATA $65,89,32,84,79,32,82$, $69,78,65,77,69,32,7 \emptyset, 73,76$ ,69,45,76 :REM*98
    1625 DATA $73,83,84,32,32,78,32$, $32,89,32, \emptyset, 27,78,69,87,32$, $7 \emptyset, 73,76$
    :REM* 41
    $163 \emptyset$ DATA $69,32,78,65,77,69,58$, $\emptyset, 28,68,73,83,65,66,76,69$, 32,7め,85
    :REM*176
    1635 DATA $78,67,84,73,79,78,32$, $75,69,89,83, \emptyset, 29,69,78,65$, 66,76,69
    :REM*129
    $164 \emptyset$ DATA $32,7 \emptyset, 85,78,67,84,73$, $79,78,32,75,69,89,83, \emptyset, 3 \emptyset$, 68,69,7ø
    :REM*96
    1645 DATA $73,78,69,32,7 \emptyset, 85,78$, $67,84,73,79,78,32,75,69,89$ 83, $\emptyset, 31$
    :REM*145
    $165 \emptyset$ DATA $32,7 \emptyset, 49,32,32,7 \emptyset, 5 \emptyset$, $32,32,7 \emptyset, 51,32,32,7 \emptyset, 52,32$ $, 32,7 \emptyset, 53 \quad:$ REM $^{*} 48$
    1655 DATA $32,32,7 \emptyset, 54,32,32,7 \emptyset$, $55,32,32,7 \emptyset, 56,32, \emptyset, 33,75$, 69,89,61 :REM*125
    $166 \emptyset$ DATA $18,32,32,32,32,32,32$, $32,32,32,32,32,32,32,32,32$ ,32,32,32 :REM*1 $\emptyset \emptyset$
    1665 DATA $32,32,32,32,32,32,32$, $32,32,32,32,32, \emptyset, 34,73,78$, 83,69,82
    :REM*241
    $167 \emptyset$ DATA $84,32,67,79,8 \emptyset, 89,32$, $68,73,83,75,32,73,78,84,79$ , 32,68,82
    :REM*2ø2
    1675 DATA $73,86,69,58,32, \emptyset, 36,3$ $2,32,79,75,65,89,32,84,79$, 32,67,79
    :REM*89
    $168 \emptyset$ DATA $8 \emptyset, 89,32,7 \emptyset, 73,76,69$, $45,76,73,83,84,32,32,78,32$ ,32,89,32
    :REM*15ø
    1685 DATA $\emptyset, 37,7 \emptyset, 73,76,69,32,6$ $7,79,8 \emptyset, 89,32,87,79,82,75$, $73,78,71$
    :REM*131
    $169 \emptyset$ DATA $32,7 \emptyset, 82,79,77,32,68$, $82,73,86,69,58,32, \emptyset, 38,73$, $78,83,69 \quad:$ REM*84
    1695 DATA $82,84,32,84,65,82,71$, $69,84,32,68,73,83,75,32,65$ ,78,68,32
    :REM*217
    $17 \emptyset \emptyset$ DATA $8 \emptyset, 82,69,83,83,32,83$, $8 \emptyset, 65,67,69, \emptyset, 4 \emptyset, 8 \emptyset, 82,79$, 71,82,65
    :REM*114
    $17 \emptyset 5$ DATA $77,32,73,78,32,77,69$, $77,79,82,89,32,87,73,76,76$ , 32,66,69
    :REM*51
    $171 \emptyset$ DATA $32,68,69,83,84,82,79$, $89,69,68, \emptyset, 41,73,78,83,69$, 82,84,32
    :REM*21 $\emptyset$
    1715 DATA $83,79,85,82,67,69,32$, $68,73,83,75,32,65,78,68,32$ , 8申, 82,69 :REM*97 $172 \emptyset$ DATA $83,83,32,83,8 \emptyset, 65,67$, $69, \emptyset, 42,32,32,32,32,32,79$, 75,65,89
    :REM*246
    1725 DATA $32,84,79,32,7 \emptyset, 79,82$, $77,65,84,32,68,73,83,75,32$ , 32,78, 32
    :REM*149
    $173 \emptyset$ DATA $32,89,32, \emptyset, 17,2,7,1,1$ $9,2,7,23,2 \emptyset, 6,1 \emptyset, 1,21,6,1 \emptyset$
    :REM*244
    1735 DATA $17,22,6,11,13,23,6,13$ $, 13,26,2,7,3, \emptyset, \emptyset, 27,6,7,4$
    :REM*81
    $174 \emptyset$ DATA $24,2,7,3,28,6,11,9,29$ $, 6,13,9,3 \emptyset, 6,15,9,31,6,18$
    : REM*1 $\emptyset \emptyset$
    1745 DATA $5,33,6,7, \emptyset, 34,6,11,5$, $11,6,13,12,4 \emptyset, 6,11,2,36,2$
    :REM*79
    $175 \emptyset$ DATA $7,3,37,6,11,5,15,2,7$, $11,8,6,11,7,9,6,13,4,1 \emptyset$
    :REM* 4
    1755 DATA $6,14,8,11,6,15,12,12$, $6,18,8,13,6,2 \emptyset, 5,11,6,21,1$ 2
    :REM*85
    $176 \emptyset$ DATA $1,11, \emptyset, 1,2,11,9,1,3,1$ $1,9,34,4,6,1,2,5,6,1$
    : REM*17 ${ }^{\text {* }}$
    1765 DATA $24,1,2,7,1,6,11, \emptyset, 1,7$ $, 6,11,5,16,2,7,3,14,14$
    :REM*1 $\varnothing 7$
    $177 \emptyset$ DATA $1 \emptyset, \emptyset, 38,6,11,3,41,6,1$
    $1,3,42,2,7,3,256$
    :REM*84

