Gems

WRITTEN BY
HENNING
VAHLENKAMP

SEE JUST WHAT BASIC 7.0 CAN DO IN A 128.

```
20 CHAR ,13,10,"SPRITE
   CHAOS!"
30 FOR D=0 TO 63:READ
   V:POKE3584+D,V:
   NEXT
40 FOR I=2 TO 8:SPRSAV
   1,I:NEXT
50 SPRCOLOR 16,16
60 FOR S=1 TO 8:MOVSPR
   S,0,0:NEXT
70 FOR S=1TO8:SPRITES,
   1,S+1,1,1,1,1:NEXT
80 DO:FOR I=1 TO 8
90 A=INT(RND(1)*360+.5)
```

```
100 S=INT(RND(1)*15+1)
    :IF S<5 THEN 100
110 MOVSPR I,A #S
120 NEXT:LOOP
130 DATA 0,170,0,2,90,
    128, 9,106
140 DATA 160,9,170,160,
    37,170,168,38
150 DATA 170,168,38,170,
    168,150,17 0,170
160 DATA 154,170,170,
    170,170,170,170,170
170 DATA170,170,170,170,
    170,170,170,170
180 DATA 170,170,42,170,
    168,42,170,168
190 DATA 42,170,168,10,
    170,160,10,170
200 DATA 160,2,170,128,0,
    170,0,0
```

Curve Explosion

Picture an infinite number of different parabolic curves streaming out like a fountain from a central point on the screen. That's what Curve Explosion does with its short plotting routine. The program works like a circle algorithm, but it draws only half a circle. Each curve has a common starting point. Run this one on your 128 to see the intriguing display.

```
1 REM CURVE EXPLSION
10 COLOR 1,2:COLOR
   0,1:COLOR1,4
20 GRAPHIC 1,1
30 DRAW ,0,199 TO 319,
   199
40 DO:A=INT(RND(1)
   *70+10)
50 B=INT(RND(1)*150+10)
60 C=INT(RND(1)*2+1)
70 IF C=1 THEN BEGIN
80 D=3.14:E=-.1:F=-.2:
   G=A:BEND:ELSE
   BEGIN
90 D=0:E=3.3:F=.2:G=-
   A:BEND
100 LOCATE 160,199
110 FOR R=D TO E STEP F
```

```
120 X=INT(A*COS(R)):
    Y=INT(B*SIN(R))
130 DRAW TO 160+G+X,
    199-Y
140 NEXT R:LOOP
```

String Bounce

Are you looking for a new way to display a message on your 128? If so, try String Bounce. Just put any message into A$, and this program will move it around

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the screen. If the message hits a border, it bounces off and continues in the opposite direction. Your message will leave a trail as it moves if you change the color in line 90. Change the 39 in lines 30 and 120 to 79 to make the program work on the 80-column screen. Keep the message reasonably short, or it will move down excessively.

```
1 REM STRING BOUNCE
10 SCNCLR:A$="COMMODORE!"
20 COLOR 5,2:COLOR 0,1:COLOR
   4,1
30 X=INT(RND(1)*39-LEN(A$)+.5)
40 IF X<0 THEN 30
50 Y=INT(RND(1)*23+1)
60 CHAR ,X,Y,A$:DX=1:DY=1
70 V=INT(RND(1)*3-1)
80 IF V=0 THEN 70
90 DO:XO=X:YO=Y:COLOR 5,1
100 CHAR ,XO,YO,A$:X=X+V*
    DX:Y=Y+V*DY
110 IF X<1 THEN DX=-DX:X=XO
120 IF X>39-LEN(A$) THEN DX=-
    DX:X=XO
130 IF Y<1 THEN DY=-DY:Y=YO
140 IF Y>23 THEN DY=-DY:Y=YO
150 COLOR 5,2:CHAR ,X,Y,A$
160 LOOP
```

Star Shapes

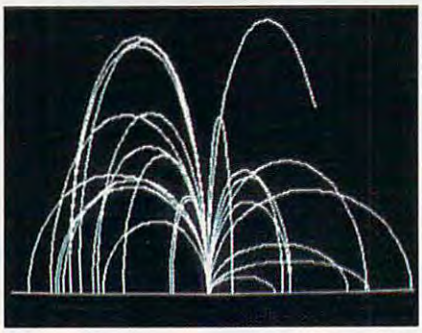
Star Shapes puts simple trigonometry to use so you can create an infinite variety of star-like designs. When you run the program, it asks you for an x and y radius. These are the radii of two circles. Lines are drawn from each of ten points arranged in a circle to each of ten points around your circle. The results produce elaborate symmetrical star shapes. Run it to see what I mean. These programs have few frills, so you'll have to hit Run/Stop-Restore and type RUN again to get this one to repeat.

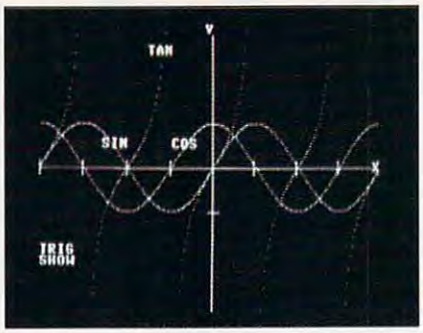
```
1 REM STAR SHAPES
10 COLOR 1,2:COLOR 0,1:COLOR
   4,1
20 INPUT"[SHFT CLR][CRSR DN]
   ENTER X RADIUS: ";X1
30 INPUT"ENTER Y RADIUS: ";Y1
40 FOR D=1 TO 10:READ A(D),B(D)
   :NEXT
50 GRAPHIC 1,1
60 FOR L=1 TO 10
70 FOR R=0 TO 6.28 STEP .628
80 LOCATE A(L),B(L)
90 X=INT(X1*COS(R)):Y=INT (Y1* SIN
   (R))
100 DRAW TO X+160,Y+100
110 NEXT R,L
120 DATA 249,100,232,147,187,176
130 DATA 132,176,87,146,70,99
140 DATA 87,52,132,23,188,24,233,53
```

Brownian Symmetry

This little hack differs from typical kaleidoscope-type programs by simulating Brownian motion, the random movement of microscopic particles in a fluid. I won't attempt an explanation of this phenomenon here, but it can produce eye-catching designs.

The program works by displaying a pixel influenced by Brownian motion and copying it across four lines of symmetry, resulting in eight reflections. You can choose hi-res or multicolor mode for the display as well as whether to erase the points after they're plotted. I think you'll find that Brownian Symmetry shows that there can be beauty in scientific phenomena.






```
1 REM BROWNIAN SYMMETRY
10 V=1:COLOR 0,1:COLOR 4,1
20 INPUT"[SHFT CLR][CRSR DN](H)I-
   RES OR (M)ULTI ";GR$
30 IF GR$="H" THEN SC=1:ELSE SC
   =3:V=2
40 INPUT"[CRSR DN]ERASE POINTS
   (Y/N)";ER$
50 X=0:Y=0:P=2:GRAPHIC SC,1
60 IF SC=3 THEN P=INT(RND(1)* 15
   +2)
70 COLOR 1,P
80 D=INT(RND(1)*15+1)
90 MX=INT(RND(1)*(D*2+.5)-D)
100 MY=INT(RND(1)*(D*2+.5)-D)
110 X=X+MX:Y=Y+MY
120 IF X<-100 THEN 80
130 IF Y<-100 THEN 80
140 IF X> 100 THEN 80
150 IF Y< 100 THEN 80
160 FOR L=1 TO 2
170 DRAW ,(160-X)/V,100+Y
180 DRAW ,(160-Y)/V,100+X
190 DRAW ,(160-X)/V,100-Y
200 DRAW ,(160-Y)/V,100-X
210 DRAW ,(160+X)/V,100+Y
220 DRAW ,(160+Y)/V,100+X
230 DRAW ,(160+Y)/V,100-Y
240 DRAW ,(160+Y)/V,100-X
230 IF ER$="N" THEN 60
240 COLOR 1,1: NEXT L: GOTO 60
```

Star Bursts

Your monitor screen goes black and then slowly fills with an infinite variety of distinct, colorful explosions or star bursts. That's what the following program will do on your 128. Each star burst consists of 25 randomly selected and colored rays emanating from a central point. Try it; I think you'll find this one is a real eye-catcher!

```
1 REM STAR BURSTS
10 COLOR 0,1:COLOR 4,1
20 GRAPHIC 3,1:DO
30 X1=INT(RND(1)*159)
40 Y1=INT(RND(1)*199)
50 FOR RP=1 TO 25
60 CS=INT(RND(1)*3+1)
70 CO=INT(RND(1)*7+2)
80 X2=INT(RND(1)*24-11.5)
90 Y2=INT(RND(1)*40-19.5)
100 COLOR CS,CO
110 DRAW CS,X1,Y1 TO
    ABS(X1+X2),ABS(Y1+Y2)
120 NEXT:LOOP
```

Trig Show

Beginning math students often have trouble remembering the six basic trigonometric curves: sine, cosine, tangent, cosecant, secant, and cotangent. Trig Show helps by drawing each curve one at a time from -2 times pi to 2 times pi along the x-axis. It also shows each curve's relationship to another curve since all of them appear and overlap on the same screen. When one curve finishes its plot, press Return to see the next one. Try this useful visual aid to increase your understanding of these trigonometric fundamentals. When typing this one in, remember that to enter pi in line 250, hold down the Shift key while simultaneously pressing the up-arrow (↑) key.

```
1 REM TRIG SHOW
10 COLOR 0,1:COLOR 4,1:COLOR
   1,2
20 GRAPHIC 1,1
30 CHAR ,0,19,"TRIG"
40 CHAR ,0,20,"SHOW"
50 DRAW ,0,100 TO 319,100
60 DRAW ,159,0 TO 159,199
70 FOR X=0 TO 319 STEP 39.75
80 DRAW ,X,95 TO X,105:NEXT
90 DRAW ,155,70 TO 165,70
```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```
100 DRAW ,155,130 TO 165,130
110 CHAR ,39,12,"X":CHAR ,19,0,"Y"
120 BB=0:DEF FNY(X)=SIN(X)
130 CHAR ,7,10,"SIN":GOSUB250
140 BB=0:DEF FNY(X)=COS(X)
150 CHAR ,15,10,"COS":GOSUB250
160 BB=1:DEF FNY(X)=TAN(X)
170 CHAR ,12,2,"TAN":GOSUB250
180 BB=1:DEF FNY(X)=1/SIN(X)
190 CHAR ,30,22,"CSC":GOSUB250
200 BB=1:DEF FNY(X)=1/COS(X)
210 CHAR ,12,22,"SEC":GOSUB250
220 BB=1:DEF FNY(X)=1/TAN(X)
230 CHAR ,30,2,"COT":GOSUB250
240 END
250 FOR X=.05 TO 4*(π) STEP .05
260 IF BB=1 THEN IF FNY(X)*30>=-
    100 AND FNY(X)*30<=100 THEN
    DRAW ,X*25.5,100-FNY(X)*30
270 IF BB=0: THEN DRAW ,X*25.5,
    100- FNY(X)*30 280 NEXT:WAIT
    212,1:RETURN
```

Now let's shift our attention to some 80-column gems.

Close and Open

Over the years, many routines have been written to clear the 40-column text screen in different ways. The following short routine demonstrates an interesting screen clear for the 128's often neglected 80-column text screen. First, text is displayed, and the program waits for a keypress. Then the left and right sides of the screen come together, squeezing out the text. The screen is cleared, new text is printed, and the screen expands again to reveal it. Try this one in your own programs instead of a boring SCNCLR command.

```
1 REM CLOSE & OPEN
10 SCNCLR:PRINTCHR$(27)CHR$
   (82)
20 CHAR ,26,10,"HERE IS THE
   [CTRL 9] F I R S T[CTRL 0]
   SCREEN"
30 GETKEY K$:IF K$=" " THEN 30
40 R=86:L=6:DO
50 SYS 52684,R,35:SYS 52684,L,34
60 R=R-1:L=L+1
70 LOOP UNTIL R<L:SCNCLR:SLEEP1
80 CHAR ,25,10,"HERE IS THE [CTRL
   9] S E C O N D[CTRL 0] SCREEN"
90 DO:R=R+1:L=L-1
100 SYS 52684,R,35:SYS 52684,L,34
110 LOOP UNTIL L<6
```

Shaker

Shaker does for the 128's 80-column screen what many routines have done for the 40-column screen: It shakes it back and forth. This hack takes advantage of the VDC chip's little-known smooth-scrolling feature. By repeatedly moving the screen eight pixels to the left then eight to the right in increments of one, it produces this smooth effect. Try it and liven up dull text displays.

```
1 REM SHAKER
10 GRAPHIC 5,1:COLOR 5,5
20 FOR I=15 TO 64:CHAR ,I,6,"*":
   CHAR,I,16,"*":NEXT
30 CHAR ,36,8,"SHAKER"
40 CHAR ,31,10,"COMPUTE'S
   GAZETTE"
50 CHAR ,30,12,"324 WEST WEN
   DOVER AVENUE"
60 CHAR ,29,14,"GREENSBORO, NC
   27408"
70 FOR L=7 TO 0 STEP -1
80 SYS 52698,,25:RREG AC
90 SYS 52684,(AC AND 248)+L,25
100 NEXT L
110 FOR R=0 TO 7
120 SYS 52698,,25:RREG AC
130 SYS 52684,(AC AND 248)+R,25
140 NEXT R:GOTO 70
```

I hope you take a few minutes to type in these little gems and see what a 128 can do. Feel free to modify and embellish these programs and use them as a basis for your own programming ideas. ❑

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THE LOST WORLD

Does this sound familiar? You're tired of shoot-'em-up computer games that do nothing for a child's mind, but your child shuns educational games in favor of action and adventure. If that's the case, then Free Spirit Software has the answer for both of you in an adventure program it has just imported from the land down under.

Based on a Sir Arthur Conan Doyle novel published at the turn of the century, The Lost World is an offering from Satchel Software, a company that promotes the use of computers and computer text games in the school systems throughout South Australia. This particular program, geared toward junior high students, ties in nicely with the study of fossils, dinosaurs, and natural history. The game also helps students by encouraging reading, increasing vocabulary, widening thought processes, developing concentration, and developing problem-solving strategies.

With these goals in mind, you would probably expect The Lost World to be boring. It's not! The game is great fun! It combines text commands with colorful graphics in a rollicking adventure that can be played alone or solved as part of a group effort. You'll find yourself facing quite an array of obstacles and many unique elements. In fact, if you don't use your head, you might end up as a tasty tidbit for a hungry dinosaur.

The game's text commands are relatively simple. Directions (north, west, up, down, and so on) can be abbreviated by typing the first letter of the word. Youngsters who aren't familiar with a keyboard won't be put off by having to type in a lot of text. Action commands are kept simple, too, using verbs such as take, cut, drop, make, and so on. This lets children with varying reading levels play and enjoy the game. You can also save your adventure—a nice feature if you've just had an unfortunate encounter with an Allosaur.

Players will have fun finding treasure, discovering fossils, and meeting dinosaurs in The Lost World, but they'll also be learning.

Satchel wants its software to be challenging but not frustrating. The programmers have found that a little help goes a long way, so they've included a 176-page manual that is divided into two parts. The first 67 pages are for the teacher, and they offer suggestions and possible solutions for the game. This section should be used sparingly. Children in the appropriate age range should be able to solve the game with just a few hints to steer them in the right direction. The remaining 109 pages of the manual are a bonus. They are crammed with games, crossword puzzles, and short articles that will pique a child's curiosity and offer hours of related activities. There's lots of good information here for students who want to do some reports for extra credit, too.

The Lost World is far more than a text game and activity book. In fact, this three-disk package outdistances any game program I've ever seen. Satchel actually gives you an incredible resource disk in this program that includes a basic database, a simple-to-use word processor called Easy Word, and several disk utilities—all designed for junior high students.

The database is already set up with five files that pertain to dinosaurs, explorers, and imaginary lands. Users can choose to view, edit, search, or sort the files. They can also add, delete, and print records. While the users can't create their own files, this program helps familiarize them with ways to work within databases and access information.

The people at Satchel Software realize that novices often inadvertently erase portions of their projects while learning to use a new program. To reduce this frustrating possibility, some commands, such as DELETE, have safeguards built into them that prevent a user from erasing the entire database. Speaking from personal experience, there've been many times when I've wished for this feature on my own database.

The word processor included in The Lost World is called Easy Word, and it lives up to its name. It's a practical, 40-column word processor that is so simple to use that kids will enjoy using it for reports and other writing tasks. Satchel has built several safeguards into the word processor program, too. For example, function keys handle most commands within the program (LOAD, CLEAR, SAVE, ERASE, CENTER, PRINT), and these commands stay onscreen throughout the program. That way users won't lose any work trying to remember the right command.

Another safeguard built into the program restricts access to the Erase option. When you press f8 to erase files, you get a message informing you that Erase is a restricted option. You then have to go through several more steps, including entering the full name of the file you want to erase. After all these steps, it's rather unlikely that you'll accidentally delete an important file.

I think you're going to be very surprised when you check out The Lost World. This package delivers everything that its developers promise and more. I for one am going to be watching for more programs bearing the Satchel Software name.

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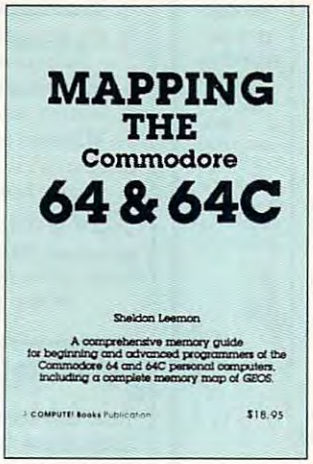

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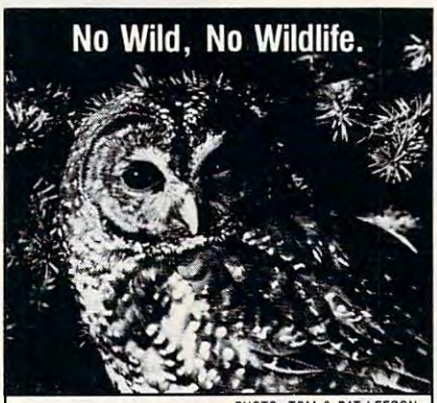

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VIDEO DIGITIZER

There's a new digitizer on the market. This German import, called simply Video Digitizer, is distributed in the U.S. by RIO Computers. Video Digitizer does far more than simply replace ComputerEyes, which has been discontinued—it leaves it in the dust!

The screen image is limited to standard Commodore high-resolution, and you need a decent image and a stable source signal if you hope to accomplish anything. But this little gem manages to find a clean image where ComputerEyes could see only black-and-white streaks. I ran the cable from my new VCR (which I bought only after making sure it could produce a nearly perfect freeze-frame) to my Commodore 128 (in 64 mode) and compared Video Digitizer with ComputerEyes on the same video image. Video Digitizer created a perfectly presentable picture of Captain Kirk, while ComputerEyes covered the poor captain with streaks. I was impressed!

Of course, any digitized image needs at least a little touching up. With ComputerEyes this always meant loading a third-party conversion program such as Icon Factory and porting the image over to Doodle or geoPaint for touch-ups. Video Digitizer, on the other hand, has a drawing program called Eddison that's built right in! As a matter of fact, Eddison is a full-featured, sophisticated graphics tool in its own right. In a sense, Video Digitizer is an add-on accessory to Eddison, not the other way around. After all, the digitizer is controlled from an icon that's a selection on Eddison's menu, just like the pencil or brush choices.

Video Digitizer scans an image in black-and-white or gray scale. The former requires less time to scan and is considerably more forgiving about the picture you choose. It creates a very recognizable scan of a person's face, for example, even if it's not a close-up. The downside is that the image is comprised of areas that are strictly black or white. There are no shades of gray between the two. You can manually set the threshold level (the darkness level at which the software chooses to make a pixel black instead of white), which greatly alters the look of the scan. This high-contrast image is great for many things. If you plan to resize the image later in a program like geoPublish, it's the only way to go.

Gray-scale scans are created with a myriad of dots in patterns to create levels of gray. This sounds great in theory, but when it comes down to practice, there usually isn't sufficient contrast in the source image to give you a

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well-defined image. This isn't a flaw in the Video Digitizer, however; ComputerEyes does the same thing. A live video image from a video camera with good lighting to create sharp contrast can be scanned successfully this way. A video tape image, on the other hand, will usually wash out. Fortunately, it's a simple matter in Eddison to scan and rescan using various methods until you come up with an image you like. This is perhaps the single most impressive feature of the Video Digitizer system. You not only have the choice of repeating your scan quickly and easily, but you can also immediately use Eddison to alter each image to see if it fits the bill. This little unit, barely the size of a standard cartridge, is a joy to work with.

This is not to say that everything is perfect. Probably the biggest drawback to Video Digitizer is its price. The competition (now limited to VideoByte and its companion cartridge, VideoMate) retails for less than half Video Digitizer's price. Granted, Video Digitizer runs circles around VideoByte's converted multicolor images if you want a high-resolution scan and can justify the price.

Another major disappointment is Video Digitizer's documentation. Like VideoFox and other products in this line, the manuals for Digitizer and Eddison are poor translations of the original German, with sentences running from comical to unintelligible. A number of features are so poorly described that I was forced to give up when I couldn't figure them out by trial and error. Richard Ollins, president of RIO Computers, assures me that a new comprehensive set of manuals are available. With the new documentation, all the products in this line, including VideoFox, PageFox, and the new genlock that RIO plans to release, will be integrated into an impressive set of graphics and video tools for the 64.

If you're a "Star Trek" and a graphics fan like me and dream of using great pictures on your computer of Spock, the *Enterprise*, and maybe your brother, then Video Digitizer is worth the cost. I know I'll gladly earmark $250 for one when my strained budget allows. I've never been so sad as when I had to pack up this review unit of Video Digitizer and ship it back to the company.

STEVE VANDER ARK

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FEEDBACK

The 64's missing memory, loading the first file in a directory, and more

Why Only 39K?

If the 64 has 64K of memory, how come only 39K is available to BASIC programming?

A. MARIE
SAN ANTONIO, TX

At the heart of all personal computers is the microprocessor. In the 64, this processor is the 6510, a variation of the 6502 used in the Apple. One characteristic of this chip is that it can access only 64K of memory at a time.

If the designers of the 64 simply filled the computer with 64K of empty memory, the machine would be helpless. Computers need certain built-in programs to function. Don't confuse these built-in programs with the programs you write yourself or load from disk. The built-in programs are stored in special memory chips called ROM (Read Only Memory). Unlike other programs, they remain safe in their ROM memory chips even when power is turned off. The BASIC language itself is one of these programs. Another program is the computer's operating system, which performs housekeeping duties.

These internal programs need some of the 64K of space that the 6510 microprocessor chip can address. To make room for them, the 64 designers used some of the RAM area. That's why, when programming in BASIC, you have only 38,911 bytes of memory. The 25K of RAM that appear to be missing are taken up by the BASIC interpreter program, the operating system, and other things. The designers did make it possible, however, to switch off the 64's ROM, thus freeing the full 64K of RAM underneath.

Unfortunately, when you switch off BASIC and the operating system, you are left with what amounts to an unconscious computer. You must replace the operating system software with some of your own that takes care of the necessary housekeeping tasks. Since BASIC is gone, this replacement must be machine language. Therefore, the full 64K of RAM is available, but only to advanced programmers fluent in machine language.

Load Me First

I have a question about making a menu program the first one on a directory. I have a disk of files, and no matter how often I save the menu program, it doesn't come first in the listing. I want to be able to load the menu by simply typing *LOAD"*",8* and *RUN*. How do I do that?

T. AIGHT
BOSTON, MA

You can load the first program on a directory listing with LOAD"",8 only if you're loading a program for the first time. After that, that command will load the last program loaded. To load the first program any time, use LOAD "0:*",8. Now let's address the real question.*

To make any program the first program on the disk requires that the program that is currently first be replaced. Here's how to do it.

Place the disk you want to rearrange into the disk drive. Load and list the directory. Note the program at the top of the directory list. (Press Run/Stop if necessary to keep the list from scrolling off the screen.) This first program on the disk is the one you'll have to move to make room for your menu program.

Use the COPY command to duplicate the first program with another name, for example, OPEN 15,8,15, "COPY0: newname=oldname*": CLOSE 15.* Newname *is the name of the copy, and* oldname *is the name of the original.*

Once you've copied the program elsewhere on the disk, you can safely delete the original with the SCRATCH command: OPEN 15,8,15, "S0: oldname*": CLOSE 15. As before,* oldname *is the name of the original. Now you can use the RENAME command to change the new name back to the original. Its format is OPEN 15,8,15, "R0:* oldname =newname*": CLOSE 15. Now you have two possibilities. If your menu program is already on the disk, you can use the COPY command, which will move the menu to the front of the disk. If the menu program isn't already on the disk, insert a disk that contains the program and load it in. Replace that disk with the one you've been working with and save the menu program to it.*

If you've done everything right, your menu program should now be the first program on the disk. Test it by by entering LOAD"0:",8.*

Underlining

I have a 64, Cardco + G interface, Star SG10 printer, and WordPro 3 Plus word processor. I can't get my system to underline anything. All four products claim to support underlining, so please tell me what to do in this regard. I'm not that knowledgeable about BASIC programming or the equipment. My main desire is to use the equipment for word processing.

PENNY CAESAR
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Underlining from within a word processor, and making files impossible to load

ware are being used. Given three interfaces, five printers, and seven word processors, you could find 105 different ways to hook them up and possibly 105 different answers to the question of underlining. Unfortunately, we don't have access to much of the equipment or software mentioned, so it's difficult for us to find the specific answer.

There are three routes you could take: First, write or call the manufacturers of your printer, interface, and software. The worst that could happen is that you'd get no reply. If you bought your printer at a local Commodore dealer (very few of those, these days), someone at the store may be able to help.

Second, try contacting a local user group. You may find someone there who has similar equipment. Or perhaps someone with printer experience can help you find the answer through experimenting.

Third, check your printer manual for the codes that turn underlining on and off. In your case, the way to enable underlining should be ESC – 1, which means send an escape (ESC) character, a minus sign, and a CHR$(1). To disable underlining, you'd send ESC – 0. This is often called an escape sequence because you use the ESC character followed by a sequence of one or more other characters. The ASCII value of ESC is 27, and the ASCII value of the minus sign is 45. To test this, enter and run the following BASIC program.

```
10 OPEN 4,4
20 PRINT#4,CHR$(27); CHR$(45);
   CHR$(1);
30 PRINT$4,"THIS SHOULD BE
   UNDERLINED.";
40 PRINT#4,CHR$(27); CHR$(45);
   CHR$(0);
50 PRINT$4," AND THIS IS NOT."
60 PRINT#4:CLOSE 4
```

If the printer underlined the first sentence, but not the second, you have the proper codes.

If it didn't work, there could be several things wrong. Here's where it becomes a little complicated. You may have mistyped the program; check the spelling and punctuation. The interface may have intercepted the codes before they reached the printer. Escape sequences can sometimes be used to program interfaces as well as to set printer options. If you have such an interface, it may have seen the ESC and thought that it was intended to be an interface code and not a printer code. If that's the case, you'll have to send ESC twice. Usually, when a programmable interface receives two ESC codes, it sends the second one to the printer.

Another potential problem is that the DIP switches on the printer or interface might be in the wrong position. DIP switches control the way your interface or printer acts. These vary widely from brand to brand, so check the printer manual and the interface manual for guidance on the proper settings.

Finally, it may be that your printer needs a different escape sequence for underlining; again, it's necessary to check your manual.

Before you start experimenting with the word processor, try to underline from a BASIC program. When you know the proper escape sequence from BASIC, you'll be prepared to try it from the word processor.

Some word processors use printer files to keep track of various printer settings. When you place a generic underline command in the document, the proper escape sequence is sent when you print the document, providing you've previously loaded the correct printer file.

Other word processors require you to know the commands to enable or disable underlining and other features. You'll have to check the documentation for your word processor. If you need to use the commands, you'll have to define three format keys for CHR$(27), CHR$(0), and CHR$(1). Then, whenever you want to underline, place the defined key for 27, –, and the key for 1 in the text of your document.

Unloadable Files

I remember seeing a programming tip somewhere that protected files from being loaded by unauthorized people. It required a code to load. Do you know of such a way that I can protect my programs?

RAY FISHER
PALATKA, FL

There are a number of ways a programmer can "lock" his or her BASIC programs from prying eyes, but here's a simple way that won't force you to remember any exotic codes. Just remember the character string (CHR$) for a comma, which is CHR$(34).

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BEGINNER BASIC

Larry Cotton

NONREPEATING NUMBERS RETURN

Readers respond with their own programs to generate 52 nonrepeating random numbers.

Last November, I challenged you to submit programs that would generate nonrepeating random numbers in either BASIC or machine language. Thank you for your responses. Appropriately, all of the responses were in BASIC. (I'd hoped for a few ML versions, but I suppose mine couldn't be improved. In my dreams!)

The object was to compare BASIC and ML speed by generating 52 nonrepeating numbers, such as you get when shuffling a deck of cards.

And the winner is Howard Monroe. (I'm sorry, Howard. I misplaced your envelope, so I don't know where you live.) Here's Howard's program.

