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RISERS AND SLIDERS

Step right up and grab a Slider! Hop on board and take a ride! No, I'm not talking about a new skateboard; I'm talking about a new game from MicroStorm that's called Risers and Sliders.

When I first heard the name, I must admit, the first thing I thought of was the children's game Chutes and Ladders. Then, I booted up the game and discovered a maze that vaguely resembles the mouse-shaped symbol that the Disney channel uses as a logo. Kid stuff, I thought again. However, when I began to play, I quickly saw how wrong I was. This game is definitely not geared to the preschool crowd.

Risers and Sliders is an arcade action game that offers 50 increasingly difficult levels of play. The game's title comes from the red-colored Risers and the blue Sliders that you use to move swiftly around the screen. The Risers move your character up and down; the Sliders move you from side to side. There are also wedge-shaped Sliders that are a cross between the other two transports. They move more or less diagonally on the screen. Of course, you can also walk your character from side to side, but he can't jump or climb. Using combinations of the transports and walking, your goal is to move through the mazes, gather all the diamonds in each, and build up your score.

It's not nearly as easy as it sounds. Learning how to move around takes practice. You have to move your man over the transport and press the fire button while moving the joystick handle in the direction you want to travel. If you have good joystick skills, you'll probably learn the game faster than I did. I have a tendency to overshoot the mark when I'm using a joystick. Do, that in this game, and you'll fall to your death. Even my joystick jockey teenager had to make several attempts before clearing a level.

For one thing, there's the pesky little critters called moths that can sneak up

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Circle Reader Service Number 170

on you. They move around the screen unfettered by transports and can pounce rather unexpectedly. Their bite is deadly to you, and you have only three lives to lose. You can evade the moths, or you can attempt to kill them. You do that by smashing them with your transporter. It's worth attempting a kill since you'll earn an extra life if you manage to dispose of 12 of them. You'll also add five points to your score for each one of the moths you eliminate.

Another danger when traveling through the mazes is falling. Be careful where you step! One false step and—BOOM! You've lost a life. In the more advanced mazes you'll also need to know whether or not it's safe to take the diamonds. You'll soon discover how disastrous it can be if you guess wrong. By the way, you get one point for every diamond that you collect. Whenever you earn 200 points, you will get another life.

The screen border helps you keep track of how well you're doing. In addition to the typical score information, the border flashes whenever you earn an extra life. It flashes blue for earning a bonus life on points and red for earning a life for slaying those pesky moths. You'll want to get as many lives as possible because the dangers increase as you advance in the game.

With 50 levels, this game is quite a value. Some levels are complicated; some are deceptively simple. Each has its own dangers. The game's designer, Daniel Lightner, knew how challenging the game was, so he programmed in bonus points for you at the end of every level. You'll get 600 points if you finish a maze in one try, 400 points for two tries, and 200 points for three attempts. If it takes you more than three attempts, you get zip. I played a lot of practice rounds (my name for games in which I died) before I earned any bonuses. Maybe you'll do better. The game will keep you busy for several hours.

That reminds me. Did I mention the clock? Well, that's another little surprise the designer added as a booby trap. You have to complete each of the mazes in five minutes or less. Now five minutes may sound like a lot of time to you, but you'll be surprised how quickly it will pass. Trust me on that. I lost more than one life running around the mazes, avoiding moths, and forgetting about the time. I soon learned to keep a closer watch on my time.

Lightner tried to pack the screens with as many diamonds and obstacles as he could. However, I believe he could have done a better job on the graphics. Risers and Sliders doesn't re-

ally utilize the screen as well as it could have. The transporters are depicted as minuscule squares just a couple of pixels wide. Only their colors designate them as anything special. The moths are a couple of tiny, interconnected loops. The fact that they were moving told me they were supposed to be the deadly moths. Even your character is little more than a stick man that moves. I've seen better graphics on a 64.

The attraction in Risers and Sliders, however, isn't the art. The difficulty of the game is its charm. I suspect once you discover this program, you'll keep coming back for more.

MARTI PAULIN

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TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and The Automatic Proofreader are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each Gazette Disk and are printed in all issues of Gazette through June 1990.

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Bug-Swatter

Steven Bakke noticed that Fastball (January 1993) highlights the wrong item when he makes a selection from the menu. To correct this problem, load but do not run the program. Then, type *POKE 2133, 201* and press Return. Save this corrected version with another filename.

James T. Jones of Klondike, Texas, points out an error in the April "Programmer's Page." When you run Sequential File Printer, you'll get a *FILE OPEN* error message if you select the Print File option. To correct it, change line 190 to read as follows.

```
190 PRINT#4,A$:: GOTO 160
```

In the May issue, we published a review of Video Digitizer that is distributed by RIO Computers. At the end of the review, we inadvertently published the company's old address. The correct address is RIO Computers, 3310 Berwyck Street, Las Vegas, Nevada 89121; (702) 454-0335. We regret the error.

In "Screen Gems" (May 1993), several readers spotted typographical errors in various program listings. Bill Gisonda of Bethpage, New York, noted that lines 230 and 240 of Brownian Symmetry should be numbered 250 and 260 respectively. Also, lines 150 and 230 should read as follows.

```
150 IF Y > 100 THEN 80
230 DRAW, (160=X)/N,100-Y
```

Donald Klich of Mount Prospect, Illinois, spotted other typos, which just goes to show what can happen when typesetters have to enter listings without the aid of The Automatic Proofreader. Curve Explosion would look better if line

10 were entered as follows.

```
10 COLOR 1,2: COLOR 0,1:
COLOR 4,1
```

In Trig Show, lines 270 and 280 had some problems with an extra colon and a missing Return. The lines should read as follows.

```
270 IF BB=0 THEN DRAW ,
X*25.5,100-FNY(X)*30
280 NEXT: WAIT 212,1:
RETURN
```

In January 1993, we printed a request from a 128 user in Syria who would like to correspond with other Commodore users around the world. Here is his correct address.

Ahmad Husam Mukhalalati
P.O. Box 10392
Aleppo, Syria

Chess Ranking

I would like to start a chess club, and I have been looking for a program that calculates club members' chess rankings. Could you give me some help with a program?

VINCENT SULEWSKI
SOUTH HADLEY, MA

Here is a simple program that calculates rankings after players have completed either one or a series of games. As players compete, they should keep track of the number of games they play; their opponents' rankings; and their overall score for wins, ties, and losses.

```
AS 10 PRINT"{CLR}"
GX 20 INPUT"NUMBER OF GAMES PLAYED";G
MF 30 DEFFNF(X)=(99↑(X/800))/(1+(99↑(X/800))):REM{2 SPACES}RATING FORMULA
PX 40 INPUT"YOUR RATING";R
KA 50 PRINT"OPPONENTS' RATINGS?"
CE 60 FORB=1TOG
KE 70 INPUT O
CP 80 X=R-O
FP 90 IF X<-800 THEN X=-800
```

```
ED 100 D=D+FNF(X)
GH 110 NEXT
RB 120 INPUT"YOUR SCORE";S:S=S-D
DR 130 IF R<2100 THEN 170
JD 140 IF R<2400 THEN 160
JP 150 S=S*16:GOTO 220
MP 160 S=S*24:GOTO 220
HM 170 S=S*32:IF R+S+.5>INT(2099) THEN 220
MM 180 IF G<4 THEN G=4
XH 190 IF S>32+(3*(G-4))AND R+S+S-(32+(3*(G-4)))<2100 THEN 210
KS 200 GOTO220
HJ 210 R=R+S+S-(32+(3*(G-4))):GOTO230
GC 220 R=R+S
GE 230 PRINT:PRINT"YOUR NEW RATING IS";INT(R+.5)
EE 240 PRINT:PRINT"AGAIN?"
HQ 250 GET A$: IF A$=""THEN EN 250
RA 260 IF A$<>"Y" THEN EN D
CD 270 GOTO10
```

A full-featured chess ranking calculator that keeps track of an entire club's standings would be too large to supply here. If a chess fan who programs would like to submit an original program, we'll consider it for publication in the "Programs" section.

Scratched Commas

In the March 1993 "Feedback," you told how to scratch a filename that appeared in a disk directory as a comma. Your methods are fine, but there is a much simpler method. Simply enter the following line.

```
OPEN15,8,15."SO?":CLOSE15
```

This question mark wildcard will erase any file whose name consists of but a single character.

AL WILDERMUTH
RIVERSIDE, CA

Thanks to Al and all the other readers who replied with this simple solution that slipped Gazette's collective mind. Just check the directory first to see if there are any single-

Updates and corrections to earlier programs, a program that calculates chess rankings, and more

character files on that disk that you wish to retain. If so, rename them before deleting.

Interest Calculations

As an active participant in IRA distributions, I was very interested in IRA Minimum Distributions (April 1993). I was attracted to lines 980, 990, and 1000 where the interest calculations take place.

Years ago, I got involved in interest calculations, especially after I read in a mathematical journal that it was impossible to calculate daily compound interest (yield) except by the one-day-at-a-time method, as used in the article.

As an engineer, I find the word *impossible* to be incomprehensible, so I devised a means for making long-term calculations easy. As published, the calculation for a sample 20-year projection and its 20-year payout schedule takes nine minutes and 42 seconds. With my revision, the same calculation takes only 7 seconds.

Insert REM after line numbers 980, 990, and 1000 to preserve the original code and then enter this line.

```
985 SP=SP*EXP(1)↑(365.25
*LOG(1+R/365.25))+.001:
SP=INT(SP*100)/100:
RETURN
```

The 365.25 allows for the extra day in a Leap Year.

LES WILLIS
DELAND, FL

Machine Language

Over the years, your magazine has carried a column for machine language programming; however, I haven't seen any instructions on how to actually implement the information. Is a special program required?

EARL WOODMAN
DILDO, NF
CANADA

When you start learning machine language, the first thing you need is an assembler. An assembler is to machine language what the BASIC programming language is to programming in BASIC. It translates your commands into numbers that the computer can understand and use.

Since it's difficult to write a program entirely in numbers, an assembler replaces the sequence of numbers with standardized mnemonics, commands that humans can more easily remember and understand. Here's an example.

```
10 * = 880
20 LDA #147
30 JSR 65490 40 RTS
```

In this short program, when you enter SYS 880, the computer's screen clears. The 147 is the number which clears the screen. LDA is a mnemonic that means Load the Accumulator, a special area in the computer. So 147 goes into the accumulator, and the program moves on to the next instruction. JSR means that the program then Jumps to Subroutine at 65490, which is the address in ROM which prints whatever character is currently in the accumulator. The screen clears, and the program moves on to RTS. This command, Return from Subroutine, causes the computer to leave machine language and return to BASIC.

This program is called source code, but you cannot run it as you would a BASIC program. The assembler takes this code and turns it into object code, poking numbers 169, 147, 32, 210, 255, and 96 into memory locations 880-885.

The computer doesn't have any idea what to do with LDA, but when LDA is converted into 169, it knows

to load the accumulator. It's also easier to remember LDA than 169. The 32 means JSR, 210 and 255 is a two-byte address that represents 65490, and 96 returns the computer to BASIC (RTS).

For those who don't have an assembler, we often print the code in the form of a BASIC loader. The computer's ML instructions are in the DATA statements.

```
10 FOR A = 880 TO 885
20 READ D: POKEA,D
30 NEXT
40 SYS 880
50 DATA 169,147,32,210,255,96
```

As with most Commodore software, finding a good commercial assembler such as Commodore Macro Assembler, Buddy 64, or Merlin64 may be difficult these days, but a number of public domain programs are available. Gazette's own BASSEM (April and May 1990) is still available on the Best of Gazette Utilities Disk (\$13.95).

Resume Typing

I have some suggestions which might help Jack Christlaw, who was having difficulty entering programs in one typing session.

Whenever I wish to stop typing, I save what I have using the number of the next BASIC or ML line of code as the filename. This assures that I'll never use the same filename twice and I'll always know where to begin again. I also always use a fresh disk with only MLX or Proofreader on it.

ARNOLD JONES
STONE RIDGE, NY

Send your questions and comments to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

A question about machine language, and a tip about saving partial programs

PD PICKS

Steve Vander Ark

MISCHIEVOUS 64 AND MORE

QuantumLink isn't the only place to find shareware and public domain files, but it's probably the *best* place. Q-Link has more files than anybody else—plain and simple.

I have a copy of its catalog of files, a burly tome close to two inches thick and heavy enough to keep the door to my computer room shut against my one-year-old. This hernia-inducer makes a valiant effort to list all 35,000 of Q-Link's programs and files. Yes, *35,000!* Make no mistake; if you're serious about your Commodore, you belong on the Q.

If you aren't a Q-Linker, though, you can find good PD programs on any BBS that supports the Commodore. The Rogue River BBS in Grand Rapids, Michigan, has all the files mentioned in this column. The phone number is (616) 361-8267. Of course, all programs mentioned here are also on Gazette Disk. Here are my PD picks for this month.

Mille Bornes

Original author unknown.
QuantumLink filename: MILLE_BORNES.3; uploaded by RolFB.

I seldom play Mille Bornes. My wife and I bought it about ten years ago, and it's a great game. The problem is that I play it for blood, which is the way my wife plays Monopoly. That's why we don't play Monopoly either. So when I found this one-player card program buried in the 64 games section of Q-Link, I got all excited. Now I could stomp someone at Mille Bornes without having to sleep on the couch!

This version of Mille Bornes isn't glamorous. It's entirely text with gameplay true to the original. You take turns with

the computer, playing or discarding cards from your hand, trying to accumulate distance toward a goal of 1000 miles. Along the way you play cards against the computer's hand and try to inflict your opponent with all sorts of calamities, including flat tires and accidents. You see where attitude can creep into the game.

According to comments posted on Q-Link about this game, some of its more obscure rules aren't supported in this version. I wouldn't know, since I don't play the original enough to remember any of the more obscure rules! All I know is that this little gem of a game is addicting.

The computer is a bland adversary, of course. I miss the scowl I used to get from my wife when I would gleefully slap down an accident card. She doesn't play Mille Bornes on our 128 much. She's too busy playing Monopoly on the IBM.

Maximum Overdrive

By Dan Komaromi.
QuantumLink filename: OVERDRIVE; uploaded by DigiDan.

I'm not sure what category to put this piece of programming genius into—it's certainly not a game. But what the heck: Here it is, and it's absolutely my favorite 64 download of all time. Like I just said, it's not a game. It's not a utility either, really. It doesn't exactly keep you glued to your monitor; in fact, it works the best when you aren't even around.

Let me explain. Maximum Overdrive is the sneakiest bucket of surprises you'll ever dump on your unsuspecting 64. When you first run it, you are presented with a menu of interesting-sounding options. Once you make your choice, your beloved Commodore computer disappears and is replaced by nothing less than its

evil twin. Oh, it looks just fine—same blue screen, same friendly blinking cursor, same everything. But, oh, what horrors lurk within!

For example, when you enter an innocent LOAD command, the computer might snap back with *LOAD IT YOURSELF!* With another setting, your usually complacent 64 reacts to a keypress by snarling that it's trying to sleep. It then turns off its monitor.

There's a startlingly impressive self-destruct mode which really grabs your attention if you have the volume cranked up. There's even an option which looks for all the world like you've accidentally connected with NORAD computers somewhere and have launched a few missiles.

The author, who calls himself DigiDan on Q-Link, has had his programs published in several magazines, and his expertise shows in the slick interface as well as in the nifty screen tricks. He includes some extra touches, such as allowing you to disable the Run/Stop key and type in your own bits of nastiness for the In-sult section. Komaromi employs some excellent raster interrupt effects, a good dose of SID chip sound magic, and an oversized helping of cleverness to make your 64 go off its electronic rocker.

The general idea is to set up your computer with one of these fake startup screens when you are going to be away from your keyboard. Should some unsuspecting victims try to use it, they'll be left wondering how they managed to make the whole system go kablooie when they just typed a simple command. I'm not sure why I like this program so much because I don't have anyone to pull these tricks on, but I get a bang out of watching them run.

I know. Get a life! ☐

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MACHINE LANGUAGE

Jim Butterfield

FILE-END TRIMMER

Last time, we learned that a file that ends with more than one return can cause trouble when used with the BASIC INPUT# statement. Now, let's write a program to detect and correct this problem.

A BASIC program will poke the ML code into place. Phase 1 then checks the file, and phase 2 copies the file, chopping any extra returns.

The detection phase uses a brief ML program at \$2200, decimal 8704. The file is corrected, if needed, by a longer ML program at \$2217, decimal 8727. This is the code we'll examine here.

File-copying programs must deal with ST, the status word, found at address \$90. We must read the ST value right after we reference a file so that it won't be changed by some other file activity.

Our program reads from one file and writes to another. We must check ST (for end-of-file) after each read. We have an input character to dispose of, so we may need to write to the output file before we act on the end-of-file signal.

We'll test ST right after performing an input and push the test results to the stack. Later, we'll act on those results.

Here's a second puzzle. Our task is to remove extra return characters from the file end. But, as we read the file, we don't know if we're near the end. We must not copy returns until we know it's safe.

When we read a return character from the input stream, we won't output it. We'll count it, using location \$2100 as a counter. If we find more text, we'll output the correct number of returns before continuing. I'll comment on selected parts of the program.

Initial code zeroes the counter at \$2217. We enter the main read loop, and the input

stream switches to logical file 1.

We grab a character and test the ST variable, pushing the result to the stack with PHP.

```
2221 JSR $FFE4
      LDY $90
      PHP
```

We skip ahead if we didn't get a return. Return needs special work: We count it and then check to see if we're at the end of the input file. That information is on the stack, remember? If we're not at end-of-file, we keep reading.

```
      CMP #$0D
      BNE $2237
      INC $2100
      PLP
      BEQ $2221
```

If it's a return at the end of the file, we push the test results back on the stack and zero the counter to get rid of the excess returns.

```
      PHP
      LDY #$00
      STY $2100
```

The program reaches \$2237. Either we've received a character (still in the A register) which is not a return, or we're at end-of-file. Push the input character to the stack, disconnect the input stream, and hook the output stream to logical file 2.

```
2237 PHA
      JSR $FFFC
      LDX #$02
      JSR $FFC9
```

Is the return counter 0? If so, skip the next bit.

```
      LDX $2100
      BEQ $2250
```

Location \$2245 sends the returns using a loop. We'll omit that code. The next step outputs the character that was

received.

```
2250 PLA
      JSR $FFD2
      JSR $FFCC
```

We check the end-of-input condition, still on the stack. We either loop or quit.

```
      PLP
      BEQ $221C
      RTS
```

Here's the whole program in the form of a BASIC loader.

```
ES 100 PRINT "FILE END TRIMMER
- JIM BUTTERFIELD"
XR 110 DATA 162,1,32,198,255,1
69,0,141,0,33,32,228,25
5
GS 120 DATA 164,144,240,246,14
1,1,33,76,204,255
AQ 130 DATA 169,0,141,0,33,162
,1,32,198,255
HQ 140 DATA 32,228,255,164,144
,8,201,13,208,12
HM 150 DATA 238,0,33,40,240,24
0,8,160,0,140,0,33
PC 160 DATA 72,32,204,255,162,
2,32,201,255,174,0,33
RX 170 DATA 240,11,169,13,32,2
10,255,202,208,248,142,
0,33
KH 180 DATA 104,32,210,255,32,
204,255,40,240,194,96
RS 200 FOR J=8704 TO 8794
EJ 210 READ X:T=T+X
BP 220 POKE J,X
AE 230 NEXT J
SG 240 IF T<>11245 THEN STOP
XF 300 INPUT "NAME OF FILE";FS
JQ 310 OPEN 15,8,15
FJ 320 OPEN 1,8,2,FS
GB 330 INPUT#15,E,ES:IF E<>0 T
HEN PRINT ES:STOP
QH 340 SYS 8704
SB 350 CLOSE 1
SD 360 CLOSE 15
GC 370 IF PEEK(8449)<>13 THEN
{SPACE}PRINT "FILE DOES
NOT END WITH <RETURN>."
":END
SE 380 IF PEEK(8448)<>13 THEN
{SPACE}PRINT "FILE ENDS
WITH A SINGLE <RETURN>."
":END
XS 390 PRINT "FILE ENDS WITH M
ULTIPLE <RETURN> CHARS."
"
XB 400 INPUT "SHOULD I CLEAN I
T UP?";XS
HF 410 XS=LEFT$(XS,1)
AF 420 IF XS<>"Y" THEN END
AD 430 INPUT "NAME OF REVISED
{SPACE}FILE";RS
AH 440 OPEN 15,8,15
DS 450 OPEN 2,8,3,"0":"+RS+",S,
W"
MK 460 INPUT#15,E,ES:IF E<>0 T
HEN PRINT ES:STOP
PF 470 OPEN 1,8,2,FS
CP 480 INPUT#15,E,ES:IF E<>0 T
HEN PRINT ES:STOP
QE 490 SYS 8727
QM 500 CLOSE 1
PP 510 CLOSE 2
EQ 520 CLOSE 15
```

Read a file
with BASIC's INPUT#
statement and
chop any extra
Returns that
may cause a crash.