    ## Listing 2. The DOS Shell Saver program.

    $1 \emptyset$ REM DOS SHELL SAVER :REM*196 2ø INPUT"FILENAME"; NM\$ :REM*152 $3 \emptyset$ SYS $57812 \mathrm{NM} \$, 8,1:$ POKE 193,1 96: POKE 194,134
    :REM*24
    $4 \emptyset$ POKE 174,156 : POKE $175,159:$ SY S 62957
    .REM*32 $5 \emptyset$ PRINT"SAVE COMPLETE. CHECK D RIVE FOR ERRORS" :REM*146

    ## WORDMAN

    From p. 62.
    +STR\$(WC) +" OF" +STR\$(C) +" W ORDS \{CTRL 8\}": GOSUB72 $\emptyset: V=11$ 47: EC= $\emptyset$ :REM*9 $\emptyset$
    $245 \mathrm{MT}=\emptyset: \mathrm{M} 1=\emptyset:$ PRINT" $($ HOME $\}\{$ CRSR DN\}LETTER ?"; POKE198, $\emptyset$ :REM*99
    25ф WAIT198, $1:$ GETG $\$: \operatorname{IFASC}(\mathrm{G} \$)=1$ 33ANDRR $=\emptyset$ THEN795 : REM*26
    255 IFASC (G\$) <650RASC (G\$) >9 $\emptyset$ THE N25 $\emptyset$ :REM*85
    $26 \emptyset \mathrm{ON}((\mathrm{CT}>\emptyset)+2)$ GOSUB3 $\mathrm{D}_{5}$ :ONM1GO TO245:FORF=1 TOL: IFG $\$=E R \$(F)$ THEN3 $\emptyset \emptyset$
    :REM*253
    265 NEXT:ON ( (CT=L) + 2) GOTO325:ON MTGOTO245:EC=EC+1:IFEC>9THE NGOSUB715: $5,69 \emptyset, 7 \emptyset \emptyset, 7 \emptyset 5,71 \emptyset:$ POKEV, ASC (G\$) $-64: V=V+2:$ REM*1 $\emptyset 5$
    275 IFEC $<>7$ THEN 245 :REM*164
    $28 \emptyset$ POKES $1,7:$ FORT $=1$ TO $2 \emptyset:$ POKES +2 $4,15:$ POKES $+1,11 \emptyset:$ POKES $+5,9:$ POKES $+6,9:$ POKES $+4,17$
    -REM*189
    285 POKES + 4, 16:NEXT: POKES $1, \emptyset$
    :REM*23 $\emptyset$
    29ø IFAL=1THENPRINT" $\{5$ CRSR DNS )(CTRL 2)(3 SPACEs)THIS WIL L \{CTRL 8\}NOT\{CTRL 2\} SAVE YOUR WORD LIST\{CTRL 8\}":RET URN
    :REM*49
    295 GOTO245 :REM*2ø2
    $3 \emptyset \emptyset$ POKE1 $263+\mathrm{F}, \mathrm{ASC}(\mathrm{G} \$)-64: M T=1$ : $\mathrm{CT}=\mathrm{CT}+1: \mathrm{G} \$(\mathrm{CT})=\mathrm{G} \$: \mathrm{GOTO} 265$
    :REM*97
    $3 \emptyset 5$ FORT $=1$ TOCT $:$ IFG $\$=G \$(T)$ THENM 1 $=1$
    :REM*148
    $31 \emptyset$ NEXT: RETURN
    :REM*251
    315 PRINT" (SHFT CLR\}": X=12: Y=13 : Z\$="USED ALL WORDS":GOSUB7 $2 \emptyset:$ FORT $=1 \mathrm{TO} 25 \emptyset \emptyset:$ NEXT: GOTO33 $\emptyset$
    :REM*118
    32ø PRINT" $\{$ HOME $\}\{6 \text { CRSR DNs }\}^{\prime \prime} ; \boldsymbol{W}$ D\$(R): GOSUB755: ON ( (WC=C) + 2) GOTO315: GOTO155
    :REM*255
    325 PRINT" $\{$ HOME $\}\{9$ CRSR DNs $\}\{2$ CRSR RTs\} \{CTRL 9) CORRECT\{CT RL Ø\}": GOSUB755: ON ( (WC=C) + 2 ) GOTO315:GOTO155 :REM*32
    $33 \emptyset$ POKE53281, $\emptyset:$ PRINT" $\{$ SHFT CLR $\}^{\prime \prime}: L E=5: D O=4: W I=3 \emptyset: D E=14: G O$ SUB91ø
    :REM*221
    $335 \mathrm{LE}=7: \mathrm{DO}=6: \mathrm{WI}=26: \mathrm{DE}=1 \emptyset: \mathrm{GOSUB}$ 91ø
    :REM*22 1
    $34 \phi$ GW=WC-MW:PRINT" $\{$ HOME $\}$ "TAB(1 73)" $\{$ CTRL 8\}\{4 CRSR DNs\}MIS SED WORDS $=" ; M W:$ POKE198, $\emptyset$ :REM*255
    345 PRINTTAB (12)" $\{$ CRSR DN\}CORRE CT WORDS $=" ;$ GW: PRINTTAB (27) " $\{3$ COMD Ys $\}\{C R S R$ DN $)$ "
    :REM*152
    35 PRINTTAB(14)"TOTAL WORDS =" ;WC
    :REM*1 19
    355 PRINTTAB (253)" \{CRSR DN\}\{CTR L 4\}"+P\$:WAIT198,1 :REM*68
    $36 \emptyset$ PRINT" $\{$ SHFT CLR\}\{CTRL 8\}\{3 CRSR DNS $\}\{4$ SPACES $\} D O$ YOU $W$ ISH TO PLAY AGAIN?\{2 SPACEs
    \}\{CTRL 9$\} Y / N^{\prime \prime}:$ POKE198，$\emptyset$ ：REM＊17
    365 GETA\＄：IFA\＄＝＂N＂THENPRINT＂$\{\mathrm{SH}$ FT CLR ${ }^{\prime \prime}$ ：POKE788，49：END
    ：REM＊2め2
    $37 \emptyset$ ON（（A\＄＝＂Y＂）＋2）GOTO155：GOTO3 65
    ：REM＊21
    $375 \mathrm{X}=1 \emptyset: \mathrm{Y}=3: \mathrm{Z} \$=$＂PRESS \｛CTRL 9\} C\｛CTRL $\emptyset\} ~ T O ~ C R E A T E ~ A ~ N E W ~ F ~$ ILE＂：GOSUB72 $\emptyset: \mathrm{X}=9: \mathrm{Y}=9: \mathrm{Z} \$=$＂$\{$ COMD（a）＂
    ：REM＊134
    $38 \emptyset$ GOSUB72 $\quad$－ ：REM＊151
    $385 \mathrm{X}=12: \mathrm{Y}=9$ ： $\operatorname{GOSUB} 72 \emptyset: \mathrm{X}=13: \mathrm{Y}=3$ ： Z\＄＝＂PRESS \｛CTRL 9\}E\{CTRL $\emptyset\}$ TO EDIT AN EXISTING FILE＂： GOSUB72ø
    ：REM＊12ø
    $39 \emptyset$ GETA\＄：IFA\＄＜＜＂C＂ANDA\＄＜＞＂E＂TH EN39ø
    ：REM＊165
    395 IFA\＄＝＂E＂THENCLR：RW＝1：GOSUB1 $\emptyset 5: W W=1: E D=1$ ：GOTO525
    ：REM＊218
    4 4ø CLR：RW＝1：GOSUB1 $\emptyset 5:$ PRINT＂$\{2$ CRSR DNS \} ENTER \# OF WORDS $\{$ CRSR DN \}": INPUT" $\{3$ SPACES $\}\{$ CTRL 9\}MAXIMUM\{CTRL $\emptyset\}$ OF 2 $\emptyset^{\prime \prime}$ ；WD\＄
    ：REM＊231
    $4 \emptyset 5$ WD＝VAL（WD\＄）：IFWD＞ $2 \emptyset \mathrm{ORWD}<1 \mathrm{TH}$ EN1 55
    ：REM＊15ø
    41ๆ PRINT＂$\{3$ CRSR DNS $\}$ \｛CRSR RT \} INCLUDE DEFINITIONS？\｛CTRL 9\}Y/N\{CTRL $\emptyset\} "$
    ：REM＊11
    415 GETAS：IFA\＄〈＞＂Y＂ANDA\＄〈＞＂N＂TH EN415 ：REM＊5
    $42 \emptyset$ IFA $\$=$＂ Y ＂THENDF $=1 \quad:$ REM＊177
    425 AJ \＄＝＂＂：PRINT＂\｛SHFT CLR\}\{5 SPACES ）MAXIMUM LENGTH $=16$ CHARACTERS \｛HOME \} \{CRSR DN \}": FORI＝ 1 TOWD
    ：REM＊128
    $43 \emptyset$ IFI $>9$ THENAJ $\$=" ":$ REM＊133
    435 ONWWGOTO775：PRINTAJ\＄；；＂\｛2 SPACEs $\}\{2 \text { CRSR LFs }\}^{\prime \prime} ;:$ INPUT WD（I）
    ：REM＊36
    $44 \emptyset \operatorname{IFWD} \$(I)=" " O R L E N(W D \$(I))>16$ THENGOSUB79ø：GOTO435