```
5 PRINT"(CLR)(DOWN)PRESS
  ANY KEY TO RANDOMIZE 52
  NUMBERS"
6 PRINT"WITHOUT
  REPEATS.":PRINT
7 GETA$:IFA$=""THEN7
10 C=52:Q=RND(-TI/101)
20 DIM R(C),X(C)
25 REM INITIALIZE THE DECK
30 FORI=1TOC:X(I)=I:NEXTI
35 REM GENERATE 52 RANDOM
  NUMBERS BETWEEN 1 AND 52
  INCLUSIVE
40 FORI=1TOC:R(I)=INT(C*RND(1))
  +1:NEXTI
45 REM GENERATE THE RANDOM
  PERMUTATION
50 FORI=1TOC:A=R(I):B=X(I):
  X(I)=X(A):X(A)=B:NEXTI
60 FORI=1TOC
70 PRINT X(I),
80 NEXTI
90 PRINT:PRINT:PRINT"AGAIN?
  (Y=YES, N=NO)":PRINT
100 GETA$:IFA$<>"Y"THENIF
  A$<>"N"THEN100
110 IFA$="N"THENEND
120 GOTO40
```

Howard points out that the important lines are 10–50 and that in reshuffling the "deck," it's important to branch back to line 40, not line 30.

His program is unique in that the time it takes to generate the 52 numbers is virtually the same each time the program runs. This is not so of my primitive version or of any of the other submissions that rely on IF-THEN statements to test the random numbers.

Howard's program requires only 118 jiffies (I'll explain this term in a moment) to generate the 52 numbers. To time how long a routine takes, add a line like this where you want the timer to start.

```
1 TI$="000000"
```

A clock, based on the 64's CPU clock, measures time in jiffies (about 1/60 second). The jiffy clock can be set to 0 with a line like that above. From then on, that clock runs frantically until it's reset.

If you'd like to see the jiffy clock in action, just type *PRINT TI* in immediate (nonprogram) mode and press Return. Do this a few times and watch as the jiffies fly by. In program mode, you would add a line number to the command, such as *55 PRINT TI*.

The clock is set to 0 in line 1, and line 55 prints the number of jiffies that have elapsed since then. Everything that happens between line 1 and line 55 is timed in jiffies.

But I digress. My November program often took 4700 or more jiffies to generate the 52 numbers. Howard's speed-enhanced version blew mine away by a factor of almost 40. All other programs submitted beat mine by factors of 2–15. My next challenge was to see if I could squeeze any more speed out of Howard's program. Yes, I could—but not much. First, I changed his random statement in line 40.

```
40 FORI=1TOC:R(I)=INT
  (C*RND(.))+1: NEXT
```

The number inside the parentheses that follows RND can be anything, so I made it 0. Actually, by substituting a period for the numeral 0, it works even faster. This shaved 18 jiffies off Howard's time. Then I combined the last two FOR-NEXT loops into one and dropped the I variable. This eliminated a calculation and shaved another 14 jiffies.

I tried using DEF FN to define the RND function, but that actually slowed down the program. I also tried making the 1 in line 40 a constant; that didn't help either. So here's the speed-enhanced version. It times everything up to the actual printing of the numbers and also rudely strips away the program's user-friendliness.

```
10 TI$="000000"
20 PRINTCHR$(147)
30 C=52:Q=RND(-TI/101)
40 DIMR(C),X(C)
50 FORI=1TOC:X(I)=I:NEXT
60 FORI=1TOC:A=INT(C*
  RND(.))+1:B=X(I):X(I)=X(A);
  X(A)=B:NEXT
70 PRINTTI:PRINT
80 FORI=1TOC
90 PRINTX(I),
100 NEXT
```

An elegant (albeit slower) version by David Zammat of Summit, New Jersey, tests whether each new integer generated has been used previously. If it hasn't, the program prints it and generates another one. I received several variants of this program

```
10 D=52:DIM U(D)
20 FOR C=1 TO D
30 N=INT(D*RND(1))+1
40IFU(N)=0THENU(N)=1:PRINTN;:
  NEXT:END
50 GOTO 30
```

Again, thanks, Howard, David, and all the others for your input. I'll try to offer another challenge before long. ❐

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MACHINE LANGUAGE

Jim Butterfield

ARRAYS

Create an array in BASIC and modify it with machine language.

If you create an array in BASIC, that array can be used or modified by machine language programs. The start-of-arrays pointer tells where to find the first array. Using the pointer, the ML program looks for the array it wants and then goes for the data.

The first two bytes of an array give its name. The next two bytes give the array's size, which enables a program to leap ahead to the next array if desired. The fifth byte contains the number of dimensions. Following that, each dimension has a two-byte number that shows its size (including the 0 element). Thus, a one-dimensional array has seven bytes of header material, after which the data is stored. Integer arrays—which we'll use in our sample program—store each value in two bytes.

The start-of-arrays pointer may be found at addresses $2F and $30 on the VIC-20, Plus-4, and 64. The 128 sites the pointer at $31 and $32—but be careful, the values themselves are stored in bank 1.

Let's take a look at a sample program that uses BASIC to set up an integer array. We'll then ask a machine language program to calculate a Fibonacci series and place it in that array. A Fibonacci series starts with values 1 and 1 (or 0 and 1, if you like). Each new value is the sum of the two previous values. The series goes 1, 1, 2, 3, 5, 8, 13, and so on.

Our BASIC program creates only one array. To keep our program small, we won't check the array name, but we will check its size, since the calculated values should not overrun the array area.

The code starts by copying the start-of-arrays pointer into a work pointer at $22 and $23.

```
033C: LDA $2F: STA $22: LDA $30
:STA $23
```

Next, we extract the size of the array and add it to the array address. That gives us the address of the next array, the end of this one. We'll store it at $03C0/1.

```
LDY #$02: CLC: LDA ($22),Y: ADC
$22: STA $03C0
INY: LDA ($22),Y: ADC $23: STA
$03C1
```

Skip seven bytes to get past the header data.

```
LDA $22: ADC #$07: STA $22: BCC
$0360: INC $23
```

The array initially contains all 0s. Reaching beyond element 0, we'll change element 1 to a value of 1.

```
0360: LDY #$03: LDA #$01: STA
($22),Y
```

Now the program proceeds to set up a second pointer, with a value of the first pointer plus 2. These two pointers will reference adjacent values in the array.

```
CLC: LDA $22: LDY $23
ADC #$02: STA $24: BCC $0372:
INY
0372: STY $25
```

Here comes our main loop in the program. We add together the two pointed-at values and put the result temporarily on the stack.

```
0374: LDY #$01: CLC: LDA
($22),Y: ADC ($24),Y: PHA
DEY: LDA ($22),Y: ADC ($24),Y:
PHA
```

Now we bump the pointers to the next set of values.

```
CLC: LDA $24: LDY $25: STA $22:
STY $23
ADC #$02: BCC $0390: INY
0390: STA $24: STY $25
```

If we have moved beyond the array's end, we'll exit.

```
CMP $03C0: TYA: SBC $03C1: BCS
$03A9
```

Otherwise, we bring back the value from the stack and store it in the new array location. Then we loop back.

```
LDY #$00: PLA: STA ($24),Y
INY: PLA: STA ($24),Y
CLC: BCC $0374
```

If it's time to exit, we must remember to remove the two unwanted bytes from the stack.

```
03A9: PLA: PLA: RTS
```

You may change the size of the array as defined by the DIM statement in the BASIC program, but integer arrays can't hold a value greater than 32,767.

Don't forget that BASIC can move arrays to a new location to make room for new variables. Always work from the start-of-arrays pointer; its value may have changed since you last used it.

```
EG 80 PRINT "(64 ONLY) M/L ARR
      AY ACCESS"
XK 90 DIM A%(20)
EM 100 DATA 165,47,133,34,165,
      48,133,35,160,2,24,177,
      34,101,34
HE 110 DATA 141,192,3,200,177,
      34,101,35,141,193,3,165
      ,34,105,7
AA 120 DATA 133,34,144,2,230,3
      5,160,3,169,1,145,34,24
      ,165,34
XC 130 DATA 164,35,105,2,133,3
      6,144,1,200,132,37,160,
      1,24
CE 140 DATA 177,34,113,36,72,1
      36,177,34,113,36,72,24,
      165,36,164,37
SH 150 DATA 133,34,132,35,105,
      2,144,1,200,133,36,132,
      37
DK 160 DATA 205,192,3,152,237,
      193,3,176,12,160,0,104,
      145,36,200,104
MJ 170 DATA 145,36,24,144,203,
      104,104,96
PH 200 FOR J=828 TO 939
EJ 210 READ X:T=T+X
BP 220 POKE J,X
AE 230 NEXT J
PC 240 IF T<>10638 THEN STOP
GF 300 SYS 828
SB 310 FOR J=1 TO 20
MS 320 PRINT A%(J);
PP 330 NEXT J
```


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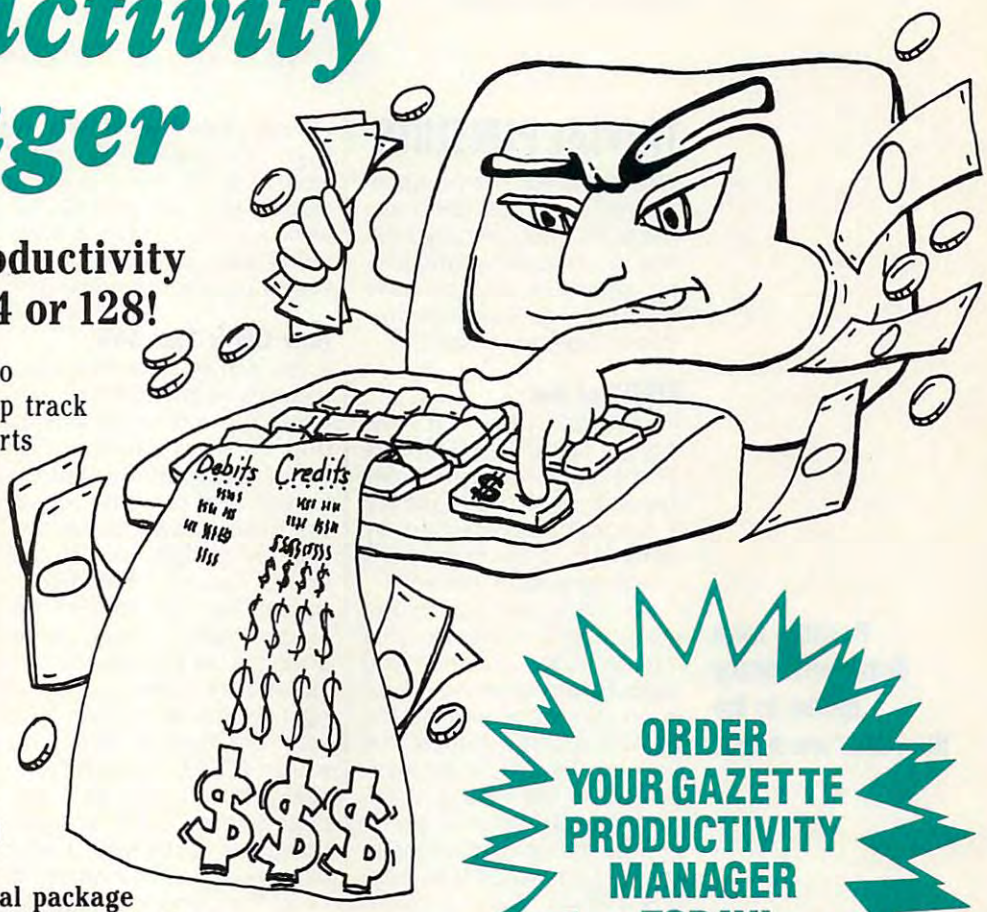

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PROGRAMMER'S PAGE

Randy Thompson

TRIVIAL PURSUITS

Believe it or not, the 64 is over ten years old, the 128 a mature eight. That's almost a lifetime in computer years. During this tenure, hackers have found many quirks in these machines. Here are a few.

Hackers have discovered many quirks in the 64—here are a few.

READY or Not

In the old days, it was thought that the *OUT OF DATA* message that spuriously appears when you're editing a program was caused by some bug in the computer's operating system. Not so.

As many alert programmers might observe, this message occurs when you press Return while the cursor is on the same line as the *READY* prompt. Notice that the word *READY* can be interpreted as the BASIC statement *READY*, which is exactly what the computer tries to do: read information from a data statement. If your program doesn't have any data statements, the computer replies with the cryptic but correct *OUT OF DATA ERROR*. If your program does contain data, your computer reads the value into Y and then responds with a more reasonable sounding *SYNTAX ERROR*, because the period (.) that follows *READY* is not a valid BASIC command.

Another common typing mistake is to type the command *RUN* on top of the *READY* prompt. This produces the word *RUNDY*, which your computer rarely accepts. In most cases, your computer complains with an *UNDEF'D STATEMENT* error because it cannot interpret the characters DY as a valid line number. However, whenever the BASIC interpreter is unable to find a line number, it tries to jump to line number 0. So by starting all your programs with line 0, you can enter *RUNDY*—or *RUNIT*, or *RUNNY*, or even *RUNAWAY*—to start your program. For the same reason, you can enter *GOTO* without a line number or even *GOTOJAIL* or *GOTOGO* to start a program from line 0.

How Old Is Your 64?

If you own an early-model 64, then you've probably encountered the infamous lockup bug. To see if you're one of these lucky people (I am!), turn on your computer, move the cursor down to the last line, and hold down the space bar until the cursor passes the right edge of the screen twice. Next, hold down the Del key until the cursor moves back to the far right column. If you own a 64 with the lockup bug, the words *LOAD*, *?SYNTAX ERROR*, *READY*, and *RUN* appear on the screen, and the computer locks up. If you have a program in memory, it runs. The cursor continues to flash, but the computer ignores your keypresses, even Run/Stop–Restore.

If you own a Datasette (remember them?), you can defeat the bug by simultaneously pressing the left Shift key and 3, or X and 5, or V and 7, and so on (every other key from left to right on the top and bottom rows). The screen will display *PRESS PLAY ON TAPE*. Press Play on the Datasette and then Run/Stop. Your computer will return to normal. Disk drive owners can avoid the bug if the first line in the program in memory is OPEN 15,8,15:INPUT#15,S$:CLOSE 15.

Interestingly, the lockup bug will occur only when your cursor color is red, cyan, blue, yellow, light red, dark gray, light blue, or light gray. Safe colors are black, white, purple, green, orange, brown, medium gray, and light green.

Beyond the Call of Duty

Although the widest Commodore screen is 80 characters, the number used in a TAB( ) function can be as large as 255. For example, on a 40-column screen you can use PRINT TAB(240) to move the cursor down six lines. Any number greater than 255 results in an *ILLEGAL QUANTITY* error.

As with the TAB( ) function, the ON *X* GOTO statement can't handle numbers greater than 255. This is contrary to early Commodore documentation, which states that negative numbers and numbers greater than 255 cause the 64 to fall through to the next program line. Negative numbers and numbers greater than 255 both produce *ILLEGAL QUANTITY* errors.

Keyboard Confusion

Plug a joystick into port 1, turn on your computer, play with the joystick, and watch your computer screen fill with seemingly random characters. This happens because the joystick port shares the same CIA chip and I/O lines as the keyboard.

If you're short a joystick and need to emulate one, try these alternatives. For example, just as pressing the joystick's fire button produces a space, hitting the space bar makes a program think that you've pressed the joystick's fire button. To simulate joystick up, press 1; joystick down, press back arrow (←); joystick left, press Ctrl; and joystick right, press 2.

Send your programming tips (or trivia) to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We pay $25–$50 for each tip that we publish in this column. ❐

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GEOS

Steve Vander Ark

MORE GREAT GEOS GOODIES

Last month I talked about some of the latest GEOS shareware/public domain programs on QuantumLink, but Q-Link isn't the only place to find GEOS applications. You can find some great programs in other GEOS collections.

These are disks that contain a number of GEOS files. You'll find a wide variety of goodies, from utilities and applications to clip art files and fonts. Some of the programs and fonts I use most often came on a collection disk. Here are some sources.

Try these disk collections for some great GEOS finds.

GEOS Powerpack

GEOS Powerpack, Powerpack II, and GEOS Companion are collections released by *RUN* magazine. The disks are still available, and they're probably the best GEOS collections ever released. You'll want to get all three.

Powerpack includes such gems as Write Hand Man, a writing and pattern analyzer, and PaintView II, a geoPaint viewer which includes an option to save part of a geoPaint file as a Doodle file. There's a card file database as well as Thumbnail, a utility that creates miniature versions of geoPaint documents to be used as clip art or printed by the page full for reference copies of your collection. There's also a version of Breakout for GEOS. The fonts, particularly those by Susan Lamb, and the scanned, high-quality clip art images are spectacular.

Powerpack II contains the updated version of geoTerm for the 64 and 128, games, and a simple word processor, which imports and converts text files in ASCII. An interesting utility on the disk creates a stand-alone documentation file from a geoWrite document. Unfortunately, all the documentation for the programs is included in that form on the disk itself, leaving little space for clip art files and fonts.

The GEOS Companion disk boasts a music editor and an animation program, as well as a 1581 boot disk creator and other excellent utilities, including a batch loader. There are more fonts, including one of my personal favorites, Smith Corona (regular and megafont versions), and still more clip art files. Thankfully, this disk has a separate manual instead of on-disk documentation files.

As of this writing, these disks are available from Tech Media, Special Products, P.O. Box 2151, Salisbury, Maryland 21802. You can order by calling (800) 824-5499. The two Powerpack disks are $19.97 each; GEOS Companion is $24.97. Add $3.95 shipping and handling to each order, not each disk.

Collette Utilities

Jim Collette is so well known and admired for his GEOS programming that Creative Micro Designs figures that his name on a disk is enough to get folks to buy this collection of his better utilities. This is CMD's most recent GEOS release. Included are updated versions of some of the finest GEOS programs ever written: geoWizard and the premier font creator, Font Edit. Also included are Mini-Desk, one of the more useful desk accessories; a utility which automatically places the current photo scrap into the first photo album on the disk; a set of PostScript utilities for laser printing; and a DOS wedge. As always, Jim's programs are user-friendly and user-proof. The $34.95 price is ridiculously inexpensive for these quality programs. You can order the collection from Creative Micro Designs, P.O. Box 646, East Longmeadow, Massachusetts 01028. To place an order call (800) 638-3263.

GeoPowerTools

The folks who publish Lodestar, the magazine on a disk for the Commodore, offer a collection of utilities by Scott Resh, a talented GEOS programmer. PowerTools includes several photo albums of excellent clip art and a number of fonts. For sheer number of files for your dollar, you can't beat this disk of 21 utility programs and games. You'll find BASIC 8-to-Amiga format conversion programs, directory and sector editors, a program which prints the contents of the Date Book that your GEOS Calendar uses, a nifty desk accessory that turns any part of the visible screen into a photo scrap, a fast formatter, a SID music player, and a utility that prints multiple copies of a geoPaint document. You can get this collection from Softdisk, P.O. Box 30008, Shreveport, Louisiana 71130. Or order by calling (800) 831-2694. The price is $9.95 plus $4.50 shipping and handling.

COMPUTE's GEOS Collection

COMPUTE also has a collection of GEOS programs, selected from the Gazette section of COMPUTE magazine. Included on this disk are a couple of nifty games—I like Skeet, myself—and utilities such as a word counter for geoWrite, a screen dumper, and a help file creator. The disk also includes a nice multidensity printer driver for Epson-compatible printers. This collection is available for $13.95 (shipping and handling included) from COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. ❐

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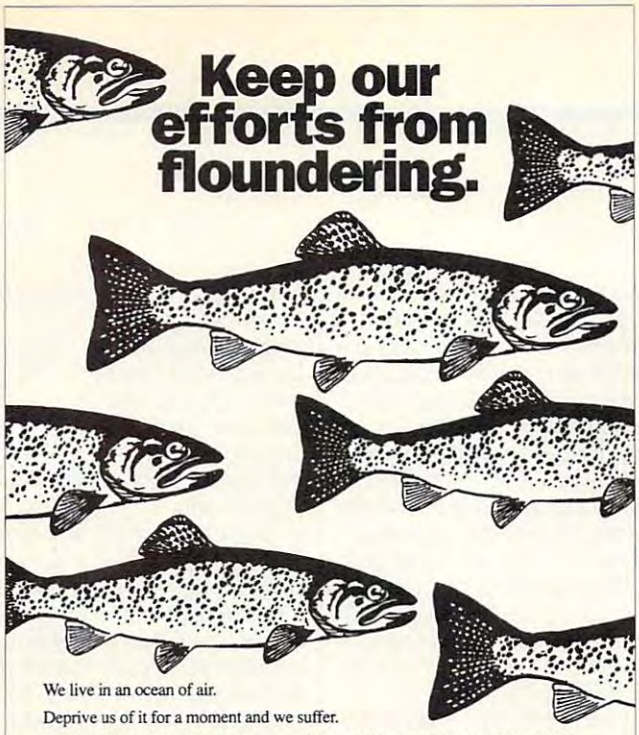

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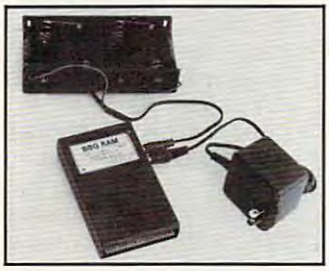

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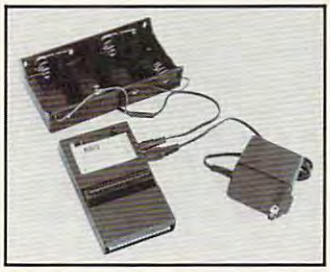

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D'IVERSIONS

Fred D'Ignazio

WHEN TELEVISION GOES DIGITAL

I opened the *Wall Street Journal* today, and a story jumped out at me. It described how TCI—Tele-Communications Incorporated—may soon offer 500 TV channels to its 11 million cable viewers. TCI is the nation's largest cable TV operator. It's now allying itself with two other cross-industry heavyweights, AT & T and General Instrument Corporation, to upgrade its analog cable system to a digital network. This new network, according to the *Journal,* will "open the gates for a vast sea of entertainment and information options for cable subscribers."

Imagine the TV-zapping cowboy in your family with a remote that accesses 1500 channels.

The conversion to digital is possible because of advances in video and sound compression. Complex mathematical algorithms hard-wired into special-purpose (digital signal processor) computers in TV programmers' studios will shrink a TV signal to one-tenth of its normal size. This will allow cable to carry ten times today's 50 or 60 channels. All this is possible without converting the standard coaxial cable to the more expensive fiber optic cable. As fiber optic cables replace coax, however, we'll see another threefold jump in cable capacity.

Backyard satellite-dish owners will see 30 to 50 new digital TV channels on their TV sets by next summer. The rest of us will come online sometime in 1994. Once the system is up and running, it's expected to carry 500 cable channels simultaneously. And if your local cable uses fiber optics, you might be seeing up to 1500 channels!

Does this sound like overchoice, or what? Can you imagine the TV-zapping cowboy in your family with a remote that accesses 1500 channels? It boggles the imagination! The average zap lasts about 1.4 seconds, so just completing a circuit around the cable racetrack would take a mind-numbing 30 minutes. That's 30 minutes filled with random, nonsequential video and sound bites, brought to you compliments of your zippy zapper. Most TV shows would be over by then, so if your brain isn't reduced to sludge, you can blast off into another button-pushing blitzkrieg that will last another half an hour.

Fortunately, the move to digital cable will result not only in more channels but also in a fundamental redefinition of the word TV. Fifteen hundred passive couch-potato channels offering video pabulum may sound like torture, but that's only if your resident zapper forces you to sit through an orgy of channel-hopping.

A more sane way to approach this new deluge of programs is to think of TV in a new way—not as disjointed programs, but as a multimedia library or bookstore. The key to this way of thinking will be offered to you at the time your TV is hooked up. It'll be in the form of a tiny black box that according to one cable-industry official "will be the most powerful piece of electronics technology" in your home. This box will feature the most advanced multimedia computer chips and programs on the market. The box won't look like a computer, so no one will panic. But it'll turn your TV into a computer monitor and your zapper into a tiny computer keyboard.

The transformation of TV to computer will happen just in time. Instead of randomly hopping through a confusing flood of 1500 programs, you'll have brightly colored computer menus that will allow you to pluck a single program out of the vast sea of choices. The menus will gently quide you (much like a good librarian) into narrowing your selections. Do you want entertainment or news? Do you want a first-run sitcom or an oldie but goody? Do you want nature, history, mystery, or trash? The choice is up to you.

Don't think of TV any more as TV. Think of it as your own private bookstore that houses thousands of titles. (At 1500 titles an hour, your "bookstore" will offer 6000 titles in a single evening of browsing.) Your bookstore isn't a standard print emporium but an electronic multimedia bookstore with books that spring to life when you open them; books that spill over with real people; and books that talk to you, play music, and captivate you with lifelike scenes of drama, suspense, murder, and intrigue. You can browse through all these myriad titles by casually pointing and clicking on menu buttons that group the books into topics such as fiction, nonfiction, biography, current events, animals, horror, and science fiction.

And, remember, this is not a commercial bookstore that you are visiting. It is *your* bookstore, so you can pick up a book, mark a page, set the book down, and ramble off to a different book or a whole new aisle. Later on, you can continue browsing where you left off. Or you can click on your VCR and make "photocopies" so you can review the books at your leisure. Or, you can place requests to the cable operators, and they will reprogram a channel and ship you just the books that you want to see again.

You'll get all this for only a small fee—or maybe a large fee. It'll be worth it. And it'll be a blissful break from the mad TV zapper who is prowling around the TV room of almost every American family. ❐

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MAILING LIST

By Maurice Yanney

If you want to keep track of names, addresses, birthdays, and other information, you'll find Mailing List a flexible and useful program. You can easily store information for up to 500 people pertaining to names, addresses, phone numbers, or whatever else you desire.

Once the data is entered, it can be retrieved based on any of the fields. You can also print labels in any desired order by activating some or all of the fields.

Typing It In

Mailing List is written entirely in machine language, but it loads and runs like a BASIC program. To type it in, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts you, respond with the following values.

Starting address: 0801
Ending address: 2238

Be sure to save a copy of the program before exiting MLX.

Using Mailing List

When you begin Mailing List for the first time or start from a new disk, the program will create files to hold data and information on which records are available and which are occupied. So use a disk that has plenty of room on it. Once the files have been created, the program will look for a setup file and, if one exists, load it.

At the top of the screen are three pull-down menus: System, Printer, and Record. On the right side of the screen are five other options called buttons. The main part of the screen displays the names of all the fields and the information contained in those fields for a particular record.

To select an item, move the arrow-shaped cursor with a joystick, mouse, or cursor keys. When the cursor is over a particular item, it will be highlighted. Press the fire button, mouse button, or space bar to select an item.

To select one of the data fields, position the cursor over either the name of the field or the text area for that field. (Some fields are larger than others and thus have a larger area from which the field may be selected).

When one of the pull-down menus is selected, a menu containing five entries appears underneath. To choose one of the options from the menu, move the cursor to the desired option, highlight it, and press either the button or space bar. Moving the cursor out of the menu area will remove the pull-down menu.

Editing Data

To edit any of the fields, just move the cursor over either the field label or the text area and press the button or space bar. Once the field is selected, the arrow will disappear. The Home key positions to the start of the field, the Insert key will insert a character, and the Delete key removes the character under the cursor. The cursor keys can also move the cursor left and right. While editing a field, the Run/Stop key can be used to cancel the edit. Run/Stop also restores the field to the previous text in addition to exiting the current edit.

Adding Data

You can enter data by moving to a field, pressing the space bar or button, typing the desired text, and pressing Return. This approach is tedious and suited only for editing a few fields of a particular record. When adding several records, switch to the Add mode.

To enter Add mode, move the cursor to the right of the screen and click the Mode button. The mode will switch from Edit to Add, and the First Name field will now be selected. Proceed to enter the data. To leave any field blank, just press Return.

When you press Return on the last field (Ind 2), the record is written to disk, and the program advances to the next available record position. Note that the Rec # indicator is updated and the First Name field is selected.

Continue this process until you no longer wish to add records. To stop entering data, press the Run/Stop key. This will switch the mode back to Edit and return the arrow cursor. If any of the fields have data when the Run/Stop key is pressed, the data will not be stored unless the Write button is selected. When all 500 record positions are filled, you'll get a message telling you that no space is available.

While in Add mode, data in the fields remains preserved. If you notice a mistake after you've moved to a new field, press the Run/Stop key, which sets the mode to Edit and returns the cursor to the first field. Make the changes, set the mode back to Add, and continue entering data.

System Options

To change screen and cursor colors, use the System pull-down menu at the top of the screen. Highlight the desired option and then press either the space bar or fire button. Moving the cursor outside the menu box will remove the pull-down menu.

Once one of these options has been selected, the bottom portion of the screen will display an arrow pointing to the current value. Move the cursor left or right and press either the button or space bar to select the setting.

Printer Options

The options in the Printer menu are selected in the same fashion as those of the System. The printer options let you customize your printed labels. You can save the setup, load the setup, reset the default values, set the printer format, and print records.

The first three options are used to save, get, and reset the format that the labels are printed in as well as to save, get, and reset the system options. When the Save Setup option is selected, the current settings for the printer, screen colors, and cursor speed are stored in a file. If the file exists, it will be overridden. Load Setup will retrieve prior saved settings. Setting the default will reset the values to what they were the first time the program was run.

When the option to set the printer is selected, a new screen appears. Use this screen to set the printer device number, the printer secondary address, and the label format. To select a particular item, move the cursor to the desired item and then press the space bar or fire button.

Once an item has been selected, the cursor will change to either a minus, a vertical bar, or a plus. The new cursor signifies the direction the cursor keys, joystick, or mouse can be

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moved to change the selected item. When the item is a number (such as the printer device number), moving up increases the value by one; moving down increases the value by ten.

If the item is one of the label fields, then the cursor will be either a minus or a plus. Moving left or right will go through the various fields, which are abbreviated by three characters: First Name (FST), Middle Name (MID), Last Name (LST); Address Line 1 (LN1), Address Line 2 (LN2), City (CTY), State (STA), Zip Code (ZIP), Phone Number (PHN), Other Information 1 (OT1), Other Information 2 (OT2), Indicator 1 (IN1), and Indicator 2 (IN2).

There is also a Numbers option for sending special ASCII codes and a series of spaces to separate items. (This does not result in any output to the printer. It is used to help improve screen readability.) This option is a number between 0 and 255. Moving the cursor left or right will change the selection. Moving it up will change the value by 1, and down will change the number by 10. (A value of 65, for example, would send a lowercase *a* to the printer.) Some special numbers to keep in mind are 10 (linefeed), 13 (carriage return), 27 (escape), 32 (space), and 44 (comma).

Once the desired option appears, press the fire button or space bar to select the item. When you've finished making changes to the printer, move the cursor to the Done option.

Mailing List is designed to be flexible. This means that carriage returns at the end of each line and spaces between the fields need to be explicitly specified. This is the default setting. Most labels require six lines. So if you will be printing many labels, make sure that there are exactly six carriage returns per label, or else they may not print properly. Care must be taken in setting the fields so as not to exceed the label width, since the program does not restrict the line width.

When the option to print the records is selected from the Printer menu, the bottom of the screen will display two choices. You can either print the current record or multiple records by selecting the Based-On-Get option. This second option works in one of two ways, depending on the Get mode. If the Get mode is Seq (sequential), then all the records starting with the current record will be printed. If the mode is Patt (pattern), then all records matching the selected Get pattern will be printed. The printing can be stopped by pressing the Run/Stop key, letting you abort or continue printing.

Customizing the Setup

Once the printer and screen settings are to your liking, save the setup under the Printer menu. The next time Mailing List is started, the setup file will be loaded, and your favorite colors, cursor speed, and label format will automatically be set.

Record Options

The Record options at the top of the screen are used to go to the next and prior records, set the Get condition, count the number of records, or delete the current record.

The Next and Previous Record option will obtain the next or the prior record. If the Get mode is set to sequential, then the next occupied record or the prior occupied record is retrieved. If the Get mode is set to retrieve based on the pattern, then the next record meeting the Get option or the previous record meeting the requirements of the Get option is retrieved.

To set the Get condition, a new screen is displayed. The screen contains three items which can be modified: Get Option, Get Operation, and Get String. Cursor to the desired option and press either the space bar or the button.

When Get Option is selected, the cursor changes to a minus. Moving left or right changes the current field. Any of the data fields can be used in adjusting how records are retrieved. Once the desired field has been reached, press the button or the space bar to make the selection.

The Get Operation has three alternatives: less, equal, and greater. To change the condition, move the cursor beneath the field, press the space bar or button, and then move left or right to the desired operator. Once again, press the space bar or button to make the selection.

The Get String is the string that the Get Option field is compared to. This option is selected by moving underneath the field and pressing the space bar or button. Once it is selected, enter the string and press Return when finished.

Move the cursor to Done and press the space bar or button to return to the main screen. The Get Option, Get Operation, and Get String will be displayed at the top of the screen.

The Get mode is useful when looking for records meeting a specific condition or for printing records matching a particular requirement. Note that although the Get condition may be set, the mode must be set to pattern (via the Get button) to take affect. If the mode is sequential, then retrieval of the records will be sequential regardless of how the Get condition is set.

If, for example, you want to print out all the names of people in the state of North Carolina, set the Get Option to STA, set the Get Operator to equal (=) and make the Get String NC. Set the Get mode to pattern, go to the Printer menu and select the Print Records entry, and then print on the Based-On-Get option.

Other uses of Get involve using the Indicator 1 and Indicator 2 fields. They can be used to keep track of people on certain lists such as Christmas card lists. Each Christmas just print out the records where IND1 = Y, or however you want to set it.

The Count Records option displays the number of records stored. To delete a record, first go to the proper record number and then select the Delete Record option. The record will still be displayed on the screen as a safeguard, but it will be marked as removed on the disk. If you change your mind after deleting the record, press the Write button while the information is still onscreen.

Buttons

The buttons are options that appear on the right side of the screen. A button is selected by moving the cursor to the item and pressing the space bar or fire button.

There are buttons to select a specific record number, set mode to Add or Edit, set the Get retrieval to sequential or pattern, Write a record, and Clear data from the screen.

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Once the Record Number is selected, you must then input a number between 1 and 500. If the selected record number has data, that data will be retrieved and displayed. If no record exists, the record number is updated, and the data fields are cleared on the screen.

The Mode button toggles between Add and Edit. Its use is discussed in adding and editing records.

The Get button toggles the retrieval method to either sequential or pattern mode. Sequential mode is used when records will be retrieved sequentially while pattern mode indicates that retrieval will be based on the settings of the Get condition.

The Write button writes the contents currently displayed on the screen to the current record number. If, for example, you want to update the phone number of a friend, first select the proper record number, make the change, and then press the Write button. If the Write button is not pressed, any changes will be aborted.

The Clear button clears all the data displayed on the screen for a particular record. The data is not erased from the record on disk.

MAILING LIST