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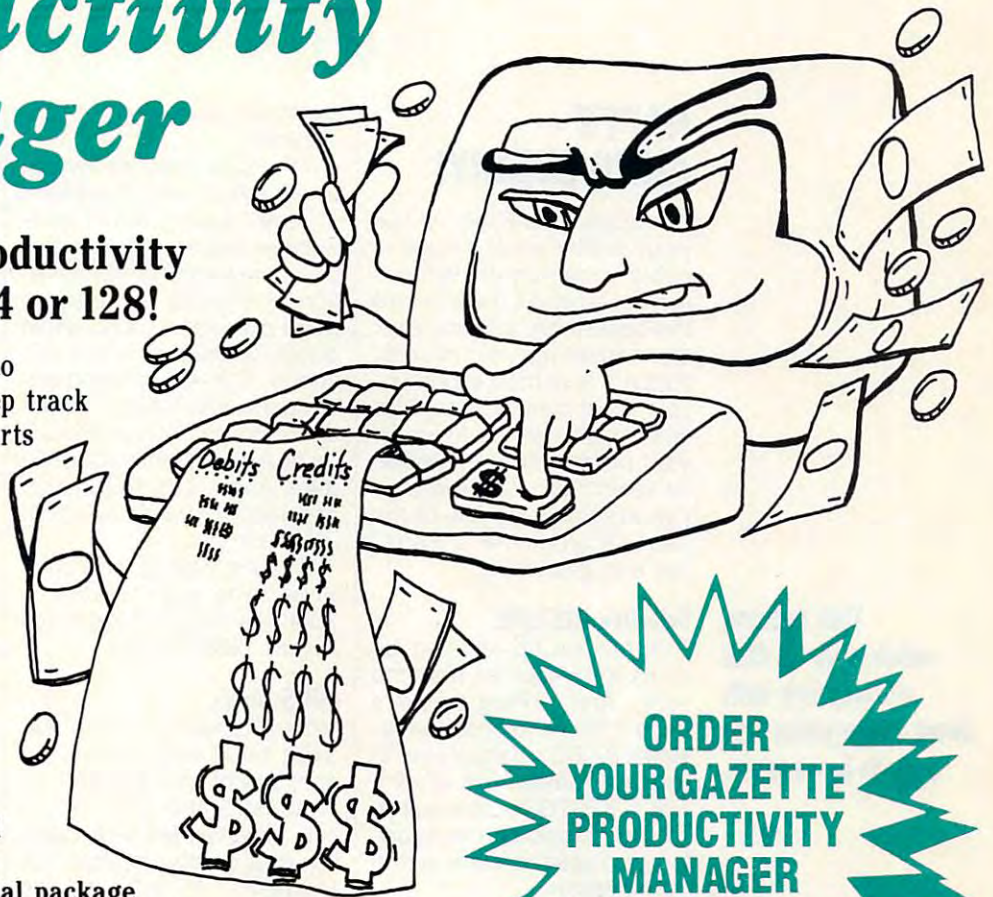
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PROGRAMMER'S PAGE

Randy Thompson

HAPPY ANNIVERSARY!

"Programmer's Page" is five years old this issue! It made its debut in the August 1988 edition of Gazette. I'd like to take this opportunity to thank all of my readers for your interest; support; and, most important, your great contributions. This column, after all, is a forum for your programming expertise. To celebrate our anniversary, I've assembled a few of the best "Programmer's Page" tips ever published.

This column celebrates its fifth anniversary with some more great tips sent in by readers.

Selective RESTORE

This bizarre tip—written by yours truly—comes from the very first "Programmer's Page." This short routine restores BASIC's data pointer to any line number, just like the 128's RESTORE command. To use it, execute the following instructions once within your program.

```
BD 10 POKE 784,108:POKE 785,12
      2:POKE 786,0
PQ 20 DEF FN RS(N)=USR(N)+POS(
      " {A} {U} {T} {2 E} {<
      L' {2 E} ")
```

Then, add the following command to your program.

X=FN RS(line number)

In this case, *line number* is the line number of the DATA statement at which you want your program to READ. In other words, RESTORE to this line. The line number can be a number, variable, or even an expression such as 1000+I*10. If you want, you can replace X with a variable. Just be warned that the value of the variable used will be scrambled.

Be especially careful when entering line 20. A single typo could cause the computer to lock up when the program is run. Note that there are no spaces between the USR

statement, plus sign, or POS statement.

To ensure accurate typing, use The Automatic Proofreader; see "Typing Aids" elsewhere in this issue. To help further, here's an English translation of how to enter those weird characters found within quotation marks in line 20: space, Ctrl-A, Commodore-U, space, Ctrl-T, two Commodore-English Pounds, Shift-F, Back Arrow, Commodore-G, Back Arrow, L, single quote, and two Commodore-English Pounds.

If you're looking for a challenge, try to figure how this tip works—without looking in the August 1988 Gazette.

MID\$ Magic

Most programmers use BASIC's MID\$ function on the right side of an equal sign, as in A\$=MID\$(B\$,3,1). On the 128, however, MID\$ can also be used on the left side. For example, if A\$ equals 123456789 and B\$ equals ABC, the instruction MID\$(A\$,4,1)=B\$ sets A\$ equal to 123A56789, while the instruction MID\$(A\$,4)=B\$ sets A\$ equal to 123ABC789.

Using this technique, you can stuff one character or a group of characters into the middle of another string without juggling LEFT\$ and RIGHT\$ functions. Credit for this useful string-handling advice goes to Michael Verdigué of Lawton, Oklahoma.

Unscrollable Lines

Here's a short machine language subroutine from Sean Ganess of Woodside, New York, that protects the top two lines from being scrolled off the screen. You can still print text to these lines and erase them by clearing the screen, but they are unaffected by scrolling text. You might want to use this feature to display such things as your location

in an adventure game or to show the disk drive status in a utility program.

```
FR 10 GOSUB 3000:END
GF 3000 FOR I=828 TO 875:READ
      {SPACE}D:POKE I,D:C=C+
      D:NEXT
XK 3010 IF C<>6370 THEN PRINT
      {SPACE}"ERROR IN DATA
      {SPACE}STATEMENTS":END
CF 3020 SYS 828:POKE 59639,1:P
      OKE 64982,53:POKE 1,53
HQ 3030 RETURN
FJ 3040 DATA 160,0,132,38,169,
      224,133,39,177,38,145,
      38,200,208,249,230,39,
      165
QA 3050 DATA 39,201,0,208,241,
      160,0,132,38,169,160,1
      33,39,177,38,145,38,20
      0,208
KJ 3060 DATA 249,230,39,165,39
      ,201,192,208,241,96,0
```

To use this program, simply GOSUB 3000 whenever you want to protect the top two screen lines. This subroutine needs to be executed only once when your program is first run.

Missing Data

Neglecting to put numeric data between the commas in a DATA statement is the same as including the digit 0. For example, check out the following program.

```
10 FOR I=1 TO 10: READ D:
   PRINT D:NEXT
20 DATA .....
```

Line 20 produces the same results as the following.

```
20 DATA 0,0,0,0,0,0,0,0,0,0
```

If you are reading string data—as in the command READ D\$—the missing data is interpreted as a null string. This tip came courtesy of Doug Ross of Merrickville, Ontario, Canada.

Send your programming tips 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. □

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BEGINNER BASIC

Larry Cotton

BUCKS IN A POT

Let's get back to reviewing BASIC statements, specifically FOR-NEXT loops. Here's a quick review. FOR-NEXT (or FOR/TO/STEP/NEXT as the *Commodore 128 Programmer's Reference Guide* calls it) executes repetitive loops.

We've seen how each FOR-NEXT loop requires seven separate and distinct elements and how STEP can be less than 1, more than 1, or a negative value. (Omitting STEP yields a step size of +1.) Here are some simple examples.

```
10 FOR J = 1 TO 4
20 PRINT J
30 NEXT
```

```
10 FOR J = .5 TO 3.5 STEP .5
20 PRINT J
30 NEXT
```

```
10 FOR J = 10 TO 1 STEP -2
20 PRINT J
30 NEXT
```

A very common use for FOR-NEXT is to load arrays. We've studied arrays in this column before, but if you don't understand or remember them, we'll get back to them soon. For now, just think of an array as a group of pigeonholes that need numbers stuffed into them. The pigeonholes usually have names such as A(1) or B(4). Here's how to fill a small one-dimensional array using a FOR-NEXT loop.

```
10 FOR J = 1 TO 10
20 A(J) = 25
30 NEXT
```

This simple pigeonhole stuffer will make each variable A(1) through A(10) equal to 25. Here's how you can make the variables equal the counter as it's increased.

```
10 FOR J = 1 TO 10
```

```
20 A(J) = J
30 NEXT
```

You can read DATA statements and place them into the arrays, too.

```
10 FOR J = 1 TO 7
20 READ Q
30 A(J) = Q
40 NEXT
50 DATA 12, 2, 52, 41, -3, 3.5,
-7.34
```

After this program runs, A(1) will be 12, A(5) will be -3, and so on.

Let's take another look now at nested FOR-NEXT loops. Here's an example.

```
10 FOR A = 1 TO 3
20 FOR B = 3 TO 4
30 PRINT "A="A,"B="B
40 NEXT B
50 NEXT A
```

The A loop is the outer one, and it loops a total of three times. The B loop is the inner one, and it loops twice for each value of A. The use of the variable names after NEXT is optional, but it can help keep things straight.

Now, let's get to the meat of this month's column. The other day, a friend called to ask for help with his third-grade son Derek's homework.

The problem, as we understood it, was to calculate how many combinations of twenties, tens, and fives could be in a pot of \$200. Naturally, I don't need much inspiration to write a BASIC program. So I wrote one to solve the problem, and it just happened to use nested FOR-NEXT loops. Here it is.

```
10 PRINTCHR$(147)
20 INPUT"HOW MUCH IS IN THE
POT";P
30 TW=P/20
40 FORI=0 TO TW
50 R=P-I*20
60 TE=R/10
```

```
70 FORJ=0 TO TE
```

```
80 C=C+1
```

```
90 NEXTJ
```

```
100 NEXTI
```

```
110 PRINT:PRINT"THESE
ARE"C"COMBINATIONS."
```

Line 20 asks the user for a pot value. Enter the number only, not a dollar sign. Line 30 finds the maximum number of twenties (TW) which can be in the pot. Then we start a loop in line 40 which counts up from no twenties to TW.

Lines 50 and 60 calculate the maximum number of tens there can be in the pot for any given number of twenties. Our inner loop (J) begins at line 70 and counts up from no tens to the maximum number of tens for each value of I, the twenties counter.

Inside the inner FOR-NEXT loop is another counter (C in line 80) which simply increments every time the inner loop is used. For each number of tens for a given number of twenties, there will be a certain number of fives necessary to arrive at the total pot. Therefore, we've counted all the possible combinations!

If there were ones in the pot, you would need another FOR-NEXT loop which would increment (or decrement) the fives while holding the twenties and tens constant. The number of combinations would become staggering.

This seemed like a tough problem for a third-grader to solve. We discovered later that the actual assignment was to find just *some* of the possible combinations—not all of them! Anyway, it was an interesting problem and a good excuse to write a BASIC program. By the way, there are 121 possible combinations of twenties, tens, and fives in a pot of \$200. With larger pots, watch the time it takes to calculate the combinations grow exponentially. □

How many combinations of fives, tens, and twenties can you find that will total \$200?

IMPORTING GEOS GRAPHICS

Two of my favorite subjects are graphics and geoPublish, and last month I talked about both. I described differences between geoPaint's bitmapped graphics and geoPublish's object-based ones.

This fundamental difference between the two formats is important for you to understand, lest you find yourself confused and frustrated. Once you get the hang of object-based graphics, though, you'll love the freedom that they give you to experiment and to create.

Working with geoPublish, you'll most likely want to use clip art with your documents. Most of this art will be in bitmap format, which means that it's stored as a fixed set of dots laid out to form an image. This graphics don't use the same format as those created by geoPublish itself, but that doesn't mean that you can't use them. You can import these bitmaps very easily.

Each mode of geoPublish has an import tool. In both Page Graphics and Master Page modes, the bitmap appears where you click the cross hairs on the page. Once imported, the bitmap is an object on its own layer, just like any other object on the page. Remember, if you enlarge this image, you won't be adding more dots to the image; you'll only be making the existing dots bigger. As a result, an enlarged bitmap looks blocky and jaggy. GeoPublish offers a smoothing option which helps by rounding off some of the sharp edges, but this doesn't always make it look better.

In Page Layout mode things work a little differently. You can still resize an image and change its attributes, but

the way you move a bitmap onto your page is unique to this mode. In Page Layout mode you create rectangular areas (regions) on the page in which to place text or, in this case, bitmaps. Before you can import an image, you must define an area in which the image will be located. This region can contain only the graphic or text file you specify for it. If you place a region on top of another region, you won't be able to see through the one on top. And if you place the region on top of a text region, the text will adjust around it.

This is very useful for mixing text and graphics on a page. You can create a large text region, then create graphics regions on top where you want the bitmaps to appear. The text will flow around those regions as pretty as you please.

In Page Graphics mode, however, if you place a graphic in the middle of a text area, the two will just overlap. This also can be a useful technique if you change the pattern of the bitmap to gray instead of black, allowing the text to stand out. But if you want text to flow around graphics, you'll want to import those graphics in Page Layout mode.

Remember that I said that the regions you create in Page Layout mode are rectangular. The text will flow around that rectangular area, not around the edges of the image itself. There's no built-in way to make text flow around an irregular edge. You can simulate this effect by creating a number of text regions, each sized to hold a few lines of text and each fitted to the edges of the graphic image. The problem occurs if your graphic was imported in Page Layout mode. This mode won't let you cross its straight region edges with your text regions.

If you import the image in Page Graphics mode it won't be visible in Page Layout mode at all, which means it'll be next to impossible to fit a text region next to it with any precision. Probably the easiest way to simulate text flowing around an irregular graphic is to create text which has a built-in flow created by pressing the Return key at the end of the lines in strategic places, then fitting the graphic to it in Page Graphics mode.

There is one other way to get graphics onto your geoPublish page. You can first import them into a geoWrite document which you then import into your geoPublish document. The graphic gets imported as well as the words. It even keeps its formatting within that text area (centered, for example). This method works particularly well if you want the graphics to be tied to the text, such as in a fancy headline or a letterhead. Of course, you're stuck with geoWrite's rather limited photo scrap size.

Let's think bigger for a minute. It can be a bit of a hassle to import photo scraps when they're limited to the size of the geoPaint window. There are utility programs which will let you clip photo scraps as large as an entire page. One of the best, called Scrap Can, comes as a bonus on the geoCanvas disk from Creative Micro Designs. A shareware example is Scrap It (Q-Link filename: SCRAP IT, uploaded by TerryV7). These utilities will in effect let you convert an entire geoPaint page into a geoPublish page, although the whole thing is then a single large object. You can also convert a geoPublish page from a series of layered objects into a large bitmap (in other words, convert it into a geoPaint document) with the program Paint Pages, which comes in the GEOS 2.0 package. □

Get the most from geoPublish by importing bitmapped graphics and clip art.

D'IVERSIONS

Fred D'Ignazio

MULTIMEDIA ROAD WARRIOR

My name is Fred D'Ignazio, but most people know me as the Road Warrior. For the past ten years, I've journeyed to more than 100 school districts in North America, Europe, and Australia as a multimedia evangelist—a Johnny Appleseed of new technology.

My mission began in the mid-1980s in a kindergarten classroom in Cahaba Heights, Alabama. I had conceived a concept of classroom learning known as the multimedia sandbox. Children and teachers in the sandboxes scavenged common items from around their schools such as a computer, a tape recorder, a record player, a tiny musical keyboard, a VCR, a TV, a camera, and so on. I then taught them how to use \$5 Radio Shack cables to connect these items into a children's multimedia publishing center.

The idea caught on like wildfire in the Jefferson County, Alabama, schools. Pretty soon we had 13 multimedia sandbox schools and almost 100 children, parents, and teachers who were learning to assemble, troubleshoot, and operate these scavenged multimedia workstations.

In early 1986 I was invited as a featured speaker to one of the foremost national conferences for computer-using educators. To prepare for the national debut of the multimedia sandbox, I asked the conference organizers for the basic elements of a scavenged workstation (a computer, VCR, camcorder, and so on) along with presentation devices such as a video projector and a speaker system for a room full of hundreds of adults. I arrived at the conference fully expecting all the equipment to

be assembled for me. After all, the Jefferson County kids and teachers had mucked around with this stuff for months.

Boy, was I surprised! None of my stuff was ready. Technicians were scratching their heads and telling me that it was impossible to plug a computer's video-out jack into a VCR and that it was not appropriate to use a common tape recorder as an audio input device for a VCR. There were none of the Radio Shack cables and adapters that I required to integrate the little devices into a multimedia workstation.

But I toughed it out. I reassured everyone that such things were being done every day by five-, six-, and seven-year-olds in Alabama. Then, I rushed out of the hotel and ran across town to a Radio Shack and quickly purchased \$25 worth of cables and adapters.

Back at the conference hotel, I hurriedly plugged cables to the equipment and computer. A short time later, hundreds of people arrived for the demonstration of my multimedia sandbox. I turned on the video projector. Uh-oh! The bulb burnt out. I turned on the large speaker that the hotel had provided for my sound system. No sound. No one could hear or see my stuff.

I'd brought an hour's worth of videotapes and computer slides created by the Alabama children on their scavenged multimedia workstations. They included multimedia story problems for math class; multimedia book reports and biographies; and multimedia science projects featuring animated black holes, beating hearts, and dancing skeletons. I also had a wonderful presentation by a team of kindergartners and sixth-graders titled "What Is a Principal?"

I couldn't show any of it. I was stunned. What had be-

come simple for us in my kindergarten classroom in rural Alabama was impossible to demonstrate in a world-class technology conference in one of America's largest cities.

I survived that experience by calling my audience to the front of the room to see my stuff on a little TV and computer screen and to listen carefully to the puny sounds coming out of my portable speaker.

That's the day I first became a multimedia Road Warrior. I vowed that I would never be caught off guard again.

Since then, I've traveled with all of my multimedia supplies squashed into four durable Road Warrior bags. I carry the two smaller ones on board each plane and check the two larger bags. If the two larger bags don't show up at my destination, I can do a "Multimedia Lite" presentation with the cables and stuff from the two carry-on bags. If I'm fortunate and the airlines doesn't lose the two bags that I've checked, I can put on a whiz-bang "Multimedia Classic" presentation full of rocket ships blasting off, kindergartners' digital videos, and New Age music composed by deaf children.

So if you're in an airport in the coming months, watch for me. I'm the small bearded man, rushing from one airport gate to the next, carrying two small duffel bags, trailing green and red Radio Shack cables, and spilling stacks of CD-ROMs and disks on the floor behind me.

It's a dirty, sweaty job, but some day, people will look at their gleaming multimedia TVs and remember the early days of multimedia, back to the days of spaghetti-like cables, the multimedia boxes that never seemed to work together. If you jog their memories, they may even recall a little man with a vision—the guy they called the Road Warrior. □

Who is that little guy rushing through airports with duffel bags stuffed with more parts than a small electronics store?

32 SPRITES

By Bill Soudan

As far as games go, most 64 users are aware that they normally are limited to having eight sprites (or MOBs, Movable Object Blocks) to manipulate. There are programs, however, that can double or even triple the eight-sprite limit, but these programs often impose restrictions or cause annoying flicker—making the extra sprites almost worthless.

Thirty-two Sprites lets you quadruple the 64's sprite limit without losing any flexibility, while keeping flicker to the barest minimum. Thirty-two Sprites can handle up to 32 sprites at a time, and each sprite can be placed anywhere on the screen!

Thirty-two Sprites is a BASIC program that lets you create a customized machine language routine for up to 32 sprites. To help avoid typing errors, enter 32 Sprites with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you run it.

Getting Started

Load and run 32 Sprites. After a short pause, a main menu will come up. This is where you can customize almost every aspect of 32 Sprites. To change an item on the menu, type in the number in front of the parameter you want to change and press Return. If the parameter can be turned on and off, the program will first prompt you for the desired setting. Next, the program will ask you the new memory location. You can enter the new location in either hex (by preceding it with a dollar sign) or in decimal. You may simply press Return if you wish to leave the program at its default location.

Menu Selections

The first item in the menu is Starting Address. This simply specifies the memory location where the machine language code for 32 Sprites will begin in memory. The next eight menu items correspond to the computer's sprite registers. Each of these can be turned on or off, and each can also place the shadow registers anywhere in memory.

Because there are only enough registers in the VIC chip for eight sprites, 32 Sprites must set aside a section of

memory to handle 32 sprites. The hex and decimal addresses listed next to each of the sprite parameters indicate where in memory the shadow registers of that particular parameter will start.

You can place these shadow registers anywhere in memory. For example, the default Y position shadow registers start at 52992 (\$CF00). To change sprite 1's Y position, simply poke 52992 (\$CF00) with the desired Y position. Each consecutive memory location controls the next consecutive sprite number. To change sprite 2's Y position, poke 52993 (\$CF01) with the desired number. This continues to location 53023 (\$CF1F), which controls sprite 32's Y position.

Temp Page

The next menu item is Temp Page. This is a workspace in memory, 256 bytes long, required to sort the sprites from the least Y position to the greatest Y position. All 256 bytes are used, and this area of memory should not be used by any other program.

Order Table

Order Table is the next menu item. This is a 32-byte area needed by 32 Sprites to hold the order of the sprites after they are sorted.

Extra Y Table

Because 32 Sprites uses interrupts to function, changing a sprite's Y position while the VIC chip is drawing will cause that particular sprite to flicker and possibly will cause other sprites to flicker as well. The Extra Y Table is a copy of the Y position shadow registers, and it is used by the interrupt routine to prevent flicker. Again, this 32-byte area should not be used.