    445 NEXT
    ：REM＊125
    $45 \emptyset$ PRINTTAB（12）＂CRSR O．K．？\｛CTRL 9\}Y/N\{CTRL $\emptyset\} "$ ：GETA\＄：IFAS＝＂N＂THENWW＝1：GOT 0425 ：REM＊213
    455 IFAS $\langle$ ）＂$Y$＂THENPRINT＂$\{3$ CRSR UPS $\}^{\prime \prime}$ ：GOTO $45 \emptyset:$ REM＊11
    $46 \emptyset$ IFDF $=1$ ORED $=1$ THENGOSUB8 $\emptyset \emptyset$ ：REM＊31
    465 ONEDGOTO96 $\emptyset$
    ：REM＊82
    $47 \emptyset$ PRINT＂$\{$ SHFT CLR\} \{ 2 CRSR DNs ］ENTER FILE NAME（MAX OF 1 3 CHARACTERS ）\｛CRSR DN \}"
    ：REM＊21
    475 A $\$=" \prime$ ：PRINTTAB（5）＂（PRESS（C TRL 9）RETURN（CTRL $\emptyset$ \} TO"; ：REM＊26
    $48 \emptyset$ PRINT＂EXIT TO MENU）（CRSR D N）＂：ID $\$=" "$ ：INPUTID $:$ IFID $\$="$ ＂THENAL＝1：GOSUB28 $\emptyset$ ：GOSUB56 $\emptyset$ ：REM＊211
    485 ON（（A\＄＝＂Y＂）＋2）GOTO155：ON（（A $\$=" N ")+2)$ GOTO $47 \emptyset \quad:$ REM＊136
    49Ø IFLEN（ID\＄）＞13THENPRINT＂\｛SHF