```
0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 20 96
0811:20 20 20 20 20 A0 C4 B9 06
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 FF 85 2D A9 2A 85 E9
0839:2E 4C 00 01 1B E6 03 FF FD
0841:2A AD 20 B9 6E 09 99 E8 25
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 FC 65 A6 85 F7 58
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0F 20 34 CF
08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8
0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C 0E 08 A4 A8 F0 59
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 42
0959:A9 F0 0A B1 F7 C6 FD C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 0C 08 75
0971:0A 00 9E 20 32 30 36 32 4F
0979:00 00 00 E7 FA 0F 82 A5 C8
0981:BA 81 D2 90 07 C9 0C B0 DC
0989:03 8D 79 85 9B 51 08 7A B4
0991:1B 20 76 1C B6 3E 03 60 DE
0999:70 46 11 29 19 70 E1 14 8C
09A1:1F 19 0A D6 CD FD 02 A3 46
09A9:13 40 58 2A AE 13 A8 E4 FA
09B1:01 28 99 98 97 3C C0 A8 E2
09B9:28 0E F9 1A 47 08 86 CA 76
09C1:80 61 25 F2 00 C0 D1 07 ED
09C9:D0 78 0C 3E 30 2E 00 37 39
09D1:0A CA AC A9 15 42 E9 67 B8
09D9:88 EF 0C 1C 5E 15 0C 7B 4A
09E1:F0 F0 05 AE C0 2A D9 38 CE
09E9:99 0B D2 78 B8 2A C6 1E 87
09F1:5A 09 19 A7 12 3E 9C 84 58
09F9:0D AE 0A BB 1F 16 1E 80 49
0A01:C0 67 10 0C 60 D7 20 EE A3
0A09:1E 44 46 04 C3 50 C8 35 6C
0A11:A0 07 A8 A6 05 1C 86 C2 1F
0A19:AD A0 08 41 99 06 E4 30 20
0A21:14 6A 0D A0 0B 8A 21 07 51
0A29:87 A1 30 6B 10 86 00 23 E3
0A31:86 08 41 18 0A B1 06 A0 F7
0A39:0D C5 90 09 C3 50 78 35 6D
0A41:A0 0E 20 0B 48 06 0A 61 AD
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0A51:C9 0B 04 67 28 AC 1A A0 CC
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0A61:A0 12 A0 18 32 08 0B A2 4A
0A69:8C 53 83 A0 71 EC 15 06 82
0A71:0E 61 8C 68 18 0A 48 60 D6
0A79:0F D0 09 A2 8D A9 31 A0 AA
0A81:68 38 F8 23 C9 11 09 DA A8
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0A91:6E 3D 23 96 22 34 16 00 08
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0AA9:06 4B A3 46 0E E9 07 AD 40
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0AC9:0C 28 3C 79 F0 09 26 20 25
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0AD9:09 0A 55 60 B0 20 30 7C 88
0AE1:8A E7 02 85 47 4B 81 58 90
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0B11:84 C9 14 8A A9 05 1B 40 DE
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0C39:A7 27 01 4C 1A 0C 01 01 D7
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0C59:CD 41 C8 0E 66 83 28 28 5C
0C61:7E 28 99 00 00 98 A2 00 9D
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0D11:70 F0 B2 14 30 6E 0F 18 A8
0D19:56 17 0C FE 03 41 00 3B ED
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0D29:15 39 0B A2 F6 AD 43 4D E9
0D31:40 CD 01 60 32 E0 AE A1 19
0D39:84 0A 2B A4 00 18 60 7D 66
0D41:8D C2 34 80 D6 03 AC 67 E4
0D49:C8 8C 80 3A 8A 03 18 6D 9C
0D51:B2 AA AC A0 06 BD E9 20 2A
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0D81:81 80 B7 60 74 CC F2 D0 07
0D89:F3 F7 11 EC CF 47 E7 CE C6
0D91:47 DF 4C B0 0D B9 A3 30 A2
0D99:DD C4 30 90 D7 F0 02 B0 1A
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0DE9:4A 3E 60 20 10 0E F3 A9 11
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0E01:A4 80 8F AB 4F 6D 31 0C DA
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0E11:07 39 28 F0 19 50 43 21 C4
0E19:AD C1 51 71 8A E7 28 C0 C2
0E21:38 80 F0 D0 B1 4C DF 0E 31
0E29:55 94 85 1C 64 C2 30 55 6B
0E31:CE 80 08 39 14 D4 E8 14 43
0E39:24 34 42 A9 16 B6 04 11 FB
0E41:18 04 00 8C D0 08 03 10 EF
0E49:94 05 22 86 B9 0D 71 89 0C
0E51:63 01 20 36 F8 0C E6 A9 36
0E59:9E 5C 47 86 43 4C 0B 0F 9D
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0E79:01 08 C1 8C DF 28 41 7E B9
0E81:8E C3 0E D4 E0 00 88 86 83
0E89:39 DC 77 0F 09 06 8D C0 95
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0EA9:F0 16 B6 78 A1 36 0B 8F AD
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0EB9:94 A1 34 8E 8F 0A 4C C9 FE
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0EC9:94 2E E3 80 4C D8 0F BD E1
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0ED9:01 2D 05 30 1D AE BE 5B E1
0EE1:CA 04 48 D0 CC BC 94 22 1F
0EE9:9C 90 C2 DF 20 A3 0B F0 65
0EF1:17 C1 C6 49 C9 FF 28 2A 40
0EF9:06 21 CD 22 1C 80 06 CD F9
0F01:CD 8D D0 A5 06 ED 07 AD 81
0F09:BA 30 F0 27 D8 86 07 06 16
0F11:D0 1F AD BB 0A 16 00 87 01
0F19:82 BC E1 3F 2B 30 86 06 05
0F21:A0 CA B9 72 2F 76 68 20 E4
0F29:F5 4F 5D 46 3B 04 AD BD 29
0F31:30 8F 75 80 E1 5E 10 C5 70
0F39:3A C0 C8 0E C7 8D C2 30 C8
0F41:68 4A 20 33 22 ED 3D 65 06
0F49:2B F8 3C C1 4C F1 3D 90 14
0F51:F1 A0 A1 DA F0 F8 1E D8 F2
0F59:4C BB 16 47 35 E2 11 2A 84
0F61:21 14 15 87 0E 14 4E C6 54
0F69:83 80 91 0B 02 0E 10 DE 93
0F71:08 42 A1 03 20 61 53 1C D1
0F79:68 F5 10 78 29 0E 08 42 A6
0F81:50 1C C8 D5 A3 38 90 CD 32
0F89:4C 10 11 53 69 60 07 51 55
0F91:31 B5 71 11 1D 8F 6A 40 31
0F99:23 6F 42 E1 C1 18 28 0B 55
0FA1:A0 D6 03 05 CC 7A 00 0E D4
0FA9:44 01 1C E3 50 2B A0 55 B1
0FB1:11 CB 50 40 C8 48 E0 00 82
0FB9:41 10 D2 10 8C 46 FC A1 F0
0FC1:01 0D D0 28 17 10 13 85 E4
0FC9:08 82 A4 C5 8C D3 D0 13 E5
0FD1:24 97 43 1D 84 0C 8A 20 AB
0FD9:59 AA 11 2E 40 F0 DF C0 9A
0FE1:07 F0 DB C0 33 D0 0C 4A 86
0FE9:0E 17 B1 63 22 83 10 48 C8
0FF1:E4 0F 06 0C 57 51 20 21 29
0FF9:24 4C 0F 12 C0 3F D0 1F 04
1001:D0 F1 AE E2 2E 16 47 4E B0
1009:60 E2 D1 82 C0 C0 01 F0 70
1011:3B E0 7D 4B B9 C2 EB 70 8C
1019:09 E0 0D 09 83 B9 03 EC 1E
1021:4C F9 11 B9 81 EB E2 CE F3
1029:0A 22 AE C2 AD 04 2B 12 BE
1031:80 20 04 24 A5 C5 38 ED FE
1039:78 2D F0 F8 20 6E 12 4C B9
1041:72 11 D5 DD 21 04 52 80 B5
1049:50 2A 60 15 03 2B CA F0 C4
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1059:F5 AD B9 13 9E 13 05 01 94
1061:51 B1 F1 57 54 88 CC 90 39
1069:90 06 03 41 4C 49 12 60 D3
1071:20 73 0A 14 FC 64 0A C8 57
1079:AE 07 2B 57 2F 90 F4 F0 24
1081:F2 60 C2 4A C4 71 4F 80 3B
1089:83 00 B0 00 85 CC AE 41 7F
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10A9:A5 90 F0 16 29 40 C9 40 5E
10B1:F0 10 A0 1C B9 0A 29 54 C0
10B9:F5 90 C2 11 A0 4C 18 45 0E
10C1:0F F1 90 5C 50 02 30 A0 49
10C9:08 70 60 0A 0E 18 26 02 D5
10D1:06 C0 26 F0 04 C8 4C C6 9B
10D9:12 83 F0 CE 03 71 AD B8 E0
10E1:40 19 20 B1 36 D0 0C 67 FB
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10F1:AD 51 A0 15 8A C6 08 35 57
10F9:D0 12 AD 52 2D C9 30 D0 A3
1101:0B C7 59 02 04 C3 4C 38 E5
1109:96 6A 85 C7 8D 17 03 8A 97
1111:05 E8 03 83 1E A0 D7 43 EE
1119:89 D0 A9 51 A0 8B 83 76 2F
1121:80 86 42 80 90 71 1C 68 60
1129:90 03 2C 3C 30 21 D7 80 D3
1131:AA 53 91 0F 53 A8 D1 58 D9
1139:54 CC F8 58 21 BD 98 29 B7
1141:00 AE 79 2D A0 02 0B DB 10
1149:20 6A 1B 0A A2 26 A0 29 32
1151:4C 6C 13 8D 5A BC 03 E4 A0
1159:05 84 4F 50 E3 CF C0 62 50
1161:29 C8 E8 85 10 05 C5 05 E4
1169:58 33 77 70 66 E0 A4 68 E2
1171:6C 10 3D 6C 25 59 21 05 12
1179:2B 84 F5 99 32 10 04 1B 9F
1181:F5 17 1E 23 02 0C 20 00 DA
1189:06 21 80 7B 2D 20 AE 84 8A
1191:80 93 E2 0F 40 E0 AD 7A 81
1199:2D D0 47 AB 7D 88 47 D9 A0
11A1:86 CF 81 78 C9 C8 9E 4C AD
11A9:18 14 0F A4 4C DD 14 A3 AE
11B1:AB F0 C0 0D 69 CE 10 04 79
11B9:67 F1 1D E5 0F 50 91 0A F4
11C1:A9 00 A0 F9 99 5D 0A 7C 3F
11C9:57 2C 85 7A F5 72 7A 3E A7
11D1:3C 6E 05 15 8C 72 25 00 18
11D9:65 01 0B AC 03 2B 5D 1A B4
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11E9:A0 C9 70 B4 0F 62 9C 80 E3
11F1:F8 53 05 2B 66 CD CA 85 3E
11F9:87 91 00 0E 67 06 61 24 5F
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1209:2F 1B 1E 74 50 52 A8 04 B7
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1249:F0 50 0B 30 50 02 0B 1D 1C
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1261:74 0D C9 FF EA 08 24 8A 86
1269:A4 06 71 F0 20 3E A0 0C E5
1271:8A 17 03 82 24 F5 16 7B C9
1279:2D A0 44 04 84 14 90 BC 77
1281:12 88 3E 01 0B 03 20 BA 08
1289:60 04 79 25 20 8B 25 94 6E
1291:AE AF 25 AC AB AE 10 8D 2E
1299:06 A6 2B 4C 80 15 B9 5C BC
12A1:2C F0 13 AD 7C 00 F9 5B 88
12A9:81 1C DA AD 7D 2D CD 5C 64
12B1:2B 00 27 11 17 15 50 CC DB
12B9:02 0F 35 1F 9D 01 3C 53 F7
12C1:37 54 60 90 05 6B 8C 5A F4
12C9:81 2C 18 F0 A0 36 A1 00 EC
12D1:A2 32 70 60 59 80 0C D0 9D
12D9:67 A9 05 AB 56 28 6C 58 FB
12E1:05 4E 18 85 38 A4 05 18 ED
12E9:B9 B0 31 E3 CF 46 05 F0 0E
12F1:DC DE 4D C6 C6 CA 8E 6C 3D
12F9:80 58 15 68 00 C7 AD 52 6A
1301:C9 23 F0 C0 02 22 06 88 2C
1309:B9 00 61 19 C0 4C FD 92 8F
1311:0D 60 A4 09 34 84 01 AD 5E
1319:46 0A C0 06 4C 86 02 E0 BE
1321:0C 16 24 40 3E 24 64 84 2B
1329:06 A9 13 5A 42 60 C3 18 F7
1331:20 08 60 C0 5E 3E 9E 85 30
1339:15 4C CF D8 96 E2 B0 59 7F
1341:DD 90 85 E2 6B 03 47 AD FC
1349:4C 70 16 A9 AB 40 77 09 65
1351:3C 01 7C AE E2 F8 CD 90 77
1359:8F D0 04 A9 0E D0 03 38 88
1361:E9 01 8A F3 15 57 E0 06 1B
1369:5A 02 D0 15 1D 46 AD 3C 42
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1381:22 56 1E 88 2D 4C 18 17 7C
1389:38 1B 0B 90 B2 E8 80 04 3B
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1399:06 B0 B1 61 03 CB 00 62 E4
13A1:34 A1 21 4C 56 5F B1 10 D6
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13B9:91 0A 9D 93 31 4C 98 16 1A
13C1:0C FE 19 80 43 DB 41 14 F8
13C9:E8 16 AA CD 00 07 AE DC 72
13D1:31 E8 4C 04 17 20 E2 0A 9D
13D9:69 01 4C 12 17 A0 C4 D7 3C
13E1:11 06 9A 88 D3 1C 84 07 0D
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13E9:A6 26 DD 07 A1 08 D1 C8 B2
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1429:E4 08 28 07 AD 8D 31 BB FC
1431:B0 00 8D 50 07 AE 91 61 DF
1439:E1 21 77 20 EA 08 27 2A 7B
1441:A9 08 A2 1F D8 31 00 62 74
1449:2C 59 13 41 5D 33 A9 57 B6
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1459:8B C2 0F 41 A4 08 34 2F CA
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1469:44 66 C0 66 A9 52 8D 2A A7
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1479:90 D0 11 03 8D 03 20 E4 0E
1481:FF DC 5A 80 A0 98 EB 20 93
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14A1:51 D4 1C 8D 20 D0 38 A6 5F
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14B1:0C 20 35 32 07 60 06 0F 86
14B9:70 00 CE 51 58 E8 0E E0 6C
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1561:A0 05 B9 C1 15 C0 E2 80 62
1569:99 55 04 88 FC 4A A9 9E C1
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1579:ED 54 F0 0C 46 0B E8 E8 A7
1581:E0 0E F0 E0 4C 8F 19 AE 4D
1589:1D 47 CA CA E0 04 F0 D4 E7
1591:8E 00 DE E0 06 41 B9 09 9E
1599:06 06 A2 4C 63 19 E0 0A AC
15A1:F0 EE 12 4C A9 B2 31 13 94
15A9:8D A0 30 54 D8 06 69 20 DF
15B1:B8 19 60 AD 9F 67 17 90 BE
15B9:0D 10 48 C9 0A 55 00 80 3A
15C1:18 4C 4D 24 40 F0 49 F1 41
15C9:E8 12 EE A5 88 0D 78 7C 0B
15D1:0A 42 28 4C 05 1A CE 40 C9
15D9:01 AD 41 C9 90 34 F0 0C F7
15E1:8D A1 31 39 18 4C CC 19 99
15E9:A9 AD D2 79 03 A2 7A F5 D3
15F1:20 A2 21 D7 91 09 C9 03 BD
15F9:B0 EC 48 3D F0 12 CE 8B 8D
1601:88 BB D0 17 A9 BE 37 A2 45
1609:4C 44 1A EE 5C D8 C9 BF 38
1611:D0 05 A9 BC 8D E0 02 AD 89
1619:A2 30 8D 7B 05 4C 0B 1A 95
1621:C4 97 00 44 A9 A3 09 1D E4
1629:0E 30 85 FE A0 13 B9 E8 B6
1631:02 58 14 99 C8 05 70 A1 6D
1639:05 F2 A0 0B A2 10 A9 23 35
1641:20 5B 11 3C 2E 03 B9 30 5B
1649:A0 C2 0B 84 2A A1 4E 23 B7
1651:05 37 87 5C A9 9E 05 A2 F8
1659:BC 20 B0 22 A7 7E 00 0A 65
1661:7A FC 00 44 D3 1A 09 89 F0
1669:14 91 01 47 86 11 40 38 C9
1671:3F E4 38 80 21 00 08 AD 4C
1679:01 DC AA 37 30 30 C0 80 6A
1681:02 30 0E E4 1A 28 C2 80 42
1689:03 4C 90 07 91 C9 0F F0 8F
1691:B6 E9 50 88 83 C3 06 47 A4
1699:F0 A7 20 7F 0A 1B 0F 0E 0D
16A1:4C 82 1A A0 0C A2 18 C0 BD
16A9:BF 03 A9 20 D4 CD 81 88 17
16B1:3E 10 29 60 20 2F 25 20 54
16B9:39 17 C0 D1 0B 7B C0 28 6D
16C1:84 C9 20 F0 53 C9 30 90 68
16C9:57 C9 3A B0 53 C0 00 F0 F4
16D1:30 76 7A 64 02 83 02 70 DB
16D9:0A C8 00 51 10 C7 45 AD 2A
16E1:02 5C 08 D0 11 03 2B 6D 8C
16E9:DF 5C 82 28 0E 10 07 2E DC
16F1:89 B9 56 2B 38 E9 30 AA 43
16F9:18 8A 6D 30 2E 00 1A 09 34
1701:0B C8 C0 03 D0 A1 DF 94 90
1709:04 00 8E 40 9E A4 99 BF 89
1711:02 88 D0 FA A2 00 BD CB 88
1719:25 99 DD 02 38 47 08 E0 EB
1721:E0 74 F2 A9 0B 8D F8 07 5D
1729:B3 FB 41 A9 07 2B 88 40 29
1731:EC 10 08 46 00 1B D0 A9 F6
1739:2F 8D BB A9 23 40 4F D0 FD
1741:71 A0 8F 43 46 47 85 74 45
1749:4F 3A 80 E8 98 AC E7 C0 54
1751:05 80 1C 32 2E C0 21 AC 2C
1759:E7 C0 15 F0 07 88 8C 80 51
1761:35 00 D4 80 E1 35 20 06 F6
1769:20 02 E2 00 C4 01 8D 00 C9
1771:D0 98 8D 10 D0 BD F0 2C 6C
1779:00 18 6D 00 A7 07 D0 60 B6
1781:1A 09 76 3C C4 01 55 0C 72
1789:65 1C 12 0C 98 3E 02 11 47
1791:64 C0 60 01 60 69 02 09 F3
1799:36 1E AA 01 E6 1B 4C 64 70
17A1:12 90 02 C0 40 C8 34 73 4A
17A9:04 04 E6 00 D7 C1 20 C0 7E
17B1:1B 81 D0 03 20 B9 1B E5 1C
17B9:12 85 C7 20 54 20 A9 A0 64
17C1:15 1E 7B 20 DA 06 50 0C 0F
17C9:50 88 80 E8 06 90 B6 80 41
17D1:99 0D 12 35 10 07 5D 04 01
17D9:C8 C0 0E D0 F2 E0 2E 06 E8
17E1:BA 99 F7 04 99 BF 05 99 82
17E9:0F 8A 0B AF 06 99 FF 06 3B
17F1:98 18 69 28 A8 18 17 31 27
17F9:E6 30 5C 00 62 A1 9B 59 5D
1801:88 08 67 21 A1 67 21 0A 6D
1809:9E 85 0C 93 0D 79 16 AC CB
1811:72 16 E2 0F 20 6E 0A A9 C5
1819:B2 76 88 02 A7 63 A7 1E A9
1821:55 01 03 3C F6 54 F3 D8 2A
1829:CF 01 04 0E DC 3B 0E A2 75
1831:01 A0 0E 9B D8 CF A0 26 F2
1839:7B 24 06 00 1D 8F 82 79 96
1841:A0 14 C3 3C 80 0D 87 79 C3
1849:00 06 4F 90 01 06 C7 E1 7F
1851:80 3F 2B B5 A2 00 AD 65 28
1859:11 70 32 C8 AD D0 45 D1 0E
1861:FB 90 98 56 71 FF 2A 90 9C
1869:24 80 52 FB CD 00 2B 90 2B
1871:1D EC C0 21 D0 01 60 8E 6F
1879:F0 00 34 AD 06 B6 BA 09 0D
1881:1A 22 06 60 1C 92 C8 E8 B3
1889:EC 3E F2 BD 4A 9A 09 1A E2
1891:F8 04 42 A0 40 9C 18 AE E4
1899:01 2B E0 FF F0 43 08 6E 44
18A1:02 2B 07 C8 C8 9D EF 80 28
18A9:B5 1D 2A 28 1C A0 20 63 CA
18B1:C8 B1 FD 8D 01 45 00 8B F3
18B9:AC 04 40 7D 11 E0 78 2A 48
18C1:B1 FB 50 85 03 06 A6 BE 68
18C9:4C EE 1D C0 C5 0E 88 F7 FA
18D1:02 05 2B D0 E9 26 11 4C 0D
18D9:00 D1 05 0E D1 71 0E 51 C1
18E1:1D 0B 7C 0D 51 1D 0B 87 60
18E9:0D 51 1D 0B 92 0D 51 5D 12
18F1:3D 20 9D 42 34 10 0F 51 F1
18F9:10 3C 44 A8 3B 44 75 2C 56
1901:B3 34 44 75 2C BE 34 44 03
1909:75 2C C9 34 44 64 F5 80 9D
1911:D4 08 C5 60 4E 29 80 D4 5B
1919:22 A2 BB 1B 91 57 80 DF F8
1921:CE 42 1C 9C B0 E8 D0 2C 8F
1929:C4 D1 05 0B F1 CD 42 07 D5
1931:3C 0B F9 A0 27 79 F6 00 9A
1939:08 20 69 0A A9 04 EC 5D D9
1941:82 1C 77 F7 1D D5 5D 46 6B
1949:A9 66 05 DD CD A2 73 57 9F
1951:E1 51 00 77 19 02 B0 90 03
1959:41 7F 3B CF 5D 36 3C 09 B5
1961:1B 77 6C 39 09 1B 77 89 4D
1969:39 09 1B 77 A6 39 09 19 9A
1971:F4 CC 3B F7 32 C2 D2 1E 98
1979:A0 05 87 7C 1D 3C 3E 7C C8
1981:1B 15 A9 7A C4 37 B1 0F D8
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1999:17 BD 4F C2 06 5F F9 17 95
19A1:56 42 06 5F 53 4E C2 06 A5
19A9:5F 62 8E AF 1F 1C F1 0B 49
19B1:35 0D 1B 63 0E 4C B4 1F 85
19B9:4C 4A 7C 10 27 77 85 DE 36
19C1:1C 2D 00 20 81 1E 20 63 77
19C9:76 23 A9 8E CB 3D 40 1C 0E
19D1:FC A9 C0 58 9D 00 20 8C 44
19D9:AE 36 28 20 A2 23 8D 40 F4
19E1:01 58 C8 FF F0 3D AD 3F DA
19E9:2B F0 D8 AD 3D 2B C9 00 0E
19F1:E6 09 71 4D C2 01 4E 42 D5
19F9:C1 10 95 90 01 0A 20 E3 21
1A01:18 E0 12 03 72 12 D6 0C 81
1A09:AA 84 C9 04 D0 06 20 16 22
1A11:11 4C 27 20 4C C7 1F A0 28
1A19:1B 20 96 23 20 3C 25 AD D1
1A21:07 2B 62 F0 53 02 82 51 F7
1A29:80 09 93 B7 6C 03 73 47 6B
1A31:41 01 53 1C C0 4C E1 14 81
1A39:91 60 50 86 02 48 D8 40 E3
1A41:04 D9 99 00 DA 99 E8 DA 0B
1A49:C8 D0 F1 8C 73 6C 00 01 6B
1A51:47 1D 05 C0 91 90 C3 20 93
1A59:21 1C 2D F7 08 DD 51 00 A4
1A61:28 8F 39 42 21 22 14 47 D9
1A69:49 43 E3 B0 B1 1F C0 D0 F6
1A71:CC A9 59 B2 D8 28 07 10 52
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1A89:AD 2C 20 7C 1A 8D 92 31 C8
1A91:8D 27 D0 20 C3 40 3E 00 0E
1A99:AF 01 E2 23 23 A8 E0 B9 AB
1AA1:10 9F 82 B9 43 76 0A 0E C7
1AA9:B9 11 99 11 0E F8 A8 B9 A2
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1AB9:B9 0E A8 0A 00 B9 D6 2F C7
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1AE9:41 AA A0 00 8E CF 16 8C E9
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1AF9:AC 7D 2D C8 C0 05 D0 E8 BA
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1B09:30 0A A8 C8 B6 BE 93 31 84
1B11:A6 01 17 CF 02 AD 35 29 15
1B19:8E A0 60 2B 12 E0 BB E0 E9
1B21:0A B0 03 94 60 AE 8D 02 0D
1B29:2E BF 02 9A 84 38 D0 3C 33
1B31:C9 07 D0 06 E0 1D EE 3A 1C
1B39:D0 3E 61 4F 0F C9 0F D0 17
1B41:0F B9 62 24 A2 94 0F AA 2C
1B49:A9 81 C9 1E 8A AA 29 01 22
1B51:F0 1B A0 09 02 F0 1C 8C 04
1B59:08 F0 0B 8A 29 04 D0 1E F2
1B61:40 78 41 C6 27 14 02 E4 DC
1B69:14 03 EC 68 FF CB 04 87 4D
1B71:F0 08 20 49 0A 38 24 00 34
1B79:11 3C 48 00 0A 78 90 00 A3
1B81:03 4C A2 21 70 FA 09 04 38
1B89:AE DB 31 AC DC 31 20 BA A5
1B91:FF F0 B8 61 80 BD 41 C0 6F
1B99:10 04 30 04 39 01 CC FF 86
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1BA9:AA 26 E7 88 03 A4 90 D0 E0
1BB1:05 88 CA D0 F5 C8 EE 11 B4
1BB9:2E AD 20 07 38 ED 64 A8 D1
1BC1:8C 40 12 D0 0A 20 AC 14 DB
1BC9:B9 C4 30 20 DA 18 20 D2 60
1BD1:FF AC 41 2B 66 04 C8 30 13
1BD9:53 61 32 C9 20 45 14 C9 FC
1BE1:40 B0 01 71 1E 60 C8 41 E0
1BE9:20 60 C9 80 B0 04 18 69 B8
1BF1:40 60 38 E9 80 4C 80 46 82
1BF9:B7 AD 6C 08 0A 18 6D 8E 9F
1C01:31 69 CF AA C8 D0 FD E8 3F
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1C11:E0 00 F0 11 81 4D 1B CA 2B
1C19:4C BE 22 9E 18 FB F5 78 6A
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1C29:39 75 02 23 20 31 23 B1 8B
1C31:FD C0 D1 01 C0 0A D0 F7 AA
1C39:20 10 23 D0 EF 60 8C 24 35
1C41:8F 81 35 90 87 9E 2B A6 05
1C49:A7 60 FB 69 28 B0 14 38 E7
1C51:2E 18 FC 04 FD 69 0A D8 09
1C59:48 A5 FE 69 00 50 04 C8 A7
1C61:E8 E0 09 60 8E DB 6E AC DA
1C69:E1 04 C8 60 A9 D3 85 FB 56
1C71:A9 25 85 FC A9 27 C9 3F 05
1C79:A9 26 E9 60 52 B6 00 3C FC
1C81:F0 FA AD 00 AC 41 F3 0E 07
1C89:DC 29 10 F0 EC 93 7A 00 36
1C91:30 58 00 04 4E 41 13 A9 7F
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1CA1:FA A9 05 8D 3E 2B 20 FA 15
1CA9:71 8D 07 F5 12 C0 F8 05 C8
1CB1:09 48 A3 90 04 14 1C 20 C6
1CB9:F5 1B FD ED 93 0C 4E C9 85
1CC1:FF 10 04 00 60 8D 55 20 82
1CC9:33 40 FB 19 16 17 A0 0C 17
1CD1:66 11 07 46 98 8E 46 10 62
1CD9:D0 F4 9E 16 9E 1C 00 03 55
1CE1:80 20 DE 23 DB A9 A0 91 C8
1CE9:FB AD 91 31 91 FD C8 C0 A7
1CF1:78 D0 F2 60 18 A5 FC 69 B9
1CF9:D4 D0 8E A5 FB 85 FD 80 6F
1D01:ED B0 90 1B E3 01 B0 F0 97
1D09:08 91 00 D0 C1 91 91 5D 8D
1D11:70 6C 50 00 47 85 E8 4F 1A
1D19:44 06 45 EC 03 65 0A 22 52
1D21:09 19 A4 A0 90 20 7D 12 D6
1D29:AE 39 CA 8E 40 2B 80 21 1C
1D31:08 C2 00 90 83 00 42 0A D3
1D39:A1 22 C2 44 42 E6 C7 C9 70
1D41:88 A2 C7 22 52 D4 37 08 DF
1D49:49 84 5A 43 40 08 A9 B8 F6
1D51:EC 20 A9 BD A0 28 20 1E 1F
1D59:AB 0E 2E 3D 23 20 8E 24 61
1D61:AF D8 15 D0 55 59 B7 48 21
1D69:1E 89 41 C9 11 B0 17 AD 01
1D71:CB 00 DE AA 20 80 1D AD 03
1D79:01 2B 8D 3A 2B A5 C5 C9 99
1D81:01 F0 FA 4D EF 20 A9 1D 1D
1D89:20 99 23 AF E9 7F 8D 0D 0F
1D91:DC A9 FF 8D 00 DC 88 87 89
1D99:C4 14 13 12 8D CF 20 B7 62
1DA1:22 83 65 B1 FD 11 80 91 5C
1DA9:FB C8 CC 02 2B D0 F3 28 7A
1DB1:F1 85 0F 78 16 2E 0A 7C A9
1DB9:16 EA 84 FD A9 1E A0 5D 8E
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1DC9:11 9F 85 85 FE A9 25 86 EC
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1DD9:20 A0 00 99 C4 30 C8 C0 1F
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1DE9:13 13 14 05 8D 15 05 D0 E0
1DF1:0C A0 A2 06 A0 23 C0 41 63
1DF9:0A E5 72 AE 69 22 20 CD CD
1E01:BD CC 85 C7 87 78 8A A6 56
1E09:F4 9C A6 7B 2D D0 04 20 48
1E11:66 ED 01 20 7D 13 03 CA 27
1E19:18 69 B2 C9 40 69 68 52 79
1E21:32 5C A0 F0 0B C9 02 B0 E4
1E29:0A 84 4B C9 F5 B0 03 CA D4
1E31:09 10 28 1A 01 84 A0 A9 A1
1E39:0F 20 C3 FF 20 98 12 60 65
1E41:A9 00 8D E5 0E A9 01 8D 09
1E49:36 60 AD 5B 60 05 7C 2D 61
1E51:AD 5C 2B 8D 7D 2D 60 0E 29
1E59:08 93 00 FC F8 F8 FC DE D2
1E61:8F D8 B5 18 20 2F 23 44 1C
1E69:20 5F 23 70 20 87 23 08 66
1E71:2C 5F 2F 08 30 4B 33 08 1F
1E79:34 5F 37 08 40 9B 43 08 0E
1E81:44 9B 47 08 48 5F 4B 08 8E
1E89:4C 5F 4F 08 50 4B 53 05 89
1E91:58 73 5B 05 5C 73 5F 05 07
1E99:60 73 63 05 64 27 67 05 33
1EA1:68 27 6B 7B 48 8F 4B 7B 93
1EA9:2C 9B 2F 7B 34 9F 37 7B 8A
1EB1:3C 9B 3F 7B 50 8F 53 03 FC
1EB9:54 F1 30 03 10 07 03 1B 90
1EC1:06 06 C0 0B 07 24 08 42 66
1EC9:10 0B 44 0C 01 25 0D 00 D0
1ED1:05 0E 01 16 0F 01 11 11 45
1ED9:80 0B 12 88 13 00 1C 14 C8
1EE1:00 0A 15 00 09 0D E0 06 87
1EE9:82 14 08 1E 09 0A 1E 08 04
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1EF9:28 3F 2B 17 2C 3F 2F 17 C4
1F01:30 3F 33 17 34 3F 37 43 4F
1F09:24 6B 27 43 28 6B 2B 43 D5
1F11:2C 6B 2F 43 30 6B 33 43 33
1F19:34 6B 37 6F 24 97 27 6F 67
1F21:28 97 2B 6F 2C 97 2F 6F 43
1F29:30 97 33 6F 34 97 37 04 35
1F31:30 E2 05 05 44 06 40 04 EF
1F39:07 44 08 05 80 1C 40 05 57
1F41:40 04 06 44 07 40 04 08 EE
1F49:10 0A 04 50 05 40 04 06 CE
1F51:44 07 40 04 08 1B 0A CD 4A
1F59:D0 48 40 F0 09 30 5A 80 67
1F61:00 CE 41 4D 01 21 C6 49 B3
1F69:B2 5A E1 01 10 CD 49 C8 F6
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1F79:4C D1 1B 90 03 A1 0E 98 12
1F81:20 CC CA 18 3C 00 A6 F0 FD
1F89:49 54 59 B2 83 D3 54 EA D6
1F91:45 5D 0C 20 DA 49 CC 2B 0E
1F99:80 D0 48 4F 4E A9 23 27 D0
1FA1:08 75 3C CF 54 48 74 3E B0
1FA9:32 8D 41 31 0D 5C F8 01 6C
1FB1:A2 32 4C 64 D9 D3 68 CD 5A
1FB9:41 38 02 D0 D2 C9 CE D4 24
1FC1:C5 D2 1A 1C 22 80 D2 C5 1B
1FC9:C3 CF D2 C4 0D 48 22 86 D8
1FD1:00 62 25 0E D1 0A 0F 10 13
1FD9:68 BD 43 21 0E DD 8D 2D 66
1FE1:70 85 C1 39 2A 41 44 0C 70
1FE9:40 28 C4 CC 4F 41 44 A9 69
1FF1:0C 80 43 61 23 46 4C 54 F3
1FF9:C8 2A E0 24 C3 00 0E 20 DF
2001:08 26 0A 54 00 06 C9 CE CF
2009:45 58 9E C6 86 09 34 56 59
2011:49 C7 46 24 80 20 89 00 8A
2019:6D 58 55 64 10 40 2C 53 44
2021:34 D2 30 51 24 40 6A 00 42
2029:03 75 E3 4E 41 2A EE C2 FC
2031:B9 0C 10 57 25 D3 43 5E 26
2039:AC E0 0D 41 2F 1E A0 45 36
2041:45 44 26 91 41 57 22 03 C1
2049:19 01 2E 2E C6 41 53 54 35
2051:8C 71 E1 48 E3 03 7C 40 59
2059:03 15 12 F7 D8 80 43 8A FB
2061:18 C3 55 52 53 62 01 AC 41
2069:4C 4F 52 75 6E 90 11 23 40
2071:60 0A CD 4F 44 45 90 00 6B
2079:66 01 04 D7 8D 74 54 45 57
2081:00 C3 21 07 10 00 D0 41 AA
2089:19 00 8C 14 51 0B 01 D8 BA
2091:20 00 C5 44 49 54 D7 59 83
2099:46 4C 45 79 59 CA 8D 49 AA
20A1:53 4B 20 C5 52 52 3A 00 0F
20A9:12 8C 71 98 8D 6B C2 55 C2
20B1:54 54 84 04 CF 30 09 B0 04
20B9:01 80 C2 47 20 D4 4F 20 7A
20C1:C3 57 61 C1 1D 55 45 92 5D
20C9:00 C4 C0 CA 56 09 64 B1 51
20D1:50 A0 81 45 A9 98 2F C9 BE
20D9:3B 88 D2 45 41 44 59 00 56
20E1:B1 7E 41 56 15 4C 2C 40 9A
20E9:9B 3C C6 94 90 CD C9 C4 3D
20F1:47 50 48 00 41 46 47 CC 71
20F9:73 92 C3 D4 D9 47 D3 D4 C6
2101:C1 60 04 DA C9 D0 46 D0 59
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2109:C8 CE 60 04 19 09 CF D4 11
2111:55 42 41 31 20 04 C9 CE 3D
2119:32 3E 3C 23 23 23 3E C4 A4
2121:03 20 20 20 12 D0 94 04 F3
2129:40 6C CF C4 45 56 49 78 7B
2131:CE 15 09 00 39 B0 E7 78 16
2139:43 95 65 44 41 52 59 DC 56
2141:44 44 52 B2 4C D8 07 73 73
2149:00 19 01 68 32 02 9A 81 C8
2151:03 26 E4 C2 05 A7 2C 40 C6
2159:06 06 A4 20 0D 20 07 00 AD
2161:13 8A 83 3A 16 32 3C C8 9E
2169:60 20 23 00 02 0E C4 B3 CD
2171:4F 79 50 41 43 45 20 C1 09
2179:56 41 12 CE 41 42 43 39 39
2181:80 3A 4D 4C 2E 53 A0 36 37
2189:00 53 2C 57 00 0E 18 27 2B
2191:45 63 72 81 8B 9F B3 C7 BF
2199:C8 C9 D6 0B 0F 1E 1E 0F 7A
21A1:0F 0A 14 14 14 01 01 12 6A
21A9:C9 4E 49 A0 C7 41 4C 49 BC
21B1:5A E0 54 C6 49 4C 45 53 A9
21B9:EE 13 04 6D 58 55 50 D0 19
21C1:42 3C C4 5C 56 A0 05 11 E2
21C9:19 1E 14 21 CF 50 5E 20 51
21D1:41 02 4F 4E 46 11 0D 0D A1
21D9:12 1D 1D 1D C7 45 54 20 FD
21E1:D3 54 52 CC 9D 2D 72 2A EA
21E9:CE 55 4D 42 45 52 78 46 61
21F1:46 82 EA 20 3D 20 9B C8 C1
21F9:10 D4 C9 CE D5 C5 3E A0 82
2201:3C C1 C2 CF D2 51 9E 91 D3
2209:3C C3 D5 D2 D2 C5 CE C1 51
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2219:20 CF CE 20 C7 C5 D4 3E 7A
2221:00 12 D3 AC 27 54 49 4E 9A
2229:47 20 D2 45 43 4F 52 44 08
2231:53 00 30 00 00 00 00 00 25
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Maurice Yanney, the author of Balloon Pop (August 1992) and Cats and Mice (January 1993), lives in Lebanon, Pennsylvania.