How Many Sprites?

The last menu item lets you determine the maximum number of movable object blocks or sprites that you want to use at one time. This number can be changed to 16, 24, or 32. Note that changing this register changes the length of the shadow registers. If 32 Sprites is set to 16 sprites, only 16 shadow registers are needed. This should always be set to the maximum number of sprites which you plan to use in your program.

Generating 32 Sprites

After you've set the parameters for your sprites, it's time to generate 32 Sprites, which is a machine language routine. This is item 14 on the menu.

A minute or two after selecting this option, the program will generate the code and supply you with its starting and ending addresses in both decimal and hex and with information on how to enable and disable 32 Sprites. The program will ask you if you'd like to save the ML routine to disk. Respond with Y or N.

If you wish to save 32 Sprites to disk, press Y and the program will prompt you for a filename. Type in your choice of a filename and hit Return. Make sure a disk is in the drive. Be careful because the program doesn't check for disk errors.

After the program is saved or after pressing N at the save prompt, the program will ask if you want to print an information sheet. The info sheet is simply a listing of the starting and ending addresses of the ML routine; the SYS addresses that enable and disable 32 Sprites; and a copy of the main menu parameters, with the on/off status and address. If you'd like a copy, turn on your printer and press Y. Once the print-out is completed or after hitting N, the program will clear the screen and end. The 32 Sprites machine language is now in memory and ready to be used.

Your Own Programs

With 32 Sprites, you can now write your own BASIC programs that contain up to 32 sprites. Before calling the SYS address to start 32 Sprites, your program must clear out the shadow registers; otherwise, a screen full of garbage sprites will appear on the screen when 32 Sprites starts. You can do this by poking 0s into the shadow registers with something like the following.

```
100 FOR J=0 TO 31: POKE 52992+J,0: NEXT
```

This line will set each sprite's Y position to 0. Don't forget to do this to any other shadow registers which are being used, too.

Once all registers have been cleared and/or set up as desired, use SYS and the starting address of the machine language program. Thirty-two

Sprites will enable raster interrupts, clear out the temp page, and begin to operate.

The best way to handle the shadow registers is to define a variable at the beginning of the program with the registers' location. Here's an example.

110 YPOS=52992: REM Y POSITION SHADOWS

Then to change any given sprite's Y position, use the POKE command.

120 POKE YPOS+5,100: REM SPRITE 6'S YPOS

Note that you subtract 1 from the sprite's actual number. To change sprite 32's Y position, you'd add 31 to the YPOS. To change sprite 1's Y position, you could use YPOS plus 0, or simply YPOS.

The shadow registers of High X bit, X expand, Multicolor, and Priority operate a bit differently. Each of these registers can be either off (by poking them with a 0) or on (by poking them with any number other than 0).

Each of the sprite parameters you turned on before generating 32 Sprites with its BASIC generator can be changed for each sprite by using the corresponding shadow register. Note that 32 Sprites doesn't change any registers in the VIC chip which you turned off before generating 32 Sprites.

For example, multicolor can still be used even if you didn't turn it on from 32 Sprite's main menu. However, because you told 32 Sprites to leave the register off, its shadow registers won't work, and you won't be able to tell 32 Sprites which sprites are multicolor and which are not. But you can change the actual register in the VIC chip.

For example, if you decide beforehand that you are going to design all of your sprites in multicolor mode, you could turn off the multicolor shadow registers before generating and then tell the VIC chip to display all sprites that it draws in multicolor by using POKE 53276,255.

32 Sprites won't interfere with the multicolor register, and the VIC will display all eight sprites as multicolor. In order to display more sprites, 32 Sprites

tricks the VIC into displaying either two, three, or four sets of eight sprites on the same screen. The VIC believes it's displaying eight sprites in all, and it displays them in multicolor.

Thirty-two Sprites can handle up to the maximum number of sprites you set for it on the main menu. Every single sprite can be displayed anywhere on the screen. Displaying more than eight sprites on a horizontal row could cause flickering and some distortion. Thirty-two Sprites operates at its best when the sprites are spaced out along the y-axis. Careful designing of game screens will prevent too many sprites on one row.

You may have noticed there wasn't a shadow register which turns a sprite on or off. To do this with 32 Sprites, simply set the corresponding sprite's Y position to 0. This tells 32 Sprites you don't wish to have that sprite drawn.

Hints and Tips

While greatly enhancing the 64's graphics capabilities, 32 Sprites is a machine language routine which does take up processor time. The more sprites displayed on the screen and the more parameters set to on, the slower the computer runs. The best way to conserve speed is to cut down on the number of sprites. Of course, whenever you need all 32 sprites, this will not be possible.

The other way to increase the speed of the computer is to turn off any unneeded sprite parameters. In 32 Sprites' machine language routine, only the parameters turned on are updated by the program. The rest are left to the VIC chip to handle. Although it takes a minimal amount of time to copy a value from a shadow register to the corresponding VIC register, it becomes noticeable when you multiply this time by 32.

The parameters which bog down the computer the most are the High X bit, X expand, Multicolor, and Priority. Do without them whenever you can. Although the High X bit cannot usually be done without, Priority is rarely used and can usually be set to off.

The next way to conserve processor time is to place the sprites nearer the top of the screen. Thirty-two Sprites begins at the top of the screen and search-

es down until it finds the number of sprites for which it was set. By placing the sprites closer to the top, 32 Sprites will have to do less searching and use less processor time.

You may notice some distortion of the tops and bottoms of the sprites when you're using 32 of them. This is because the computer may be too slow to update the VIC registers as fast as needed when the sprites are in certain positions. The best way to avoid this is to leave the top and bottom row or two of the sprite definitions blank.

Because 32 Sprites is a raster interrupt, it does change the interrupt vector at \$0314-\$0315. Machine language programmers can still use another interrupt, as long as it doesn't use another raster interrupt. Every 1/60 second, like the normal timer interrupt, and after all the sprites on the screen have been drawn, 32 Sprites jumps to the normal interrupt routine, usually located at \$EA31. This JMP is located at the starting address plus \$61. It can easily be changed to jump to your own interrupt routine instead. Just remember to end your interrupt with JMP \$EA31.

Although 32 Sprites provides improved sprite capability and flexibility, it's not infallible. Placing the sprites in certain positions can often cause flicker or cause some sprites to disappear. The best way to prevent flicker is to design playing screens which space the sprites out along the y-axis.

Since the VIC chip is actually limited to eight sprites, 32 Sprites divides all of the sprites into eight-sprite chunks and displays each chunk as one group. You still cannot display more than eight sprites on a horizontal line because of the VIC chip's limitations. If you decide to put more than eight on one row, 32 Sprites will do its best to display more than eight sprites per horizontal line.

How It Works

Thirty-two Sprites works by use of the VIC chip feature called raster interrupts. The computer screen is redrawn every 1/60 second. After one screen is drawn but before the next one begins, 32 Sprites quickly sorts the sprites in order from lowest Y position to highest Y position. On the screen, that is from

the sprite closest to the top to the one closest to the bottom.

The program then displays the top-most eight sprites and tells the VIC chip to let 32 Sprites know when these sprites have been drawn. Once the VIC chip alerts 32 Sprites, the screen is only partially redrawn. The topmost eight sprites have been drawn, but the rest of the screen hasn't been drawn yet. So 32 Sprites puts the next eight sprites into the VIC's registers, and they are drawn. This process repeats for each series of eight sprites.

A Demonstration

To give you some idea of 32 Sprites's power, try this demonstration program. The demo consists of a BASIC program and machine language sprite data. Before you can run the demo, however, you must generate 32 Sprites. Load and run the main BASIC program. Once the menu comes up, type 14 and hit Return. When the program asks you if you want to save to disk, answer Y and type in 32 for the filename.

This is the name the demo searches for when it runs. Don't print out the information sheet at this time.

To help avoid typing errors, enter the demo with The Automatic Proofreader. Save the program before you try to run it.

Sprite data is written in machine language. Enter it with MLX, our machine language entry program. Again, see "Typing Aids." When MLX prompts, respond with the following addresses.

Starting address: C3A0

Ending address: CAFF

Since the demo automatically loads this data, save it with the filename 32 DEMO.ML. Make sure that this file and 32 are all on the same disk as the demo. Control the demonstration with a joystick plugged into port 2.

32 Sprites

KX 100 REM COPYRIGHT 1993 - COMPUTE PUBLICATIONS - ALL RIGHTS RESERVED
 HB 110 REM WRITTEN BY BILL SOUDAN
 MA 120 REM
 KC 130 POKE53281,0:POKE53280,0:PRINT"{CLR}":ZP=191
 XX 140 PRINT"{CYN}{CLR}{H}{N}

```
{BLU}{G}{CYN}
{14 SPACES}32 SPRITES"
MP 150 POKE1063,103:POKE55335,6
DK 160 PRINT"{BLU}{39 T}{LEFT}{INST}{T}"
FP 170 PRINT:PRINTTAB(15)"{3}MAIN MENU"
RG 180 PRINT:DIM P$(12),P(12,1),H$(16)
CE 190 X$="0123456789ABCDEF"
RJ 200 FORJ=1TO16:H$(J-1)=MID$(X$,J,1):NEXT
RQ 210 FORJ=0TO12:READP$(J):NEXT
EG 220 DATA "STARTING ADDRESS","Y POSITION","X POSITION","HIGH X BIT"
EP 230 DATA "X EXPAND","COLOR","MULTICOLOR","PRIORITY","POINTER"
DX 240 DATA "TEMP PAGE","ORDER TABLE","EXTRA Y TABLE","MAX # OF MOBS"
PM 250 FORJ=0TO12:READ P(J,0),P(J,1):NEXT
FK 260 DATA 3,49152,3,52992,1,53024
HE 270 DATA 1,53056,2,53088,1,53120
QC 280 DATA 2,53152,2,53184,1,53216
GB 290 DATA 3,52736,3,52672,3,52704
EM 300 DATA 3,32
JM 310 FORP=0TO12:GOSUB1200:NEXT
RC 320 PRINT" {YEL}14 {CYN}GENERATE {WHT}32 SPRITES"
HR 330 W$="{HOME}{21 DOWN}"
EB 340 GOSUB1360:PRINTW$;:INPUT T"{3}YOUR CHOICE";C$
AA 350 C=VAL(C$):IFC<10RC>14THEN340
JG 360 IFC>12THEN470
RA 370 IFC<1,0)=3THEN420
AF 380 GOSUB1360:PRINTW$;:PRINT"{3}SELECT: ";P$(C-1);"{WHT}1.{3} ON {2 SPACES}{3}2.{WHT} {2 SPACES}OFF"
GD 390 GETA$:IFAS<>"1"ANDAS<>"2"THEN390
AR 400 IFAS="1"THENP(C-1,0)=1
BJ 410 IFAS="2"THENP(C-1,0)=2
CR 420 GOSUB1360:PRINTW$;:ML$="-1":INPUT"{3}NEW MEMORY LOCATION";ML$
JF 430 IFLEFT$(ML$,1)="$"ANDLEN(ML$)=5THEN$=ML$:GOSUB1340:ML=D:GOTO450
JA 440 ML=VAL(ML$):IFML<0ORML>65535THEN460
MG 450 P(C-1,1)=ML
SS 460 P=C-1:GOSUB1200:GOTO340
JF 470 IFC=14THEN510
```

```
CJ 480 GOSUB1360:PRINTW$;:PRINT"{3}SELECT: {WHT}1.{3} 16 {WHT}2.{3} 24 {WHT}3.{3} 32"
EP 490 GETA$:IFAS<>"1"ANDAS<>"2"ANDAS<>"3"THEN490
AG 500 P(12,1)=(VAL(AS)*8)+8:GOTO460
AF 510 REM GENERATE ML CODE
HQ 520 AD=P(0,1)
KK 530 GOSUB1370
DM 540 PRINT"{HOME}{11 DOWN}{CYN}"TAB(12)"GENERATING ML..."
KB 550 DEF FNH(X)=INT(X/256)
KR 560 DEF FNL(X)=X-(FNH(X)*256)
MM 570 PRINT"{DOWN}"TAB(9)"INITIALIZATION CODE..."
GF 580 MP=0:GOSUB1440
KG 590 FORJ=1TOP(12,1)/8:PRINTTAB(12)"RASTER HANDLER";J:GOSUB1560:NEXT
BB 600 AD=AD-34:DA$="A9FA8D12D0A9008D00004C31EA":GOSUB1430
XK 605 POKEAD-5,FNL(P(0,1)+100):POKEAD-4,FNL(P(0,1)+100)
JD 607 GOSUB 1907
HK 608 DI=AD:DA$="78A9318D1403A9EA8D1503A9008D15D08D1AD0A9818D0DDCA9008D0DDCA993"
HJ 609 DA$=DA$+"20D2FF5860":GOSUB1430
HP 610 GOSUB1370:PRINT"{HOME}{7 DOWN}"TAB(16)"COMPLETE."
AS 620 PRINTTAB(5)"{2 DOWN}BEGINNING ADDRESS: ";D=P(0,1):GOSUB1300
PF 630 PRINTP(0,1);" $"+AS:PRINTTAB(5)"ENDING ADDRESS: {3 SPACES}";:D=AD:GOSUB1300
JA 632 PRINTAD;" $"+AS
QJ 635 PRINT"{DOWN} ENABLE 32 {SPACE}SPRITES: {3 SPACES}";:D=P(0,1):GOSUB1300
JP 636 PRINT"SYS";P(0,1);"(JMP {SHIFT-SPACE}$"+AS+)"
QM 637 PRINT" DISABLE 32 SPRITES: {2 SPACES}";:D=DI:GOSUB1300
FX 638 PRINT"SYS";DI;" (JMP {SHIFT-SPACE}$"+AS+)"
AM 640 PRINTTAB(13)"{2 DOWN}SAVE 32 SPRITES ML?"
KP 650 GETA$:IFAS<>"Y"ANDAS<>"N"THEN650
RE 660 IFAS="N"THEN710
KS 670 GOSUB1370:PRINT"{HOME}{7 DOWN}"TAB(5)"ENTER FILENAME: ";:OPENL,0:INPUT #1,F$:CLOSE1
```

PROGRAMS

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JD 680 PRINT:PRINTTAB(15)"
      {2 DOWN}SAVING...."
DQ 690 SYS57812 FS,8,1:POKE193
      ,FNL(P(0,1)):POKE194,FN
      H(P(0,1)):POKE174,FNL(A
      D+1)
XM 700 POKE175,FNH(AD+1):SYS 6
      2957
KG 710 GOSUB1370:PRINT"(HOME)
      {10 DOWN}"TAB(10)"PRINT
      OUT INFO SHEET?"
RP 720 GETAS:IFAS<>"Y"ANDAS<>"
      N"THEN720
SC 730 IFAS="N"THENPRINT"(CLR)
      ":END
KM 740 GOSUB1370:PRINT"(HOME)
      {10 DOWN}"TAB(14)"PRINT
      ING...."
MR 750 OPEN4,4,7:PRINT#4:PRINT
      #4:PRINT#4
KE 760 PRINT#4,SPC(23)"32 SPRI
      TES"
QH 770 PRINT#4:PRINT#4:PRINT#4
DG 780 PRINT#4,SPC(23)"STARTIN
      G ADDRESS:";D=P(0,1):G
      OSUB1300
GE 790 PRINT#4,P(0,1);" $"+AS:
      PRINT#4,SPC(23)"ENDING
      {SPACE}ADDRESS:
      {2 SPACES}";D=AD:GOSUB
      1300
CK 800 PRINT#4,AD;" $"+AS:PRIN
      T#4
QX 802 PRINT#4,SPC(19)"ENABLE
      {SPACE}32 SPRITES:
      {3 SPACES}";D=P(0,1):G
      OSUB1300
SA 804 PRINT#4,"SYS";P(0,1);"
      {SPACE}(JMP
      {SHIFT-SPACE}$"+AS+)"
HC 806 PRINT#4,SPC(19)"DISABLE
      32 SPRITES:{2 SPACES}"
      ;D=DI:GOSUB1300
ES 808 PRINT#4,"SYS";DI;" (JMP
      {SHIFT-SPACE}$"+AS+)"":
      PRINT#4:PRINT#4
BR 810 FORJ=1TO12:PRINT#4,SPC(
      16);P$(J);SPC(20-LEN(P$(
      J)));
AF 820 IFP(J,0)=3THENPRINT#4,"
      N/A";
MX 830 IFP(J,0)=2THENPRINT#4,"
      OFF";
GJ 840 IFP(J,0)=1THENPRINT#4,"
      ON ";
RR 850 PRINT#4,SPC(5);P(J,1);:
      D=P(J,1):GOSUB1300
RX 860 PRINT#4,SPC(10-LEN(STR$(
      P(J,1))));"$"+AS:NEXT
BQ 870 PRINT#4:CLOSE4:END
PJ 880 DATA 78,A9,<0+72,8D,14,
      03,A9,>0+72
FS 890 DATA 8D,15,03,A9,7F,8D,
      0D,DC,A9,01
EJ 900 DATA 8D,1A,D0,AD,11,D0,
      29,7F,8D,11
JB 910 DATA D0,A9,FA,8D,12,D0,
      A9,00,8D
SF 920 DATA <0+100,>0+100,A9,F
      F,A2,00,9D
FH 930 DATA <9,>9,E8,D0,FA,A9,
      FF,8D,15,D0
RR 940 DATA 58,60,01,02,04,08,
      10,20,40,80
DR 950 DATA FE,FD,FB,F7,EF,DF,
      BF,7F,A9,01
HK 960 DATA 8D,19,D0,AD,<0+100
      ,>0+100,0A
XB 970 DATA A8,B9,<0+101,>0+10
      1,8D,<0+95
SC 980 DATA >0+95,B9,<0+102,>0
      +102,8D
RQ 990 DATA <0+96,>0+96,4C,FF,
      FF,4C,31,EA
KM 1000 DATA 00,<0+111,>0+111,
      00,00,00,00
DH 1010 DATA 00,01,00,00,A2,00
      ,BD,<1,>1,C9,1D,90,0E,
      A8
GB 1020 DATA B9,<9,>9,30,04,C8
      ,4C,<0+121
DS 1030 DATA >0+121,8A,99,<9,>
      9,E8,E0,<C
MD 1040 DATA 90,E6,A2,00,A0,1D
      ,B9,<9,>9,10
BA 1050 DATA 4F,C8,B9,<9,>9,10
      ,49,C8,B9,<9
DK 1060 DATA >9,10,43,C8,B9,<9
      ,>9,10,3D,C8
XB 1070 DATA B9,<9,>9,10,37,C8
      ,B9,<9,>9,10
DD 1080 DATA 31,C8,B9,<9,>9,10
      ,2B,C8,B9,<9
SM 1090 DATA >9,10,25,C8,B9,<9
      ,>9,10,1F,C8
AA 1100 DATA B9,<9,>9,10,19,C8
      ,B9,<9,>9,10
AC 1110 DATA 13,C8,B9,<9,>9,10
      ,0D,C8,B9,<9
GH 1120 DATA >9,10,07,C8,C0,1D
      ,B0,AE,90,0F
CC 1130 DATA 9D,<A,>A,A9,FF,99
      ,<9,>9,E8,E0
RB 1140 DATA <C,90,A4,B0,18
RS 1142 DATA E0,08,B0,05,BC,<0
      +56,>0+56
EE 1144 DATA 88,2C,A0,FF,8C,15
      ,D0
CD 1149 DATA A9,FF,9D,<A,>A
BH 1150 DATA E8,E0,<C,90,F8,EE
      ,<0+100
BM 1160 DATA >0+100,A2,<C,CA
BX 1170 DATA BD,<1,>1,9D,<B,>B
      ,CA,10,F7,XX
PM 1180 END
DE 1200 POKE214,5+P:PRINT
BQ 1210 PRINT"{YEL}";P+1;"
      {LEFT} {CYN}"P$(P)
FF 1220 PRINT"{UP}"TAB(22);
QJ 1230 IFP(P,0)=1THENPRINT"
      {3}ON "
HA 1240 IFP(P,0)=2THENPRINT"
      {4}OFF"
MC 1250 IFP(P,0)=3THENPRINT"
      {RED}N/A{3}"
BJ 1260 PRINT"{UP}"TAB(26);P(P
      ,1);"{5 SPACES}"
SA 1270 D=P(P,1):GOSUB1300
AX 1280 PRINT"{UP}"TAB(34)"$";
      AS
BD 1290 RETURN
KF 1300 T=INT(D/4096):AS=H$(T)
      :D=INT(D-T*4096)
JA 1310 T=INT(D/256):AS=AS+H$(
      T):D=INT(D-T*256)
KA 1320 T=INT(D/16):B$=AS:AS=A
      $+H$(T):D=INT(D-T*16):
      B$=H$(T)+H$(D)+B$
JE 1330 AS=AS+H$(D):RETURN
QP 1340 D=0:FORJ=3TO0STEP-1:J1
      =ASC(MID$(D$,5-J,1))-4
      8:IFJ1>16THENJ1=J1-7
DA 1350 D=D+(J1*16↑J):NEXT:RET
      URN
JK 1360 FORX=21TO24:POKE781,X:
      SYS 59903:NEXT:RETURN
KB 1370 FORX=2TO24:POKE781,X:S
      YS59903:NEXT:RETURN
FB 1380 DAS="68F00D":GOSUB1430
QE 1390 POKEAD,185:POKEAD+1,FN
      L(P(0,1)+56-SB):POKEAD
      +2,FNH(P(0,1)+56-SB):A
      D=AD+3
EG 1400 DAS="0D"+AA$+"8D"+AA$+
      "F00BD009":GOSUB1430
FX 1410 POKEAD,185:POKEAD+1,FN
      L(P(0,1)+64-SB):POKEAD
      +2,FNH(P(0,1)+64-SB):A
      D=AD+3
CQ 1420 DAS="2D"+AA$+"8D"+AA$:
      GOSUB1430:RETURN
CJ 1430 MP=1:FORJJ=1TOLEN(DAS)
      STEP2:AS=MID$(DAS,JJ,2
      ):GOSUB1450:NEXT:MP=0:
      RETURN
XM 1440 READAS:IFAS="XX"THENRE
      TURN
KG 1450 IFLEFT$(AS,1)="<"THEN1
      500
AX 1460 IFLEFT$(AS,1)=">"THEN1
      530
GS 1470 A1=ASC(LEFT$(AS,1))-48
      :A2=ASC(RIGHT$(AS,1))-
      48:IFA1>16THENA1=A1-7
QB 1480 IFA2>16THENA2=A2-7
SE 1490 POKEAD,A1*16+A2:AD=AD+
      1:ON -(MP=0) GOTOL440
      {SPACE}:RETURN
HK 1500 PL=0:IFLEN(AS)>2THENPL
      =VAL(MID$(AS,4))
RA 1510 WG$=MID$(AS,2,1):WG=VA
      L(WG$):IFWG$>"@ANDWG$
      <"D"THENWG=ASC(WG$)-55
HS 1520 POKEAD,FN L(P(WG,1)+PL
      ):AD=AD+1:ON -(MP=0) G
      OTOL440:RETURN
SP 1530 PL=0:IFLEN(AS)>2THENPL
      =VAL(MID$(AS,4))
ER 1540 WG$=MID$(AS,2,1):WG=VA
      L(WG$):IFWG$>"@ANDWG$
      <"D"THENWG=ASC(WG$)-55

```