    T CLR\}\{CRSR DN\}\{2 CRSR RTs\} ＂+ LL\＄：GOSUB77ø：GOTO47
    ：REM＊ $1 \emptyset 7$
    495 OPEN15，8，15：OPEN5，8，5，＂$\emptyset:$ WM ＂+ ID\＄＋＂， $\mathrm{S}, \mathrm{W}^{\prime \prime}$ ：GOSUB76 $\quad$ ：IFET $=8$ THEN $47 \emptyset \quad:$ REM＊ 44
    $5 \emptyset$ FORM＝1TOWD： $\operatorname{IFDF} \$(M)="$ THEND F\＄（M）＝＂．＂：REM＊1ø5
    505 NEXT
    ：REM＊4
    $51 \emptyset$ FORDC＝1TOWD：PRINT\＃5，WD\＄（DC） ；CR\＄；DF\＄（DC）：NEXT：GOSUB76 $\emptyset$ ： IFET＝8THEN155
    ：REM＊89
    515 CLOSE5：CLOSE15：CLR：RW＝1：GOS UB1Ø5：GOTO155 ：REM＊63
    $52 \emptyset$ CLR：RW $=1:$ GOSUB1 $\varnothing 5$ ：REM＊146
    $525 \mathrm{ON}((\mathrm{SF}=1)+2) \mathrm{GOTO} 595: \mathrm{C}=1: \mathrm{PRI}$ NT＂$\{$ SHFT CLR $\}\{3$ CRSR DNs \}EN TER FILE NAME：＂：REM＊2 ${ }^{\prime} 7$
    $53 \emptyset$ PRINTTAB（6）＂（CRSR DN）（PRESS \｛CTRL 9\}\$\{CTRL $\emptyset\}$ \｛CTRL 9）RETURN $\{C T R L$ Ø）FOR DIRECT ORY）＂：REM＊52
    535 PRINT＂ 44 SPACES $\}$ DEPRESSING SHIFT KEY STOPS SCROLLING＂： POKE198，$\varnothing$
    ：REM＊ 69
    $54 \emptyset$ PRINTTAB（7）＂（PRESS（CTRL 9） RETURN\｛CTRL $\emptyset\}$ TO EXIT TO M ENU）（CRSR DN \}":PRINT:ID\$="" ：INPUTID\＄
    ：REM＊152
    545 IFID $\$=$＂＂THENSF $=\emptyset: C=\emptyset:$ GOTO15 5
    ：REM＊195
    55 IFID\＄＜＞＂\＄＂THEN56ø ：REM＊13
    555 PRINT＂\｛SHFT CLR\}":GOSUB6ø5: PRINTTAB（14）＂（CRSR DN \} \{CTRL 2）＂$+\mathrm{P} \$+$＂$\{$ CTRL 8\}": WAIT198, 1：ONSFGOTO595：ONEDGOTO525 ：REM＊75
    56 IFSF $=1$ ORAL $=1$ THENPRINTTAB（ 12 ）＂（CRSR DN\}\{CTRL 2\}ARE YOU SURE？\｛CTRL 9\}Y/N\{CTRL $\emptyset\}\{C$ TRL 8\}":GOTO61ø :REM*118 565 IFID $\$=" \$ "$ THEN52 $\emptyset \quad$ ：REM＊15 $57 \emptyset$ OPEN $15,8,15:$ OPEN $5,8,5, " \emptyset: W M$ ＂+ ID\＄＋＂，S，R＂：GOSUB76 $\emptyset$ ：IFET ＝8THEN 155
    ：REM＊114
    575 IFEN $=62$ THENGOSUB765：ONEDGOT O525：GOTO52 $\quad:$ REM＊87
    $58 \emptyset$ INPUT\＃5，WD\＄（C），DF\＄（C）：C＝C＋1 ：IFST＝ØTHEN58 $\quad:$ REM＊174
    585 CLOSE15：CLOSE5： $\mathrm{C}=\mathrm{C}-1:$ IFED $=1$ THENWD $=$ C：GOTO425 ：REM＊2ø1
    59 GOTO155 ：REM＊25 1
    595 PRINT＂（SHFT CLR）\｛CRSR DN\} E NTER FILE NAME \｛CTRL 9\}EXAC TLY\｛CTRL Ø\} AS SHOWN": PRINT ＂ON THE DIRECTORY＂：REM＊55
    $6 \emptyset \emptyset \mathrm{SF}=1$ ：GOTO53 $\emptyset$
    ：REM＊218
    $6 \emptyset 5$ SYS83 0 ：OPEN $15,8,15$ ：GOSUB76 $\emptyset$ ：CLOSE15：ON（（ET＝8）＋2）GOTO52 5：RETURN
    ：REM＊189
    61Ø GETA\＄：IFA\＄＜＞＂Y＂ANDA\＄＜＞＂N＂TH EN61 $\emptyset$ ：REM＊238 615 IFAL $=1$ THENAL $=\emptyset:$ RETURN
    ：REM＊119
    $62 \emptyset$ IFA $\$=$＂N＂THEN595 ：REM＊ 82 625 OPEN15，8，15：OPEN5，8，5，＂$\emptyset: "+$ ID\＄＋＂，S，R＂：GOSUB76 1 ：IFET＝8T HEN595 ：REM＊53
    $63 \emptyset$ IFEN $=62$ THENGOSUB765：GOTO595