UTILITY PLUS

By Eric Jevon Bryant

Utility Plus is a group of three useful utility programs for the 64 written in machine language to take advantage of the language's power and speed. The first utility, Word Wrapper, wraps text around the screen when words become cut off by the screen border. Integer Array Search lets you quickly search through an array of integers for a specific value, and String Array Search searches through an array of strings for a specific string of characters.

The utilities in the Utility Plus package can be used separately or together. They were programmed independently. Also, they reside at 52376–53247, which is near the top of free RAM, so it may be possible to run other machine language programs with these in place. If you use all three programs, this leaves you with 3227 bytes of free RAM, a little more than 3K.

Originally, Utility Plus was written to complement a text adventure I had written. The majority of the program was in BASIC, and the utilities were created to speed up the parsing of commands and outputting text to the screen. Utility Plus's usefulness, however, is not restricted to text adventures. You may use the package in just about anything from databases to your own word processor.

Entering Utility Plus

Utility Plus is written entirely in machine language. To enter it, use MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following starting and ending addresses if you want to have all three utilities.

Starting address: CC98
Ending address: CFFF

Note that Utility Plus is a package of three utilities that are independent of each other. This means that you may wish to type in only the ones that you need. If you want only one or two of them, use the addresses listed below and enter only those lines of the MLX listing.

Word Wrapper
Starting Address: CC98
Ending Address: CDFB

Integer Array Search
Starting Address: CDFC
Ending Address: CEE4

String Array Search
Starting Address: CEE5
Ending Address: CFFF

Be sure to save a copy of the program before exiting MLX. When you're ready to use the program, load it with the ,8,1 extension, type *NEW*, and then start to work on your own BASIC programs. You'll find Utility Plus helpful in many programming situations.

Word Wrapper

If you've ever used the PRINT statement in a program to print out instructions or other information, you know how difficult it can be to make the words wrap properly. It usually takes a good deal of trial and error to make the statement print correctly. Word Wrapper does the work for you.

To use this utility, place the text you wish printed to the screen in the string variable A$. (Failure to do this could result in the computer's locking up). Type *SYS 52376,0* and the text contained in variable A$ will be printed. Any words that might have been cut off by the edge of the screen will be wrapped around. If you type *SYS 52376,1* the words will print, but the program will automatically add a prompt that tells you to press Return to continue. Note that you may print something beforehand with a semicolon and then invoke Word Wrapper, and it will continue from that PRINT statement, wrapping accordingly.

Word Wrapper is quite powerful. After Word Wrapper has printed something onscreen, anything that is printed afterward will be tacked onto the end of the string, as if you used PRINT with a semicolon. To avoid this, simply print after you execute Word Wrapper.

Integer Array Search

An integer is any number that does not contain a fraction. On the 64, an integer must fall within the range of from 32767 to -32767. In Commodore BASIC, an integer is recognized as a variable name following by a percent sign, A% or BC%, for example.

Integer Search can look through any array of integers that contains no more than 255 elements. (It's better if your arrays have no more than 254 elements since a 255 is a null value for Integer Search.)

To invoke the Integer Array Search, type the statement *SYS 52732,XY%, NUM,Z*. In this statement, XY% is the integer array to search through (the percent sign is needed), NUM is the number to search for, and Z is the initial value in memory location 251. Index Array Search will retrieve the index held in 251 first and will start the search at the very next index. Therefore, it's a good idea to initialize your integer search by entering *SYS 52732,XY%,0*. This will place a 0 in 251 and start

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your search at an index of 1.

The array index that contains your value NUM is held at memory location 251; just enter *PRINT PEEK(251)* to find its value. A value of 255 means there was no match, while anything less indicates the index where there was a match. If the variable you entered for XY% does not exist, the program will return a *SEARCHING ERROR* message.

String Array Search

In BASIC, a string is any string of characters. String Array Search lets you search through any list (an array) of strings for a specific string or even a part of a string.

Place the string you're searching for in string variable A$. This may even be the first few characters of the string. For example, JOH would locate JOHNS, JOHNSON, or JOHANSON, but not JIM JOHNSON. Failure to have something contained in A$ could result in the computer's crashing.

With this done, enter *SYS 52965,AB$,X*, with AB$ being the string array to search (the $ is necessary) and X being the initial value for 252. Once again, if string AB$ does not exist, you'll receive a *SEARCHING ERROR* message. This time, however, the matched index will be stored in memory location 252, so it will not conflict with the Integer Array Search. A 255 in this location indicates that a match was not found.

Utility Demo

This demonstration program gives you an example of the Utility Plus features and how to use their functions. Programmers may find that dissecting the code is helpful. Since Utility Demo is written entirely in BASIC, enter it with The Automatic Proofreader to help eliminate typing errors. Be sure to save the program before running it.

Simply run the demonstration with Utility Plus already in memory and watch as it demonstrates the integer and string searches, saving the Word Wrapper for the finale.

The program sets arrays T%() and IR%() for integer arrays and S$() for a string array. The demo illustrates the Integer Search by picking ten random numbers between 0–254 and then searching for these values in arrays T%() and IR%(). T%() has a maximum of 100 elements, so some of the random numbers will not be found if they exceed 100. Also, the values in T%() are equal to 100 minus the index, while in IR%() there is a direct relationship. Thus, the value 37 is held in index 73 in T%() and 37 in IR%(). Use this to check the searches.

The second demo deals with the string S$(). This array contains the word *TRASH* in 234 of its 254 elements and the word *TREASURE* is scattered at random in 20 elements throughout the array. The numbers onscreen are the indexes of the elements that contain the word *TREASURE*. The variable LI$ contains this list.

Finally, the word-wrap demo prints some text on the screen, prompts you to press Return, and continues with more text.

Some Final Notes

First, the Z in SYS 52732,XY%,Z (Integer Search) and the X in SYS 52965,AB$,X (String Search) are optional; they may be left out. The utility will simply begin the search at the current index held in 251 for Integer Search or 252 for String Search.

Second, when searching for negative values in the Integer Search, you must place this value in a variable and then enter *SYS 52732,XY%,VAR* with VAR being this variable. If you attempt to enter *SYS 52732,XY%,-1* you will run into problems.

Third, if your A$ variable contains a short string and you call Word Wrapper, you may see some garbled text printed after your word. To clear this up, simply add CHR$(0) after your A$ text as in A$=A$+CHR$(0). This will add a null character to your string and stop the garbage.

Finally, there is a programming trick that will allow you to set the left margin for Word Wrapper. Simply enter *POKE 52496, 256 – left margin*. For example, if you wanted a left margin of 5, you would enter *POKE 52496, 255 – 5*, or *POKE 52496, 251*. There is also a way to set the right margin, but it isn't as simple; those able to decode machine language may be able to solve it. Hint: fool around with locations 52460 and 52496 combined.