```

ER 1550 POKEAD,FN H(P(WG,1)+PL
):AD=AD+1:ON -(MP=0) G
OTOL1440 :RETURN
BH 1560 POKEP(0,1)+L01+J*2,FNL
(AD):POKEP(0,1)+L02+J*
2,FNH(AD)
GF 1570 DA$="A200A0":IFJ=1THEN
DA$=DA$+"00":EP$="08":
SB=0
HF 1580 IF J=2THENDA$=DA$+"08"
:EP$="10":SB=8
DA 1590 IFJ=3THENDA$=DA$+"10":
EP$="18":SB=16
QR 1600 IFJ=4THENDA$=DA$+"18":
EP$="20":SB=24
BB 1610 DA$=DA$+"84BF":GOSUB14
30
AG 1620 IFJ=1THENB1=AD:GOTO166
0
QS 1630 B1=AD:DA$="B9":GOSUB14
30
AF 1640 POKEAD,FNL(P(10,1)-8):
POKEAD+1,FNH(P(10,1)-8
):AD=AD+2
AH 1650 DA$="300EA8B9<B>BA4BF1
86914CD12D0B0FB":GOSUB
1430
CJ 1660 DA$="B9<A>A":GOSUB1430
GP 1670 DA$="10034C0000A8":GOS
UB1430
SP 1680 DA$="B9<B>B9D01D0":GOS
UB1430
HK 1690 IFP(2,0)=1THENDA$="B9<
2>29D00D0":GOSUB1430
ES 1700 IFP(7,0)=1THENDA$="B9<
7>748":GOSUB1430
BF 1710 IFP(4,0)=1THENDA$="B9<
4>448":GOSUB1430
RQ 1720 IFP(6,0)=1THENDA$="B9<
6>648":GOSUB1430
GD 1730 IFP(5,0)=1THENDA$="B9<
5>548":GOSUB1430
PP 1740 IFP(3,0)=1THENDA$="B9<
3>348":GOSUB1430
XX 1750 IFP(8,0)=1THENDA$="B9<
8>8A4BF99":GOSUB1430
BB 1760 IFP(8,0)=1THENPOKEAD,F
NL(2040-SB):POKEAD+1,F
NH(2040-SB):AD=AD+2
HE 1770 IFP(3,0)=1THENAA$="10D
0":GOSUB1380
QH 1780 IFP(5,0)=1THENDA$="689
9":GOSUB1430
PE 1790 IFP(5,0)=1THENPOKEAD,F
NL(53287-SB):POKEAD+1,
FNH(53287-SB):AD=AD+2
EE 1800 IFP(6,0)=1THENAA$="1CD
0":GOSUB1380
XP 1810 IFP(4,0)=1THENAA$="1DD
0":GOSUB1380
FP 1820 IFP(7,0)=1THENAA$="1BD
0":GOSUB1380
QD 1830 PL=6:IFJ>1THENPL=25
AF 1840 POKEB1+PL,FNL(AD):POKE
B1+PL+1,FNH(AD):DA$="E
8E8C884BFC0"+EP$:GOSUB
1430
PQ 1850 D=254-(AD-B1)
QG 1860 IFD>129THENGOSUB1300:D
A$="D0"+RIGHT$(A$,2):G
OSUB1430:GOTO1880
BS 1870 DA$="F0034C":D=B1:GOSU
B1300:DA$=DA$+B$:GOSUB
1430
QS 1880 DA$="AD<A>A3010A8B9<B>
B38E9078D12D0EE00004CB
CFEA9008D0000A9FA8D12D
04C31EA"
QS 1885 GOSUB1430
MK 1890 POKEAD-33,FNL(P(10,1)+
8+SB):POKEAD-32,FNH(P(
10,1)+8+SB)
XA 1900 POKEAD-10,FNL(P(0,1)+1
00):POKEAD-9,FNH(P(0,1
)+100)
XG 1905 POKEAD-18,FNL(P(0,1)+1
00):POKEAD-17,FNH(P(0,
1)+100)
SQ 1907 POKEAD-2,FNL(P(0,1)+97
):POKEAD-1,FNH(P(0,1)+
97)
BK 1910 RETURN
FG 1920 B1=AD:DA$="B90000300EA
8B9<1>1A4BF186914CD12D
0B0FB":GOSUB1430
BE 1930 POKEB1+1,FNL(P(10,1)-8
):POKEB1+2,FNH(P(10,1)
-8):RETURN

```

32 DEMO

```

XR 100 REM 32 SPRITES DEMO
GA 110 REM
FP 120 PRINT"{CLR}{N}{H}":POKE
53281,0:POKE53280,0
EH 125 IFA=0THEN A=1:LOAD"32 D
EMO.ML",8,1
BE 127 IFA=1THEN A=2:LOAD"32",
8,1
JX 130 REM INITIALIZE 32 SPRIT
E REGISTERS
HH 135 DIM C(10)
EQ 140 Y=52992:X=53024:HX=5305
6:C=53120
KE 150 P=53216:PR=53275
AF 160 FORJ=0TO31:POKEY+J,0:PO
KEX+J,0:POKEHX+J,0:POKE
C+J,0:POKEPJ+14:NEXT
CS 170 FORJ=0TO63:POKE704+J,0:
POKE832+J,0:POKE896+J,0
:NEXT
QF 180 FORJ=3TO59:POKE832+J,25
5:NEXT
KD 190 POKEPR,255:SYS 50080:SY
S 49152:POKE53269,255
PJ 200 DT$="{HOME}{24 DOWN}"
SS 210 PRINTLEFT$(DT$,8);TAB(1
5){CYN}32 SPRITES"
JJ 220 PRINTTAB(9){7}CUSTOM 3
2-SPRITE RASTER"
EB 230 PRINTTAB(15)"CONTROLLER
"
RB 240 PRINT:PRINTTAB(9)"YOU C
AN DISPLAY UP TO 32"
JD 250 PRINTTAB(6)"SPRITES ON

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```

{SPACE}THE SCREEN AT AN
Y"
QS 260 PRINTTAB(7)"TIME. EACH
{SPACE}SPRITE CAN MOVE"
CQ 270 PRINTTAB(9)"ANYWHERE ON
THE SCREEN."
RK 280 FORCL=1TO10:READC(CL):N
EXT:DATA 8,2,9,10,7,1,7
,10,9,2
AX 290 FORJ=31TO0STEP-1:POKEP+
J,13:FORCL=1TO10:POKEC+
J,C(CL):NEXT:NEXT
QC 300 GOSUB 1010
DF 310 GOSUB 1000
XM 320 PRINTLEFT$(DT$,12);TAB(
7)"YOU HAVE FULL CONTRO
L OVER"
PB 330 PRINTTAB(7)"EVERY SPRIT
E OPTION EXCEPT"
AS 340 PRINTTAB(13)"Y-EXPANSIO
N."
RQ 350 FORJ=0TO31:POKEC+J,INT(
RND(1)*15)+1:NEXT:GOSUB
1020
RD 360 FORJ=0TO31:POKEC+J,2:NE
XT:GOSUB1020
FG 370 FORJ=0TO63:POKE832+J,0:
NEXT
RR 375 FORJ=0TO31:A=INT(RND(1)
*3)+1:IFA=1THENPP=13
EQ 377 IFA=2THENPP=14
RS 378 IFA=3THENPP=11
JM 379 POKEP+J,PP:NEXT:CC=85
DA 380 FORJ=3TO59:POKE704+J,IN
T(RND(1)*256):POKE896+J
,CC:CC=255-CC:POKE832+J
,255
KP 385 NEXT
SK 390 POKE53285,7:POKE53286,1
0
FK 400 GOSUB1020:POKE53276,255
:GOSUB1020:GOSUB1020:PO
KE53276,0:GOSUB1020
BA 410 FORJ=0TO31:POKEP+J,13:N
EXT
ER 420 GOSUB1020:POKE53277,255
:GOSUB1020:POKE53277,0
FS 440 PRINTLEFT$(DT$,12);TAB(
5)"MOVE SPRITE #1
{2 SPACES}WITH JOYSTICK
"
JM 450 PRINTTAB(2)"IN PORT 2.
{2 SPACES}PRESS + AND -
TO CHANGE"
EF 460 PRINTTAB(3)"SPRITE NUMB
ER.{2 SPACES}PRESS C TO
CHANGE"
FJ 470 PRINTTAB(8)"COLOR. PRES
S Q TO QUIT."
BF 480 SYS 50272:POKE254,0:SP=
1
GE 490 POKE254,SP-1:PRINTLEFT$(
DT$,12);TAB(18);MID$(S
TR$(SP),2);" "
DG 500 GETA$:IFA$="+ANDSP<32T
HENSP=SP+1:GOTO 490
EH 510 IFA$="-ANDSP>1THENSP=S

```

PROGRAMS

```

P-1:GOTO 490
EJ 520 IFA$="C"THENPOKEC+SP-1,
      (PEEK(C+SP-1)+1)AND15
EG 530 IFA$<>"Q"THEN500
GS 540 POKE828,0:SYS 828
GG 999 END
DH 1000 FORJ=1TO24:POKE781,J:
      SYS 59903:NEXT:RETURN
DJ 1010 FORJ=1TO1000:NEXT:RETU
RN
PQ 1020 FORJ=1TO500:NEXT:RETUR
N
  
```

32 DEMO.ML

```

C3A0:78 A9 00 8D 62 C0 A9 C4 D5
C3A8:8D 63 C0 A2 00 8A 0A 0A 5A
C3B0:0A 0A 9D E0 C4 8A 4A 4A B0
C3B8:4A 4A 9D C0 C4 E8 E0 20 63
C3C0:90 EB 58 60 39 00 39 00 D8
C3C8:39 00 39 00 39 00 39 00 50
C3D0:39 00 39 00 39 00 39 00 58
C3D8:39 00 39 00 39 00 39 00 60
C3E0:39 00 39 00 39 00 39 00 68
C3E8:39 00 39 00 39 00 39 00 70
C3F0:39 00 39 00 39 00 39 00 78
C3F8:39 00 39 00 39 00 39 00 80
C400:A2 00 BD C0 C4 D0 24 BC 0D
C408:E0 C4 B9 00 C5 9D 20 CF 1F
C410:B9 00 C7 9D 40 CF B9 00 FD
C418:C9 9D 00 CF C8 D0 05 A9 28
C420:01 9D C0 C4 98 9D E0 C4 B7
C428:4C 50 C4 BC E0 C4 B9 00 DD
C430:C6 9D 20 CF B9 00 C8 9D 82
C438:40 CF B9 00 CA 9D 00 CF A9
C440:C8 C0 FE 90 07 A9 00 9D C3
C448:C0 C4 A0 00 98 9D E0 C4 39
C450:E8 E0 20 90 AD 4C 31 EA 7F
C458:00 00 00 00 00 00 00 00 E1
C460:78 A9 75 8D 62 C0 A9 C4 46
C468:8D 63 C0 A9 00 85 FD 85 DB
C470:FC 85 FE 58 60 A6 FE AD 88
C478:00 DC 4A 90 03 FE 00 CF 6F
C480:4A 90 03 DE 00 CF 4A 90 06
C488:15 48 BD 20 CF 18 69 01 1B
C490:9D 20 CF 90 08 BD 40 CF 7B
C498:49 01 9D 40 CF 68 4A 90 04
C4A0:15 48 BD 20 CF 38 E9 01 B4
C4A8:9D 20 CF B0 08 BD 40 CF 95
C4B0:49 01 9D 40 CF 68 4C 31 C0
C4B8:EA 00 00 00 00 00 00 00 B7
C4C0:01 01 01 01 01 01 01 01 4A
C4C8:01 01 01 01 01 00 00 00 4B
C4D0:00 00 00 00 00 00 00 00 5A
C4D8:00 00 00 00 00 01 01 01 69
C4E0:3A 4A 5A 6A 7A 8A 9A AA E9
C4E8:BA CA DA EA FA 0A 1C 2C F8
C4F0:3C 4C 5C 6C 7C 8C 9C AC F9
C4F8:BC CC DC EC FC 0C 1C 2C FA
C500:A9 97 90 8B 86 83 7C 79 C5
C508:76 74 71 6F 6A 69 67 65 3E
C510:62 60 5D 5B 5A 58 58 56 81
C518:53 51 50 50 4E 4C 4B 49 34
C520:47 47 46 44 42 41 41 3F 07
C528:3F 3E 3C 3C 3A 3A 39 39 94
C530:37 35 35 34 34 32 30 30 89
C538:30 2F 2F 2D 2D 2B 2B 2B F7
C540:2A 2A 28 28 28 26 26 26 3F
C548:25 25 25 23 23 23 21 21 8F
C550:21 21 20 20 20 1E 1E 1E 8E
C558:1E 1E 1C 1C 1C 1C 1B 64
  
```

```

C560:1B 1B 1B 1B 1B 19 19 19 DD
C568:19 19 19 19 18 18 18 18 E4
C570:18 18 18 18 18 18 18 18 FB
C578:18 18 18 18 18 18 16 02
C580:18 18 18 18 18 18 18 0C
C588:18 18 18 18 18 18 18 14
C590:13 18 18 19 19 19 19 3B
C598:19 19 19 1B 1B 1B 1B 62
C5A0:1B 1C 1C 1C 1C 1E 1E B1
C5A8:1E 1E 20 20 20 20 21 21 B5
C5B0:21 23 23 23 25 25 25 59
C5B8:26 26 28 28 28 2A 2A D0
C5C0:2B 2B 2D 2D 2D 2F 30 30 DB
C5C8:30 32 32 34 35 35 37 37 A6
C5D0:39 39 3A 3C 3C 3E 3E 3F E8
C5D8:41 41 42 44 44 46 47 49 F4
C5E0:4B 4B 4C 4E 50 51 53 55 17
C5E8:56 58 5A 5B 5D 5F 60 62 42
C5F0:67 69 6A 6C 6F 71 76 79 46
C5F8:7C 80 83 86 90 97 A9 A9 9B
C600:A9 BA C0 CA CD D1 D4 D7 0D
C608:DB E0 E1 E5 E6 E8 EA EE F5
C610:F0 F2 F3 F5 F7 F8 FA FC 47
C618:FD FF 01 02 04 06 06 07 30
C620:09 0B 0C 0C 0E 10 10 11 19
C628:13 13 15 15 16 18 18 19 52
C630:19 1B 1B 1D 1E 1E 20 20 10
C638:20 22 23 23 23 25 25 27 14
C640:27 27 28 28 28 2A 2A 2C 1D
C648:2C 2C 2C 2D 2D 2D 2F 2F FA
C650:2F 31 31 31 31 32 32 32 E3
C658:32 34 34 34 34 34 36 36 EA
C660:36 36 36 36 37 37 37 37 FC
C668:37 37 37 37 39 39 39 39 14
C670:39 39 39 39 39 39 39 39 FD
C678:39 39 39 39 39 39 3B 08
C680:39 39 39 39 39 39 39 0E
C688:39 39 39 39 39 39 39 16
C690:39 39 39 37 37 37 37 37 DF
C698:37 37 36 36 36 36 36 36 E6
C6A0:34 34 34 34 34 32 32 32 20
C6A8:32 32 31 31 31 2F 2F 2F E8
C6B0:2F 2D 2D 2D 2C 2C 2C 2A 2E
C6B8:2A 2A 28 28 27 27 25 BE
C6C0:25 25 23 23 22 22 20 BA
C6C8:20 1E 1D 1D 1B 1B 19 18 F2
C6D0:18 16 16 15 15 13 11 11 2C
C6D8:10 10 0E 0C 0B 09 07 8A
C6E0:06 04 02 01 01 FF FD FA C1
C6E8:F8 F8 F7 F5 F3 F0 EE EB BC
C6F0:EA E8 E6 E1 E0 DC DB D7 33
C6F8:D4 CD CA C5 C0 BA A9 23 81
C700:00 00 00 00 00 00 00 8F
C708:00 00 00 00 00 00 00 97
C710:00 00 00 00 00 00 00 9F
C718:00 00 00 00 00 00 00 A7
C720:00 00 00 00 00 00 00 AF
C728:00 00 00 00 00 00 00 B7
C730:00 00 00 00 00 00 00 BF
C738:00 00 00 00 00 00 00 C7
C740:00 00 00 00 00 00 00 CF
C748:00 00 00 00 00 00 00 D7
C750:00 00 00 00 00 00 00 DF
C758:00 00 00 00 00 00 00 E7
C760:00 00 00 00 00 00 00 EF
C768:00 00 00 00 00 00 00 F7
C770:00 00 00 00 00 00 00 FF
C778:00 00 00 00 00 00 00 08
C780:00 00 00 00 00 00 00 10
C788:00 00 00 00 00 00 00 18
  
```

```

C790:00 00 00 00 00 00 00 20
C798:00 00 00 00 00 00 00 28
C7A0:00 00 00 00 00 00 00 30
C7A8:00 00 00 00 00 00 00 38
C7B0:00 00 00 00 00 00 00 40
C7B8:00 00 00 00 00 00 00 48
C7C0:00 00 00 00 00 00 00 50
C7C8:00 00 00 00 00 00 00 58
C7D0:00 00 00 00 00 00 00 60
C7D8:00 00 00 00 00 00 00 68
C7E0:00 00 00 00 00 00 00 70
C7E8:00 00 00 00 00 00 00 78
C7F0:00 00 00 00 00 00 00 80
C7F8:00 00 00 00 00 00 00 88
C800:00 00 00 00 00 00 00 91
C808:00 00 00 00 00 00 00 99
C810:00 00 00 00 00 00 00 A1
C818:00 00 01 01 01 01 01 01 E8
C820:01 01 01 01 01 01 01 01 B1
C828:01 01 01 01 01 01 01 01 B9
C830:01 01 01 01 01 01 01 01 C1
C838:01 01 01 01 01 01 01 01 C9
C840:01 01 01 01 01 01 01 01 D1
C848:01 01 01 01 01 01 01 01 D9
C850:01 01 01 01 01 01 01 01 E1
C858:01 01 01 01 01 01 01 01 E9
C860:01 01 01 01 01 01 01 01 F1
C868:01 01 01 01 01 01 01 01 F9
C870:01 01 01 01 01 01 01 01 02
C878:01 01 01 01 01 01 01 01 0A
C880:01 01 01 01 01 01 01 01 12
C888:01 01 01 01 01 01 01 01 1A
C890:01 01 01 01 01 01 01 01 22
C898:01 01 01 01 01 01 01 01 2A
C8A0:01 01 01 01 01 01 01 01 32
C8A8:01 01 01 01 01 01 01 01 3A
C8B0:01 01 01 01 01 01 01 01 42
C8B8:01 01 01 01 01 01 01 01 4A
C8C0:01 01 01 01 01 01 01 01 52
C8C8:01 01 01 01 01 01 01 01 5A
C8D0:01 01 01 01 01 01 01 01 62
C8D8:01 01 01 01 01 01 01 01 6A
C8E0:01 01 01 01 01 00 00 00 6B
C8E8:00 00 00 00 00 00 00 00 7A
C8F0:00 00 00 00 00 00 00 00 82
C8F8:00 00 00 00 00 00 00 00 8A
C900:32 32 33 33 34 35 36 36 EB
C908:37 38 38 39 3A 3B 3B 3C 51
C910:3C 3D 3E 3F 3F 40 41 41 8B
C918:42 43 44 44 45 45 47 47 7F
C920:48 48 49 4A 4B 4C 4C 4D 29
C928:4D 4E 4F 50 50 51 52 52 A3
C930:53 54 55 55 56 56 58 58 97
C938:59 59 5A 5B 5C 5C 5D 5D 3D
C940:5E 5F 60 61 61 62 62 63 B9
C948:64 65 66 66 67 67 69 69 AF
C950:6A 6A 6B 6C 6D 6D 6E 6E 55
C958:6F 70 71 72 72 73 73 74 D1
C960:75 76 76 77 78 78 79 7A A5
C968:7B 7B 7C 7C 7E 7E 7F 80 5D
C970:80 81 82 83 83 84 84 85 E9
C978:86 87 87 88 89 89 8A 8B BD
C980:8C 8C 8D 8D 8F 8F 90 90 74
C988:91 92 93 93 94 95 95 96 F1
C990:97 98 98 99 9A 9A 9B 9C D5
C998:9D 9D 9E 9E A0 A0 A1 A1 8C
C9A0:A2 A3 A4 A4 A5 A6 A6 A7 0A
C9A8:A8 A9 A9 AA AA AB AC AD E5
C9B0:AD AE AF AF B0 B1 B2 B2 1C
C9B8:B3 B4 B5 B5 B6 B7 B7 B8 22
  
```