    635 CLOSE5：PRINT\＃15，＂Sめ：＂＋ID\＄：C LOSE15：GOTO595 ：REM＊191
    $64 \emptyset \mathrm{X}=\emptyset: \mathrm{Y}=28: \mathrm{Z} \$={ }^{\prime \prime}\{$ SHFT U $\}$（ 3 SHF T＊S\} \{SHFT I) ${ }^{\prime \prime}:$ GOSUB $72 \emptyset:$ FOR $\mathrm{X}=1 \mathrm{TO} 2: 2 \$="\{\mathrm{SHFT}-\}\{3$ SPACE s\} \{SHFT -\}": GOSUB72ø:NEXT:Y $=24$
    ：REM＊62
    $645 \mathrm{Z} \$=$＂$\{$ SHFT J $\}\{2$ SHFT＊S $\}$ \｛COM D R \} \{SHFT K\} \{3 SPACES \} \{SHFT J）\｛COMD R\} \{2 SHFT *S \} (SHFT K）＂：GOSUB72 $\quad$ ：RETURN
    ：REM＊159
    650 X＝4：Y＝27：ZS＝＂\｛SHFT－\}\{SHFT W\} \{3 SPACES $\}\{$ SHFT W $\}\{$ SHFT－ \}": GOSUB72 $\emptyset: \mathrm{X}=5: \mathrm{Z} \$=$＂$\{\mathrm{SHFT}$－ \}\{2 SPACEs $\}\{$ SHFT $S\}\{2$ SPACE s\} $\{\text { SHFT }-\}^{\prime \prime}:$ GOSUB $72 \emptyset: X=6: 2 \$$ $="($ SHFT -$\}\{$ SHFT J $\}\{3$ SHFT＊ s）\｛SHFT K\} \{SHFT - ${ }^{\prime \prime}$ ：REM＊34
    655 GOSUB72 $0: \mathrm{X}=7: 2 \$=$＂$\{$ SHFT J \} \{S HFT＊）\｛SHFT I\} \{SHFT U\}\{SHF T＊\} \{SHFT K ${ }^{\prime \prime}$ ：GOSUB72 $\emptyset:$ RETU RN
    ：REM＊47
    $66 \emptyset \mathrm{X}=8: \mathrm{Y}=29: \mathrm{Z} \$=$＂$\{$ CTRL 6）$\{$ SHFT LB．）\｛SHFT Q\} \{COMD *) (CTRL 8 $\}^{\prime \prime}:$ GOSUB $72 \emptyset:$ RETURN ：REM＊178
    $665 \mathrm{X}=9: \mathrm{Y}=23: \mathrm{Z} \$=$＂$\{$ SHFT U $\}\{13 \mathrm{SH}$ FT＊s）\｛SHFT I\}": GOSUB72 $\quad \mathrm{X}=$ $1 \emptyset: 2 \$="\{$ SHFT -$\}\{$ SHFT U $\}\{$ SHF T I）$\{9$ SPACES $\}\{$ SHFT U $\}\{$ SHFT I\} $\{\text { SHFT }-\}^{\prime \prime}$ ：GOSUB72 $\varnothing$
    ：REM＊113
    $67 \emptyset$ FORX $=11$ TO1 $5: Z \$=$＂$\{3$ SHFT -5$\}$ $\{9$ SPACEs $\}\{3 \text { SHFT }-s\}^{\prime \prime}:$ GOSU B72 ：NEXT： $2 \$="\{2$ SHFT -S$\}\{\mathrm{C}$ OMD Q\} \{3 SHFT * $\}$ \｛COMD R\} \{S HFT＊$\}\{C O M D ~ R\}\{3$ SHFT＊s $\}\{C$ OMD W）$(2 \text { SHFT－s })^{\prime \prime}:$ REM＊238
    675 GOSUB72 $\emptyset: X=17$
    ：REM＊1 ${ }^{\text {R } 5 ~}$
    $68 \emptyset \mathrm{Z} \$=$＂MM\｛SHFT J\} \{COMD R\} \{SHFT ＊$\}\{C O M D ~ R\}\{C O M D ~ E\}\{S H F T ~ *\}$ \｛COMD E\} \{COMD R\}\{SHFT *\}\{CO MD R）\｛SHET K\}MM": GOSUB72 1 ：R ETURN ：REM＊166
    $685 \mathrm{Y}=26:$ FORX $=18 \mathrm{TO} 2 \emptyset: \mathrm{Z} \$={ }^{\prime \prime}$（SHFT －\} \{SHFT -\}\{3 SPACES\}\{SHFT －）\｛SHFT－\}": GOSUB72 $\emptyset:$ NEXT： RETURN
    ：REM＊91
    $69 \emptyset \mathrm{Y}=26: \mathrm{X}=21: \mathrm{Z} \$=$＂$\{$ COMD Q$\}\{$ SHFT ＊$\}\{C O M D$ W\} \{3 SPACEs $\}\{C O M D$ Q）\｛SHFT＊\} \{COMD W\}": GOSUB72 $\emptyset: X=22: Y=24: Z \$="\{$ SHFT U $\}\{S H$ FT＊\} \{SHFT K \} \{SHFT -$\}\{3 \mathrm{SP}$ ACES \} \{SHFT - \} \{SHFT J) \{SHFT ＊\} $\{$ SHFT I\} ": GOSUB72ø
    ：REM＊15 ${ }^{\text {R }}$
    $695 \mathrm{X}=23: Z \$="\{$ SHFT J $\}\{3$ SHFT＊s \}\{SHFT K\}\{3 SPACES $\}$ \｛SHFT J \} \｛3 SHFT＊s \} (SHFT K)":GOSUB7 $2 \emptyset:$ RETURN
    ：REM＊143
    $7 \emptyset \emptyset \mathrm{X}=1: \mathrm{Y}=3 \emptyset: \mathrm{Z} \$="\{$ CTRL 2 ）＊$\{$ CTRL 8）＂ ：GOSUB72 $\emptyset$ ：RETURN：REM＊46
    $7 \emptyset 5 \mathrm{Y}=3 \emptyset:$ FORX $=11$ TO15STEP $2: 2 \$="$＇ SHFT Q\}": GOSUB72 $\varnothing$ ：NEXT：RETU RN
    $:$ REM＊1 $\emptyset 5$
    $71 \emptyset \mathrm{Y}=27: \mathrm{X}=1 \emptyset: \mathrm{Z} \$="\{2 \mathrm{COMD} \mathrm{Ps}\}\{3$ SPACEs）（2 COMD Ps）＂：GOSUB7 $2 \emptyset: X=11: Z \$="(S H F T M$ ）（SHFT $N$
    ）（SHFT Q）\｛SHFT M）\｛SHFT N\} ＂：GOSUB72 $\emptyset:$ RETURN ：REM＊226 $715 \mathrm{X}=6: \mathrm{Y}=28: \mathrm{Z} \$=$＂$(\mathrm{SHFT}$ U）（ 3 SHF T＊S\}\{SHFT I\}":GOSUB72 1 ：MW＝ MW +1 ：RETURN ：REM＊157
    $72 \emptyset$ POKE781，X：POKE782，Y：SYS6552 $\emptyset:$ PRINTZ $\$:$ RETURN ：REM＊252
    725 PRINTTAB（12）＂\｛CTRL 3）＊＊＊ ＊＊＊＊＊＊＂：RETURN ：REM＊27
    730 PRINTTAB（12）＂＊＂SPC（15）＂＊＂：R ETURN
    ：REM＊144
    735 PRINT＂$\{$ SHFT CLR $\}\{3$ CRSR DNs ）＂TAB（255）＂MUST USE A＂：PRIN TTAB（15）＂$\{2$ CRSR DNs $\}\{C T R L$ 9）HIGHLIGHTED＂：REM＊255
    $74 \emptyset$ PRINTTAB（17）＂\｛2 CRSR DNs $\} N U$ MBER＂：FORT＝1TO2øøø：NEXT：GOT 0155
    ：REM＊112
    745 PRINT＂$\{$ SHFT CLR $\}$＂TAB（253）＂$\{$ 2 CRSR DNs）NO WORDS IN MEMO RY＂：PRINTTAB（14）＂\｛CRSR DN\}O PTION \｛CTRL 9\}4\{CTRL Ø\} TO LOAD＂ ：REM＊1 $\varnothing 5$
    $75 \emptyset \operatorname{PRINTTAB}(93)$＂THEN PRESS $\{C T$ RL 9\}RETURN(CTRL 2)": X=22: Y $=14: 2 \$=P \$$ ：GOSUB72ø：WAIT198， 1：GOTO155
    ：REM＊134
    $755 \mathrm{X}=15: \mathrm{Y}=1: 2 \$="(\operatorname{COMD} 6)^{*}$＂+PS ＋＂＊\｛CTRL 8）＂：GOSUB72ø：WAIT 198，1：RETURN ：REM＊119
    760 INPUT\＃15，EN，EM\＄，ET，ES：IF（EN （2ø）OR（EN＝62）THENET $=\varnothing$ ：RETUR N
    ：REM＊16ø
    765 PRINT＂$\{7$ CRSR DNS \} \{CTRL 9\} （CTRL 2\}DISK ERROR\{CTRL $\emptyset\} "$ EN＂$\{$ CRSR LF $\}$ ，＂EM§＂，＂ET＂$\{$ CR SR LF $\}, " E S^{\prime \prime}(C T R L$ 8）＂：ET＝8 ：REM＊79
    77＠PRINT＂ （CRSR DN\}\{7 SPACES\}" + P\＄＋＂TO CONTINUE＂：WAIT198，1 ：CLOSE5：CLOSE15：POKE198，$\varnothing$ ：R ETURN ：REM＊95
    775 PRINTAJ\＄；I；＂（2 SPACEs）（CTRL 9）＂；WD\＄（I）：WD\＄（I）＝＂＂：PRINT ＂（CRSR UP）（3 CRSR RTs）＂；：I NPUTWD\＄（I）
    ：REM＊244
    $78 \emptyset \operatorname{IFWD} \$(\mathrm{I})="$＂ORLEN（WD\＄（I））$>16$ THENWD\＄（I）＝＂＂：GOSUB79ø：GOTO 775 ：REM＊227
    785 NEXT：GOTO45 ：REM＊116
    79＠ $\mathrm{X}=\mathrm{I}+1: \mathrm{Y}=3: \mathrm{Z} \$=\mathrm{SP} \$+$＂$\{$ CRSR UP $\}$ ＂：GOSUB72ø：RETURN ：REM＊95
    $795 \mathrm{Y}=\operatorname{INT}((38-(\operatorname{LEN}(\mathrm{DF} \$(\mathrm{R})))) / 2)$ $: \mathrm{X}=24: \mathrm{Z} \$=$＂$(\text { CTRL } 2)^{* \prime \prime}+\mathrm{DF} \$(\mathrm{R})$ ＋＂＊\｛CRSR UP\}\{CTRL 8)":GOSUB 72ø：GOTO245 ：REM＊218
    $8 \emptyset \emptyset$ FORLO $=1$ TOI－1 $:$ IFLO $>1$ THENGOSU B895：ONED +1 GOTO $9 \varnothing$ ：PRINT＂$\{$ H OME\}\{2 CRSR DNs\}":GOTO815 ：REM＊89
    $8 \emptyset 5 \mathrm{LE}=1: \mathrm{DO}=7$ ：WI $=38: \mathrm{DE}=3:$ REM＊74
    81ø PRINT＂$\left\{\right.$ SHFT CLR\} \{CRSR DN\} $\left\{\begin{array}{c}\text { C }\end{array}\right.$ TRL 2）＂TAB（11）＂DEFINITION\｛2 SPACEs）SCREEN＂：PRINTTAB（1ø ）＂（CTRL 8）（2ø COMD Ys $\} "$ ：REM＊2ø7
    $815 \mathrm{XA}=\operatorname{INT}(32-(\operatorname{LEN}(\operatorname{WD}(\operatorname{LO})))) / 2$ ：PRINTTAB $(\mathrm{XA}+4):$ FORI $=1$ TOLEN （WD\＄（LO））：PRINT＂$\{$ CTRL 2）\｛CO