UTILITY PLUS

```
CC98:A2 00 20 79 00 C9 2C D0 6F
CCA0:03 20 00 E2 86 B1 4C 47 CC
CCA8:CD 00 A5 D3 18 E9 27 B0 82
CCB0:02 69 28 8D A9 CC A2 00 49
CCB8:A0 00 B1 A5 C9 00 D0 08 2B
CCC0:A5 B1 D0 01 60 4C AC CD 1F
CCC8:20 D2 FF C9 20 D0 08 A9 C1
CCD0:01 85 A3 A2 00 86 A4 C9 18
CCD8:0D D0 05 A2 FF 8E A9 CC 52
CCE0:A0 01 20 8E CD EE A9 CC 42
CCE8:AD A9 CC C9 28 F0 0C E6 FD
CCF0:A5 A5 A5 C9 00 D0 BF E6 C1
CCF8:A6 D0 BB C6 A3 A2 00 E8 8E
CD00:A9 14 20 D2 FF E4 A3 D0 52
CD08:F6 CA A9 20 20 D2 FF E0 36
CD10:00 D0 F6 A0 01 20 8E CD 3C
CD18:A5 A5 E5 A3 85 A5 A5 A6 9B
CD20:E5 A4 85 A6 4C 2D CD C8 6E
CD28:84 A3 4C AA CC A2 03 E6 01
CD30:A5 A5 A5 C9 00 F0 08 CA F7
CD38:E0 00 F0 08 4C 2F CD E6 84
CD40:A6 4C 37 CD 4C AA CC A5 52
CD48:2D 85 A3 A5 2E 85 A4 A0 1C
CD50:00 B1 A3 C9 41 F0 06 C8 0C
CD58:20 8E CD F0 F2 C8 B1 A3 32
CD60:C9 80 D0 F4 A0 03 20 8E 4A
CD68:CD A0 00 B1 A3 85 A5 C8 75
CD70:B1 A3 85 A6 C6 A3 A5 A3 9C
CD78:C9 FF D0 02 C6 A4 A0 00 3D
CD80:B1 A3 A8 A9 00 91 A5 A0 BF
CD88:01 85 A4 4C 27 CD E6 A3 41
CD90:A5 A3 C9 00 F0 06 88 C0 92
CD98:00 D0 F3 60 E6 A4 F0 F6 8F
CDA0:12 5B 52 45 54 55 52 4E A5
CDA8:5D 92 A0 00 B9 A0 CD 20 B7
CDB0:D2 FF C8 C0 02 D0 F5 A0 BA
CDB8:00 B9 A2 CD AE 18 D0 E0 4C
CDC0:17 F0 0A 20 D2 FF C8 C0 50
CDC8:06 D0 EE F0 05 18 69 80 64
CDD0:D0 F1 A0 00 B9 A8 CD 20 91
CDD8:D2 FF C8 C0 02 D0 F5 A9 EB
CDE0:00 85 C6 A5 C6 F0 FC A0 A5
CDE8:00 A0 00 84 B1 A9 14 20 71
CDF0:D2 FF C8 C0 08 D0 F6 A9 36
CDF8:00 85 C6 60 A9 80 85 A4 D3
CE00:20 FD AE 09 80 85 A3 20 15
CE08:73 00 C9 25 F0 07 05 A4 3D
CE10:85 A4 20 73 00 A9 25 20 E5
CE18:FF AE 20 83 AE 20 AA B1 9A
CE20:85 A6 84 A7 20 79 00 F0 0D
CE28:05 20 00 E2 86 FB A5 2F 1D
CE30:85 AD A5 30 85 AE A0 00 DB
CE38:B1 AD C5 A3 D0 07 C8 B1 F2
CE40:AD C5 A4 F0 1E A5 AD C5 72
CE48:37 D0 0D A5 AE C5 38 D0 7F
CE50:07 A0 0C 20 2F F1 D0 06 06
CE58:20 DB CE 4C 36 CE 4C 65 86
CE60:A4 EA EA A9 00 85 B0 A0 1B
CE68:00 20 DB CE C8 C0 04 D0 98
CE70:F8 A0 00 B1 AD 85 AA C9 70
CE78:03 F0 D6 AA CA 20 DB CE B6
CE80:20 DB CE B1 AD 95 AF E0 1E
CE88:00 D0 F1 C6 AF A5 B0 F0 6B
CE90:02 C6 B0 20 DB CE A9 00 66
CE98:85 AB 85 AC A0 00 B1 AD 75
CEA0:C5 A6 D0 12 C8 B1 AD C5 34
CEA8:A7 D0 0B 18 A5 AB AA E5 48
CEB0:FB 90 03 86 FB 60 20 DB B6
```


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```
CEB8:CE 20 DB CE A5 AB C5 AF 45
CEC0:F0 05 E6 AB 4C 9C CE A5 C7
CEC8:AC C5 B0 F0 09 E6 AC A9 3A
CED0:00 85 AB 4C 9C CE A9 FF 7D
CED8:85 FB 60 E6 AD A5 AD F0 03
CEE0:01 60 E6 AE 60 A9 80 85 0F
CEE8:B1 20 FD AE 85 B0 20 73 B4
CEF0:00 C9 24 F0 07 05 B1 85 C9
CEF8:B1 20 73 00 A9 24 20 FF 04
CF00:AE 20 79 00 F0 05 20 00 0A
CF08:E2 86 FC A9 00 85 AC 85 E9
CF10:AA A5 2E 85 AB A0 00 B1 1E
CF18:AA C9 41 F0 0C E6 AA A5 AD
CF20:AA C9 00 D0 F0 E6 AB F0 FF
CF28:EC C8 B1 AA C9 80 D0 ED 31
CF30:E6 AA 20 EB CF E6 AA 20 40
CF38:EB CF A0 00 A2 00 B1 AA F8
CF40:95 A3 E0 02 F0 04 E8 C8 02
CF48:D0 F4 A5 2F 85 AA A5 30 87
CF50:85 AB A0 00 B1 AA C5 B0 26
CF58:F0 20 A5 AA C5 37 90 0E 12
CF60:A5 AB C5 38 90 08 A0 0C EB
CF68:20 2F F1 4C 65 A4 E6 AA 1D
CF70:A5 AA C9 00 D0 DC E6 AB 3A
CF78:F0 D8 C8 B1 AA C5 B1 D0 9B
CF80:DA A0 00 E6 AA 20 EB CF A1
CF88:C0 03 F0 03 C8 D0 F4 A0 AB
CF90:00 B1 AA C9 01 D0 D3 E6 68
CF98:AA 20 EB CF E6 AA 20 EB 1E
CFA0:CF 38 B1 AA E9 00 85 A9 1B
CFA8:E6 AA A0 00 A2 00 B1 AA 9D
CFB0:95 A6 C0 02 F0 04 C8 E8 0F
CFB8:D0 F4 A6 A3 CA E4 A6 B0 F4
CFC0:0F A0 00 B1 A4 D1 A7 D0 B7
CFC8:07 C8 C4 A3 F0 27 D0 F3 AA
CFD0:E6 AC A5 AC C5 A9 D0 05 0A
CFD8:A9 FF 85 FC 60 A0 00 E6 3A
CFE0:AA 20 EB CF C0 02 F0 C2 0B
CFE8:C8 D0 F4 A5 AA C9 00 F0 87
CFF0:01 60 E6 AB 60 18 A5 AC 1C
CFF8:AA E5 FC 90 D3 86 FC 60 23
```

UTILITY DEMO

```
HB 10 REM UTILITY/DEMO
EX 20 REM BY ERIC J. BRYANT
XB 30 REM COPYRIGHT 1993 - COM
      PUTE PUBLICATIONS - ALL
      {SPACE}RIGHTS RESERVED
DD 40 REM DIMENSIONING ARRAYS
EC 90 DIM T%(100)
GR 100 DIM IR%(254)
MH 110 DIM S$(254)
MA 120 REM
XG 130 REM BUILDING ARRAYS
CC 140 REM
EC 150 FOR X=1TO100: T%(X)=100
      -X :NEXT
DP 160 FOR X=1TO254: IR%(X)=X
      {4 SPACES}:NEXT
PD 170 FOR X=1TO254:S$(X)="TRA
      SH":NEXT
CF 180 REM
SS 190 FOR X=1TO20 :IX$=MID$(S
      TR$(X),2)
KB 200 Y=INT(RND(0)*254):IF S$
      (Y)<>"TRASH" THEN 200
PA 210 S$(Y)="TREASURE-"+IX$:N
      EXT X
HH 220 REM
QF 230 REM DEMO
AH 240 REM INTEGER ARRAYS
DK 250 REM
DA 260 PRINTCHR$(147);CHR$(18)
      ;"INTEGER ARRAY DEMO:"
PF 270 FOR X=1TO10:Y=INT(RND(0
      )*254):NU$=MID$(STR$(Y)
      ,2)
BC 280 PRINTSPC(1);NU$;TAB(5);
      "(T%){2 SPACES}";
PF 290 SYS 52732,T%,Y,0:IF PEE
      K(251)=255 THEN PRINT"N
      OT FOUND":GOTO 310
BQ 300 PRINT"LOCATION";PEEK(25
      1)
DS 310 PRINTTAB(5);"(IR%) ";
KB 320 SYS 52732,IR%,Y,0
ER 330 PRINT"LOCATION";PEEK(25
      1) :NEXT X:GOSUB590
JS 340 REM
PK 350 REM STRING ARRAYS
BA 360 REM
JE 370 PRINTCHR$(147);CHR$(18)
      ;"STRING ARRAY DEMO:"
KS 380 PRINT" THE TEXT ";CHR$(
      34);"TREASURE-(X)";CHR$
      (34);" IS LOCATED:":POK
      E252,0
RP 390 FOR X=1TO20:IX$=MID$(ST
      R$(X),2):A$="TREASURE"
DE 400 SYS 52965,S$,PEEK(252)
HQ 410 VU$=MID$(STR$(PEEK(252)
      ),2):LN=LEN(VU$): ZE$="
      000"
KK 420 IF LN<3 THEN VU$=LEFT$(
      ZE$,3-LN)+VU$
SH 430 PRINT" ";VU$;:LI$=LI$+V
      U$+" ":NEXT X:GOSUB 590
EF 440 REM
KF 450 REM WORD WRAPPER
QG 460 REM
HR 470 PRINTCHR$(147);CHR$(18)
      ;CHR$(14);"WORD WRAPPER
       DEMO:";CHR$(146);" ";
HJ 480 A$="THIS IS A DEMO FOR
      {SPACE}THE WORD WRAPPIN
      G UTILITY! SEE HOW THE
      {SPACE}WORDS WERE "
AD 490 A$=A$+"AUTOMATICALLY WR
      APPED AROUND THE HEADIN
      G? WORD WRAPPER KEEPS T
      RACK "
HF 500 A$=A$+"OF WHAT POSITION
       ON SCREEN YOU ENABLED
      {SPACE}THIS UTILITY, AL
      LOWING FOR "
PM 510 A$=A$+"MUCH VERSITILITY
      ."
JK 520 SYS 52376,1:PRINT:PRINT
FH 530 A$="ALSO NOTICE HOW WOR
      D WRAPPER JUST PROMPTED
       YOU TO PRESS [RETURN],
       "
EF 540 A$=A$+"THIS ALLOWS YOU
      {SPACE}TO PROMPT THE US
      ER BEFORE CONTINUING WI
      TH A RATHER "
FQ 550 A$=A$+"LENGTHY TEXT."
FF 560 SYS 52376:PRINT:PRINT:G
      OSUB 590:
BP 570 PRINTCHR$(147);CHR$(142
      );"UTILITY/DEMO COMPLET
      E."
QM 580 END
HX 590 PRINTCHR$(18);"CONTINUE
      ?":PRINTCHR$(18);"(Y)ES
       OR (N)O"
EJ 600 GET A$ :IF A$="" THEN 6
      00
DR 610 IF A$<>"N" THEN RETURN
XQ 620 END
```

Eric Jevon Bryant lives in the Bronx, New York City, NY.

DIRECTOR-EASE

By Randy J. Clemmons

I have subscribed to Gazette since 1985, and I always look forward to reading Jim Butterfield's "Machine Language" column. In October 1992, Jim wrote that programming to read a disk directory is no trivial task. I thought you might like to look at my solution for reading directories. Director-Ease (pun intended) makes it possible to create a directory reader easily wherever 102 bytes of RAM are available.

Director-Ease has an option to create a BASIC loader, which allows BASIC programmers an easy path to incorporate a directory reader into their work. Also, if you wish, Director-Ease lets you display only specific file types, such as PRG, SEQ, REL, or USR files.

Entering the Program

Director-Ease is written entirely in BASIC. To help avoid typing errors, enter the program with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you try to run it.

Using the Program

Load and run Director-Ease. To use the program for the first time, use the default starting address of 828 which appears on screen. Location 828 is in the 64's cassette buffer, a favorite place for small machine language routines. Respond to the make loader question with *N* for no. You'll then see a message onscreen that tells you to use SYS 828 to view files. Enter that SYS to verify that everything is working well.

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Relocation

Let's check out Director-Ease's relocatability feature. Enter *RUN* and repeat the steps outlined in the previous paragraph, but this time pick an address in the 64's upper RAM. For example, enter a starting address between 49152 and 57145. Remember, use a place where 102 bytes of RAM are available.

You could choose a location inside BASIC's normal program space, but you'd have to take steps to protect the code from being overwritten eventually by BASIC. You could do it by moving BASIC's top-of-memory pointer down and then entering a CLR statement to realign BASIC's pointers. Then you could safely use an address above the top-of-memory pointer.

Create a Loader

To use the BASIC loader option, enter *Y* when the programs asks if you want to create one. When the program finishes executing, several lines of BASIC code will appear onscreen. This code is ready to run, save, or renumber.

It's easy to add this BASIC loader code to your programs by using an append routine. If you don't already have an append routine, see Randy Thompson's "Programmer's Page" in the September 1992 Gazette.

What's Happening

As Director-Ease executes, the following events take place. The code is placed in 102 bytes of RAM and then a relocation routine makes adjustments to some machine language instructions (JMP and JSR) inside the code. When the make loader option is selected, the dynamic keyboard technique is employed to create the data statements for BASIC and to delete Director-Ease from memory, leaving only the code for a BASIC program.

Being Selective

Reading either specific (PRG, SEQ, REL, USR) file types or all file types is easy with Director-Ease. The default for Director-Ease is to view all file types, but by entering a few POKEs, you can change the program to read specific file types only. Another default option is to view sequential files only. To switch to this default, enter *POKE (starting address + 9),6*. Then enter the SYS and starting address to view the directory. If there are no sequential files on the disk, only the disk header is printed. To switch back to viewing all files, enter *POKE (starting address + 9),1*.

Before continuing, let's review the decimal equivalents for ASCII characters *P, S, R,* and *U*. The ASCII value for *P* (PRG) is 80, the value for *R* (REL) is 82, the value for *S* (SEQ) is 83, and the value for *U* (USR) is 85. Here's how those values can be used to select specific file types for display.

POKE (starting address + 99),80
to view program (PRG) files only.
POKE (starting address + 99),82
to view relative (REL) files only.
POKE (starting address + 99),83
to view sequential (SEQ) files only.
POKE (starting address + 99),85
to view user (USR) files only.

To enable the option to view specific file types, enter one of the above POKEs and then *POKE (starting address + 9),6*. Then use SYS to get to the starting address to see the directory. To switch back to viewing all file types, enter *POKE (starting address + 9),1*.

Device Numbers

Director-Ease also lets you see directories on devices other than device 8. You can customize the program by entering the following three POKEs plus the device number of your drive or REU. (Note: The selective directory option will not work with Commodore 1700 series REUs. When used with these REUs, the option only lists directories of all file types.)

For directories on devices other than device 8, you'll have to enter three POKEs, each ending with the desired device or drive number. Here are those POKEs.

POKE (starting address + 1), device #
POKE (starting address + 21), device #
POKE (starting address + 89), device #.

Now, when you check a directory by typing *SYS starting address*, you'll get a listing of programs and files on whichever device or drive number that you selected in the above POKEs.

DIRECTOR-EASE

```
BM 0 REM COPYRIGHT 1993 - COMP
     UTE PUBLICATIONS INTL LTD
     - ALL RIGHTS RESERVED
JM 1 GOTO10:REM BY RANDY CLEMM
     ONS
SD 2 S=10{2 SPACES}:REM * DELE
     TE ROUTINE 2-8 *
JR 3 PRINT"{CLR}{2 DOWN}":FORI
     =S TO S+60 STEP10
FD 4 IFI>340THEN NEXT:PRINT"GO
     TO7":GOTO6
HS 5 PRINTI:PRINTCHR$(20):NEXT
     I:PRINT"S="S+60"{LEFT}:GO
     TO3"
GH 6 POKE198,10:FORK=1TO10:POK
     E630+K,13:NEXTK:PRINT"
     {HOME}":END
XK 7 PRINT"{CLR}{2 DOWN}":FORM
     =1TO8:PRINTM:NEXTM:PRINT"
     PRINT CHR$(147):LIST"
SH 8 POKE198,9:FORK=1TO9:POKE6
     30+K,13:NEXTK:PRINT"
     {HOME}":END
PJ 10 GOSUB130:INPUT"{CLR}
      {2 RIGHT}{2 DOWN}CREATE
      {SPACE}BASIC LOADER Y/N"
      ;C$:IFC$="Y"THENGOSUB110
      :GOTO 30
KJ 20 PRINT"{2 RIGHT}{2 DOWN}S
      YS";S:PRINT"{2 RIGHT}
      {2 DOWN}TO VIEW "T$" FIL
      ES":END
JH 30 PRINT"{CLR}{2 DOWN}":FOR
      I=STOS+47STEP6
JJ 40 IFI>FTHENNEXT:PRINT"GOTO
      80":GOTO70
PK 50 PRINTI;"DATA ";:FORJ=0TO
      5:R$=STR$(PEEK(I+J)):PRI
      NTRIGHT$(R$,LEN(R$)-1);"
      ,";
PJ 60 NEXTJ:PRINTCHR$(20):NEXT
      I:PRINT"S="S+48"{LEFT}:F
      ="F"{LEFT}:GOTO 30"
BM 70 POKE198,10:FORK=1TO10:PO
      KE630+K,13:NEXTK:PRINT"
      {HOME}":END
GH 80 SA=(PEEK(679)*256)+PEEK(
      680):EA=SA+101
DE 90 PRINT"{CLR}{3 DOWN}"SA-1
      "FORI="SA"TO"EA":READDA:
      POKEI,DA:NEXTI:END"
MF 100 PRINT"RUN 2":POKE198,2:
       POKE631,13:POKE632,13:P
       RINT"{HOME}":END
EK 110 REM **{3 SPACES}SAVE ST
       ARTING ADDRESS
       {3 SPACES}**
MB 120 TV=S:HB=INT(TV/256):LB=
       INT(TV-(HB*256)):POKE67
       9,HB:POKE680,LB:RETURN
SC 130 PRINT"{CLR}{3 RIGHT}
       {3 DOWN}ENTER STARTING
       {SPACE}ADDRESS NO.
       {3 SPACES}828"
DX 140 INPUT"{30 RIGHT}{UP}";S
DK 150 PRINT"{3 RIGHT}{2 DOWN}
```


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```
        POKING DATA TO MEMORY .
        .."
GG 160  REM * DIRECTORY ML DATA
         *
XR 170  FOR I= S TO S+101:READD
        A:POKEI,DA:NEXTI:F=S+10
        1
FC 180  DATA 169,8,170,160,0,32
        ,186,255,169
KS 190  DATA 1,162,154,160,3,32
        ,189,255,32
XS 200  DATA 192,255,162,8,32,1
        98,255,32
QJ 210  DATA 228,255,32,228,255
        ,32,225,255
HC 220  DATA 240,49,32,228,255,
        32,228,255
AH 230  DATA 165,144,208,39,32,
        228,255,141
PD 240  DATA 160,3,32,228,255,1
        74,160,3,32
MG 250  DATA 205,189,169,32,32,
        210,255
JE 260  DATA 32,228,255,240,6,3
        2,210,255,76
DJ 270  DATA 126,3,169,13,32,21
        0,255,76,91
KJ 280  DATA 3,32,204,255,169,8
        ,32,195,255
FD 290  DATA 96,36,48,58,42,61,
        83,0,0
DH 300  REM ** RELOCATION DATA
        {SPACE}**
QR 310  DATA 94,11,13,100,50,51
        ,100,56,57,66,75,76,31,
        83,84
RM 320  REM ** RELOCATION ROUTI
        NE **
EB 330  FORI=1 TO 5:READ DA:TV=
        S+DA:HB=INT(TV/256):LB=
        INT(TV-(HB*256))
SG 340  READLO:POKE(S+LO),LB:RE
        ADHI:POKE(S+HI),HB:NEXT
        I:RETURN
```

Randy Clemmons wrote this program when he found himself needing to relocate a directory reader to make room for other machine language code which required the same memory. He lives in San Diego, California

CROSSREF 128

By Donald G. Klich

Have you ever wanted to make modifications to someone else's BASIC program but were afraid to touch it for fear of reusing a variable name or removing an instruction that may be used as an entry point? Then you need CrossRef 128.

CrossRef 128 will process any 64 or 128 BASIC program and send an alphabetical listing of all variables and all the lines that refer to them to your printer. It also prints a list of all entry-point line numbers with their associated branching line numbers.

With this listing, it's then possible to choose unused variable names or replace original coding lines without the fear of accidentally queering the original program.

Typing It In

CrossRef 128 consists of two program segments, both written in BASIC 7.0. To help avoid typing errors, enter the programs with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Save the first segment with any name you wish, but be sure to save the second segment with the filename SEG.2 since the first program loads the second by that name. Note that abbreviated commands (upper case characters) are used on line 20 of the first segment. This is necessary so that the required code will fit in the key-definition area.

Creating a List

Load and run the first short program, and make sure your printer is turned on. This program loads the f1 function key area, displays some instructions, and then exits. Now DLOAD the program to be cross-referenced. Finally, be sure that the disk containing SEG.2 is in the drive and press the f1 key.

The amount of execution time required depends on the length and complexity of the target program. Large programs may take 15 minutes or more to process. As a comfort, turn up the volume on your monitor, and you should hear the churning activity.

The printout lists all variables used in the program in alphabetical order and the line numbers in which they appear. Following that is a listing in numerical order of lines that branch to other lines and their destinations. Now you can consult this cross-reference list before making changes or alterations to 64 or 128 BASIC programs without worrying about deleting or overwriting important variables or line numbers.

CROSSREF 128

```
PK 5 REM COPYRIGHT 1993 - COMP
       UTE PUBLICATIONS INTL LTD
       - ALL RIGHTS RESERVED
JS 10  REM LABELS AND CONSTANTS
SB 20  A$= "FAST"+CHR$(13)+"OP2
       ,8,2,"+CHR$(34)+"0:W,S,W
       "+CHR$(34)+CHR$(13)+"CM2
       "+CHR$(13)+"LI"+CHR$(13)
       +"PR2"+CHR$(13)+"CLOSE2"
MF 25  KEYI,A$+CHR$(13)+"RUN"+C
       HR$(34)+"SEG.2"+CHR$(34)
       +CHR$(13)
BQ 30  COLOR0,1:COLOR4,1:PRINT"
       {CLR}{4 DOWN}{YEL}
       {5 SPACES}LOAD THE PROGR
       AM TO BE PROCESSED":PRIN
       T"{10 SPACES}THEN PRESS
       {SPACE}THE F1 KEY"
```

SEG.2

```
MS 10  REM COPYRIGHT 1993 - COM
       PUTE PUBLICATIONS INTL L
       TD - ALL RIGHTS RESERVED
AG 20  REM SEGMENT 2
ED 30  FAST:OPEN2,8,2,"@0:W,S,R
       ":DIMRS$(150),PU$(14),LB
       $(700),LN%(700),ZS$(20),
       NA%(200),BA%(200):B=1:Q=
       1:QT$=CHR$(34):OPEN1,4
SG 40  FORI=1TO150:READRS$(I):N
       EXT
QA 50  FORI=1TO12:READPU$(I):NE
       XT
PF 60  REM ***ROUTINE TO EXTRAC
       T A LINE
CX 70  GET#2,A$:SU=ST
PB 80  IFA$=CHR$(13)THEN100
GC 90  B$=B$+A$:GOTO150
ER 100 IFLEFT$(B$,5)="READY"TH
       ENB$="":GOTO150
MA 110 IFB$=""THEN150
SB 120 I=INSTR(LEFT$(B$,9),"RE
       M"):IFI>0THENB$="":GOTO
       150
PA 130 I=INSTR(LEFT$(B$,10),"D
       ATA"):IFI>0THENB$="":GO
       TO150
XP 140 GOSUB170:B$=""
KH 150 IFSU=0THEN70:ELSECLOSE2
       :GOTO600
CH 160 REM ***ROUTINE TO EXTRA
       CT AN INSTRUCTION
CE 170 C$="":I=INSTR(B$," ",1)
       :N=VAL(LEFT$(B$,I-1)):P
       =I+1:ZP=1
QQ 180 IFP>LEN(B$)THEN250
BD 190 IFMID$(B$,P,1)=":"THEN2
       40
HK 200 IFMID$(B$,P,1)<>QT$THEN
       220
EH 210 P=P+1:IFCS=0THENCS=1:GO
       TO180:ELSECS=0:GOTO180
GC 220 IFCS=0THENC$=C$+MID$(B$
       ,P,1)
AB 230 P=P+1:GOTO180
DB 240 CL=LEN(C$):GOSUB270:P=P
       +1:C$="":GOTO180
MB 250 CL=LEN(C$):GOSUB270:RET
       URN
DC 260 REM ***SUBROUTINE TO EX
```


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```
      TRACT CONSTANTS
AQ 270 L=1
PQ 280 HT=0
JM 290 GOSUB520:IFL>0THEN290:E
       LSEL=-L
DC 300 IFL=CL+1THEN470
BR 310 FORT=1TO12:IFMID$(C$,L,
       1)<>PU$(T)THENNEXT:GOTO
       330
FD 320 HT=1:L=L+1:IFL=CL+1THEN
       470:ELSE310
MA 330 IFASC(MID$(C$,L,1))<>34
       THEN380
RP 340 HT=1:L=L+1
FK 350 FORT=LTOL+254:IFASC(MID
       $(C$,T,1))=34THENL=T+1:
       GOTO370
MM 360 NEXT:END
HH 370 IFL=CL+1THEN470
PC 380 IFMID$(C$,L,1)<>CHR$(44
       )ANDMID$(C$,L,1)<>CHR$(
       32)THEN400
GQ 390 L=L+1:HT=1:IFL=CL+1THEN
       470:ELSE380
FB 400 IFASC(MID$(C$,L,1))>57O
       RASC(MID$(C$,L,1))<48TH
       EN430
RH 410 IFSN=1THEN430
GR 420 HT=1:L=L+1:IFL=CL+1THEN
       470ELSE400
GG 430 IFHT=1ANDSN=0THEN280
AA 440 IFHT=1ANDSN=1THEN460
HK 450 SN=1:E$=E$+MID$(C$,L,1)
       :L=L+1:IFL=CL+1THEN470:
       ELSE280
BQ 460 SN=0:GOSUB480:GOTO280
AK 470 IFSN=1THENSN=0:GOSUB480
       :RETURN
SA 480 REM ***ROUTINE TO BLOCK
        DUPLICATE REFERENCES
RF 490 FORI=1TOZP:IFE$=ZS$(I)T
       HENE$="":RETURN
EB 500 NEXT:LN%(B)=N:LB$(B)=E$
       :ZP=ZP+1:ZS$(ZP)=E$:B=B
       +1:E$="":RETURN
KC 510 REM ***SUBROUTINE TO ST
       RIP INSTR
XE 520 FORT=30TO150STEP30:IFMI
       D$(C$,L,LEN(RS$(T)))>RS
       $(T)THENNEXT:GOTO580
CQ 530 T=T-29:FORU=TTOT+29:IFM
       ID$(C$,L,LEN(RS$(U)))>R
       S$(U)THENNEXT:GOTO580
DX 540 IFMID$(C$,L,LEN(RS$(U))
       )<RS$(U)THEN580
JF 550 IFRS$(U)="REM"THENB$=""
       :GOTO150
AD 560 IFRS$(U)="THEN"ORRS$(U)
       ="ELSE"ORRS$(U)="GOTO"O
       RRS$(U)="GOSUB"THENGOSU
       B700
CG 570 L=L+LEN(RS$(U)):HT=1:RE
       TURN
GE 580 L=-L:RETURN
HF 590 REM ***ROUTINE TO PRINT
        OUTPUT
GK 600 PRINT#1,"VARIABLE CROSS
        REFERENCE LIST":PRINT#
       1,"LABELS MAY APPEAR MO
       RE THAN ONCE ON A LINE"
       :PRINT#1
DR 610 A$="ZZZZ":FORI=1TOB-1:I
       FLB$(I)<A$THENA$=LB$(I)
CB 620 NEXT:IFA$="ZZZZ"THEN650
FM 630 PRINT#1,A$;SPC(6-LEN(A$
       ));"-";:FORI=1TOB-1:IFL
       B$(I)=A$THENPRINT#1,LN%
       (I);:LB$(I)="ZZZZ"
BQ 640 NEXT:PRINT#1:GOTO610
QG 650 PRINT#1:PRINT#1,"ACCESS
       ED LINES AND WHERE THEY
        ARE REFERENCED":PRINT#
       1
GJ 660 A%=32767:FORI=1TOQ-1:IF
       BA%(I)<A%THENA%=BA%(I)
MM 670 NEXT:IFA%=32767THENPRIN
       T#1:CLOSE1:SCRATCH"W":S
       LOW:END
AC 680 PRINT#1,A%;" - ";:FORI=
       1TOQ-1:IFBA%(I)=A%THENP
       RINT#1,NA%(I);:BA%(I)=3
       2767
JH 690 NEXT:PRINT#1:GOTO660
AD 700 L$="":FORI=L+LEN(RS$(U)
       )TOCL:A$=MID$(C$,I,1):I
       FASC(A$)<58ANDASC(A$)>4
       7THENL$=L$+A$:NEXT:GOTO
       730
SC 710 IFA$=" "THENNEXT:GOTO73
       0
RC 720 IFA$=","THENNA%(Q)=N:BA
       %(Q)=VAL(L$):L$="":Q=Q+
       1:NEXT:GOTO740
SC 730 IFL$<>""THENNA%(Q)=N:BA
       %(Q)=VAL(L$):Q=Q+1
RF 740 RETURN
DS 750 DATA ABS,AND,APPEND,ASC
       ,ATN,BACKUP,BANK,BEGIN,
       BEND,BLOAD,BOOT,BOX,BSA
       VE,BUMP,CATALOG,CHAR,CH
       R$,CIRCLE,CLOSE,CLR,CMD
       ,COLLECT,COLLISION,COLO
       R,CONCAT,COPY,COS
PB 760 DATA DCLEAR,DCLOSE,DEC,
       DEF,DIM,DIRECTORY,DLOAD
       ,DO,DOPEN,DRAW,DSAVE,DV
       ERIFY,ELSE,END,ENVELOPE
       ,ERR$,EXIT,EXP,FAST,FET
       CH,FILTER,FN,FOR,FRE,GE
       T
AJ 770 DATA GOSUB,GO64,GOTO,GR
       APHIC,GSHAPE,HEADER,HEX
       $,IF,INPUT,INSTR,INT,JO
       Y,KEY,LEFT$,LEN,LET,LIS
       T,LOAD,LOCATE,LOG,LOOP,
       MID$,MOVSPR,NEW,NEXT
AM 780 DATA ON,OPEN,OR,PAINT,P
       EEK,PEN,PI,PLAY,POKE,PO
       S,POT,PRINT,PUDEF,RCLR,
       RDOT,READ,RECORD,REM,RE
       NAME,RESTORE,RESUME,RET
       URN,RGR,RIGHT$,RND,RREG
       ,RSPCOLOR
JF 790 DATA RSPPOS,RSPRITE,RUN
       ,RWINDOW,SAVE,SCALE,SCN
       CLR,SCRATCH,SGN,SIN,SLE
       EP,SLOW,SOUND,SPC,SPRCO
       LOR,SPRDEF,SPRITE,SPRSA
       V,SQR,SSHAPE,STASH,STEP
       ,STOP,STR$,SWAP
PM 800 DATA SYS,TAB,TAN,TEMPO,
       THEN,TO,TRAP,TROFF,TRON
       ,UNTIL,USING,USR,VAL,VE
       RIFY,VOL,WAIT,WHILE,WID
       TH,WINDOW,XOR,ZZZZZ,#,(
       ,),+,-,/,*,↑,;,<,>,=
```

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YOUR OWN DATABASE

By Jim Butterfield

You can sit down at your 64 or 128 and write your own customized database program. The program will be in BASIC, and although it will have a few limitations, it will work nicely. Here's how to go about it. A sample program is included that will run on either a 64 or 128.

Types of Databases

The simplest type of database is called a flat file system. You may think of it as a set of cards in a drawer, in no particular order. To find a given record, you'll have to search through the whole set. That's not too hard to do if your database is of modest size. Our program will use flat files. This means that any new items that we add go at the end. We may also delete or modify existing records.

Indexed files are the next type of database and are a step up in complexity. The records are put in some type of order, such as alphabetical order by name. Although it wouldn't be a great deal of work to change our simple program to an indexed type, we'll stick with the simple flat files.

Relational databases are more complex because records are linked to each other. A school database might link students to classes to teachers to classrooms. These databases are too complex for us to tackle here.

Limitations

Some Commodore 8-bit machines have hard disks, but the most common setup is a single floppy disk drive. That configuration limits the size and

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style of databases that can be easily fitted into our system.

Our project will stay with a database that can be read completely into the computer's RAM memory. The process consists of reading in the whole file, viewing or modifying the data, and writing the whole file back to floppy disk.

Commodore BASIC is limited by the INPUT statement (and the related INPUT# statement). If the data coming in contains a comma (,) or colon (:) character, these statements will not behave. Ornate coding can get around these problems. But to keep it simple, we'll forbid the use of these characters in our database.

Typing It In

Database is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you exit Proofreader.

The Program

Database is a brief demo program to show you how to go about doing the job. You may want to modify it and expand on its basic form. As it stands in this demo, the database keeps track of members of a small club: last name, first name, date (of birth or membership), and high score.

In planning a database, it's important to list the fields: the data elements that go to make up a record. The sample program has four fields, and I've deliberately chosen three types: string (a name), date, and numeric value. A fourth type, dollars and cents, is also common, but isn't included here.

Decide on a maximum number of records for your database. I've chosen 50 records, but this can be easily changed by modifying the value of N9 in line 110.

The four fields are set up as arrays named A$( ), B$( ), C$( ), and D( ). The dollar symbols used with the first three indicate that these are strings. Field 3, C$( ), is the date, and it could be a number rather than a string. But since we don't do arithmetic on this field, it may be conveniently left as a string value. You may want to total or average field 4, which is the high score, so we'll drop the dollar sign and make this field a numeric one.

Program Modules

In lines 100–350, the program does a little initialization and then reads in the data file. If the data file doesn't exist, the program warns you of this but allows you to continue with an empty database. The program will create this file once you have entered some data.

Lines 400–510 ask for some action. You have the following options: add, delete, change (a record), show (the file), or quit. Some actions are not available if the database is empty or full.

Quit

Lines 520–760 handle the Quit option. If no changes have been made to the file or if the database contains no records, the program quits immediately. Otherwise, the program creates an updated file called MYDATA and writes it to disk. This is done carefully so that a backup file will exist. The sequence scratches the previous backup file; renames the former data file so that it becomes the backup; and, finally, writes the new data file.

Add

Lines 1000–1160 let you add records to the database. Data for the new record is requested. Then this record is displayed, allowing you to accept or cancel it.

Delete

Lines 2000–2210 contain the routine to delete records. You can select the record for deletion. That record is shown in detail so that you can confirm or cancel the delete request.

Change

The routine to change a record is found in lines 3000–3190. You are allowed to select the record to be changed. The record is shown in detail, with the four fields numbered; you are asked to select which field to change. After any change, you may continue to make changes on the same record.

It should be noted that a program can be set up to allow only certain changes. For example, the high score field might be available for modification, but the name fields, once entered, might be nonchangeable.

Display

Lines 4000–4290 display the records on the screen or send them to the printer. The coding assumes a 40-column screen, so the data is squeezed to fit. The screen display pauses from time to time to allow the data to be read. Printer output, in contrast, takes advantage of the wider output area and prints all records without pause.

Specify

The DELETE and CHANGE commands call for a specific record to be selected. This is done in the subroutine between lines 5000–5160. If you don't find the desired record, a no-record-selected value of 0 may be returned.

Date

Lines 8000–8120 handle the date routine: You are prompted for a date in year/month/day order. This is changed to a numeric string within the database. Dates held in this way, 19930214, for example, may be easily searched or sorted if necessary. Note that you may enter the month either as a name or as a number.

Comments

Database programs often contain extra features not shown here. For example, the program might search for selected data or produce totals or averages. Again, there are related programs (report generators) that sort and summarize data, but our simple program is kept to a minimum of steps.

Watch for the limitations of the INPUT statement. We've mentioned the need to stay away from commas and colons. As you expand the features of your database, keep in mind a few other factors. The computer won't like empty fields. If you have fields such as middle initial, apartment number, or date of marriage, be sure to have your program fill unused items with a dummy character such as a slash or asterisk.

Some databases never delete or change a record. If you need a change, a correcting entry is added. That's a valid way to do things, but it may cause the data file to grow to an unreasonable size. You might find it useful to reform your data at intervals, say

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at the start of each year. The old database may be kept as an archive; the new one will contain only current information.

The program Database is just a start. Plan your own data, and modify the program to meet your own needs.

DATABASE