```

C9C0:B9 BA BA BB BB BC BD BE FD
C9C8:BE BF C0 C0 C1 C2 C3 C3 34
C9D0:C4 C4 C6 C6 C7 C7 C8 C9 F5
C9D8:CA CA CB CC CC CD CE CF D5
C9E0:CF D0 D1 D1 D2 D3 D4 D4 4C
C9E8:D5 D5 D7 D7 D8 D8 D9 DA 0E
C9F0:DB DB DC DD DD DE DF E0 ED
C9F8:E0 E1 E1 E2 E3 E4 E5 E5 44
CA00:E5 E4 E3 E2 E1 E1 E0 E0 A5
CA08:DF DE DD DD DC DB DB DA C7
CA10:D9 D8 D8 D7 D7 D5 D5 D4 F7
CA18:D4 D3 D2 D1 D1 D0 CF CF C5
CA20:CE CD CC CC CB CA CA C9 DF
CA28:C8 C7 C7 C6 C6 C4 C4 C3 10
CA30:C3 C2 C1 C0 C0 BF BE BE DD
CA38:BD BC BB BB BA BA B9 B8 FB
CA40:B7 B7 B6 B5 B5 B4 B3 B2 6C
CA48:B2 B1 B0 AF AF AE AD AD F5
CA50:AC AB AA AA A9 A9 A8 A7 14
CA58:A6 A6 A5 A4 A4 A3 A2 A1 84
CA60:A1 A0 A0 9E 9E 9D 9D 9C 30
CA68:9B 9A 9A 99 98 98 97 96 4C
CA70:95 95 94 93 93 92 91 90 9C
CA78:90 8F 8F 8D 8D 8C 8C 8B 48
CA80:8A 89 89 88 87 87 86 85 64
CA88:84 84 83 83 82 81 80 80 C5
CA90:7F 7E 7E 7C 7C 7B 7B 7A 60
CA98:79 78 78 77 76 76 75 74 7C
CAA0:73 73 72 72 71 70 6F 6F DD
CAA8:6E 6D 6D 6C 6B 6A 6A 69 88
CAB0:69 67 67 66 66 65 64 63 1D
CAB8:62 62 61 61 60 5F 5E 5E F5
CAC0:5D 5C 5C 5B 5A 59 59 58 A0
CAC8:58 56 56 55 55 54 53 52 35
CAD0:52 51 50 50 4F 4E 4D 4D 8E
CAD8:4C 4C 4B 4A 49 48 48 47 F8
CAE0:47 45 45 44 44 43 42 41 4D
CAE8:41 40 3F 3F 3E 3D 3C 3C A6
CAF0:3B 3B 3A 39 38 38 37 36 15
CAF8:36 35 34 33 33 32 32 39 B0

```

Bill Soudan manipulates sprites in Girard, Pennsylvania.

MIDWAY COMMAND

By Michael Sedlezky

Midway Command is a two-player strategy game for the 64. You and a friend assume the roles of American and Japanese naval commanders during World War II.

Experience the Battle of Midway as each of you orders your powerful carrier forces into battle with each other. Your flotilla is made up of battleships, cruisers, destroyers, and aircraft carriers. There are 14 vessels per side. Winning the game is accomplished by sinking your enemy's carrier. Your ships battle each other with cannon shells.

Midway Command is written entirely in machine language, but it loads and runs like a BASIC program. To enter it, use MLX, our machine language entry pro-

gram. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

Starting address: 0801

Ending address: 1680

The game is played on a grid that resembles a standard checkerboard. Each occupied square contains a marker that indicates a ship. The American marker is black, and the Japanese marker is white.

Use your joystick in port 2 to position the game's cursor to select a square of your choice. As the cursor moves over a square, a view of the ship is displayed along with its type and two scale bars.

Ship Strength

One scale represents the ship's strength. This scale represents the amount of damage the ship can withstand. As the scale decreases in size, the ship is in danger of sinking. Damage inflicted on any ship cannot be repaired.

Ship Firepower

The firepower scale represents the amount of damage the ship's guns will inflict on an enemy vessel's strength. This scale will increase if this ship fires the blow that sinks an enemy ship. As a ship gains experience, it becomes a deadlier fighting vessel.

Playing the Game

The game is played in turns. Each player has the option either to move or to attack. The American commander starts first. You choose one of your ships by selecting it with the cursor and then pressing the fire button. You then have the option either to move or to fight by pressing a function key. Follow on-screen directions.

You finish a turn by selecting a target square. The cursor is a green shade if the target square is within legal boundaries. In order for you to move onto a square, it must be unoccupied and within range. The border flashes red if you attempt an illegal move.

Moving and Firing

All ships can move at least one square in any direction. Destroyers can move two.

To attack, you must select an enemy ship that is within firing range. Each ship has different ranges, and you can fire in any direction. The carrier cannot fire. A destroyer can fire a distance of only one square. Cruisers can fire two squares only; they cannot fire one square. A battleship can fire one or two squares. The battleship is your strongest piece, followed by the cruisers and then by destroyers. Protect your carrier at all times.

Game Hints

Whenever possible, force the enemy to move into your range of fire so you can get first shot. Use your cruiser or battleship to finish off an enemy so you can increase your stronger piece's firepower.

Fight cruisers with destroyers. Use the destroyers' two-square advantage to jump to an adjoining square where the cruiser can't fire on you.

If your opponent takes a defensive strategy, analyze the setup and probe the weakest side with your destroyers. Attack from different sides and try to draw the ships out of position.

MIDWAY COMMAND

```

0801:0C 08 01 00 9E 20 33 33 48
0809:32 39 00 00 00 00 27 1D EB
0811:13 09 1D 27 27 27 1D 1D 30
0819:27 27 27 27 00 00 26 24 4E
0821:22 28 24 26 26 26 24 24 69
0829:26 26 26 26 00 19 03 00 67
0831:00 80 00 FA 0B 0F 0C 00 BD
0839:00 00 00 00 00 00 8F 00 68
0841:00 00 00 00 00 00 00 00 51
0849:00 00 00 00 00 00 00 00 59
0851:00 00 18 00 00 82 80 00 6F
0859:AA 40 02 7C 80 05 FF 40 2F
0861:00 7C 00 00 00 00 00 00 90
0869:00 00 00 00 00 00 00 00 79
0871:00 00 00 00 00 00 00 00 81
0879:00 00 00 00 00 00 87 00 98
0881:00 00 00 00 00 00 00 00 91
0889:00 00 00 00 00 00 00 00 99
0891:01 00 00 03 00 00 33 00 B8
0899:03 FF 00 79 FF 00 3F FF 41
08A1:FF FF FF 3F FF FF 0F FF C3
08A9:FF 07 FF FF 00 00 00 00 7B
08B1:00 00 00 00 00 00 00 00 C1
08B9:00 00 00 00 00 00 80 00 CA
08C1:00 00 00 00 00 00 00 00 D1
08C9:80 00 00 C0 00 00 80 00 27
08D1:00 D0 00 00 90 00 00 D7 72
08D9:C0 00 FF 9C 00 FF FF 80 94

```


PROGRAMS

```

1601:8D 74 16 A9 1F 8D 14 03 C8
1609:A9 16 8D 15 03 58 60 78 45
1611:AD 73 16 8D 14 03 AD 74 09
1619:16 8D 15 03 58 60 CE 78 E0
1621:16 10 4C A9 0F 8D 78 16 36
1629:AD 7A 16 49 01 8D 7A 16 6B
1631:8D FF 07 29 01 8D 79 16 DE
1639:A0 00 AD 19 CF F0 16 AA 16
1641:BD 00 CE 18 69 D4 85 D4 26
1649:BD 40 CE 85 D3 AE 79 16 F8
1651:BD 75 16 91 D3 AE 04 CF C6
1659:BD 00 CE 18 69 D4 85 D4 3E
1661:BD 40 CE 85 D3 AD 77 16 09
1669:49 08 91 D3 8D 77 16 4C 6E
1671:31 EA 00 00 05 00 05 00 23
1679:00 32 00 00 00 00 00 32
    
```

Michael Sedlezky is a 35-year-old mechanic and father of four children. He's the author of Gazette programs *Codebusters*, *Hoverjet*, and *Checker Command*. He lives in Mississauga, Ontario, Canada.

CHASE

By Jon Pitlingsrud

You're at home, quietly studying with a friend, when a fanfare of noise erupts from your 64. It announces the arrival of a message from aliens who have taken control of your computer. The communiqué informs you that the advanced race has sent the two of you something important: a game! Before you know it, you and your friend are in deadly competition on the game's playing field.

Chase is an arcade-style, two-player game for the 64 that requires two joysticks. The game consists of two programs: Chase, a BASIC loader; and Chase ML, a machine language program. To help avoid typing errors, enter Chase 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.

Chase ML is written in machine language. Use MLX, our machine language entry program, to enter it. When MLX prompts, respond with the following starting and ending addresses.

Starting address: 2795

Ending address: 3484

Be sure to save the ML program with the filename CHASE ML on the same disk as Chase. Chase automatically loads this program when it runs and searches for that filename.

The Rules

When you run Chase, you'll see the message from the aliens. After you've read it, press any key, and you and your opponent will be on the playing field. One player operates the red disk and the other the yellow one.

You'll see your weapons on the field. They resemble footballs. Each weapon is colored to match one of the players. The idea simply is to pick up your weapon and touch your opponent, thereby destroying him.

While the rules may be simple, executing the game plan isn't. Your opponent will be trying to avoid you until he is armed. As powerful as these weapons are, they have a few quirks. You can hold them for only a few seconds before they fly from your grasp and land on another part of the screen.

As you chase after your weapon, you may reach your opponent's first. If you touch your opponent's weapon, it will jump to a random location on the screen. To make the chase more interesting, each field has a number of obstacles scattered about it.

To quit the game and see a tally of each player's kills, press the Q key. From the score screen, press either of the joystick fire buttons to resume.

CHASE

```

CS 10 REM COPYRIGHT 1993 - COM
    PUTE PUBLICATIONS INLT L
    TD - ALL RIGHTS RESERVED
RB 12 IFA=0THENA=1:LOAD"CHASE
    {SPACE}ML",8,1
HQ 14 POKE56,39:CLR:A=RND(-TI)
    :C=65520
FD 16 S=54272:D=56576:E=53272:
    F=53265
MC 18 POKEF,0:POKE53280,0:POKE
    53281,0
PM 20 FORL=0TO23:POKES+L,0:NEX
    T
HQ 22 PRINT"{CLR}{6}{DOWN}";:A
    $="!#$%&()*+,-.CHR$(34)
EA 24 POKES+24,15:POKES+18,128
BB 26 POKES+6,255:POKES+2,255:
    POKES+4,83
HB 28 POKES+15,RND(0)*5+1
BC 30 POKED,PEEK(D)OR3:POKEE,2
    8:POKEF,27
JG 32 FORW=0TO3:FORL=0TORND(0)
    *4
QX 34 PRINTMIDS(AS,INT(RND(0)*
    11+1),1);
MC 36 POKES+1,PEEK(S+27)/8:FOR
    T=1TO50:NEXT
CX 38 NEXTL:PRINT" ";:NEXTW
    
```

```

ER 40 PRINTCHR$(13)CHR$(145)TA
    B(18);
MB 42 READB$:IFB$<>"Z"THENPRIN
    TB$:GOTO32
HH 44 READB$:PRINTB$:POKES+18,
    0:POKES+4,0
AD 46 POKE198,0:WAIT198,1
DJ 48 :
RR 50 POKE820,0:POKE821,0:SYS1
    0133
XS 52 POKEF,0:PRINT"{CLR}"
GD 54 POKE781,9:POKE782,9:POKE
    783,0:SYSC
RQ 56 PRINTTAB(9){GRN}////////
    ////////////
RJ 58 PRINTTAB(9){RED}PLAYER
    {SPACE}ONE'S SCORE:";
EQ 60 A=PEEK(820):PRINTA:PRINT
HP 62 PRINTTAB(9){YEL}PLAYER
    {SPACE}TWO'S SCORE:";
XC 64 B=PEEK(821):PRINTB:PRINT
    :PRINTTAB(9)
QA 66 IFA>BTHENPRINT"{GRN}
    {3 SPACES}PLAYER ONE WIN
    S{"
AE 68 IFA<BTHENPRINT"{GRN}
    {3 SPACES}PLAYER TWO WIN
    S{"
JR 70 IFA=BTHENPRINT"{GRN}
    {2 SPACES}THE GAME IS TI
    ED."
HS 72 PRINTTAB(9)////////
    ////////////
GP 74 POKE781,24:POKE782,8:POK
    E783,0:SYSC
GK 76 A$="PRESS FIRE TO PLAY A
    GAIN"
RG 78 POKED,PEEK(D)OR3:POKEE,2
    8:POKEF,27
AG 80 PRINTTAB(8){GRN}";
GE 82 A=40:GOSUB90:IFB=1THEN50
QR 84 PRINTTAB(8){BLK}";
FE 86 A=10:GOSUB90:IFB=1THEN50
SK 88 GOTO80
EJ 90 PRINTAS;{UP}:B=0:X=1
HM 92 IF(PEEK(56320)AND16)=0TH
    ENB=1
CK 94 IF(PEEK(56321)AND16)=0TH
    ENB=1
CH 96 IFB=0THENX=X+1:IFX<>ATHE
    N92
SG 98 RETURN
EM 100 DATA LIVE BROADCAST WIT
    H
HM 102 DATA GAZETTE'S TACHYON
AK 104 DATA IMPULSE COPYRIGHT
CQ 106 DATA CIRCA 1993. . .@@@
    @@@@
BA 108 DATA GREETINGS FROM THE
GM 110 DATA PLANET +$%*&$( ).
    @@@@
JH 112 DATA WE ARE WELL PLEASE
    D
XE 114 DATA TO BRING YOU THIS
JF 116 DATA GAME PLAYED BY THE
BF 118 DATA COOL GUYS AND GALS
BA 120 DATA ON INHABITED PLANE
    