    MD P\}"; REM＊4 $82 \emptyset$ NEXT：PRINT ：REM＊173
    825 PRINTTAB（XA）＂\｛CTRL 8）＊＊＊（C TRL 9\}(CTRL 2\}"WD\$(LO)" $\{$ CTR L $\emptyset\}\{$ CTRL 8$\}$＊＊＊＂：PRINTTAB 36）＂$\{$ COMD 6\}"LO:GOSUB91ø
    ：REM＊236
    $83 \emptyset$ PRINT＂$\{$ CRSR DN $\}$＂：PRINTTAB（3 ）＂（CRSR DN）\｛CTRL 8）TOTAL NU MBER OF CHARACTERS CAN NOT＂ ：REM＊87
    $835 \operatorname{PRINTTAB}(5)$＂EXCEED \｛CTRL 9\} （CTRL 2） 36 （CTRL 8）\｛CTRL $\emptyset\}$ ． （2 SPACEs）（INCLUDING SPACES ）$\{$ CTRL 2$\}\{$ CRSR DN $\} ":$ IFED＝1A NDE2 $=\emptyset$ THENGOTO85 $\emptyset:$ REM＊194
    84ø POKE19，64：X＝17：Y＝2： $\mathrm{z} \$=$＂$-\cdots$
    －－－－\｛UP ARROW）（CRSR UP\}":GO SUB72ø
    ：REM＊211
    845 INPUT＂（2 CRSR RTs）\｛CRSR UP） ．$\{$ CRSR LF\}"; DF $\$(\mathrm{LO}): E 2=\emptyset: \mathrm{IF}$ LEN（DF\＄（LO））＞36THENE2＝1：GOT 088 $\emptyset$
    ：REM＊6
    85 XA＝INT（4 $\emptyset-(\operatorname{LEN}(\mathrm{DF} \$($ LO $)))) / 2$ $: \mathrm{X}=8: \mathrm{Y}=\mathrm{XA}: \mathrm{Z} \$=$＂$\{$ CTRL 2 ）＂$+\mathrm{DF} \$$ （LO）：GOSUB72ø
    ：REM＊163
    855 PRINT＂$\{6$ CRSR DNs）＂TAB（249） ＂PRESS（CTRL 9）RETURN\｛CTRL Ø\} TO ACCEPT\{CRSR DN\}"
    ：REM＊44
    $86 \emptyset \operatorname{PRINTTAB}(8) "\{C T R L 9\} \operatorname{SHIFT}\{C$ TRL Ø\} \{CTRL 9\}RETURN\{CTRL ø）TO RE－ENTER＂：REM＊51
    865 GETAS：ON（（A\＄＝CHR\＄（13））＋2）GO TO87 $\varnothing$ ：ON（ $(A \$=C H R \$(141))+2) \mathrm{G}$ OTO89 $\varnothing$ ：GOTO865 ：REM＊182 $87 \emptyset$ IFED $=1$ THENGOSUB895 ：REM＊7 875 NEXT：PRINT＂$\{$ SHFT CLR $\}$（CTRL 8\}":RETURN ：REM＊44 88ø PRINTTAB（137）＂\｛CTRL 8\}\{CTRL 9\}TOO\{CTRL Ø\} \{CTRL 9\}LONG （CTRL 2）＂：PRINTTAB（88）P\＄＋＂ TO RE－ENTER＂
    ：REM＊1 $\emptyset 9$
    885 WAIT198，1：GETA\＄：GOTO81 $\emptyset$
    ：REM＊222
    $89 \emptyset X=8: Y=2: Z \$=S P \$:$ GOSUB $72 \emptyset:$ GOT 09øø
    ：REM＊125
    $895 \mathrm{Y}=2: \mathrm{Z} \$=\mathrm{SP} \$:$ FORX $=3$ TO 4 ：GOSUB 7 $2 \emptyset:$ NEXT： $\mathrm{X}=8$ ：GOSUB $72 \emptyset:$ RETURN ：REM＊156
    $9 \emptyset \emptyset$ FORX $=2 \emptyset$ TO23：GOSUB72 $\varnothing$ ：NEXT：I FED $=\emptyset$ THENPRINT＂$\{$ HOME $)(2$ CRS R DNs）＂：GOTO815 ：REM＊127
    $9 \emptyset 5$ GOTO84 ：REM＊19 $\emptyset$
    $91 \emptyset$ POKE211，LE：POKE214，DO：PRINT ＂\｛CRSR UP\}";:FORB=1TOWI:PRI NT＂\｛CTRL 3\}\{COMD P\}";:NEXT: PRINT
    ：REM＊119
    915 FORB＝1TODE： $\operatorname{PRINTTAB(LE);"~}\{\mathbf{C}$ OMD J）＂；TAB（LE＋WI－1）＂（COMD L）＂ ：REM＊242
    $92 \emptyset$ PRINT＂ （CRSR UP\}": NEXT: POKE2 11，LE：POKE214，DO＋DE +1 ：PRINT ＂\｛CRSR UP\}";:FORB=1TOWI:PRI NT＂$\{$ COMD Y）＂；：REM＊155 925 NEXT：RETURN ：REM＊1 $\emptyset$
    93Ø DATA169，2，162，176，16ø，3，32， $189,255,169,1,162,8,16 \emptyset, \emptyset, 3$