```
FC 50 REM COPYRIGHT 1993 - COM
      PUTE PUBLICATIONS - ALL
      {SPACE}RIGHTS RESERVED
AS 100 REM SIMPLE FLAT FILE DA
      TA BASE
XE 110 N9=50
QM 120 DIM A$(N9),B$(N9),C$(N9
      ),D(N9)
QH 130 S$="{17 SPACES}"
JF 140 M9$="..JANFEBMARAPRMAYJ
      UNJULAUGSEPOCTNOVDEC"
KH 200 OPEN 15,8,15
PR 210 OPEN 1,8,3,"0:MYDATA,S,
      R"
AD 220 INPUT#15,E,E$
PF 230 IF E=0 GOTO 300
QM 240 CLOSE 1:CLOSE 15
DA 250 PRINT "I CANNOT FIND FI
      LE 'MYDATA'"
DS 260 INPUT "CONTINUE";X$
SR 270 IF X$="Y" OR X$="YES" G
      OTO 400
MH 280 END
JE 300 N=N+1
DQ 310 INPUT#1,A$(N),B$(N),C$(
      N),D(N)
EF 320 IF ST=0 GOTO 300
FX 330 CLOSE 1:CLOSE 15
SJ 340 PRINT N;"RECORDS FOUND
      {SPACE}ON FILE."
EQ 350 IF N+10>N9 THEN PRINT "
      FILE ALMOST FULL!"
GB 400 IF N>0 THEN PRINT "SHOW
      , ";
RJ 410 IF N<N9 THEN PRINT "ADD
      , ";
BP 420 IF N>0 THEN PRINT "DELE
      TE, CHANGE, ";
QG 430 PRINT "QUIT?"
JS 440 INPUT X$:X$=LEFT$(X$,1)
HX 450 IF N=0 GOTO 490
GG 460 IF X$="S" GOTO 4000
DP 470 IF X$="D" GOTO 2000
RK 480 IF X$="C" GOTO 3000
BF 490 IF N=N9 GOTO 510
QM 500 IF X$="A" GOTO 1000
MH 510 IF X$<>"Q" GOTO 400
QS 520 REM QUIT .. BUT PERHAPS
       WRITE FILE
XJ 530 IF F9=0 OR N=0 THEN END
FP 540 PRINT "READY TO WRITE F
      ILE!"
HX 550 PRINT "PRESS ANY KEY."
EE 560 GET X$,X$,X$
EJ 570 GET X$:IF X$="" GOTO 57
      0
CH 580 REM DELETE ARCHIVE IF P
      RESENT
AB 590 OPEN 15,8,15
RA 600 PRINT#15,"S0:MYDATA.OLD
      "
SJ 610 REM RENAME PREVIOUS DAT
      A FILE
XA 620 PRINT#15,"R0:MYDATA.OLD
      =0:MYDATA"
JQ 630 REM WRITE NEW MASTER FI
      LE
HS 640 OPEN 1,8,3,"0:MYDATA,S,
      W"
HQ 650 INPUT#15,E,E$
FE 660 IF E<>0 THEN PRINT E;E$
      :CLOSE 1:CLOSE 15:END
FE 670 FOR J=1 TO N
XA 680 PRINT#1,A$(J)
HG 690 PRINT#1,B$(J)
QG 700 PRINT#1,C$(J)
JS 710 PRINT#1,D(J)
FD 720 NEXT J
JD 730 INPUT#15,E,E$,E1,E2
XB 740 IF E<>0 THEN PRINT E;E$
DM 750 CLOSE 1:CLOSE 15
FF 760 END
RG 1000 REM ADD A RECORD
EQ 1010 INPUT "LAST NAME";A$(N
      +1)
RR 1020 INPUT "FIRST NAME";B$(
      N+1)
GX 1030 V=N+1:GOSUB 8000 : REM
       GET DATE
HD 1040 INPUT "HIGH SCORE";D(N
      +1)
KX 1050 PRINT
KJ 1060 PRINT A$(N+1)
AS 1070 PRINT B$(N+1)
PX 1080 PRINT C$(N+1)
KE 1090 PRINT D(N+1)
DG 1100 INPUT "IS THE ABOVE OK
      ";X$
QM 1110 IF X$="Y" OR X$="YES"
      {SPACE}GOTO 1140
JX 1120 PRINT ">>> RECORD CANC
      ELLED! <<<"
XA 1130 GOTO 400
XF 1140 N=N+1:F9=1
PE 1150 PRINT N;"RECORDS TOTAL
      ."
GF 1160 GOTO 400
GE 2000 REM DELETE A RECORD
AB 2010 GOSUB 5000
MJ 2020 IF X=0 GOTO 400
FD 2030 PRINT "READY TO DELETE
       RECORD:"
AX 2040 PRINT "{2 SPACES}";A$(
      X)
ER 2050 PRINT "{2 SPACES}";B$(
      X)
FH 2060 M=VAL(MID$(C$(X),5,2))
PB 2065 PRINT "{2 SPACES}";LEF
      T$(C$(X),4);MID$(M9$,M
      *3,3);RIGHT$(C$(X),2)
HG 2070 PRINT "{2 SPACES}";D(X
      )
PC 2080 INPUT "OK TO DELETE";X
      $
QR 2090 IF X$="Y" OR X$="YES"
      {SPACE}GOTO 2120
DA 2100 PRINT "RECORD >>>NOT<<
      < DELETED!"
RX 2110 GOTO 400
PH 2120 N=N-1
AF 2130 IF X>N GOTO 2220
XQ 2140 FOR J=X TO N
JM 2150 A$(J)=A$(J+1)
RJ 2160 B$(J)=B$(J+1)
SS 2170 C$(J)=C$(J+1)
CH 2180 D(J)=D(J+1)
GE 2190 NEXT J
FH 2200 F9=1
FK 2210 PRINT ">>> RECORD DELE
      TED! <<<"
FE 2220 GOTO 400
QB 3000 REM CHANGE A RECORD
GR 3010 GOSUB 5000
BM 3020 IF X=0 GOTO 400
KS 3030 PRINT "READY TO CHANGE
       RECORD:"
SJ 3040 PRINT "1:";A$(X)
HR 3050 PRINT "2:";B$(X)
MF 3060 M=VAL(MID$(C$(X),5,2))
DS 3065 PRINT "3:";LEFT$(C$(X)
      ,4);MID$(M9$,M*3,3);RI
      GHT$(C$(X),2)
EH 3070 PRINT "4:";D(X)
PA 3080 INPUT "CHANGE WHICH FI
      ELD (0=NONE)";J
EP 3090 J=INT(J):IF J<1 OR J>4
       THEN J=0
SG 3100 ON J GOTO 3120,3140,31
      60,3180
JQ 3110 GOTO 400
JG 3120 INPUT "LAST NAME";A$(X
      )
BH 3130 F9=1:GOTO 3040
DP 3140 INPUT "FIRST NAME";B$(
      X)
PG 3150 F9=1:GOTO 3040
JK 3160 V=X:GOSUB 8000 : REM G
      ET DATE
FE 3170 F9=1:GOTO 3040
RP 3180 INPUT "HIGH SCORE";D(X
      )
XP 3190 F9=1:GOTO 3040
JS 4000 REM SHOW - DISPLAY OR
      {SPACE}PRINT
CM 4010 INPUT "SCREEN OR PRINT
      ER";X$
BP 4020 X$=LEFT$(X$,1)
SC 4030 IF X$="P" GOTO 4190
SM 4040 IF X$<>"S" GOTO 4010
KS 4050 J=1
RM 4060 K=J+20:IF K=N THEN K=N
      +1
FC 4070 PRINT LEFT$(A$(J)+S$,1
      3);
GH 4080 PRINT LEFT$(B$(J)+S$,1
      0);
DE 4090 M=VAL(MID$(C$(J),5,2))
EP 4100 PRINT LEFT$(C$(J),4);M
      ID$(M9$,M*3,3);RIGHT$(
      C$(J),2);
```


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```
DB 4110 PRINT RIGHT$(S$+STR$(D
        (J)),7)
EQ 4120 J=J+1:IF J<>K GOTO 417
        0
BA 4130 PRINT "{2 SPACES}>> MO
        RE - PRESS ANY KEY <<"
        ;CHR$(145)
BR 4140 GET X$,X$,X$,X$
BM 4150 GET X$:IF X$="" GOTO 4
        150
RF 4160 GOTO 4060
RS 4170 IF J<=N GOTO 4070
HD 4180 GOTO 400
DP 4190 REM SEND TO PRINTER
KQ 4200 OPEN 4,4
BF 4210 FOR J=1 TO N
MB 4220 PRINT#4,LEFT$(A$(J)+S$
        ,20);
BJ 4230 PRINT#4,LEFT$(B$(J)+S$
        ,15);
JQ 4240 M=VAL(MID$(C$(J),5,2))
EE 4250 PRINT#4,LEFT$(C$(J),4)
        ;MID$(M9$,M*3,3);RIGHT
        $(C$(J),2);
AA 4260 PRINT#4,RIGHT$(S$+STR$
        (D(J)),10)
QG 4270 NEXT J
MB 4280 CLOSE 4
MM 4290 GOTO 400
XM 5000 PRINT "SELECT WHICH RE
        CORD:"
JM 5010 J=1
XK 5020 K=J+20:IF K>N THEN K=N
HS 5030 FOR S=J TO K
AF 5040 PRINT RIGHT$(S$+STR$(S
        ),3);": ";LEFT$(A$(S)+
        S$,12);
BR 5050 PRINT LEFT$(B$(S)+S$,6
        );
BG 5060 PRINT LEFT$(C$(S)+S$,8
        );
CR 5070 PRINT RIGHT$(S$+STR$(D
        (S)),7)
QQ 5080 NEXT S
DF 5090 PRINT ">> SELECT RECOR
        D NUMBER, OR 0 ";
SD 5100 IF K<>N THEN PRINT "FO
        R MORE <<"
AH 5110 IF K=N THEN PRINT "TO
        {SPACE}QUIT <<"
SE 5120 INPUT X
JB 5130 X=INT(X):IF X>N THEN X
        =0
SS 5140 J=K
KM 5150 IF X=0 AND K<>N GOTO 5
        020
XB 5160 RETURN
XP 8000 INPUT "YEAR";Y
CM 8010 IF Y<1900 OR Y>9999 GO
        TO 8000
CQ 8020 INPUT "MONTH";M$
FD 8030 M=VAL(M$):IF M>0 AND M
        <13 GOTO 8050
JM 8040 M$=LEFT$(M$+S$,3)
SX 8050 FOR J=1 TO 12
HP 8060 IF M$=MID$(M9$,J*3,3)
        {SPACE}THEN M=J
FG 8070 NEXT J
QQ 8080 IF M<1 OR M>12 GOTO 80
        20
SE 8090 INPUT "DAY";D
MQ 8100 IF D<1 OR D>31 GOTO 80
        90
RK 8110 C$(V)=RIGHT$(STR$(Y),4
        )+RIGHT$(STR$(M+100),2
        )+RIGHT$(STR$(D+100),2
        )
RS 8120 RETURN
```

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ML MACROS

By Cameron Kaiser

On the side of my computer I have taped a list of SYS codes: SYS 62913; SYS 49152,X,Y,Z; SYS 64738; SYS 57812"filename",D,S; and so on. The only way I can keep them straight is to use them or write them down; otherwise, I'll forget them.

Unfortunately, I still have problems keeping all those SYS codes straight. This is where ML Macros comes in. All you have to do is remember one SYS code, and with a simple symbol that you define, you can call up an infinite number of ML programs easily and quickly. And ML Macros can prove a boon to programmers by providing an easily customized and handy interface to their programs.

Entering the Program

ML Macros is written in machine language. To enter it, you'll need MLX, our machine language entry program; see "Typing Aids" elsewhere in this issue. When the program prompts for starting and ending addresses, enter the following.

Starting address: CE00
Ending address: CFE7

Be sure to save a copy of the program before exiting MLX.

Running the Program

To install ML Macros, simply load the program with the ,8,1 extension. After it loads, type *SYS 53052*, press Return, and then type *NEW* to clear pointers. If you want to load and run ML Macros from within a BASIC program, add these lines to your program.

```
0 IFA=0 THEN A=1:LOAD "ML MACROS",8,1
1 IFA=1 THEN SYS 53052
```

Of course, you can use whatever line numbers are convenient for you.

Using the Program

To converse with ML Macros, you'll use commands that all begin with the # symbol. In ML Macros the first command defines a macro. To use it, type *#,2, ASC("character"), address. Character* is any symbol not reserved by the computer. Most punctuation marks are acceptable. *Address* is the starting address of the machine language subroutine that will be triggered when you enter the character. For example, #,2,ASC("&"),64738 will program the ampersand to reset the computer if it is entered as a command.

The second command lets you save a set of macros to disk. To use it, type *#,3,"filename",dev,1,* where *filename* is any legal filename and *dev* is the device number of your drive, usually 8. This command also saves the ML Macros code to disk with the macros so that one LOAD command will give you easy access to macros and ML code on all your disks.

The final command reloads a set of macros from disk. To use it, type *#,4,"filename",dev,1. Filename* and *dev* are used the same as they are in the SAVE command.

ML Macros isn't fussy about its input. It's possible to define two macros to the same character; however, only the first macro defined will be honored. This means you cannot erase a macro by defining its character to another ML routine. Should you wish to wipe the macro memory, type *POKE 52992, 3.* Should you wish to erase only the last macro defined, type *POKE 52992, PEEK(52992)–3.*

While ML Macros was designed with compatibility in mind—it doesn't modify IRQ, NMI, or Kernal vectors and occupies a rarely used portion of memory—any modifications to locations 52736–53223 ($CE00–$CFE7) will cause erratic behavior when ML Macros or any macro defined under it is invoked. This doesn't apply to BASIC, but it does apply to some ML routines. Good luck with your ML programs, and I hope ML Macros makes them easier.

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ML MACROS

```
CE00:23 0C CF 00 00 00 00 00 2C
CE08:00 00 00 00 00 00 00 00 A5
CE10:00 00 00 00 00 00 00 00 AD
CE18:00 00 00 00 00 00 00 00 B5
CE20:00 00 00 00 00 00 00 00 BD
CE28:00 00 00 00 00 00 00 00 C5
CE30:00 00 00 00 00 00 00 00 CD
CE38:00 00 00 00 00 00 00 00 D5
CE40:00 00 00 00 00 00 00 00 DD
CE48:00 00 00 00 00 00 00 00 E5
CE50:00 00 00 00 00 00 00 00 ED
CE58:00 00 00 00 00 00 00 00 F5
CE60:00 00 00 00 00 00 00 00 FD
CE68:00 00 00 00 00 00 00 00 06
CE70:00 00 00 00 00 00 00 00 0E
CE78:00 00 00 00 00 00 00 00 16
CE80:00 00 00 00 00 00 00 00 1E
CE88:00 00 00 00 00 00 00 00 26
CE90:00 00 00 00 00 00 00 00 2E
CE98:00 00 00 00 00 00 00 00 36
CEA0:00 00 00 00 00 00 00 00 3E
CEA8:00 00 00 00 00 00 00 00 46
CEB0:00 00 00 00 00 00 00 00 4E
CEB8:00 00 00 00 00 00 00 00 56
CEC0:00 00 00 00 00 00 00 00 5E
CEC8:00 00 00 00 00 00 00 00 66
CED0:00 00 00 00 00 00 00 00 6E
CED8:00 00 00 00 00 00 00 00 76
CEE0:00 00 00 00 00 00 00 00 7E
CEE8:00 00 00 00 00 00 00 00 86
CEF0:00 00 00 00 00 00 00 00 8E
CEF8:00 00 4C DB CF 4C 98 CF 8E
CF00:03 00 00 20 FD AE 20 9E AC
CF08:AD 4C 01 B8 20 03 CF C0 AA
CF10:01 F0 0F C0 02 F0 E6 C0 BC
CF18:03 F0 DF C0 04 F0 15 4C D7
CF20:E7 A7 4C AE A7 D0 08 A9 4C
CF28:01 8D 01 CF 4C AE A7 A9 DE
CF30:00 4C 29 CF 20 73 00 4C 20
CF38:8F CF 60 0D A9 47 A0 CF EB
CF40:8D 08 03 8C 09 03 60 20 07
CF48:73 00 A2 00 DD 00 CE F0 73
CF50:2C E8 E8 E8 EC 00 CF D0 C3
CF58:F3 20 79 00 4C E7 A7 8E 09
CF60:02 CF 20 73 00 20 6B CF 57
CF68:4C E7 A7 AE 02 CF E8 BD E6
CF70:00 CE E8 BC 00 CE 85 FE F1
CF78:84 FF 6C FE 00 AD 01 CF 60
CF80:F0 DD 20 73 00 F0 D8 DD 9E
CF88:00 CE F0 D3 4C 82 CF 20 63
CF90:D4 E1 20 A7 F4 4C AE A7 6F
CF98:20 03 CF 98 AE 00 CF 9D 3F
CFA0:00 CE EE 00 CF 20 FD AE 7B
CFA8:20 9E AD 20 F7 B7 A5 14 B5
CFB0:AE 00 CF 9D 00 CE EE 00 94
CFB8:CF A5 15 9D 01 CE EE 00 47
CFC0:CF 4C AE A7 20 D4 E1 A9 6D
CFC8:00 85 FD A9 CE 85 FE A9 58
CFD0:FD A2 E8 A0 CF 20 D8 FF EF
CFD8:4C AE A7 20 73 00 4C C4 3A
CFE0:CF 00 00 00 00 00 00 00 68
```

Cameron Kaiser is a senior at Lutheran High in San Diego. His interests include Pink Floyd, basketball, rock music, and his nine-year-old Commodore. He lives in La Mesa, California. ❐

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in Proofreader exactly as listed. Because the program can't check itself, be sure to enter each line carefully to avoid typographical errors or other mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy of the program before running it.

Next, type *RUN* and press Return. After the program displays the message *Proofreader Active,* you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, Proofreader displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line. Also, be sure not to skip any lines.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using Proofreader on the 128, do not perform any GRAPHIC commands while Proofreader is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while Proofreader is in memory.

Though Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

AUTOMATIC PROOFREADER

```
0 CLR
10 VE=PEEK(772)+256*PEEK(773):
   LO=43:HI=44:PRINT"{CLR}
   {WHT}AUTOMATIC PROOFREADER
   {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
   6:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
   6:FOR J=SA TO SA+166:READ B
   :POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
   RROR* CHECK TYPING IN DATA
   {SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
   B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
   RROR* RELOAD PROGRAM AND CH
   ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
   ,22:POKE SA+18,23:POKESA+29
   ,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773):PRINT"
    {CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
    POKE (PEEK(LO)+256*PEEK(HI
    ))-1,0:NEW
120 DATA120,169,73,141,4,3,169
    ,3,141,5,3,88,96,165,20,13
    3,167
130 DATA165,21,133,168,169,0,1
    41,0,255,162,31,181,199,15
    7,227
140 DATA3,202,16,248,169,19,32
    ,210,255,169,18,32,210,255
    ,160
150 DATA0,132,180,132,176,136,
    230,180,200,185,0,2,240,46
    ,201
160 DATA34,208,8,72,165,176,73
    ,255,133,176,104,72,201,32
    ,208
170 DATA7,165,176,208,3,104,20
    8,226,104,166,180,24,165,1
    67
180 DATA121,0,2,133,167,165,16
    8,105,0,133,168,202,208,23
    9,240
190 DATA202,165,167,69,168,72,
    41,15,168,185,211,3,32,210
    ,255
200 DATA104,74,74,74,74,168,18
    5,211,3,32,210,255,162,31,
    189
210 DATA227,3,149,199,202,16,2
    48,169,146,32,210,255,76,8
    6,137
220 DATA65,66,67,68,69,70,71,7
    2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
    116,117,151,128,129,167,13
    6,137
```


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TANDY SENSATION!

Tired of computers whose names look like catalog order numbers? Ready for a machine that does more than merely boot up or run Windows? Need a little fanfare before you start punching numbers into your spreadsheet?

Probably not. Most likely, you're more concerned with getting a computer that runs quickly and efficiently at a good price—one that comes with plenty of software, a sharp monitor, and worthwhile extras like a mouse and advanced sound. Fortunately, the Tandy Sensation! offers all that along with its cutesy name, colorful graphical user interface, and flashy introductory screen.

The Sensation! is a multimedia PC, meaning it has a CD-ROM drive and meets the MPC hardware standards as defined by the MPC Marketing Council (see Test Lab in the December 1992 issue of COMPUTE). It also has a 107MB hard drive, a 3½-inch floppy drive, a 2400-bps modem (4800-bps for fax communications), a 486SX processor running at 25 MHz, a standard 101-key keyboard, a two-button Tandy mouse, stereo MPC sound, and a Super VGA monitor running in 1024 × 768 noninterlaced mode. Loaded with plenty of software, including CD-ROM programs, this system gives you enough to keep you busy until the next congressional elections.

Forget about sitting through any tedious installation programs. Despite its wealth of features, getting started with the Sensation! couldn't be simpler. All you do is take the unit out of its box; plug the monitor, keyboard, and mouse cables into the receptacles labeled for them; run the phone cord provided from the modem to the nearest jack; and plug in the PC and monitor. Turn on the power button at the front of the unit—it's clearly marked, and it's distinct and separate from the reset button—and within moments the Sensation! announces itself with a trumpetlike fanfare. Another few seconds, and you're in WinMate, Tandy's brightly colored, talking Windows companion.

Once past the Tandy Sensation!'s exclamatory name and heraldic introductory screen, you'll find a versatile multimedia PC.

From there you're only a few clicks of the mouse button away from hours of fun and/or productivity. WinMate takes you through your programs in much the same way that Windows does; it just enhances the icons, sets them against vivid backdrops, and organizes them under such logical headings as In Touch and In the Know. Need to type a memo? Try Windows' Write program, or the truncated version of Microsoft Word included with Microsoft Works. Planning a trip? Try Travel Planner, which organizes all your important vacation information into one logical file. Want to know who invented the cotton gin? Look it up in the Concise Columbia Encyclopedia.

There's plenty more software where that came from—including Bartlett's Quotations, The World Almanac, Phoenix MicroFAX, and startup programs for America Online, Prodigy, and The Sierra Network—accessible from the moment your Sensation! powers up. I installed and used a few programs of my own, including XyWrite and The Norton Antivirus, and they all worked fine, even when modifications were necessary to the Sensation!'s CONFIG.SYS or AUTOEXEC.BAT files. I tried nearly every preinstalled program at least once, and I never had a problem except the occasional prompts to put a missing CD in the CD-ROM drive. (It would be nice if the Sensation!'s WinMate icons indicated which CD to use for which program, but that's hardly a significant concern.)