```


TS
 CJ 122 DATA THROUGHOUT THE KNO
 WN
 CH 124 DATA STELLAR SYSTEM.@@@
 @@@@
 FX 126 DATA WITHIN MOMENTS THI
 S
 ER 128 DATA TWO PLAYER MARVEL
 DB 130 DATA WILL BE TRANSFERRE
 D
 AS 132 DATA TO YOUR REMOTE 64.
 @@@@
 GS 134 DATA FORTUNATELY ENOUGH
 HA 136 DATA FOR YOU- WE HAVE M
 ADE
 CK 138 DATA IT POSSIBLE TO PLA
 Y
 JM 140 DATA ON YOUR PRIMITIVE-
 JA 142 DATA ALBEIT JUGGERNAUT-
 FR 144 DATA COMPUTER INTERFACE
 .@@@
 CA 146 DATA COINCIDENTALLY- TH
 E
 RS 148 DATA AUTHORS ALSO HAPPE
 N
 BX 150 DATA TO BE AMONG YOU.@@
 @@@@
 QJ 152 DATA THEIR NAME'S ARE.
 {SPACE}.
 RA 154 DATA TODD PILTINGSRUD A
 ND
 SX 156 DATA JON{2 SPACES}PILTI
 NGRUD.@@@@
 EM 158 DATA IF YOU HAPPEN TO R
 UN
 AK 160 DATA INTO THEM- TELL TH
 EM
 FS 162 DATA TO PHONE HOME.@@@
 @@@@
 EJ 164 DATA Z, . . . END OF MESS
 AGE

CHASE ML

2795:A9 0A 8D 24 2E 8D 6F 2E E3
 279D:80 7D 2D 8D DC 2D A2 00 71
 27A5:8E 22 2E 8E 6D 2E 8E 7B 2F
 27AD:2D 8E DA 2D 8E 1A D0 E8 CB
 27B5:8E 19 D0 20 B1 28 20 9B B7
 27BD:2B 20 9F 2B AD 1E D0 AD 85
 27C5:1F D0 A9 01 8D 1A D0 AD 41
 27CD:1E D0 8D B4 2C 4A 8D B3 B5
 27D5:2C 90 2A A2 00 20 E1 2B 3D
 27DD:E0 02 D0 18 EE 22 2E A9 BE
 27E5:0A 8D 27 D0 A9 64 8D 7B 04
 27ED:2D AD 15 D0 29 FB 8D 15 57
 27F5:D0 4C 02 28 E0 03 D0 05 3C
 27FD:78 20 9F 2B 58 4E B3 2C C6
 2805:90 31 A2 01 20 E1 2B E0 0E
 280D:03 D0 18 EE 6D 2E A9 0A 86
 2815:8D 28 D0 A9 64 8D DA 2D 27
 281D:AD 15 D0 29 F7 8D 15 D0 27
 2825:4C 38 28 E0 02 D0 08 78 98
 282D:20 9B 2B 58 4C 38 28 E0 D3
 2835:00 F0 0F A9 7F 8D 00 DC 4D
 283D:AD 01 DC C9 BF D0 88 4C 7B
 2845:8F 28 AD 7B 2D F0 02 A9 AF
 284D:01 AE DA 2D F0 02 09 02 9B
 2855:29 03 F0 DF C9 03 F0 DB 2F

285D:20 CE 2C A2 CE 4A 90 09 EA
 2865:8E F9 3F 8E FD 2F EE 34 0B
 286D:03 4A 90 09 8E F8 3F 8E D9
 2875:FB 2F EE 35 03 AD FB 2F B6
 287D:0D FD 2F D0 F8 A9 32 8D 27
 2885:FA 2F AD FA 2F 10 FB 4C 82
 288D:95 27 78 A2 00 8E 15 D0 E0
 2895:8E 1A D0 8E 04 D4 8E 0B 52
 289D:D4 8E 12 D4 A9 31 A2 EA CD
 28A5:8D 14 03 8E 15 03 A9 81 94
 28AD:8D 0D DC 60 A9 7F 8D 0D 1D
 28B5:DC 8D 0D DD A9 F8 8D 12 B5
 28BD:D0 A9 0C A2 2D 8D 14 03 57
 28C5:8E 15 03 A9 00 8D 20 D0 E4
 28CD:8D 21 D0 A2 07 8E 28 D0 05
 28D5:8E 2A D0 E8 8E 26 D0 E8 38
 28DD:8E 25 D0 A2 02 8E 27 D0 6C
 28E5:8E 29 D0 AD 12 D0 C9 FB 20
 28ED:D0 F9 A9 00 8D 11 D0 AD 5A
 28F5:16 D0 09 10 8D 16 D0 A9 B7
 28FD:FC 8D 18 D0 AD 00 DD 09 72
 2905:03 8D 00 DD A9 0F 8D 15 D3
 290D:D0 8D 1C D0 A2 CC 8E F8 1A
 2915:3F 8E F9 3F E8 8E FA 3F 94
 291D:8E FB 3F A9 28 8D 00 D0 80
 2925:8D 02 D0 A9 80 8D 01 D0 80
 292D:8D 03 D0 A9 02 8D 10 D0 F2
 2935:A9 30 8D 05 D4 8D 0C D4 34
 293D:A9 F0 8D 06 D4 8D 0D D4 7E
 2945:A9 00 8D 01 D4 8D 08 D4 EF
 294D:A9 11 8D 04 D4 8D 0B D4 72
 2955:A9 8F 8D 18 D4 A9 00 A0 81
 295D:3C 85 02 84 03 A9 82 A0 1C
 2965:2B 20 6E 2B 0A 8D F3 29 6D
 296D:20 85 2A A9 82 A0 2B 20 1E
 2975:6E 2B 18 69 04 8D F2 29 C8
 297D:A9 87 A0 2B 20 6E 2B 85 E3
 2985:02 0A 0A 65 02 85 02 A9 C6
 298D:00 85 03 06 02 26 03 06 B6
 2995:02 26 03 06 02 26 03 A9 8B
 299D:2E 65 02 85 02 A9 3C 65 8D
 29A5:03 85 03 A9 8C A0 2B 20 33
 29AD:6E 2B 18 65 02 85 02 90 16
 29B5:02 E6 03 A9 82 A0 2B 20 CA
 29BD:6E 2B AA E8 86 04 AE F3 8B
 29C5:29 BD F4 29 85 05 BD F5 FE
 29CD:29 85 06 A6 04 20 50 2A AC
 29D5:AE F3 29 BD FE 29 85 05 2A
 29DD:BD FF 29 85 06 A2 01 20 69
 29E5:50 2A CE F2 29 D0 91 A9 4D
 29ED:1B 8D 11 D0 60 00 00 08 6B
 29F5:2A 08 2A 2C 2A 2C 2A 2C E9
 29FD:2A 26 2A 26 2A 4A 2A 4A AF
 2A05:2A 4A 2A 56 57 57 57 57 C9
 2A0D:58 5C 5E 5F 5E 5F 5D 5C ED
 2A15:5E 5F 5E 5F 5D 5C 5E 5F AA
 2A1D:5E 5F 5D 5C 5E 5F 5E 5F 76
 2A25:5D 59 5A 5A 5A 5A 5B 3E A0
 2A2D:3F 3F 3F 3F 40 42 3E 3F 93
 2A35:3F 3F 41 42 42 3E 3F 3F 0E
 2A3D:41 42 42 42 3E 3F 41 42 E2
 2A45:42 42 42 3E 41 43 44 44 5B
 2A4D:44 44 45 A0 00 B1 05 91 E9
 2A55:02 C8 C4 04 D0 F7 8C 84 B9
 2A5D:2A A0 05 B1 05 AC 84 2A B8
 2A65:91 02 18 A9 28 65 02 85 01
 2A6D:02 A9 00 65 03 85 03 A9 61
 2A75:06 65 05 85 05 A9 00 65 53
 2A7D:06 85 06 CA D0 CD 60 00 22
 2A85:AA BD 20 2B 85 04 BD 21 2E

2A8D:2B 85 05 B1 04 99 00 D8 F3
 2A95:99 00 D9 99 00 DA 99 00 2A
 2A9D:DB C8 D0 F1 C8 B1 04 8D ED
 2AA5:22 D0 C8 B1 04 8D 23 D0 E0
 2AAD:C8 B1 04 8D 1C 2B 18 A9 93
 2AB5:04 65 04 85 04 90 02 E6 8B
 2ABD:05 A0 00 B1 04 8D 1E 2B 95
 2AC5:C8 B1 04 8D 1F 2B 18 A9 C3
 2ACD:02 65 04 85 04 A9 00 A8 C4
 2AD5:65 05 85 05 A0 00 A2 01 6A
 2ADD:B1 04 30 04 AA C8 B1 04 32
 2AE5:29 7F C8 8C 1D 2B A0 00 67
 2AED:91 02 C8 CA D0 FA 18 98 8C
 2AF5:65 02 85 02 90 02 E6 03 AB
 2AFD:AC 1D 2B CC 1F 2B D0 D6 40
 2B05:CE 1E 2B D0 CF 18 98 65 32
 2B0D:04 85 04 A9 00 65 05 85 07
 2B15:05 CE 1C 2B D0 A3 60 00 AD
 2B1D:00 00 00 2A 2B 2A 2B 58 C6
 2B25:2B 58 2B 58 2B 0E 0E 02 C1
 2B2D:08 01 02 C8 C9 0C 03 CA E3
 2B35:CB CC 01 02 CD CE 0B 08 AC
 2B3D:C6 26 00 C7 C7 26 00 C6 9A
 2B45:01 04 C6 26 00 C7 01 02 7B
 2B4D:CF D0 0C 03 D1 D2 D3 01 F3
 2B55:02 D4 D5 0E 0E 03 03 01 01
 2B5D:04 BE 26 3F C0 17 04 C2 4B
 2B65:26 00 C1 01 04 C3 26 44 D6
 2B6D:C5 48 98 48 20 BE 0E 68 76
 2B75:A8 68 20 28 BA 20 9B BC 0B
 2B7D:A4 64 A5 65 60 83 20 00 9B
 2B85:00 00 85 10 00 00 00 85 13
 2B8D:28 00 00 00 89 13 80 00 91
 2B95:00 88 2F 00 00 00 A2 00 39
 2B9D:F0 02 A2 02 8E E0 2B A9 59
 2BA5:96 A0 2B 20 6E 2B 18 69 90
 2BAD:35 48 A9 91 A0 2B 20 6E 5F
 2BB5:2B 18 69 1A AE E0 2B 9D 63
 2BBD:04 D0 68 9D 05 D0 98 69 37
 2BC5:00 0A 0A E0 02 D0 01 0A 4D
 2BCD:8D E0 2B AD 10 D0 3D DD 7F
 2BD5:2B 0D E0 2B 8D 10 D0 60 82
 2BDD:FB 0D F7 00 A9 00 8D CB 65
 2BE5:2C 8E B5 2C 8A 0A AA AD EE
 2BED:CB 2C 0A A8 4A CD B5 2C 22
 2BF5:F0 5D AD B4 2C 39 C4 2C 19
 2BFD:F0 55 38 BD 01 D0 F9 01 45
 2C05:D0 B0 04 49 FF 69 01 99 48
 2C0D:BD 2C 38 BD 00 D0 F9 00 69
 2C15:D0 8D CC 2C 08 AD 10 D0 7D
 2C1D:39 C4 2C D0 03 A9 00 2C C0
 2C25:A9 01 8D B6 2C AD 10 D0 B8
 2C2D:3D C4 2C D0 03 A9 00 2C D2
 2C35:A9 01 28 ED B6 2C B0 0F 5D
 2C3D:C9 FE F0 13 18 AD CC 2C C6
 2C45:49 FF 69 01 4C 56 2C C9 5D
 2C4D:01 F0 04 AD CC 2C 2C A9 D6
 2C55:FF 99 BC 2C EE CB 2C AD 1B
 2C5D:CB 2C C9 04 D0 8C A2 03 21
 2C65:8E CB 2C A9 00 9D B8 2C 2C
 2C6D:CA 10 FA A2 03 A9 00 A0 18
 2C75:07 48 BD B8 2C 8D CC 2C 04
 2C7D:68 2C CC 2C 3D 0B D9 BC 8F
 2C85:2C B0 06 8E CD 2C B9 BC 19
 2C8D:2C 48 98 4A 68 B0 01 CA 98
 2C95:88 10 DE AE CD 2C A9 80 EF
 2C9D:9D B8 2C CE CB 2C D0 CB E1
 2CA5:A2 03 BD B8 2C F0 03 CA 49
 2CAD:10 F8 8E B7 2C 00 00 00 7C
 2CB5:00 00 00 00 00 00 00 00 0E

PROGRAMS

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2CBD:00 00 00 00 00 00 01 17
2CC5:00 02 00 04 00 08 00 00 FE
2CCD:00 A0 0F 8C 05 D4 8C 0C 99
2CD5:D4 A0 0A 8C 06 D4 8C 0D 74
2CDD:D4 A0 96 8C 0E D4 A0 20 89
2CES:8C 10 D4 A0 03 8C 11 D4 6E
2CED:A0 81 8C 04 D4 8C 0B D4 8C
2CF5:A0 40 8C 12 D4 A0 02 8C 1B
2CFD:FA 2F 78 A0 8D 8C 14 03 82
2D05:A0 2F 8C 15 03 58 60 20 B8
2D08:29 2D 20 88 2D 20 E7 2D BA
2D15:20 2F 2E 20 7A 2E 20 F8 D8
2D1D:2E 68 A8 68 AA A9 01 8D CF
2D25:19 D0 68 40 AD 15 D0 29 DD
2D2D:04 D0 4A AD 7B 2D F0 05 59
2D35:CE 7B 2D D0 40 AD 7D 2D 69
2D3D:C9 0A D0 0F A9 02 8D 27 A1
2D45:D0 20 9B 2B A9 00 8D 7D 1C
2D4D:2D F0 05 CE 7C 2D D0 25 67
2D55:A9 06 8D 7C 2D AE 7D 2D CB
2D5D:BD 7E 2D 8D 00 D4 E8 BD 97
2D65:7E 2D 8D 01 D4 E8 8E 7D F0
2D6D:2D E0 0A D0 08 AD 15 D0 D6
2D75:09 04 8D 15 D0 60 00 06 66
2D7D:A0 39 35 3E 2A A5 1F 1F FA
2D85:15 00 00 AD 15 D0 29 08 8B
2D8D:D0 4A AD DA 2D F0 05 CE 4C
2D95:DA 2D D0 40 AD 7D 2D C9 4E
2D9D:0A D0 0F A9 07 8D 28 D0 3D
2DA5:20 9F 2B A9 00 8D 7D 2D 56
2DAD:F0 05 CE 7C 2D D0 25 A9 04
2DB5:06 8D 7C 2D AE 7D 2D BD 5C
2DBD:DD 2D 8D 07 D4 E8 BD DD 18
2DC5:2D 8D 08 D4 E8 8E 7D 2D 12
2DCD:E0 0A D0 08 AD 15 D0 09 22
2DD5:08 8D 15 D0 60 00 06 0A 60
2DDD:6B 2F A2 25 31 1C D1 12 10
2DES:00 00 AD 22 2E F0 35 AD 65
2DED:24 2E C9 0A D0 07 A9 00 B5
2DFS:8D 24 2E F0 05 CE 23 2E CC
2DFD:D0 22 A9 06 8D 23 2E AE E2
2E05:24 2E BD 25 2E 8D 00 D4 85
2E0D:E8 BD 25 2E 8D 01 D4 E8 D7
2E15:8E 24 2E 0E 0A D0 05 A9 DC
2E1D:00 8D 22 2E 60 00 06 0A 1D
2E25:1F 15 A5 1F 3E 2A 39 35 3F
2E2D:00 00 AD 6D 2E F0 38 AD 69
2E35:6F 2E C9 0A D0 07 A9 00 A4
2E3D:8D 6E 2E F0 05 CE 6E 2E 7F
2E45:D0 25 A9 06 8D 6E 2E AE 1A
2E4D:6F 2E BD 70 2E 8D 07 D4 36
2E55:E8 BD 70 2E 8D 08 D4 E8 A5
2E5D:8E 6F 2E E0 0A D0 08 A9 FD
2E65:00 8D 6D 2E 8D 08 D4 60 4C
2E6D:00 06 0A D1 12 31 1C A2 D9
2E75:25 6B 2F 00 00 AD 1F D0 EA
2E7D:4A 48 90 1A AD F2 2E 8D E7
2E85:00 D0 AD 10 D0 29 FE D0 03
2E8D:F3 2E 8D 10 D0 AD F4 2E 77
2E95:8D 01 D0 4C AF 2E AD 00 69
2E9D:00 8D F2 2E AD 10 D0 29 7F
2EA5:01 8D F3 2E AD 01 D0 8D E7
2EAD:F4 2E 68 4A 48 90 1A AD 28
2EB5:F5 2E 8D 02 D0 AD 10 D0 98
2EBD:29 FD 0D F6 2E 8D 10 D0 D7
2EC5:AD F7 2E 8D 03 D0 4C E2 6C
2ECD:2E AD 02 D0 8D F5 2E AD 48
2ED5:10 D0 29 02 8D F6 2E AD 06
2EDD:03 D0 8D F7 2E 68 4A 48 11
2EE5:90 03 20 9B 2B 68 4A 90 29

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2EED:03 20 9F 2B 60 28 00 80 9E
2EF5:28 02 80 AD 00 DC 29 0F A6
2EFD:49 0F AA AD 10 D0 29 01 0A
2F05:8D 8C 2F 18 AD 00 D0 7D 41
2F0D:6B 2F 8D 00 D0 AD 8C 2F 24
2F15:7D 76 2F 8D 8C 2F AD 10 1B
2F1D:D0 29 FE 0D 8C 2F 8D 10 2B
2F25:D0 18 AD 01 D0 7D 81 2F 66
2F2D:8D 01 D0 AD 01 DC 29 0F 64
2F35:49 0F AA AD 10 D0 4A 29 AD
2F3D:01 8D 8C 2F 18 AD 02 D0 50
2F45:7D 6B 2F 8D 02 D0 AD 8C 37
2F4D:2F 7D 76 2F 0A 8D 8C 2F 33
2F55:AD 10 D0 29 FD 0D 8C 2F A7
2F5D:8D 10 D0 18 AD 03 D0 7D BA
2F65:81 2F 8D 03 D0 60 00 00 3A
2F6D:00 00 FE FE FE 00 02 02 99
2F75:02 00 00 00 00 FF FF FF D4
2F7D:00 00 00 00 00 FE 02 00 DB
2F85:00 FE 02 00 00 FE 02 00 E3
2F8D:CE FA 2F D0 08 A9 80 8D 7A
2F95:04 D4 8D 0B D4 AD FB 2F 12
2F9D:F0 21 CE FC 2F D0 1C A9 05
2FA5:05 8D FC 2F EE F8 3F AD 04
2FAD:F8 3F C9 D2 D0 0D A9 00 CC
2FB5:8D FB 2F AD 15 D0 29 FE D7
2FBD:8D 15 D0 AD FD 2F F0 21 CC
2FCD:CE FE 2F D0 1C A9 05 8D 5D
2FDD:2F 2F EE F9 3F AD F9 3F D8
2FD5:C9 D2 D0 0D A9 00 8D FD 1F
2FDD:2F AD 15 D0 29 FD 8D 15 60
2FE5:D0 AD 1B D4 8D 01 D4 8D 70
2FED:08 D4 68 A8 68 AA A9 01 5F
2FF5:8D 19 D0 68 40 00 00 05 09
2FFD:00 05 2C 00 00 00 00 23
3005:00 00 00 00 00 7C 06 7E E1
300D:C6 7E 00 C0 C0 FC C6 C6 CA
3015:C6 FC 00 00 00 7E C0 C0 54
301D:C0 7E 00 06 06 7E C6 C6 5C
3025:C6 7E 00 00 00 7C C6 FE 07
302D:C0 7C 00 0E 18 18 7E 18 24
3035:18 18 00 00 00 7E C6 C6 F5
303D:7E 06 FC C0 C0 FC C6 C6 58
3045:C6 C6 00 38 00 78 18 18 68
304D:18 7C 00 06 00 06 06 63
3055:06 06 7C C0 C0 CC D8 F8 B9
305D:CC C6 00 78 18 18 18 18 C6
3065:18 7C 00 00 00 C6 FF FF 0C
306D:DB C3 00 00 00 FC C6 C6 F4
3075:C6 C6 00 00 00 7C C6 C6 31
307D:C6 7C 00 00 00 FC C6 C6 A8
3085:FC C0 C0 00 00 7E C6 C6 FA
308D:7E 06 06 00 00 FC C6 C0 B1
3095:C0 C0 00 00 00 7E C0 7C 7E
309D:06 FC 00 18 18 FE 18 18 C6
30A5:18 0E 00 00 00 C6 C6 C6 05
30AD:C6 7E 00 00 00 C6 C6 C6 80
30B5:7C 38 00 00 00 63 6B 7F 46
30BD:3E 36 00 00 00 C6 6C 38 F6
30C5:6C C6 00 00 00 C6 C6 C6 7D
30CD:7C 38 F0 00 00 FE C0 38 E4
30D5:06 FE 00 1C 1C 1C 1C 1C 8D
30DD:1C 00 1C 00 00 00 00 00 CF
30E5:00 00 00 00 00 00 00 00 46
30ED:00 00 00 00 00 00 00 00 4E
30F5:00 00 00 00 00 00 00 00 56
30FD:00 00 00 00 00 00 00 00 5E
3105:00 00 00 7C C6 C6 C6 18 71
310D:30 30 1F 06 06 7C C0 C0 3C
3115:7C 06 06 C0 C0 CE DB DB D8

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311D:73 03 03 0C 07 03 7E 30 8C
3125:18 0C F8 3C 66 66 0C 18 76
312D:33 36 FC 60 30 18 0C 06 5C
3135:73 DB 6E 0E 1C 38 00 00 B8
313D:00 00 00 CC 66 66 77 77 9F
3145:66 66 33 18 30 66 66 66 AA
314D:06 7C 00 00 00 FE 06 E6 C0
3155:3E 18 1E 00 FE 18 30 FC 56
315D:06 FC 00 00 3E F0 38 F0 19
3165:3F F3 00 00 00 00 00 00 64
316D:38 38 70 00 00 00 00 00 08
3175:38 38 00 00 00 00 FF FF 0E
317D:00 00 00 7C C6 DE F6 C6 02
3185:C6 7C 00 18 18 78 18 18 D6
318D:18 FF 00 7C C6 06 1C 70 BA
3195:C0 FE 00 7C C6 06 3C 06 AC
319D:C6 7C 00 0E 1E 36 E6 FF FA
31A5:06 06 00 FE C0 FC 06 06 88
31AD:C6 7C 00 7C C6 C0 FC C6 54
31B5:C6 7C 00 FE C6 0C 18 18 39
31BD:18 18 00 7C C6 C6 7C C6 0B
31C5:C6 7C 00 7C C6 C6 7E 06 C6
31CD:C6 7C 00 00 00 00 00 00 B2
31D5:00 00 00 00 00 00 00 00 38
31DD:00 00 00 00 00 00 00 00 40
31E5:00 00 00 00 00 00 00 00 48
31ED:00 00 00 00 00 15 15 1A E8
31F5:1A 1B 1B 00 00 55 55 AA 3A
31FD:AA FF FF 00 00 54 54 A4 54
3205:AA E4 E4 E4 E4 E4 E4 49
320D:EA E4 E4 1B 1B 1B 1B 02
3215:1B 1B 1B 1B 1A 1A 1A 15 6D
321D:15 00 00 FF FF AA AA 55 61
3225:55 00 00 E4 E4 A4 A4 54 D9
322D:54 00 00 54 5C 58 78 68 9E
3235:E8 28 28 2B 29 2D 25 1D
323D:35 15 D7 00 0A 2A 2B 2D F8
3245:35 15 D5 0D B5 D5 57 5C 25
324D:70 C0 00 5C 7A EA AA 00 B4
3255:00 00 00 00 AA AA AB 0D 1E
325D:00 00 00 0D B5 D5 57 5C A2
3265:00 00 00 5C 7A EA AA 01 65
326D:00 00 00 00 0A A8 A8 68 33
3275:68 28 28 28 28 29 29 2A 02
327D:2A 0A 00 00 00 00 AA A4
3285:AB AD 35 00 00 00 35 D5 12
328D:57 5E 70 00 00 00 70 EA 0F
3295:AA AA 00 00 00 00 AA A4
329D:AB AD 35 00 03 0D 35 D5 76
32A5:57 5E 70 57 54 5C 78 E8 BE
32AD:AB A0 00 00 00 AA 80 80 BA
32B5:8F 8C 8C 00 00 AA 00 00 41
32BD:FF 00 00 00 00 AA 02 02 D2
32C5:F2 32 32 8C 8C 8F 80 80 63
32CD:AA 00 00 00 00 FF 00 00 87
32D5:AA 00 00 32 32 F2 02 02 16
32DD:AA 00 00 8C 8C 8C 8C 8C 9C
32E5:8C 8C 32 32 32 32 32 32 59
32ED:32 32 32 2A 2A 83 3F FD B0
32F5:D5 54 42 A8 2A C2 FC 7F 03
32FD:57 15 81 00 00 00 00 00 83
3305:00 00 00 00 00 00 00 02 6D
330D:AA 80 0A AA A0 0A 55 A0 4D
3315:29 55 68 29 7D 68 29 FF E4
331D:68 29 FF 68 29 7D 68 29 C1
3325:55 68 0A 55 A8 0A AA A0 4A
332D:02 AA 80 00 00 00 00 00 4F
3335:00 00 00 00 00 00 00 00 9B
333D:00 00 00 00 00 00 00 00 A4
3345:00 00 00 00 00 00 00 00 AB

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334D:00 00 00 00 00 00 00 00 B3
3355:00 00 00 00 28 00 00 AA A7
335D:00 02 96 80 00 AA 00 00 C9
3375:00 00 00 00 00 00 00 00 DB
337D:00 00 02 00 00 00 00 00 24
3385:00 00 00 00 00 00 00 02 ED
338D:8A 80 0A AA A0 0A 54 A0 BB
3395:29 55 68 28 7D 60 29 FF 35
339D:68 09 FF 68 29 7C 68 29 36
33A5:55 68 08 55 20 0A AA A0 46
33AD:02 A2 80 00 00 00 00 00 CD
33B5:00 00 00 00 00 00 00 00 1C
33BD:00 00 08 00 00 00 00 00 25
33C5:00 00 00 00 00 00 00 02 2E
33CD:0A 80 0A 8A A0 0A 50 A0 B1
33D5:29 54 68 20 7D 40 08 FF F1
33DD:60 09 FF 68 29 70 68 20 39
33E5:54 68 08 54 20 0A 82 20 25
33ED:02 A2 80 00 00 00 00 00 0E
33F5:00 00 00 00 00 00 00 00 5C
33FD:00 00 08 00 00 00 00 00 65
3405:00 00 00 00 00 00 00 02 6F
340D:0A 00 02 8A A0 08 50 A0 C9
3415:29 54 28 20 70 40 08 3F 02
341D:60 00 CF 40 29 70 68 20 AF
3425:54 68 08 14 20 00 82 00 1A
342D:02 A0 00 00 00 00 00 00 BE
3435:00 00 00 00 00 00 00 00 9D
343D:00 00 08 00 00 00 00 00 A6
3445:00 00 00 00 00 00 00 02 AF
344D:0A 00 02 88 A0 08 50 80 C9
3455:29 14 28 20 70 40 08 33 26
345D:60 00 CC 00 28 70 68 20 83
3465:44 48 08 14 20 00 82 00 4A
346D:02 20 00 00 00 00 00 00 DE
3475:00 00 00 00 00 00 00 00 DD
347D:00 00 08 00 00 00 00 00 E6

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MEMORY MONITOR

By Kenneth R. Warrick

Several weeks ago, I was in a room filled with more than 200 people, demonstrating a program that did a lot of string building. After a while, the program came to a screeching halt by the inevitable garbage collection process.

For more than a minute, I had all these people cooling their heels while my trusty 64 did its housekeeping. I thought to myself how helpful it might be to keep a running check on the amount of string storage space still available.

Of course, this number is what we are looking for when we execute the BASIC FRE command. But since FRE performs garbage collection first, it doesn't tell us how much space has been taken up by obsolete string fragments. An onscreen monitor that would keep track of space

available would be just what the doctor ordered!

That's what Memory Monitor for the 64 does. It's a machine language utility that keeps track of the amount of free memory remaining and prints it in the upper left corner of the screen.

Typing It In

Memory is a BASIC loader that creates Memory Monitor when it runs and saves the machine language program to disk with the name Memory Monitor. To help avoid typing errors, enter Memory 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.

Before I get into the program itself, here's a little of the process that went into its creation.

Sparked by the creative muse, I thumbed through my copy of *Mapping the Commodore 64 and 64C* to find the location of the pointers at the beginning and end of RAM that's available for string storage. The end of the BASIC array storage area (+1) marks the first byte of the string storage area. This address is stored at 49-50 (\$31-\$32). Creating numerical variables takes up memory, moving this number upward and reducing the amount of space left available for strings.

As strings are created, storage begins at 40959 (\$9FFF) and moves downward toward the address found in \$31-\$32. Thus the low end of currently used string space marks the highest address still available for string storage. This address is kept at 51-52 (\$33-\$34). By subtracting, we could find our number.

We don't want our monitor to take up any precious RAM, so we shouldn't write a long BASIC routine to do the job. A machine language routine that's hidden away would be best.

Our routine should run unattended in the background without having to be called repeatedly from our BASIC program. The Kernal has in its bag of tricks a routine which every 1/60 second interrupts whatever BASIC is doing to increment the clock, control flashing of the cursor, update whatever needs to be on the screen, and check the keyboard buffer for any keypresses. By wedging our routine in ahead of all

these housekeeping chores, our task could be taken care of automatically.

Getting back to our little subtraction problem, subtracting the address found at \$31-\$32 from the address found at \$33-\$34 obtains our number in the form of two bytes in the mathematical format of base 256. How do we convert this to decimal format that humans can understand? Programmers familiar with Kernal routines will recall the routine LINPRT found at 48589 (\$BDCD) which is normally used to convert the two-byte BASIC line numbers to decimal and print their ASCII representation to the current output device. That should take care of this project in short order.

Wrong! The interrupt routine has a strict time schedule that will only allow us to wedge in a fairly short routine. Anything longer will crash! That is just what LINPRT is—too long. Back to the drawing board!

By writing an efficient routine that utilizes a large (2048 byte) lookup table, we can meet the time schedule. Those of us who hate mile-long lists of DATA statements will like how short our loader is. Our lookup table is created for us by some fancy mathematics in lines 30-60.

The program searches the first part of our lookup table for the screen POKE codes (which for the digits 0-9 are the same as their ASCII codes) for multiples of 256 (represented by the high byte obtained from our subtraction) in decimal format. The results are parked in a five-byte holding area at \$C800-\$C804.

The second part of the lookup table has the values of 0-256 (represented by the low byte) to be added into our five bytes. Later we correct for any of these sums that exceed 9 and make appropriate carries. Then, poke to the screen, color it white, and exit to the normal interrupt routine.

After reading the code for the working routine from DATA statements and poking it into place, our loader creates the lookup table. It then saves the entire bundle to disk with the filename MEMORY MONITOR by calling the Kernal routine SAVE at 65496.

Once Memory Monitor is on your work disk, you can load it with the ,8,1 extension and run it with SYS 51205.

PROGRAMS

You can also load and run the routine from within a BASIC program with the following line.