    2，186，255，32，192
    ：REM＊3
    935 DATA255，24，162，1，32，198，255 ，176，75，32，2ø7，255，32，2ø7，2 $55,169,13,32,21 \emptyset, 255:$ REM＊$\emptyset$
    $94 \emptyset$ DATA $32,2 \emptyset 7,255,32,2 \emptyset 7,255,3$ $2,2 \emptyset 7,255,133,252,32,2 \emptyset 7,25$ 5，133，251，165，144 ：REM＊219
    945 DATA2ø8，44，165，251，166，252， 32，2ø5，189，169，32，32，21ø，25 $5,32,2 \emptyset 7,255,32,21 \emptyset:$ REM＊ 148
    95＠DATA255，174，141，2，2ø8，251，1 $66,145,224,127,24 \emptyset, 15,32,2 \emptyset$ 7，255，1ø5，$, 2 \emptyset 8,235:$ REM＊83
    955 DATA $169,13,32,21 \emptyset, 255,76,1 \emptyset$ $2,3,24,169,1,32,195,255,32$ ， 2ø4，255，96，36，48 ：REM＊84
    960 PRINT＂$\{$ SHFT CLR\}\{3 CRSR DNs \}\{2 CRSR RTs\}SAVE THIS FILE USING THE＂：PRINT＂（CRSR DN） （2 CRSR RTs）（CTRL 9）ORIGINA L（CTRL Ø）NAME OF－－（CTRL 9） （CTRL 2）＂；ID\＄
    ：REM＊217
    965 PRINTTAB（13）＂\｛2 CRSR DNs $\}$ PR ESS \｛CTRL 9\}Y/N\{CTRL 8\}\{CTR L $\emptyset\}^{\prime \prime}$ ：REM＊13ø
    97ø GETA\＄：IFA\＄く＞＂Y＂ANDA\＄く＞＂N＂GO T097 $\varnothing$
    ：REM＊85
    975 ONPPGOTO1 1 1 $\emptyset, 1 \emptyset 15,1 \emptyset 2 \emptyset:$ IFAS $=" \mathrm{~N} "$ GOTO47 $\varnothing:$ REM＊42
    $98 \emptyset$ OPEN15，8，15：OPEN5，8，5，＂＠ø：W M＂＋ID\＄＋＂，$S$ ，W＂：GOSUB76 $\quad$ ：IFE T＝8THEN96 $\quad$ ：REM＊177
    985 GOTO5øø ：REM＊182
    99＠IFID\＄$=$＂＂THEN745 ：REM＊35
    995 PRINT＂$($ SHFT CLR $\}$ \｛ 2 CRSR DNs ）（ 2 CRSR RTs） THE NAME OF TH E FILE（CRSR DN\}": PRINT" $\{2 \mathrm{C}$ RSR RTs）THAT WILL PRINT IS－ －\｛CTRL 9\}\{CTRL 2\}";ID\$
    ：REM＊2ø4
    1 申ø PRINT＂$\{$ CTRL 8\}" : REM*145
    $1 \emptyset \emptyset 5$ PRINTTAB（6）＂${ }^{2}$ CRSR DNS $\}$ I S THIS THE CORRECT FILE？＂： $\mathrm{PP}=1$ ：GOTO965
    ：REM＊16ø
    1ø1ø ON（（A\＄＝＂N＂）＋2）GOTO155：PRIN T＂$\{2$ CRSR DNs $\}$（9 SPACEs $\}$ IS THE PRINTER READY？＂： $\mathrm{PP}=2$ ： GOTO965
    ：REM＊193
    1 115 ON（（A\＄＝＂N＂）＋2）GOTO155：PRIN T＂$\{2$ CRSR DNs $\}$ \｛ 9 SPACEs $\}$ IN CLUDE DEFINITIONS？＂：PP＝3：G OTO965
    ：REM＊226
    $1 \emptyset 2 \emptyset$ OPEN $4,4: \mathrm{XA}=$ INT（ $8 \emptyset$－（LEN（ID $\$$ ）））／2：GOSUB1 $\varnothing 45$ ：PRINT\＃4，＂＂ TAB（XA）；ID\＄：GOSUB1ø45
    ：REM＊61
    $1 \emptyset 25$ PRINT\＃4，CHR\＄（1ø）：FORX＝1TOC ：IFA $=$＝ Y ＂THEN1 $\emptyset 35$ ：REM＊163
    $1 \emptyset 3 \emptyset$ PRINT\＃4，＂$(3$ SPACEs）＂WD\＄（X） ，CHR $\$(1 \emptyset)$ ：NEXT：CLOSE4：GOTO 155 ：REM＊166 1 ø35 PRINT\＃4，＂$\{3$ SPACES $\}$＂WD\＄$(X)$ ；＂＂TAB（25－LEN（WD\＄（X）））；DF\＄ （X），CHR $\$(1 \emptyset):$ NEXT $:$ REM＊239