Those CD prompts take little effort to fulfill. The CD-ROM drive sits in the upper right corner at the front of this compact PC (its footprint is 15 × 15.5 × 4.2 inches), to the right of the floppy drive and above the volume buttons and jacks for microphone and headphones. You open the CD-ROM drive by pushing it in a little, after which the CD tray slides out. Unlike some multimedia machines, the Sensation! requires no CD caddy. You simply place the CD in its slot and manually close the drawer, and the disc begins to spin. As a music fan, I enjoyed being able to listen to Thelonious Monk, Jesus Jones, and Charlie Rich CDs played in the background on the Sensation! while I did my work. Like the Sensation!'s keyboard and mouse, the CD drawer proved a little stiff and clunky, though not debilitatingly so. While not blindingly fast, both the CD-ROM and hard drives gave me the speed I'd expect from a 486 machine.

The logically organized user's guide provides clear, helpful information for novice and veteran alike. I'd like to be able to tell you the technical support for the Sensation! did as well, but I don't know. The computer ran so well that I never found an excuse to call the

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company and find out. The biggest drawback I found with the Sensation! had nothing to do with technical support, anyway: I missed having a 5¼-inch floppy drive to load my old programs that came in that format. That's the price you pay, I suppose, for having a hard drive, 3½-inch floppy drive, and CD-ROM drive. The Sensation! also has a crisp, colorful monitor; a sturdy modem; and MIDI connector cables to facilitate the use of the computer's multimedia capabilities.

Looking for a computer that does a good job on a variety of tasks, comes loaded with software and CDs, and offers multimedia functions? Don't let the Sensation!'s flash fool you. Behind all the lights and sounds, you'll find an excellent machine that does a lot and does all of it well.

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ROOMS FOR WINDOWS

Whether you're a Windows novice or power user, Rooms for Windows can make your computing life a lot easier. Rooms offers a convenient and simple way to multitask like a master and organize your applications and files—both Windows and DOS. The Rooms metaphor—with its concrete images of rooms, suites, and doors—makes the program fairly intuitive; learning is also enhanced by plenty of online help and a well-designed, slim manual.

With Rooms, instead of working in a window, you work with applications, files, and other objects in a room. (Each room is a separate Windows desktop, even though only one instance of Windows is actually running.) Several rooms occupy a suite, and doors enable you to enter and exit the rooms. From the Suite Overview, you can see at a glance all the rooms in your suite: They appear side by side as large squares.

Open a new door into Windows computing with Rooms for Windows, a simplified way to organize your applications and files.

Each room can contain a specific application, such as a database program and files, or all applications and files for a specific client or project. For instance, a Newsletter Room can hold a desktop publishing program, graphics application, and all newsletter files. But what if you want to draft newsletter stories in your DOS word processor? Simply create a full-screen DOS Room. The screen looks as if you exited to your word processor in DOS, except that when you finish your DOS document, you return to the DOS Room and can enter the door to your Newsletter Room.

Switching back and forth between projects and/or applications and files in Windows and DOS is as simple as double-clicking on a Door icon. And there you go: You're multitasking and well organized to boot. What's more, you can create different suites for different tasks or people. If you share the computer with someone, each can have his or her own suite of rooms.

A special room in a suite is the Overlay Room, because any application you put inside it automatically appears in all rooms. Having Program Manager in Overlay enables you to start up Windows applications from any room. With your word processor in Overlay, it's available in whatever room you need it. It's also handy to include Windows accessories such as Cardfile and Calendar in Overlay, so you can grab or jot down names and dates from any room.

You can also share a document between rooms by using the Include command; this is similar to placing a document in Overlay. A Copy command enables you to copy a file to another room, such as a contract, and make changes to it without changing the original. You can also drag an object out of one room and into another with Move.

Rooms runs as an application under Windows; when you start a Windows session, all rooms and suites you've created are automatically opened and ready for business. To conserve system resources, you create shortcut buttons in a room. Buttons may store a special Windows application or an exit to a full-screen DOS room, or they may execute a DOS command such as copying files for backup. The application or file isn't opened until you click on the button icon.

Overall, Rooms for Windows is a practical way to take the hassle out of getting the full benefits of the Windows environment.

BETH C. FISHKIND

IBM PC or compatible (80286 compatible, 80386SX/DX compatible recommended), 2MB RAM (4MB recommended), EGA or VGA, Windows 3.0 or 3.1; mouse recommended—$59

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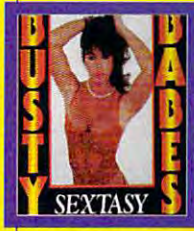

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ble Toshiba T6400, had only one slot, which I didn't want to devote to an interface card for a tape backup system.

Fortunately, several manufacturers make parallel-port tape backup drives, including Colorado Memory Systems, a company with a reputation for selling quality tape drives at affordable prices. I looked at the Jumbo Trakker 250. It should work with any PC that has a parallel port, including notebook, laptop, and desktop computers.

As you might expect, the parallel-port tape drives are somewhat slower than standard internal or external tape drives. A 33-MHz 80386 can back up 10MB in roughly three minutes with a Jumbo Trakker; it takes roughly two minutes with a standard tape drive. The slower speed isn't a problem in most cases, as you can get the system going and come back to it when it's finished. If your computer has a bidirectional parallel port, you can pick up some extra speed. (I wasn't able to get this setting to work with the T6400; Colorado Memory Systems is currently working on a fix). And if you have an EPP (Enhanced Parallel Port) on your system, the Trakker can actually move data as fast as a standard tape drive.

The Jumbo Trakker comes in two models: the 120 (a 120MB system for $448) and the 250 (a 250MB system for $548). These capacities are based on data compression, so you may get more or less than this amount on a single tape.

If you have additional data to back up, the software will prompt you to insert additional tapes. Both models use standard DC-2000 minicartridges and QIC formatting and provide a parallel-port pass-through for your printer.

The DOS-based software is easy to use and well documented. The Windows software wasn't ready in time for this review, but it should allow you to run other programs while you're performing a backup.

Overall, I like the Trakker 250 very much. If you have a notebook or laptop, it's your best solution for backing up a medium to large drive.

And if you have more than one PC and don't mind the slower speed, you can use the Trakker on all your PC-compatible systems by installing the software on each and moving the drive from machine to machine.

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Colorado Memory Systems Jumbo Trakker 250: slower than a conventional tape backup, great for notebooks and laptops.

MIGHT AND MAGIC: CLOUDS OF XEEN

Bigger, brighter, and bolder than ever, New World Computing's latest flight of fantasy is so charismatic that it nearly jumps off the screen. From the opening credits—with a clever parody of MGM's Leo the Lion—to the rogues' gallery at game's end, designer Jon Van Caneghem displays the confidence of an artist at the top of his form.

Caneghem utilizes the same dynamic front-end of his previous hit, Might and Magic III. Might and Magic: Clouds of Xeen may well be the perfect role-playing interface: detailed, yet streamlined, and colorfully intuitive. The main display window is among the largest in the genre, pulling players into this 3-D fantasy world. Even the ornate window frame is interactive, featuring unique animated signs of nearby danger, secret passages, and active spells. Character portraits also provide visual clues to your party's health: Facial expressions change to show conditions such as pain, unconsciousness, fatigue, and insanity. Select any portrait to display the icon-driven character screen, where you can view individual attributes, track party statistics, and manage inventories. Every aspect of the game is easily accessed via keyboard or mouse.

Beyond these familiar trappings, the game's story line takes the series in an entirely new direction. Your party of six adventurers gathers in the town of Vertigo, summoned through their dreams by Crodo, adviser to King Burlock. He warns of a stranger who has appeared, claiming to be the King's long-lost brother. The impostor is in fact Lord Xeen, a demonic fiend who imprisons Crodo and poisons the land from his elusive cloud kingdom. Your quest: Search the vast nether world, battle hordes of terrible creatures, and put an end to Xeen's rule.

The game world is huge: five towns, nine mines, three towers, three cloud worlds, four castles, five dungeons, three caverns, and 24 unique outdoor areas. The game's open-ended design encourages spontaneous exploration, allowing you to branch off on dozens of miniquests. Although most have nothing directly to do with your main objective, these subplots earn characters experience and rewards while adding flavor and variety. The game also contains built-in links to the Darkside of Xeen, a forthcoming sequel.

Other new features include two initial play modes: Adventurer and Warrior. The first, designed for novice players, softens the combat aspects of play.

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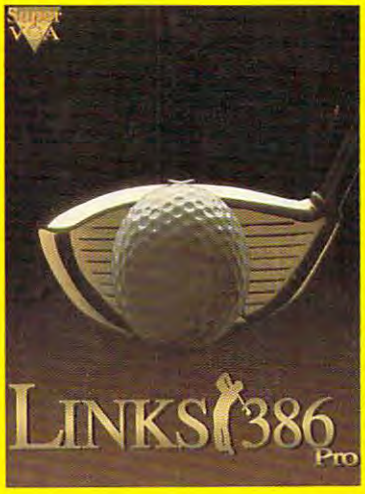

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The second unleashes full-tilt carnage from the game's roster of 90 ghastly creatures. These oversized characters, beautifully rendered in 256-color VGA, spring to life with vivid animation and chilling sound effects. Fend them off with specially modified weapons and armor, or master each of the 76 unique cleric and sorcerer spells. Veteran players will be especially pleased with the new adventurer's journal, which automatically records important clues, locations, and quest items.

The only shortcoming worth mentioning is the rather rudimentary nature of your quest. Role players itching to solve complex puzzles might be disappointed by the combat-intensive plot. On the other hand, hardcore hack-'n'-slashers will revel in melees that grow more intense with every turn.

Nearly perfect in design and execution, Might and Magic: Clouds of Xeen is one fantasy you'll wish would never end.

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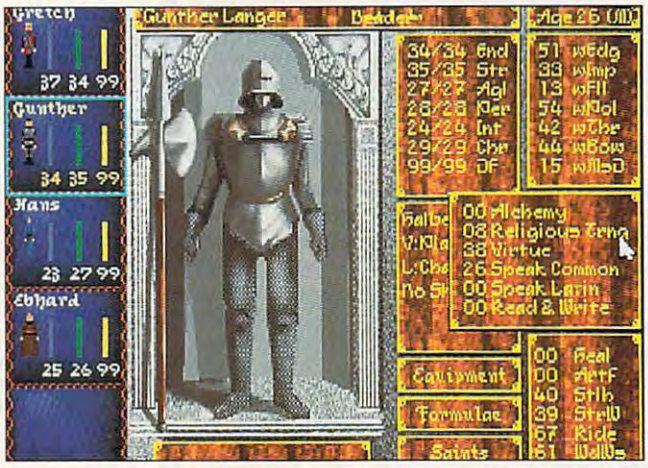
DARKLANDS

The setting is medieval Germany in the 1400s, where witches, alchemists, religious fanatics, dragons, demons, myths, and superstitions fill the popular consciousness. Darklands, a new adventure game from MicroProse, takes you there.

In Darklands, magic, or alchemy, is based on the mixing of 19 potions of three distinct quality levels from 19 special substances and four bases. They're mixed in glass flasks which are thrown at, applied to, or imbibed by the intended target.

Clerics call to 140 saints for individualized intervention in worldly events. These saints not only have a personality but they also have a sense of humor, which makes selecting different saints in various situations an entertaining game within itself.



Suit up for a trip to medieval Germany in Darklands, a role-playing adventure game packed with interesting details.

Parties can be created via a selection of heritage, training, and professions, which will mold the six attributes and 19 skills into a group of four adventurers. A fifth member can join the group for specific quests, or you can choose a predetermined party. Characters appear in paper-doll fashion on the comprehensive character information screen, which shows the item inventory (holding up to 45 items), known saints, and known alchemic formulas.

An overhead oblique display of realtime combat shows the invoking of saints, use of alchemic formulas, and ranged melee weapons, which become effective automatically when you select various actions. Combat can be with city street thugs and roving bandits, and can occur in robber knights' castles, Templar monasteries, witches' Sabbaths, dragons' lairs, and dwarven mines. I'd advise directing the play in realtime rather than allowing the rather limited and flawed artificial intelligence routing to direct the action. But for easy battles, autocombat will do.

Attention to detail is exemplary in Darklands. It's filled with appealing details, such as the relative destructive power of brass versus iron handguns, which were engineered and used in the fifteenth century. All details are as they were—or as they would've been, had the myths and stories been true.

The interiors of mines, monasteries, and the final citadel are all in the same overhead oblique display. Currently, games cannot be saved from these interiors, making gameplay more of a marathon realtime arcade game than most role players are used to. MicroProse has plans to eliminate the problem. The interior maps can be scrolled, allowing the map to serve as its own automapping routine.

Movement through the cities is achieved by making selections from lists of choices that are overlaid by watercolor background representations of the events at each area. These drawings evoke the original Samurai game engine on which Darklands has been hung. You get many such choices throughout the game, and the decisions made from these choices determine not only where the character goes and his or her success or failure, but also the plot's texture, flavor, and nuances.

The real beauty of the Darklands epic is the multitude of choices you get, which surpass the complexity and historical accuracy seen in any other contemporary computer game. The true role-playing enthusiast will be dazzled by the game's sheer volume of choices and historically accurate situations. Even after you've explored the central plot and many subplots, you can continue the quest indefinitely.

In spite of the initial trouble with bugs, this newly revised game should give you hours of pleasure. MicroProse should be congratulated for a truly heroic effort in creating a game for sword, sorcery, and history buffs.

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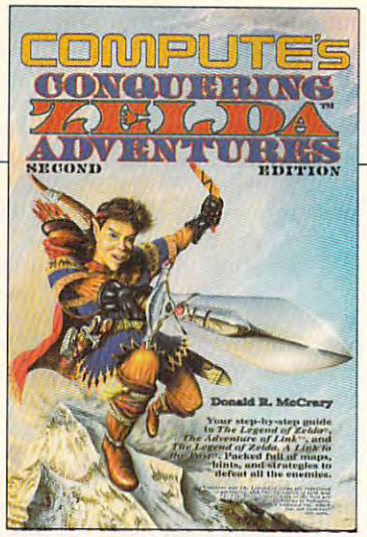

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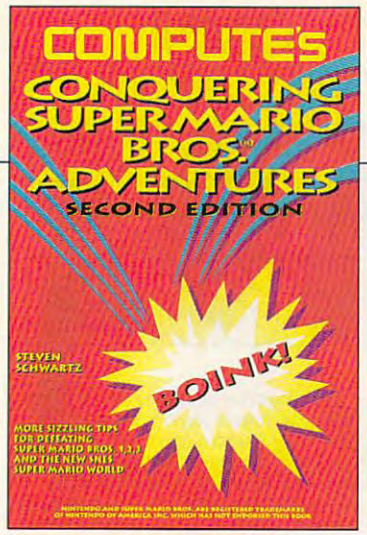

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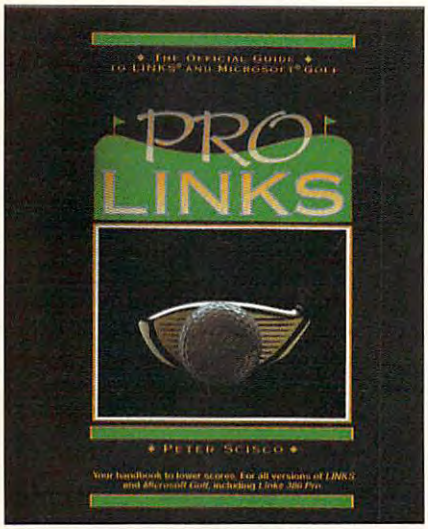

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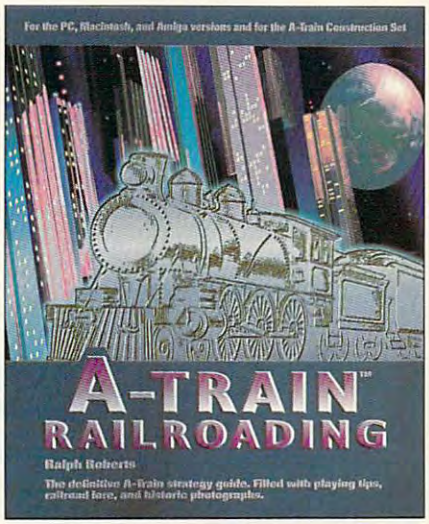

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As much as I'd like to have a fax machine, the cost is too great for two or three transmissions a week. But I use a modem every day, and its cost is easy to justify. Zoltrix has addressed this problem head-on with three low-cost internal fax/modem cards. Each of them functions just like a modem and adds full fax capabilities—all for about twice the price of a standard internal modem.

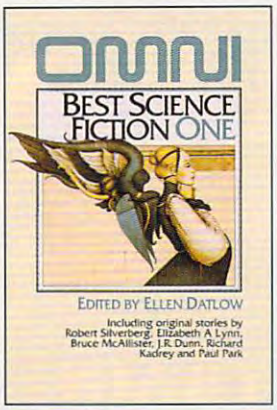
They're not at the leading edge of fax/modem technology. The manual isn't 500 pages boasting thousands of features. In other words, they're just at my level.

I don't want features I'll never use or a manual that takes a Ph.D. to read. I want a simple, straightforward device that does what I need. Anyone who can read will have no trouble installing and configuring the cards and getting the software up and running.

All three communicate at 300, 1200, or 2400 bps. All my terminal programs worked perfectly, and the America Online software—notoriously picky about modems—worked fine. I've used plenty of dedicated modems that had more trouble coexisting with a variety of communications programs.

BitCom Deluxe software comes with all three. It's a basic telecommunications package for modem mode without a lot of bells and whistles. There isn't a script or macro language as powerful as Telix's or Procomm's, and file transfers are limited to ASCII, XMODEM, YMODEM, CompuServe B Plus, and Kermit protocols. If you're new to modems, online services, and BBSs, though, it's an adequate start. One nice feature is software-generated MNP 5 compression. Since the modems aren't equipped with MNP 5 compression in hardware, this is the next-best thing. Theoretically, MNP 5 can speed up transfers as much as 200 percent.

In fax mode the boards perform well. The Standard and Enhanced models send and receive at 9600 bps, while the Integra sends at 9600 bps and receives at 4800 bps. All of them have the ability to drop their transmission speeds to 7200 or 4800 bps if the



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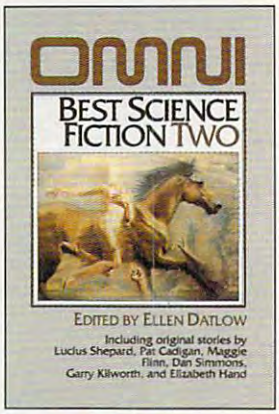

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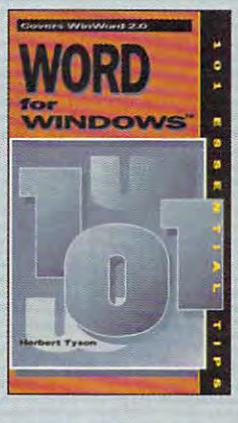

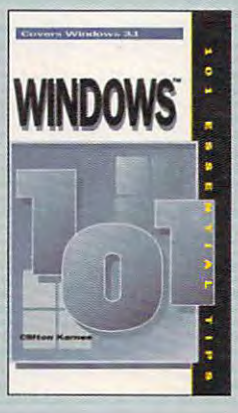

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receiver is at a lower speed or if adverse transmission conditions such as line noise make a slower speed advisable. Don't worry if all of this sounds technical. It's handled automatically by the hardware and software; I was never aware of the communication speed when sending and receiving.

Most of my testing was done between two computers at home. That provided a great advantage for reviewing these units. I saw the results of transmissions immediately and was able to draw accurate conclusions quickly. Both systems are IBM compatibles, but they're configured differently. One is a 286 with Stacker managing the hard drive. The other is a 486 with plenty of extended memory. There wasn't the faintest hint of hardware or software conflicts on either machine, even when I ran the background send and receive modules. I'd feel comfortable saying that you'll probably have the same results. Of course, there will be exceptions to this, but those will probably be rare.

All three fax/modem cards come with BitFax/SR software. It's easy to use, and it has everything I need. I was disappointed not to get an installation program to make the setup easier. But the manual is clear and easy to follow, so I didn't have any problems.

The Enhanced model has built-in error correction protocols. The best of these is the V.42/MNP auto reliable mode. It senses whether the other machine has the equivalent error-correcting protocol and responds accordingly. This is one of the most sophisticated error-correcting operating modes available today. My phone lines are relatively free of noise, so I couldn't tell the difference between models. If you're worried about line noise, though, this feature might be important for you.

Sending faxes with BitFax is easy. It loads any file in MultiMate, WordPerfect, Microsoft Word, or WordStar format. If you have any other word processor, you have to save a document as an ASCII file before sending. Then you design a cover sheet, enter information about the destination fax machine (the phone number, for instance), and press a function key.

From there it's all automatic. The transmission is initiated and managed entirely by the software and hardware. Different cover sheets can be saved to disk and loaded anytime before sending a fax. Or you can send a document without a cover sheet. And a database of destinations can be retained on disk for easy retrieval.

I found the built-in text editor useful for sending faxes. Most of the time, I send faxes with a one- or two-page message. Using my word processor requires two steps: creating the document and saving to disk, then running BitFax and sending the document. With the built-in editor, you can type your document and send it from within the same program shell.

It's just as easy to send PCX, TIF, IMG, BFX, or DFX graphics files. The software loads them and sends the graphics image automatically. And there's a conversion utility that changes received faxes which are usually in TIF format to other graphics formats. That way, you can use faxes in other programs, possibly importing them into a desktop publishing application as part of a presentation.

BitFax has a module you can install as a memory-resident program that automatically sends and receives faxes in the background. Background sending can be done automatically at a preset time, freeing up your computer from having to dedicate itself to fax transmissions. I found that sending and receiving would occasionally cause my systems to slow down. I suppose you'd have to weigh that against the benefits of running the back-

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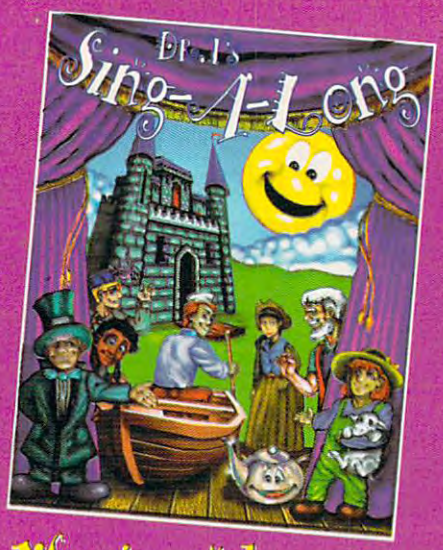

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ground module. I prefer sending and receiving faxes from the main BitFax menu without loading the memory-resident module.

There are a lot of features I don't have space to describe in detail, but here are a few that deserve mention. Incoming faxes can automatically print when received. You can view faxes on the screen instead of printing them. Multiple files can be sent in a single transmission, saving you separate initial connect charges. Form letters can be customized with a mail-merge feature.

After spending time with these fax/modem boards, I'd have a hard time justifying a dedicated fax machine for myself. It's not so much a question of cost as of usefulness. These internal fax/modem boards do so much more than a stand-alone fax machine that I'd choose them anytime over a regular fax machine for personal use. The folks at Zoltrix have arrived at what appears to be the best solution to having a complete communications system at a reasonable cost. Now I can happily give out my fax number, which happens to be the number to my home office, too.

(Editor's note: After this review was written, Zoltrix announced that the Integra was being discontinued.)

RICHARD C. LEINECKER

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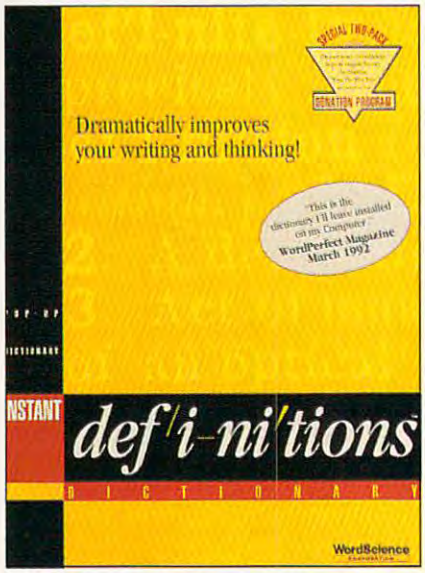
ELECTRONIC DICTIONARIES

The two things to look for in an electronic dictionary are speed and thoroughness; if there's a serious deficiency in either department, you may as well stick with the old-style, static-display, manually accessed codex (that is, book). WordScience's Instant Definitions Dictionary and Reference Software's Random House Webster's Electronic Dictionary and Thesaurus (College Edition) come up to scratch in both respects. Both are well-executed TSR dictionaries that can be quickly summoned via hot keys either from DOS or from within a word processor, and both are generous in supplying definitions—but each is superior to the other in one of these two departments.

Instant Definitions is based on *Houghton Mifflin's American Heritage Dictionary* (Office Edition) and boasts "more than 116,000 words, word forms, and phrases." The word *instant* is not misapplied. Once invoked, Instant Definitions looks up the word at your cursor or allows you to enter a word manually. If the word matches



Instant Definitions is quicker than Random House Webster's, but less thorough.

one of the main entries (or headwords) in the dictionary, Instant Definitions displays the definition, well, instantly. If the word is not a direct match (for example, if it's misspelled), then Instant Definitions provides a Suggestions window which lists alternative words. Highlight the word you want defined, hit Enter, and the Information window appears, providing definitions for the highlighted word, as well as a list of the words derived from it. Words within the definition may be defined by placing the cursor at the word and striking Enter again, opening a separate definitions window.

Instant Definitions' DictionaryScan feature also allows you to look up entries via key words in the definitions. Can't think of the name of the biped meat-eating dinosaur of the Cretaceous period? Enter *carnivorous* and *dinosaur* into DictionaryScan, and *tyrannosaur* will pop up. DictionaryScan can speed things along by letting you limit the range of the search to those letters of the alphabet that you think the word is most likely to occur in. Instant Definitions can be used in conjunction with the thesaurus or spelling checker in most word processors to make sure you're choosing exactly the word you want.

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REVIEWS

takes longer to load than Instant Definitions (from three to ten seconds, depending on your hardware), but for confirmed dictionary buffs, it's worth the wait. *The Random House College Dictionary* has long been among the two or three best general reference dictionaries of the language, a standard reflected in the electronic version of the newest edition (which has added the name *Webster's* to assure people that it's a real dictionary). RHW contains 180,000 entries in its dictionary, supplying not only an ample helping of definitions but also (in many cases) a brief etymology and an approximate date of the word's entry into printed English. In addition to having a larger and slightly more esoteric collection of main entries than Instant Definitions (including biographical entries, some current slang, and the better-known four-letter words), RHW contains a number of extensive notes on usage, touching on such things as regional pronunciation, proper participial forms, political correctness, and the like.

Like Instant Definitions, RHW has a definitions search mode that can scan the dictionary for key terms in the definitions and conjure up the words you want. Unlike Instant Definitions, however, the alphabetic search range cannot be limited, so this may mean settling down to a several-minute wait, even with the fastest PCs. RHW also provides a Wildcard search mode, for times when you're uncertain of the spelling, and an Anagram search mode, presumably for Scrabble players. As an extra, RHW includes its own thesaurus with 275,000 entries, providing not just synonyms and antonyms but also contextual usage samples that help you to fine-tune your word choice.

Which is better? Well, Instant Definitions is faster and more concise, just the sort of quick-reference electronic dictionary you need if you want to look up a definition right now and get back to work with no fuss. RHW, though a bit slower, is unquestionably the more thorough of the two—a logophile's electronic reference tool. Decide whether your style is to grab and run or relax and browse, and buy accordingly.

ANTHONY MOSES

Instant Definitions Dictionary: IBM PC or compatible, 4K RAM (using disk swapping or expanded memory), hard drive with 2½MB free—$69

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TOM LANDRY STRATEGY FOOTBALL

The ongoing fight for top gridiron simulation has left many participants battered and bruised. So far, the only clear winners are the fans, basking in the rumble of tough competition. The latest contender to take the field, Merit Software's Tom Landry Strategy Football, should be greeted with a warm cheer.

One of football's true innovators, Landry coached the Dallas Cowboys to 20 consecutive winning seasons, including 13 division championships, five NFC titles, and two Super Bowl victories. True to its namesake, the game adopts a low-key, conservative approach to this often volatile sport. Players don't directly control the on-field action but guide the team through myriad coaching duties. Exhibition and season games can be enjoyed by one or two players or as straight simulation with two computer-controlled teams. Head-to-head match-ups are by far the most rewarding, executed via null or remote modem link, with chat window. This exciting option makes it possible to form player leagues across town or across the country. Unfortunately, season play is for statistical purposes only—there are no built-in playoffs or league championships.