```
10 IF J=0 THEN J=1: LOAD "MEMORY MONITOR",8,1 20 SYS 51205
```

The manipulation of J prevents endless loop recycling since a LOAD command from program mode automatically executes a GOTO the first program line. While this may be done easily at the beginning of a BASIC program, locating it anywhere else would require a first line of IF J=1 THEN XXX, with XXX the line with the SYS command.

Here's an easier one-liner that may be located anywhere in your program.

```
10 POKE 780,0: OPEN8,8,8,1,"MEMORY MONITOR": SYS 65493: CLOSE 8: SYS 51205
```

To turn off Memory Monitor and return to guessing how much memory is left, enter SYS 51326.

MEMORY

```
DM 1 REM COPYRIGHT 1993 - COMP  
UTE PUBLICATIONS INTL LTD  
- ALL RIGHTS RESERVED  
HA 5 PRINT"{DOWN}WAIT 60 SECON  
DS...":PRINT"CREATING MEM  
ORY MONITOR"  
MC 10 FORI=51205 TO 51338:READ  
A:CK=CK+A:POKEI,A:NEXT  
SC 20 IFCK<>16246THENPRINT"ERR  
OR IN DATA STATEMENTS":E  
ND  
SX 30 FORN=0TO255:J$=RIGHT$( "0  
0000"+MID$(STR$(256*N),2  
,5):FORK=1TO5  
JB 40 POKE48896+256*K+N,ASC(MI  
D$(J$,K,1)):NEXT  
RJ 50 FORN=0TO255:J$=RIGHT$( "0  
00"+MID$(STR$(N),2),3):F  
ORK=1TO3  
XK 60 POKE50176+256*K+N,VAL(MI  
D$(J$,K,1)):NEXT:NEXT:OP  
EN8,8,8,"MEMORY MONITOR"  
DM 70 POKE250,0:POKE251,192:PO  
KE780,250:POKE781,138:PO  
KE782,200:SYS65496  
JK 80 DATA 120,169,18,141,20,3  
,169,200,141,21,3,88,96,  
56,165,51,229,49,133,251  
,165  
BA 90 DATA 52,229,50,168,185,0  
,192,141,0,200,185,0,193  
,141,1,200,185,0,194,141  
,2  
HR 100 DATA 200,185,0,195,141,  
3,200,185,0,196,141,4,2
```

```
00,24,164,251,185,0,197  
,109,2  
QQ 110 DATA 200,141,2,200,185,  
0,198,109,3,200,141,3,2  
00,185,0,199,109,4,200,  
141,4  
SF 120 DATA 200,160,5,162,0,13  
4,252,162,0,185,255,199  
,24,101,252,201,58,144,  
4,24  
HG 130 DATA 105,246,232,153,25  
5,3,169,1,153,255,215,1  
36,208,227,76,49,234,12  
0,169  
SC 140 DATA 49,141,20,3,169,23  
4,141,21,3,88,96  
MC 150 PRINT"[DOWN}ACTIVATE ME  
MORY MONITOR WITH SYS 5  
1205"
```

Kenneth R. Warrick is a physician who lives in Charleston, South Carolina.

CUBIC

By Stephen A. Bakke

Cubic is a logic puzzle for the 64. It resembles a brightly colored cube whose six sides can be twisted to mix up the colors. When the puzzle starts, the colors are mixed randomly. The object of the puzzle is to maneuver the colored pieces so that each side consists of but one of the six colors.

Presenting six sides of a cube on-screen at one time can be a problem. To get around this difficulty, Cubic unfolds the cube and displays the sides next to one another on the screen.

Cubic is written in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond to the following starting and ending addresses.

Starting address: 0801
Ending address: 0EE8

Be sure to save a copy of the program before exiting MLX. Although Cubic is written in machine language, it loads and runs like a BASIC program. Operator input is controlled exclusively by a joystick plugged into port 2.

Getting Started

The top screen line is Cubic's status line. It displays the program name, number of turns taken, and the best score achieved. Below it are six squares

that represent the sides of a cube. Each square consists of 16 smaller squares of various colors arranged in four columns by four rows.

To solve the puzzle, swap rows and columns of squares between the sides of the cube until all squares within each of the six sides contain a single color. Columns run up and down and are numbered 1 on the left through 4 on the right. Rows extend left and right and are numbered 1 on the top through 4 on the bottom.

The bottom screen line is used for operator input. Four inputs are required to exchange a row or column between two sides of the cube. Push the joystick left or right to highlight Row for row or Col for column. Press the fire button to enter your selection.

The next entry determines the row or column. Push the joystick left or right to change the row or column number. Press the fire button when the desired number is displayed.

Then select the cube number from which the swap is desired and press the fire button. Next, select the cube number to which the swap is desired and press the fire button again. The swap will occur, the number of turns will be incremented, and the bottom line will clear in preparation for the next move.

The puzzle is solved when each cube contains only squares of the same color. The screen will remain unchanged while the border cycles through various colors until you press the fire button. After you press the button, the best score will be set, the number of turns will be reset, and the six sides will be scrambled in preparation for another game.

CUBIC

```
0801:0B 08 0A 00 9E 32 30 36 2E  
0809:31 00 00 00 A9 80 8D 91 AD  
0811:02 A9 15 8D 18 D0 20 4C 98  
0819:08 20 30 09 20 E8 0A 20 A4  
0821:80 0D 20 07 0A 20 F4 0D F0  
0829:20 1A 0B A9 00 8D D1 0E B3  
0831:8D D2 0E 20 D9 0D 20 73 37  
0839:0A EE D6 0E 20 6F 0D 4C EA  
0841:FB 0C A0 00 C8 D0 FD CA B6  
0849:D0 F8 60 A2 00 8E 20 D0 81  
0851:8E 21 D0 20 44 E5 A2 00 0C  
0859:A0 05 18 20 F0 FF A9 5F 3A  
0861:A0 0E 20 1E AB A2 18 A0 E3  
0869:05 18 20 F0 FF A9 80 A0 5D  
0871:0E 20 1E AB A9 3A A0 00 86
```

0879:A2 04 86 F8 A2 15 86 F7 AA 00AA9:D3 0E 20 A6 09 AD CC 0E 40 00CD9:7F 91 F7 E6 F7 A6 F7 E0 AE
0881:91 F7 A2 1F 86 F7 91 F7 CD 00AB1:8D D3 0E 20 CB 09 20 F6 FE 00CE1:CD D0 F2 60 A9 02 8D C9 B3
0889:A2 07 86 F8 A2 C8 86 F7 4A 00AB9:0A 68 AA E8 8A E0 04 D0 81 00CE9:0E A9 50 8D C8 0E 60 A9 3F
0891:91 F7 A2 CC 86 F7 91 F7 B8 00AC1:D8 60 18 AD CD 0E 6D D2 8C 00CF1:50 8D C9 0E A9 02 8D C8 E8
0899:A2 D4 86 F7 91 F7 A2 DD 10 00AC9:0E 8D CD 0E AD CE 0E 69 11 00CF9:0E 60 A9 00 48 AA BD B8 87
08A1:86 F7 91 F7 A9 0C 8D 86 C3 00AD1:00 8D CE 0E 18 AD CF 0E 29 00D01:0E 8D CD 0E BD BE 0E 8D B2
08A9:02 A9 30 8D CA 0E A9 00 E5 00AD9:6D D2 0E 8D CF 0E AD D0 D6 00D09:CE 0E A9 00 8D C8 0E 20 0F
08B1:48 AA BC D8 0E BD DE 0E E8 00AE1:0E 69 00 8D D0 0E 60 A9 59 00D11:33 0D EE C8 0E 20 7D 09 67
08B9:EE CA 0E AA 18 20 F0 FF 83 00AE9:65 8D 0E D4 8D 0F D4 A9 1F 00D19:20 33 0D 20 7D 09 20 33 37
08C1:A9 CA A0 0E 20 1E AB 68 87 00AF1:11 8D 12 D4 60 18 AD D1 12 00D21:0D 20 7D 09 20 33 00 68 5A
08C9:AA E8 8A C9 06 D0 E1 A9 38 00AF9:0E 6D C9 0E 8D D1 0E 60 BA 00D29:AA E8 8A C9 06 D0 CD 4C 1C
08D1:00 48 AA BD 43 0E 8D C9 5C 00B01:AD CA 0E F0 13 48 18 AD A0 00D31:9E 0D A9 00 48 8D D1 0E 3D
08D9:0E BD 3D 0E 8D C8 0E 20 B4 00B09:D2 0E 6D C8 0E 8D D2 0E A9 00 00D39:20 8F 09 20 49 00 68 A4 64
08E1:EC 08 68 AA E8 8A C9 06 2D 00B11:68 AA CA 8A E0 0D D0 ED 9E 00D41:E8 E8 8A C9 08 D0 ED 60 B7
08E9:D0 E7 60 A9 00 48 AC C9 47 00B19:60 20 E5 0C 20 79 0C 20 04 00D49:A0 00 AE D1 0E F0 08 B1 9C
08F1:0E AE C8 0E 18 20 F0 FF D1 00B21:CA 0C AD 00 DC 29 0F C9 C8 00D51:F7 CD D3 0E D0 F0 AE 68
08F9:A9 49 A0 0E 20 1E AB AC A3 00B29:07 F0 16 C9 0B F0 EA AD FD 00D59:C8 0E F0 03 4C 50 0D B1 19
0901:C9 0E EE C8 0E AE C8 0E B0 00B31:00 DC 29 10 D0 EC 20 FA 1A 00D61:F7 8D D3 0E 60 68 68 68 14
0909:18 20 F0 FF A9 54 A0 0E 3B 00B39:0D A2 FF 20 43 08 4C 4E A1 00D69:68 68 68 4C 29 08 A2 00 52
0911:20 1E AB EE C8 0E 68 AA 19 00B41:0B 20 F0 0C 20 AF 0C 20 BB 00D71:A0 16 18 20 F0 FF AE D6 22
0919:E8 8A C9 04 D0 CF 60 18 5A 00B49:94 0C 4C 23 0B A9 CD 85 88 00D79:0E A9 00 20 CD BD 60 A2 CF
0921:AD CC 0E 0A 6D CC 0E 69 C3 00B51:F7 A9 07 85 F8 A9 01 8D 05 00D81:00 A0 20 18 20 F0 FF AE BC
0929:0E 29 0F 8D D3 0E 60 A9 88 00B59:CA 0E 09 30 91 F7 A0 00 44 00D89:D7 0E A9 00 20 CD BD 60 5C
0931:00 8D CC 0E 48 AA BD B8 42 00B61:DC 29 0F C9 07 F0 19 C9 A6 00D91:18 AD D6 0E CD D7 0E B0 79
0939:0E 8D CD 0E BD BE 0E 8D E2 00B69:0B F0 30 AD 00 DC 29 10 F7 00D99:03 8D D7 0E 60 20 91 0D 28
0941:CE 0E 20 20 09 EE CC 0E EF 00B71:D0 EC CE CA 0E 20 FA D0 A5 00DA1:A9 00 8D D6 0E 20 18 A0 7B
0949:20 67 09 20 7D 09 20 67 20 01 00B79:A2 FF 20 43 08 4C B5 0B 01 00DA9:05 18 20 F0 FF A9 9C A0 DF
0951:09 20 7D 09 20 67 09 20 01 00B81:EE CA 0E AD CA 0E C9 05 85 00DB1:0E 20 1E AB A0 00 C8 C0 B0
0959:7D 09 20 67 09 60 AA E8 0F 00B89:D0 02 A9 01 8D CA 0E 09 8A 00DB9:10 D0 02 A0 01 8C 20 D0 A5
0961:8A C9 06 D0 CF 60 A9 00 4C 00B91:30 91 F7 A2 4B 20 43 08 B6 00DC1:98 48 A2 FF 20 43 08 68 15
0969:48 8D D1 0E 20 8F 09 20 8F 00B99:4C 5F 0B CE CA 0E AD CA B0 00DC9:A8 AD 00 DC 29 10 D0 E6 83
0971:A6 09 68 A8 C8 C8 98 C9 15 00BA1:0E D0 02 A9 04 8D CA 0E C7 00DD1:A0 00 8C 20 D0 4C 17 08 BD
0979:08 D0 ED 60 18 AD CD 0E A8 00BA9:09 30 91 F7 A2 4B 20 43 C7 00DD9:A9 20 A0 00 A2 CD 86 F7 36
0981:69 50 8D CD 0E AD CE 0E BD 00BB1:08 4C 5F 0B A9 D5 85 F7 23 00DE1:A2 07 86 F8 91 F7 A2 D5 F6
0989:69 00 8D CE 0E 60 18 AD BE 00BB9:A9 01 8D D4 0E 09 30 91 6A 00DE9:86 F7 91 F7 A2 DE 86 F7 8C
0991:CD 0E 6D D1 0E 85 F7 85 D4 00BC1:F7 AD 00 DC 29 0F C9 07 2D 00DF1:91 F7 60 A9 0C 8D 18 D4 15
0999:F9 AD CE 0E 69 00 85 F8 1E 00BC9:F0 19 C9 0B F0 30 AD 00 2C 00DF9:60 A9 10 8D 05 D4 A9 30 D8
09A1:69 AC 85 FA 60 A2 00 18 99 00BD1:DC 29 10 D0 EC CE D4 0E 0A 00E01:8D 06 D4 A9 0A A2 00 18 8D
09A9:BD C4 0E 65 F7 85 F7 85 2F 00BD9:20 FA D0 A2 FF 20 43 08 99 00E09:69 05 E8 E0 0A D0 F8 8D 59
09B1:F9 A5 F8 69 00 85 F8 69 51 00BE1:4C 18 0C EE D4 0E AD D4 A3 00E11:01 D4 A9 25 8D 00 D4 A9 2A
09B9:AC 85 FA AD D3 0E A0 00 D5 00BE9:0E C9 07 D0 02 A9 01 8D AD 00E19:21 8D 04 D4 A2 14 20 43 DF
09C1:91 F7 91 F9 E8 E0 04 D0 10 00BF1:D4 0E 09 30 91 F7 A2 7F 4B 00E21:08 A9 00 8D 04 D4 8D 05 18
09C9:DE 60 A2 00 18 BD C4 0E 07 00BF9:20 43 08 4C C2 0B CE D4 6B 00E29:D4 8D 06 D4 8D 00 D4 8D C4
09D1:65 FB 85 FB 85 FD A5 FC 72 00C01:0E AD D4 0E D0 02 A9 06 EE 00E31:01 D4 8D 17 D4 8D 16 D4 04
09D9:69 00 85 FC 69 AC 85 FE 29 00C09:8D D4 0E 09 30 91 F7 A2 C9 00E39:8D 15 D4 60 04 04 04 0E 48
09E1:AD D3 0E A0 00 91 FB 91 5B 00C11:7F 20 43 08 4C C2 0B A9 07 00E41:0E 0E 05 10 1B 05 10 1B B1
09E9:FD E8 E0 04 D0 DE 60 18 6C 00C19:DE 85 F7 A9 01 8D D5 0E 93 00E49:12 CF D0 CF D0 CF D0 CF B0
09F1:AD CF 0E 6D D1 0E 85 FB 35 00C21:09 30 91 F7 AD 00 DC 29 CB 00E51:D0 92 00 12 CC BA CC BA 41
09F9:85 FD AD D0 0E 69 00 85 AC 00C29:0F C9 07 F0 17 C9 0B F0 12 00E59:CC BA CC BA 92 00 1E 43 E3
0A01:FC 69 AC 85 FE 60 A9 00 A8 00C31:2E AD 00 DC 29 10 D0 EC B1 00E61:55 42 49 43 9F 20 20 20 F3
0A09:48 A9 00 8D D2 0E 8D D1 40 00C39:CE D5 0E 20 FA 0D A2 FF 43 00E69:20 20 20 54 55 52 4E 53 CA
0A11:0E 20 24 0A 20 73 0A 68 A4 00C41:20 43 08 60 EE D5 0E AD D9 00E71:20 20 20 20 20 20 42 45 F6
0A19:AA E8 8A C9 FF D0 E9 60 22 00C49:D5 0E C9 07 D0 02 01 A9 01 5C 00E79:53 54 20 20 20 20 00 52 2E
0A21:CA CA 60 AD 1B D4 29 07 B9 00C51:8D D5 0E 09 30 91 F7 A2 52 00E81:4F 57 20 43 4F 4C 20 20 5F
0A29:20 56 0A AD 1B D4 29 07 84 00C59:4B 20 43 08 4C 25 0C CE E5 00E89:20 20 46 52 4F 4D 20 20 BB
0A31:AA 18 E0 05 30 03 20 21 FB 00C61:D5 0E AD D5 0E D0 02 A9 5C 00E91:20 20 20 20 20 54 4F 20 DC
0A39:0A 8A 8D D4 0E AD 1B D4 26 00C69:06 8D D5 0E 09 30 91 F7 A7 57 00E99:20 20 00 50 52 45 53 53 74
0A41:29 07 AA 18 E0 05 30 03 01 00C71:A2 4B 20 43 08 4C 25 0C AD 00EA1:20 46 49 52 45 20 54 4F 50
0A49:20 21 0A 8A CD D4 0E F0 6E 00C79:A9 C5 85 F7 A9 07 85 F8 75 00EA9:20 50 4C 41 59 20 41 47 9C
0A51:EC 8D D5 0E 60 18 6A 8D A0 00C81:A9 00 A8 AA B1 F7 09 80 2E 00EB1:41 49 4E 2E 2E 00 A5 3D
0A59:CA 0E 90 0B A9 02 8D C9 53 00C89:91 F7 E6 F7 A6 F7 E0 C9 65 00EB9:B0 BB 35 40 4B 2C 2C 2C 57
0A61:0E A9 50 8D C8 0E 60 A9 B2 00C91:D0 F2 60 A9 C5 85 F7 A9 53 00EC1:2E 2E 2E 00 27 01 02 EE
0A69:50 8D C9 0E A9 02 8D C8 5C 00C99:07 85 F8 A9 00 8A AA B1 F9 00 00EC9:50 00 06 3B 2F 00 00 05
0A71:0E 60 AE D4 0E BD B8 0E AE 00CA1:F7 29 7F 91 F7 E6 F7 A6 FA 00ED1:00 00 0D 00 00 DE 09 56
0A79:8D CD 0E BD BE 0E 8D CE 7D 00CA9:F7 E0 C9 D0 F2 60 A9 C9 72 00ED9:14 1F 09 14 1F 03 03 03 38
0A81:0E AE D5 0E BD B8 0E 8D 5E 00CB1:85 F7 A9 07 85 F8 A9 00 93 00EEL:0D 0D 00 00 00 00 00 69
0A89:CF 0E BD BE 0E 8D D0 0E 03 00CB9:A8 AA B1 F7 09 80 91 F7 EB
0A91:20 01 0B 20 C3 0A A9 00 F2 00CC1:E6 F7 A6 F7 E0 CD D0 F2 72
0A99:A8 48 20 8F 09 20 F0 09 C4 00CC9:60 A9 C9 85 F7 A9 07 85 08
0AA1:B1 F7 8D CC 0E B1 FB 8D C7 00CD1:F8 A9 00 A8 AA B1 F7 29 90

Steven Bakke writes puzzling programs in Aurora, Colorado. □

AUTOMATIC PROOFREADER

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
   CK 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
```

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, Gazette Disk offers bonus programs. This month we present three spreadsheet templates that are ready to load into SpeedCalc or GemCalc.