    ## $1 \emptyset 4 \emptyset$ CLOSE4：GOTO155

    ：REM＊42
    $1 \emptyset 45$ FORX＝1TO8ø：PRINT\＃4，＂－＂；：NE XT ：RETURN
    ：REM＊249

    ## how to Type RUN Listings

    To simplify typing RUN's C.64 and C-128 program listings, we include checksum numbers. These follow a REM statement at the end of each line (e.g., :REM*123) and necessitate your using RUN's Perfect Typist programs, listed below.

    Type in 64 Perfect Typist (Listing 1) for 64 programs, or 128 Perfect Typist (Listing 2) for 128 -mode programs, and save it to either tape or disk before running. When you want to type in a 64 - or a 128 -mode program, first load and run the appropriate Perfect Typist listing. Jot down the two SYS numbers that appear on your screen. They are the SYS numbers that you type in for deactivating and reactivating the checksum program.

    After Perfect Typist has been loaded and run, start typing in the program listing from RUN. After you press the return key to log in each line, a 1 -, 2. or 3 -digit number will appear below the line at the left margin. This is the checksum number, ranging from 0 to 255 .

    If this matches the checksum printed in the listing after the :REM*, you have typed that line correctly. Then type the next program line over the previous line's checksum value. If the checksum numbers do not agree, analyze the line on screen for errors or omissions. Make the needed changes and press the return key again to log them in. A new checksum will appear in place of the old one. Compare
    this to the magazine's number and then proceed to the next line.
    When you've finished typing in your program, disable Perfect Typist by typing in the appropriate SYS number for either 64 or 128 mode, and press the return key. Now you can save your program as usual, but before attempting to run it, turn the computer off and back on to completely clear out the Perfect Typist program.

    You may save an incomplete program any time and continue it later. To do so, reload and run the Perfect Typist program, then load the program you were working on, list it, and continue from where you left off.

    The 128 Perfect Typist will work in either 40 or 80 columns. Also, it lets you use the C-128's automatic line-numbering. If Auto is on, the checksum will be printed below the line you just entered, and the $\mathrm{C}-128$ will place the next line number below the checksum.

    All listings in RUN have been translated so that the graphics and control characters are designated as understandable key combinations. Follow instructions inside curly brackets. For example, \{SHIFT L\} means you should hold down the shift key and press the L key. What you see on your screen will look quite different from what is designated inside the brackets. Another example is $\{22$ SPACEs $\}$, which instructs you to press the space bar 22 times. $\mathbf{R}$

    ## Listing 1. 64 Perfect Typist program.

    ```
    REM 64 PERFECT TYPIST
    2 REM BY: JAMES E BORDEN
    1\emptyset POKE56,PEEK(56)-1:POKE52,PEEK (56):CLR
    2\emptyset PG=PEEK(56):ML=PG*256+6\emptyset
    3\emptyset FORX=ML TO ML+154:READD:T=T+D:POKEX,D:N
    EXT
    4\emptyset IFT<>16251 THEN PRINT"ERROR IN DATA...""
        :END
    6\emptyset POKEML+4,PG:POKEML+1\emptyset,PG:POKE ML+16,PG
    7\emptyset POKE ML+2\emptyset,PG:POKE ML+32,PG:POKE ML+38,
        PG
    8\emptyset POKE ML+141,PG
    89 PRINT"{SHFT CLR}{CRSR RT}**************
        ************************'
    9\emptyset SYS ML:PRINT "{CRSR RT}** ```