The game offers 28 professional teams—loosely based on their real-life counterparts—divided into two leagues but no divisions. Detailed scouting reports offer coaches a glimpse into their rivals' offensive and defensive ratings, from individual player stats to overall team performance: run/pass blocking, tackles, penalties, and turnovers. Reports can be saved to disk or printed, and they're automatically updated throughout season play. The only thing missing is the ability to trade players or manually adjust player attributes.

Landry's playbook boasts 2500 possible offensive combinations and hundreds of defensive plays. Most calls on either side of the line are standard issue, although a few surprises await. For example, offensive coaches can designate a "hot" secondary receiver—useful if the primary receiver is covered or for quickly dumping the ball during

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a blitz. The ability to put a man in motion also helps to confuse your attackers. Otherwise, as mentioned earlier, Landry's playbook is fairly conservative. Fans of razzle-dazzle football will be disappointed.

Defensive highlights include three types of line shifts and linebacker blitzes. Run and pass coverage is quite generic, limited to straight man-to-man and two types of deep zone coverage. Strong points include the ability to specify double coverage on different primary receivers and to key linebackers on a specific running back or simply to follow the offensive flow.

The game's point-and-click mouse interface makes it easy for anyone to assemble a cohesive play. Would-be coaches will be disappointed to find no playbook designer. Instead, the program offers a scenario builder, which allows you to specify the details of a hypothetical match-up and then play the game.

Optional 256-color VGA graphics depict the outcome of your coaching expertise. The images are well drawn but superfluous to the game. Limited animation and poor color separation make the action difficult to follow. The graphics also slow the game considerably, requiring extensive hard drive access before each play. Peripheral high points include digitized referee calls and VCR-style instant replay. Context-sensitive on-screen help is available throughout the program.

The game's main weakness is common to all statistical sport designs: internal number crunching versus real-time player interaction. When the results of your efforts are simply variables weighed against mathematical percentages, the game loses spontaneity and emotional appeal. Winning or losing becomes less a matter of inspiration and personal effort than the roll of invisible dice.

Although the program functions flawlessly, it's far too dry and distant. Designer Kerry Batts deliberately limits his audience, while most of his current competitors offer both statistical and hands-on play. Saved from obscurity by its excellent multiplayer modem option, Tom Landry Strategy Football will satisfy stat hounds but leave others wanting more.

SCOTT A. MAY

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JOHN MADDEN FOOTBALL II

If you're a computer football fan, you've been spoiled lately. Whether you prefer arcade-style or strategic football, software shelves host several excellent games from which to choose.

That choice just became a little tougher, though, with the release of Electronic Arts' John Madden Football II.

John Madden Football II, like most other games of its type, offers several play modes. From the main screen, you can choose to play a quick game, play a standard game, resume a previously saved game, or practice plays. If you choose to play a game—either quick or standard—the game setup screen appears. Here, you can change the weather, the length of a quarter, and the game playing speed, as well as toggle such options as fatigue, injuries, penalties, and the 45-second clock.

In a quick game, after the game setup screen, you needn't bother with choosing teams and playbooks, or even setting up game-save directories. Rather, you jump right onto the field, ready to test your moves against those of your opponent. Quick games play much like standard games, but with limited playbooks and some options, like game saves, unavailable.

The standard game, on the other hand, is your passport to the full simulation. After the game setup screen, you choose the visiting and home teams. Then, you select the teams' playbooks, set the teams' playing abilities, choose home-field conditions (the conditions under which the team is used to playing), and set the coaching style (which controls the balance of running plays and passing plays). Then it's onto the field, where, unlike in the quick game, you have full access to the plays in the chosen playbooks. (If you find the number of available plays overwhelming, John Madden is happy to narrow things down to a few good choices. All you have to do is ask.)

What are those blocky cartoon characters doing? John Madden Football II offers excellent simulation but inadequate graphics.

When the game begins, you select your play, and then the teams line up on the scrimmage line to battle it out. If you like, when the action begins, you can control the player with the ball, directing his run or guiding the pass. However, the arcade elements of the game are limited to a few simple moves. Where John Madden Football II shines is on the strategic side of the sport. You'll probably find yourself just picking the plays and watching the teams run them.

And speaking of the plays, John Madden Football II offers extensive opportunities for the computer coach with his eye on victory. The game includes two defensive playbooks and one offensive playbook, each of which offers more than 80 ready-to-run plays. And if you can't find the plays you need in the supplied playbooks, you can always create your own playbook with the program's Chalkboard. Here, you select various starting formations, and, using chalkboard-like tools, modify them by moving players, assigning tasks and routes, changing the types of players, and more.

Unfortunately, while John Madden Football II offers a fairly complete strategic football simulation, the graphics are less than state-of-the-art. The players are blocky figures that scurry about the field like characters in a cut-rate Saturday morning cartoon. Because of this lack of graphical detail, plays are often hard to follow.

Still, if you're fascinated by this rough-and-tumble sport's strategic side, John Madden Football II comes through. Besides having the power provided by the large playbooks, you can compare players head to head, view team rosters and statistics screens, test individual plays, construct your own playbooks, and analyze plays with the VCR-like replay feature.

The game's mediocre graphics keep it from tackling all the competition, but it's still a worthy contender for your software dollars.

CLAYTON WALNUM

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HONG KONG MAHJONG PRO

Mahjong, a Chinese gambling game that's more than 3000 years old, is played in China, Japan, and Taiwan with a passion that rivals the playing of poker in Atlantic City and Las Vegas. The game mah-jongg, which was popular in America early in this century, uses rules modified for Western play. Every geographical area to which mahjong has spread uses its own variation of the ancient rules of the game. Hong Kong Mahjong Pro uses the Hong Kong rules for the game, believed to be very similar to those used by the ancient Chinese mahjong players.

Mahjong derives its name from the design of one sparrow, the spirit of mahjong, sitting on one bamboo stick on one of the tiles used in the game. The 144

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tiles are divided into six suits: the characters, the bamboo sticks, the balls (circles or dots), the winds, the dragons, and the flowers. From a wall of tiles that surrounds the playing board, a hand is dealt to each player.

You must choose 3 computer opponents from the screen, which shows 12 increasingly more challenging opponents and their distinctive playing styles. Gameplay is augmented by smoothly animated, high-resolution, black-and-white digitized picture; the opponents' digitized speech; and high-resolution, 256-color, Super VGA still picture. The music, reminiscent of Wing Commander's, can be turned on and off; it generally complements the play. Play proceeds clockwise, as each player picks a tile from the wall, according to the throw of the dice, and discards a tile until a winning hand is made. The complex rules and nuances of mahjong include discard priorities, unique winning hands, and 14 scoring rules, but the excellent interactive tutorial that comes with the game and the instructive help system will get almost anyone playing the game and winning against the easiest opponents in several hours.

This computer version of mahjong is very unforgiving; it lacks a utility to take back a move that may have resulted from a careless slip of the finger. The documentation is flawed concerning the selection of alternative chows, or straights. When presented with one alternative of several chows, you can select No, and the computer will immediately select another alternative chow. The game is for solo play and does not support modem or multiple human players. Once the little inconveniences of gameplay are understood, the game will move along more smoothly.

Hong Kong Mahjong Pro will make it very easy for a beginner to learn this complex game without embarrassment. Mahjong players in search of opponents will find this game a godsend. Some may benefit from understanding the passion that drives many to continue playing this old-time favorite.

ALFRED C. GIOVETTI

IBM PC or compatible, 640K RAM, VGA (640 × 480, 256-color Super VGA recommended), hard disk, mouse; expanded memory recommended, disk cache recommended, supports Roland, Media Vision, Ad Lib, Sound Blaster, and 100-percent compatible sound boards—$49.95

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STAR NX-1040 RAINBOW

Anyone looking for a printer these days is sure to be confused by the literally hundreds of printers available. While IBM and Epson set the compatibility standards, several companies offer high-quality printers at reasonable prices.

Star Micronics jumps to the front with the new 9-pin NX-1040 Rainbow printer. This lightweight, Epson- and IBM-compatible printer not only produces high-quality monochrome output but also prints in seven colors in eight near letter quality fonts with up to eight enhancement modes. That's three colors more than the nearest competitor—and with a lower price tag. The NX-1040 is no faster than the average 9-pin printer, though, so don't buy it expecting 24-pin speed.

Most low-end color printers require installation of an optional color kit. The NX-1040 comes ready to print in color with the installation of the color ribbon. The ribbon cartridge doesn't need to be exchanged for another ribbon to switch from monochrome to color printing.

As with the high-end 24-pin Star printers, the NX-1040 includes the Electronic DIP Switch (EDS) mode, which changes the power-on settings without your having to manually change DIP switches. You can control up to 15 power-on defaults from the front touch panel, such as font, pitch, paper park, paper feed, panel macros, and buffer clear. Another handy feature included with the NX-1040 is quiet mode, which can also be controlled from the front panel.

Thanks to the easy-to-understand instruction manual, it took only about five minutes to set up the printer. The manual includes a command summary with page numbers in the back and a separate quick-reference guide to the operations of the control panel.

A variety of paper-handling features add to the printer's ease of use. Multipaper paths, the short tear-off function, automatic paper loading, top-of-form set, and the adjustable sheet-feed paper guide offer features that usually come with more expensive 24-pin printers. Paper parking offers the user the option of printing single sheets without removing the fanfold tractor-feed paper.

I was impressed with the color output of the NX-1040. Frankly, I didn't expect high-quality output from a 9-pin printer, but I was pleasantly surprised by the results.

Even if most of your home printing doesn't require color output, you should take a look at the NX-1040. With the low cost, ease of use, and quality color and monochrome output of this lightweight 9-pin printer, you can't lose. Even though it's limited to 9-pin speed, the NX-1040 has created a niche for itself outside the realm of overpriced and overrated printers.

JOYCE SIDES

Star NX-1040 Rainbow—$269

STAR MICRONICS AMERICA
420 Lexington Ave., Ste. 2702
New York, NY 10170
(800) 447-4700

Circle Reader Service Number 445

STAR NX-2430 MULTI-FONT

What's so different about the Star NX-2430 Multi-Font? It's just another 24-pin dot-matrix printer, right? That's what I thought when I began reviewing the unit.

Star Micronics pushes dot-matrix printer technology a step closer to that of laser printers by offering eight optional font cartridges ($39 each) that provide more than 21 extra fonts, as well as 13 bitmapped scalable fonts on disk for use with Windows 3.0 application software (an upgrade for use with Windows 3.1 is available from the company at no charge). The fonts also work with DOS-based applications such as Harvard Graphics 3.0, Lotus 1-2-3 3.1, and First Publisher 3.0. Even without the optional cartridges, there are two draft and nine letter-quality resident fonts.

For an extra $49, you can add a 32K buffer with a battery backup. If you intend to use the bitmapped fonts or

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images, you may be interested in adding this cartridge to permanently store frequently used downloadable fonts or bitmapped images.

I welcome the absence of DIP switches on this printer. Instead, Star included a built-in Electronic DIP Switch (EDS) mode that offers more options than normal DIP switches. This saves times and skin, since you don't have to be a contortionist capable of reaching hidden switches.

The NX-2430 is as small as many 9-pin printers (17.3 × 13 × 5.9 inches) and with the three paper-feed paths (rear, bottom, top), it'll fit just about anywhere. It handles forms of up to three parts.

Setting up the printer took about ten minutes. The installation of the automatic sheet feeder took longer than the printer setup, but the sheet feeder is well worth its additional cost in time and money ($99). I had to keep reminding myself that I was reviewing a dot-matrix printer, not a laser printer. The sheet feeder is exceptional. It worked well with all the software I tried, including Express Publisher, Publish-It Lite, and XyWrite.

Setup time was short, thanks to the easy-to-understand instruction manual. It includes a command summary with page numbers in the back and a separate quick-reference guide to the control panel operations.

The front control panel with liquid crystal display includes five buttons that control more than 20 functions, such as font, pitch, paper park and feed, macros, form feed and micro feed, top of form, and quiet mode. The special EDS mode is set from the front panel as well, and it controls up to 15 functions, including emulation, RAM usage, and graphics print direction.

The Star NX-2430 Multi-Font, a 24-pin dot-matrix printer, rivals the quality of laser printers at a much lower price.

Special features include automatic paper load, short tear-off, automatic bail lever closing, paper parking, external paper adjustment, top-of-form set, first line printing, landscape paper loading, dual sheet feed paper guides, and quiet mode (the output is slower in this mode).

The quality of the output is not just as good as that of any 24-pin dot-matrix printer I've ever used—in most cases, it's better. Of course, the weight of the paper used determines the quality to a certain extent. I used 20-pound business stationery for important documents and standard fanfold paper for everything else.

I always look for pros and cons, but I simply couldn't find anything wrong with this printer. It's a great buy at $399, even with the additional cost of the automatic sheet feeder and font cartridges. I'd buy it in a heartbeat if I were looking for a 24-pin dot-matrix printer.

JOYCE SIDES

Star NX-2430 Multi-Font—$399

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PC FILE 6.5

PC File 6.5 has made a very successful move from shareware powerhouse to commercial contender, more than holding its own with other databases in its price range. Jostling for shelf space at Egghead demands a highly competitive product, but PC File fills the bill.

The best changes from its shareware predecessor are modern, mousing user interfaces and native support of dBASE III PLUS databases and index files (including memo files, which let you type in large amounts of free-form text). It also reads and writes the most popular data-interchange formats such as 1-2-3, WordPerfect merge, and DIF. There is no language as such, but you can select from a wide variety of built-in functions such as UPPER() and SOUNDEX() when creating indexes and reports.

Installation is automated but a little too smart for its own good: My Stacker drives weren't detected, so I had to call tech support for a work-around in order to install it on my hard disk. The documentation is a single typeset paperback with 600 beautifully written pages. This is one of the best manuals I've ever seen, somehow mixing beginning and advanced material with uncanny skill. Apart from a glossary, I could find nothing missing from the manual and everything was where I expected to find it. The online help is almost as good, with the glaring omission of context-sensitive help for each menu item. So, while the File|Open dialog has its own help screen, Open on the File menu doesn't.

PC File 6.5 is a good data manager, allowing you to create, maintain, and alter the structure of database files. What gives it an edge is the extras: bar code support, a somewhat complex but well-designed mail merge, autodialer, macros, global search, SOUNDEX matching, and a really cool calculator. The calculator not only does the usual arithmetic but also lets you include field names in calculations, an innovative and universally handy fillip. The mail-merge feature is unmatched by any other I've used and is equally good for mass mailings and the one-offs I find myself writing with surprising frequency. I found merge instantly useful and up to the most demanding tasks, but I suppose it might be a bit much for a beginner to grasp right away. Never fear, though, because the manual explains the merge feature superbly.

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REVIEWS

Two of PC File 6.5's most-touted features are its ability to run in graphics mode and its ability to do charts, but I found neither overly impressive. The GUI slowed performance to the point that I wouldn't have used PC File if full-time graphics mode were the only option. Fortunately, you can run in the much-snappier text mode and switch modes only when graphs are displayed. The graphs are no great shakes and only use a magnified system font.

PC File 6.5 can process large amounts of data fast. It indexed a 13,500-record DBF file in less than a minute on my 33-MHz 386 and took only a few minutes to export it to DIF. This was a real data set, not a toy file generated for review purposes.

The labeler was formerly a separate product. It will do just about anything that needs to be done but lacks the kind of integration that distinguishes other features, such as the calculator and autodialer. The user interface is outmoded and bears no resemblance to the rest of PC File 6.5. It prints to generic labels and lets you create your own configuration; a selection of Avery presets would make life much easier.

I thought the eclecticism of the new features would work against PC File 6.5, but it didn't. This feels very much like a product designed with the primary emphasis on user input, labeler excepted. It's a solid product and well worth its $149.95 price. Just be sure to get phone support fast—after 30 days, you must switch to a 900 extra-charge number.

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PLAN 9 FROM OUTER SPACE

Celestial saucers from outer space! Corpses on the patio! Guest appearance by Bela Lugosi! Mix these cinematic faux pas with liberal portions of schlock horror devices, wooden tombstones, atrocious acting, and unforgivably awkward camera work and you have the original *Plan 9 from Outer Space*—the movie. Now, now, earthlings, don't groan in despair just yet. While most big-to-small screen adaptations leave us wanting, Plan 9 from Outer Space doesn't eclipse the flick of its inspiration with its badness. As games go, though, if Plan 9 isn't terrible enough to rise to cult hit status, how bad is it?

Bad is in the eye of the beholder, of course. From a gaming standpoint, Plan 9 offers nothing in the way of innovations. The point-and-click interface would profit from a more Sierra-like approach instead of tedious selection from menu options: Use item, Talk, Hit, and so on. After choosing Examine, for instance, you click on an onscreen item for a description. Then it's back to the menu to select Examine again so you can repeat the process on another item. This procedure alone could drive you to distraction. More annoying, however, is the tendency of dropped objects to disappear, hijacked by a meddlesome gremlin. Then, in a storeroom filled with useful items, you discover that you can carry only two before the irate producer of the movie shows up to berate you.

Speaking of the sleazy producer, he hires you—at a cut rate, of course—to find the missing reels of *Plan 9*. Bela Lugosi's double (he's the one who stomped around with a cape over his face) has stolen the film and plots to recut it with footage featuring himself and, even worse, to colorize it. You'd probably stop this conspiracy for free if the producer wasn't paying you.

To track down the missing reels, you'll visit both Bela's tomb and his suburban home—each characteristically limited in the number of locations to explore and objects to gather. The ubiquitous taxi proves a cumbersome and blatant method of design cost-cutting. Instead of roving from place to place, you take a taxi, and your list of destinations is limited by characters you've talked to or by the fliers you've read.

As reckoned by Konami, Plan 9 could supply beginning and intermediate players with sufficient challenge. Anyone who's seen the movie in all its tragic pretentiousness would enjoy the game. But most younger gamers probably haven't seen it; neither have most adults. Does a quest to find six reels of film set your heart aflutter? Let's hope Konami's ready to go with plan 10.

DAVID SEARS

IBM PC or compatible (16-MHz 80286 or faster recommended), 640K RAM, 256-color VGA; mouse recommended, supports Ad Lib, Roland, and Sound Blaster—$39.95

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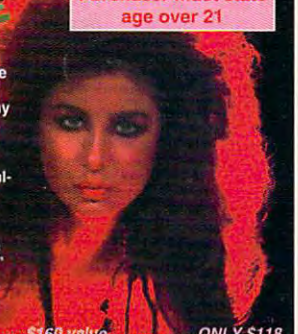

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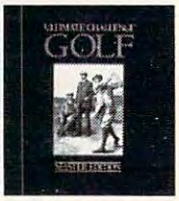

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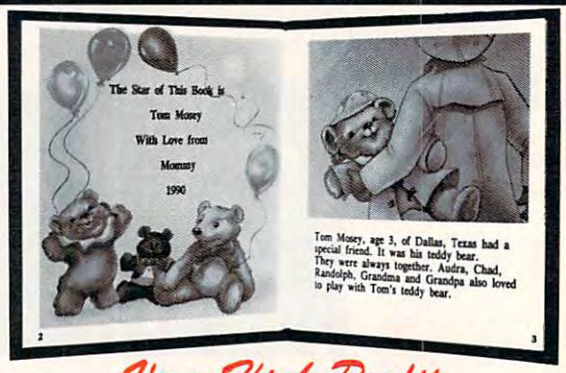

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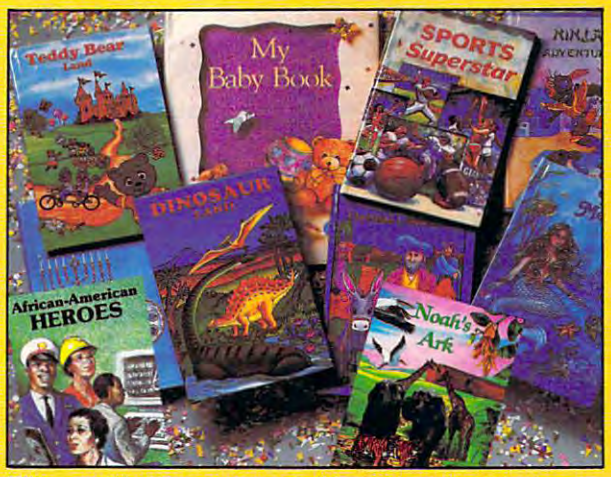

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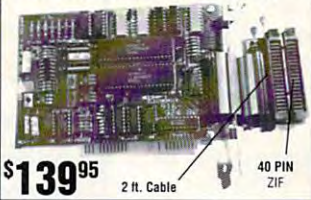

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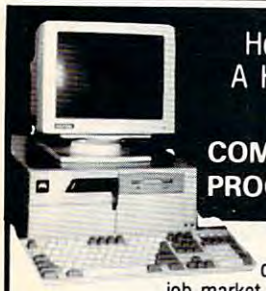

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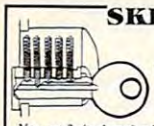

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NEWS BITS

Jill Champion

Cops and robbers, virtual libraries and portfolios, and a book for parents of cyberkids

Daryl Gates, Software Author

Controversial former Los Angeles police chief Daryl Gates recently signed a publishing agreement with Sierra On-Line to design the next Police Quest game, which will be the fourth installment in the popular adventure series.

Police Quest 4, which will feature a new, as-yet-unnamed character, will take place in Los Angeles and will be set against actual L.A. backgrounds that are digitally scanned from photographs. Look for a Christmas 1993 release.

Paperless Society Approaches

Old books deteriorate, and a library's shelves can only hold so much new material. So Columbia University Law Library has begun creating a time- and space-saving "virtual library" that can find and display on one computer screen an actual image of a printed page among millions sorted digitally.

Named Project Janus, the system is the first library application of digital full-text stored-image search and retrieval.

The superfast system allows for full-text searches, which means that a researcher can order the computer to search its entire memory for any word, phrase, or text using the Roman alphabet and then retrieve on the same computer screen an optical image of the actual printed page or document.

While you won't see an *all*-electronic library for another half-century, imagine what such systems will eventually bring to your research sessions—talking, animated history texts, for instance. Libraries as we know them will be things of the past.

Not Such a Glorious Thing

It may be a glorious thing to be a pirate king, if you live in Penzance. If you live in Boardman, Ohio, however, and you call yourself Rusty or Edie, you could be in *big* trouble.

The FBI recently raided Rusty & Edie's bulletin board service for allegedly distributing copyrighted software programs free to its many online subscribers.

Following complaints from a number of the Software Publishers Association members that their software was being illegally distributed, the SPA worked with the FBI, downloading dozens of copyrighted business and entertainment programs from the board.

Would-be pirates should take warning: This BBS was no mom-and-pop operation. Rusty & Edie's was one of the largest private bulletin board systems in the country, with 124 nodes available to callers and more than 14,000 subscribers throughout the United States and several foreign countries.

Ilene Rosenthal, general counsel for the SPA, applauded the FBI's action, which, she said, "clearly demonstrates . . . that the government understands the seriousness of software piracy." Similar raids on other boards are expected soon, as the SPA continues to work with the FBI on investigations.

Piracy, the SPA says, adds to the cost of computing. The previous year saw software industry losses to piracy of $1.2 *billion* in the U.S. alone.

Who Ought to Be in Pictures?

Looking for that big break in modeling? It's possible that you haven't taken the right approach. After all, this is the age of technology, and the newest wave in model portfolios is to show yours electronically. Some 20,000 photographs of more than 2000 top models from the most exclusive agencies are included in Models Showcase, a CD-ROM disc from Showcase Communications (140 West 22nd Street, New York, New York 10011; voice: 212-989-5708; fax: 212-989-8049).

This electronic megaportfolio allows clients—advertisers, photographers, casting agencies, talent agencies—to view models' materials, including their stats, in full, hi-res color, page by page or even compared to several other portfolios at once.

Annual model-listing costs are free for one head shot, $200 for one comp card (one to three pictures and a résumé), and $50 for each additional new picture. Annual subscriptions (including all software and database updates made throughout the yearly subscription period) are $695 each and $495 per additional user within the same firm.

Sourcebook for Parents

Parents, Kids & Computers, a new book from Random House Electronic Publishing (November 1992; $20.00), is an activity guide/source book for parents that's designed to lead the entire family into the Information Age.

Written from a parent's perspective, the book provides innovative suggestions for making computer time quality time. Parents can learn how to select the best hardware and software for their kids, explore popular programs, and discover how Windows, LOGO, and Prodigy can be homework helpers.

Authors Robin Raskin and Carol Ellison (both computer experts) encourage parents to take a hands-on approach to exploring their collection of hand-picked programs, and they furnish hundreds of ideas on how to extract maximum learning and fun from a variety of software. ❐

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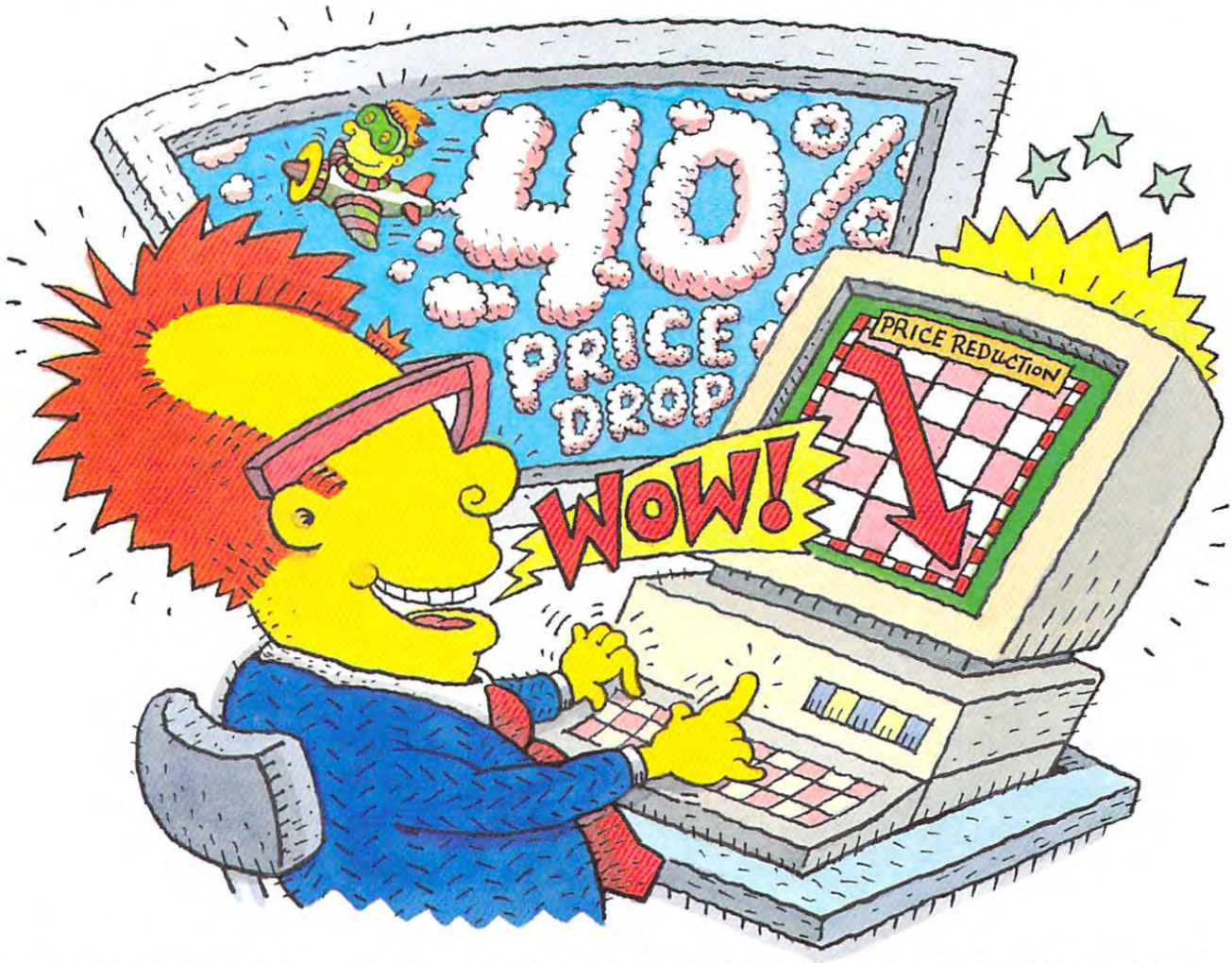

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