Bond Fund

By E.A. Ramirez
Guaynabo, PR

There are several ways to determine capital gains and losses for bond mutual funds, but the most advantageous to the taxpayer is by calculating the cumulative price per share before each transaction. This template does that. Its printout is suitable for submission to the IRS as an addendum to tax forms.

Mortgage Analyzer Decision Maker

By Dave Pankhurst
Montreal, PQ
Canada

With Mortgage Analyzer, you can see any year in the payback of a mortgage, check the balance owed, principal and interest paid, total mortgage cost, monthly payments, and more.

Having trouble making decisions? With Decision Maker, your 64 can help. List up to seven choices and the advantages of each one. Assign each advantage a numerical rating, and the computer will do the rest.

Don't forget that Gazette Disk now contains public domain programs and shareware. For a complete rundown of the PD programs on this month's disk, see "PD Picks."

You can have these programs and all of the type-in programs found in this issue—ready to load and run—by ordering the August Gazette Disk. The price is \$9.95 plus \$2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. You can order by credit card by calling (919) 275-9809, extension 283.

AST 4/33S MODEL 123B

The Cold War may have ended, but that doesn't mean they don't build battleships anymore.

The AST 4/33s model 123B 486SX computer system is a welcome change from the recent spate of ever-cheaper, ever-more-shortcuts-taken, no-name systems filling the pages of mail-order catalogs. At \$1,895 suggested retail with a street price of around \$1,700, the system is competitively priced and offers more features than average.

AST is a well-established American company. The company's Six Pack memory and clock enhancement board was one of the few viable ways to make the original IBM PC (the XT) truly usable in the early 1980s. In the years since, AST has enjoyed a reputation for building solid, reliable systems.

Of course, you may not have the room to dock a battleship on your desk. The one real drawback to the 123B is its larger-than-standard size: 15¼ × 6¼ × 16½ inches. The advantages of the unit could lead you to consider digging a larger harbor, though.

There are good reasons for the 123B's bulk. The computer gives you four full-sized expansion slots, as well as two 5¼-inch and two 3½-inch drive bays—all surrounded by a solid metal case. You have all sorts of room if you want to add additional drives, internal modems, and cruise missiles. Whatever.

Installation's simple. Plug the monitor into the back of the computer (the connector will only fit one place), attach the mouse and key-

board, then connect the power cords to the monitor and computer. Turn them on. That's it. Both DOS and Windows are preinstalled on the hard disk, and the AUTOEXEC.BAT file is programmed so that Windows comes up ready to use.

It may not look like it's



It may be built like a battleship, but the AST 4/33s model 123B 486SX runs like a clipper, offering speed and expansion room.

built for speed, but the 123B is fast and powerful. The one I tried came with a 120MB hard drive, 4MB of RAM, and a Super VGA display. The amount of RAM is easily upgradable. The only blip in an otherwise beautiful design is that while the SIMM outlets—where the additional memory chips get installed—are convenient, the sockets for adding video RAM can only be reached by removing the power supply temporarily. This, at least, is a simple task, and the rest of the system's conveniences make up for this minor inconvenience.

The documentation is excellent, with good illustrations of the procedures to follow for the various types of upgrades.

Some of the 123B's speed comes from a large 256K memory cache, coupled with a very fast Quantum 120MB hard disk. Com-

bine that with the quickness of a 486SX-33, and you'll find, as I did, that the system has very satisfactory throughput. Such Windows applications as CorelDRAW! and PageMaker—heavy system resource users—show nice zip. I was especially pleased with the quickness

CPU daughter board, and the old chip jumps right out. Insert the new chip, and the upgrade's done. This feature and the 123B's overall solidity will let you keep the machine current with technology for years to come, thus making it a better investment than computers that are harder to upgrade.

Yes, the 123B is built like a battleship (maybe that's what the B really stands for), but it's a fast, easily upgradable, and solidly reliable behemoth. I like it a lot.

RALPH ROBERTS

AST Research
(714) 727-4141
\$1,895

Circle Reader Service Number 434

MICROSOFT MOUSE

It's no small thing to redesign an input device, especially one with more than 60 million users worldwide. Yet that's precisely what Microsoft has done with its new mouse. In doing so, the mouse design team addressed many questions that may not have occurred to users, and added features which, in retrospect, are natural and quickly become indispensable.

First things first: The new mouse looks different. For one thing, it's a bit larger and longer than its predecessor. More importantly, it has a shape. Gone is the familiar bar-of-soap design, replaced by a device with a graceful curve along its left side. Microsoft's mouse remains a two-button device, although the buttons are larger than on the classic mouse.

At first glance, the new shape may seem off-putting. My initial reaction was

of display updates for CorelDRAW! figures that had a lot of fountain fills.

Hardware settings can easily be switched through the BIOS setup routine—no need to take the case off and look for DIP switches. I found in my tests that the computer is above average in disk- and processor-related tasks, compared to machines in a similar price range.

We all know that computer technology changes rapidly. The 123B solves that problem by offering an easy upgrade path. Currently—for about \$350 to \$700—it's possible to increase the performance of the 123B (and, in fact, all of AST's Bravo series) by adding a clock-doubler chip (DX2) and bringing its speed up to 66 MHz.

Upgrading the processor is a relatively simple operation. Just flip up the zero insertion force lever on the



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REVIEWS

that the mouse was too large, that I would have to retrain my hand after years of using a classic mouse. The retraining took all of ten minutes. The curved shape makes the mouse fit the hand more comfortably, and its recentered weight helps it move more easi-



The new Microsoft Mouse represents a positive evolution of a familiar device.

ly. None of this should be too surprising: The curve—indeed, every aspect of the device—is the result of intensive research into hand anatomy, postures, and ergonomics. Believe me, Microsoft knows hands!

Hands of all types, actually. Despite the curve's location on the left side of the mouse, the device is designed to work well for either right- or left-handed users. Its size may make the mouse a bit difficult for small children, but it should be fine for teenagers on up.

Other hardware features worth noting include a new, heavier cable, one that's less likely to kink. The center of gravity and the balance for the mouse are noticeably improved, and the tracking ball rolls more smoothly.

As important as the hardware is the software, and it's here that the mouse shines most brightly. Many of the driver innovations are not only common sense, but also most welcome. A good example is the new "snap-to" feature, which automatically directs the cursor to the screen's default button.

Perhaps my favorite feature is the screen wrap. At last! Now, when you move the cursor off one side of the screen, it appears on the opposite side. A magnifier enables you to enlarge sections of the screen for closer examination, while another feature relocates the cursor at the center of the screen should it get lost.

After you get over the initial surprise of the mouse's new shape, you can see how sensible—even conservative—

most of Microsoft's decisions are. Yet it's tough to see what's been left out, unless it would be a completely wireless version. (It would be nice, upon reflection, to have the mouse available in more colors than Microsoft white, but that's less a design than a marketing criterion.) The mouse will, after the keyboard, remain the most important interface device for some time to come, and there's little doubt in my mind that Microsoft's new mouse represents an evolution, and a worthwhile evolution, in this device's usefulness and practicality.

KEITH FERRELL

Microsoft
(800) 426-9400
\$109

Circle Reader Service Number 435

MANAGEPRO

Make no mistake: ManagePro is a tool for managers intent on managing people *and* information, and it places a premium on making that information available in a number of formats. Beyond the usual spreadsheet capabilities, it lets you access information about goals and the personnel in charge of meeting them in a variety of configurations: according to time lines, company-wide performance objectives, organizational charts, immediate action lists—even individual employee personnel files.

This is software that not only lets you track your people and your goals but takes pains to coach managers about their responsibilities, too. As it says in the tutorial, the creators of ManagePro believe there are four key steps in managing people toward collective goals: set the goals clearly; monitor progress; give feedback and coaching; and evaluate, recognize, and reward everyone's contributions toward the goals.

ManagePro is written with that philosophy in mind. There's a people-status board that prompts managers to check on employee progress and offer feedback. There's an Advice feature built in that lets you access basic how-to people management tips as you pull people along toward your goals. (Ironically, though, the advice is so rudimentary that you may wonder how useful it will be to managers who work for companies sophisticated enough to make optimal use of the software.) To top it all off, the creators of ManagePro go so far as to include a short peptalk book, *Managing People: Your Competitive Edge in the '90s*.

In terms of architecture, the software is divided into two main headings:

Goals and People. The Goals side features a goal planner that elaborates on companywide objectives and spells out responsibility for meeting them, a goal-status board that offers big-picture tracking at a glance, and a timeline feature that lets you monitor target dates for making it all happen. The People side consists of a status board that offers color-coded prompts to make sure you're evaluating and communicating with employees, a performance data file that lets you compile performance appraisals, and a planner that connects the dots between people and objectives.

ManagePro is commonsensical; it's a breeze to install and use. The learning curve doesn't seem prohibitively steep, thanks in part to the excellent tutorial built into the software. But you may be a while fathoming its many powers. The makers recommend half an hour on the tutorial, but I lingered a little longer to learn my way around the extensive features, and I was glad I did. You may not need all that ManagePro can do, but you needn't be scared away—even if it has more power than you need right now.

STEVE PERRY

Avantos
(800) 282-6867
(510) 654-4600
\$395

Circle Reader Service Number 436

ARTHUR'S TEACHER TROUBLE

Arthur's Teacher Trouble is the second in Brøderbund's series of interactive CD-ROM storybooks called Living Books. It brings Marc Brown's children's book to the computer screen with musical accompaniment, interesting animated effects, and a voice to tell the story. In it, you'll find the same storyteller theme, lustrous high-resolution graphics, onscreen play, and multilingual narration found in Brøderbund's original Living Book, *Grandma 'n Me*.

But unlike *Grandma 'n Me*, which was rated for children ages 3–8, Arthur is for somewhat more advanced readers, ages 6–10. Like *Grandma, Arthur's* tale can be told in English or Spanish. Language is an option you select at the title screen, and from there you can also click on Preview to get a look at what's coming up in Brøderbund's next Living Book. Then you can select whether you want to have the story read to you or to play inside it.

If you have the story read, you see the text from Brown's story highlighted onscreen as it's read in Arthur's voice.

Children can read along, recognize the words, and follow the animated action as Arthur and his friends struggle through Mr. Ratburn's third grade class and prepare for the school's big September Spell-a-thon.

All this (and more) happens when you choose to play inside the story. Doing so takes you to an interactive mode which brings the elements on-screen to life when you click on them. Each screen is a page out of Brown's book, and the animated illustrations fairly duplicate those in the small bound copy that Brøderbund includes with the software.

At every turn, the reader gets introduced to subtle humor and imaginative activities that will delight children and charm adults. Arthur, like *Grandma 'n Me*, teaches as it entertains and lets children become players in the storybooks they read. These Living Books delight at so many levels they'll make you want to buy a CD-ROM player if you don't already have one for your home computer.

CAROL ELLISON

Brøderbund
(415) 382-4400
\$44.95–\$59.95

Circle Reader Service Number 437

DOCTOR SCHUELER'S HOME MEDICAL ADVISOR

Healthcare reform comes in various packages, and this one—Doctor Schueler's Home Medical Advisor (Windows 3.1 version)—is lively with colorful graphics, packed with information, and fun to use.

The aim of Home Medical Advisor is to nurture informed healthcare consumers—a lofty goal that might help us to carve away at a national cancer called healthcare costs. It's produced by Pixel Perfect and written by Stephen J. Schueler, chairman of the Department of Emergency Medicine at Holmes Regional Medical Center in Melbourne, Florida.

Home Medical Advisor is a handy resource that you don't have to be a computer whiz to use. In fact, children and adults alike enjoy Home Medical Advisor at the St. Louis Science Center, where the DOS version of this popular program is part of the Medical Technology Gallery.

From abdominal pain to zinc oxide poisoning, you can find information on it in seven linked files: Symptom, Disease, Injury, Poison, Drug, Test, and Health & Diet. You navigate the program with simple keyboard or mouse

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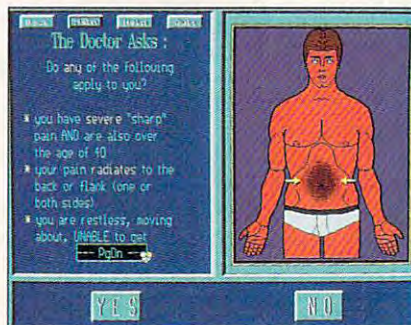


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REVIEWS

commands. You can access information by clicking on menu buttons that run along the bottom of the screen or by typing keywords in the dialog box for the Scan command.

The Windows version of Home Medical Advisor is a wonderfully souped-



The Windows version of Schueler's Home Medical Advisor is good for what ails you.

up model of the DOS version. Redraws are quicker, the color graphics spicier, and the information more complete. Now you can tell the doctor where it hurts in the Symptom File by using an anatomical drawing and simply clicking on the part of the body that's under the weather.

The Disease File offers detailed information about the signs, symptoms, evaluation, and treatment of more than 500 diseases (50 more than in the DOS version). The Injury File is a guide to more than 130 different injuries, the Poison File names some 500 poisons, and the Test File gives you the lowdown on 130 of the most frequently performed medical tests. The Drug File is much more extensive than in the DOS version, which covered about 800 prescription and nonprescription drugs; this version tackles 1200.

A new feature is the Health & Diet File, a cornucopia of tips for better living. It includes information on vitamins, nutrition, home safety, health, and travel, as well as a vaccination schedule for parents to refer to.

Look for the CD-ROM version—which promises to be even more visually exciting—in the fall. In the meantime, the Windows 3.1 version of Doctor Schueler's Home Medical Advisor is one way the ordinary person can get a handle on the healthcare issue.

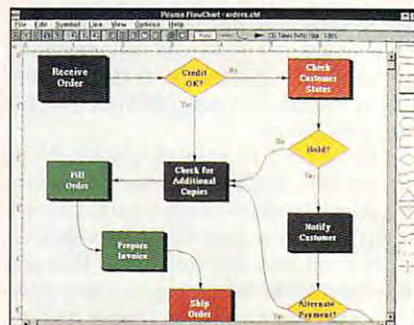
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Circle Reader Service Number 438

YOURWAY

"Manage your time and contacts," proclaims the tag line on the front of YourWay, a sophisticated and elegant variation on the old electronic-Rolodex theme. When you first call up this easy-to-install software, you see a card file laid out in front of you, surrounded along the edges by all the icons you'd



The complexities of YourWay pay off in its time and contact management capabilities.

expect: day, week, month, and task-planner windows; cut-and-paste features; and file-search features.

A built-in tutorial would've helped me digest more quickly the range of options YourWay offers, maybe, but the one in the manual does just fine. Don't expect to get through it too quickly, though. The simple stuff—like accessing and creating contact file cards, and attaching notes to them via the notepad accessory—is easy to learn and pretty self-evident. But functions like editing and file searching get pronouncedly more complicated. Nothing overwhelming, but you quickly get into territory that's less intuitive and less graphically friendly than the front end of YourWay.

But once you've mastered the ins and outs of card file maintenance and use of the planner windows, YourWay has a lot to offer. Want an alarm to notify you of lunches, meetings, or any other planned events? Easy. Worried about keeping your contact information organized? YourWay cross-references between the various planners and individual card files, so that if you set up a lunch with Tom Thomas on your daily events planner, a note of it will also appear on the notepad attached to his contact card. If you place a call to Mary Watkins at 10:25 on October 8, that'll be recorded too.

I found YourWay a little daunting at first, but I soon figured out that that was largely a graphic matter: Some of the information-configuration screens aren't immediately easy to grasp; they offer options that'll send you scurrying to the manual. Which is OK, because once you've learned it, the scheme

isn't particularly complicated.

The installation was easy, and so far, the manual has never let me down—it's written in plain language and features a good index. The only drawback is that a piece of software this high-powered has given me an inferiority complex about my list of contacts. If I'm going to stretch the capabilities of YourWay, I've got some serious networking to do.

STEVE PERRY

Prisma Software
(800) 437-2685
(319) 266-0260
\$99 (\$69 from catalog)

Circle Reader Service Number 439

SIMLIFE

SimLife, "The Genetic Playground," is a new addition to Maxis's line of simulations/games/toys, such as the popular SimCity, SimAnt, and SimWorld. SimLife's silicon-based computer world simulates many of the features of our very own carbon-based life. You build an ecosystem and fill it with life, then test your world by changing genetics and/or messing with the laws of physics. Toss in a disaster—drought, fire, flood, and so on—and see how your world adapts.

To play, you choose from six predetermined scenarios, such as exploring how a desert evolves into a forest or finding out what led to the extinction of dinosaurs. There's also an experimental scenario, where anything you say goes. (Flying llamas? No problem.) A topographical map shows you the world you're working on. Inside the map is a small rectangle called the Edit Window. Scroll the Edit Window over the map to find the section of the world you want to look at up close. A Windows-like menu system enables you to easily call up world creation and control parameters. For instance, are any of your plant and animal creations extinct, and if so, why? What can you do to save those left that are in trouble?

Life is complex, and SimLife has a lot of features, too—"more buttons than all the bellies in China," the manual declares. But, unlike life, SimLife has an entertaining and gentle online tutorial that introduces you to features one at a time. Additionally, you can limit or ignore many features so you won't get overwhelmed. The manual also offers a tutorial, reference, and educational bibliography. A lab book walks you through putting an experiment together and charting data.

SimLife gives you all sorts of interesting options. If you want to see what happens to your world and its inhabitants

in an evolutionary sense, for example, speed up the simulation, and the years and generations will zip by. If you're more interested in the day-to-day events during the life cycle of a plant or animal, all you do is slow the simulation down. With SimLife, you can do it all.

BETH C. FISHKIND

Maxis
(510) 254-9700
\$69.95

Circle Reader Service Number 440

VIRUSCAN, CLEAN-UP, VSHIELD

Every once in a while, a software company comes along that just seems to do everything the right way and at the right time. McAfee Associates is one of those companies. It has produced a line of virus detection, removal, and early-warning software that's head and shoulders above the competition.

I've used one form of virus protection or another since I was first exposed to computer viruses in college, but I always seem to come back to the McAfee products. The reasons are quite simple: They work, they work well, and they work simply.

I have encountered several viruses in my travels, what with being an avid user of bulletin board systems (BBSs) as well as a collector of shareware. Not only has VIRUSCAN (the virus detector) never missed one, but CLEAN-UP (the virus remover) has never failed to remove even the boot-sector viruses.

The really interesting thing about McAfee products is that you probably won't see them in your local computer store. They're distributed through the shareware or user-supported concept of distribution. This means that you use the software and, if you like it (that is, it's a useful utility that you use with some regularity), you pay the author some registration fee. If you don't like it, you just quit using it.

The other way you may get one of the McAfee products is if it comes with your computer. McAfee has signed bundling contracts with some computer manufacturers, such as Austin and Leading Edge.

The programs come with very easy-to-read documentation that fully explains all of the options available. I feel that a specific word of warning is warranted, though: When installing the early-warning software VSHIELD, do so after all networking and disk-caching software and before any shells such as Windows or MS-DOS Shell.

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you free upgrades and phone technical support for a year. For business use, a site license is required. It entitles you to two years' worth of free upgrades and phone support.

Another trait I find admirable is that virus elimination is the company's only business. McAfee doesn't write DOS shells or word processors, just virus detection and elimination programs. This means that all of its efforts go into keeping viruses out of our machines. These programs prove that McAfee is doing its work well.

BRADLEY M. SMALL

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Circle Reader Service Number 441

AMAZON: GUARDIANS OF EDEN

Rising from his desk, your boss, Wilbur Thornick, turns his back to you as he gives you the bad news. The expedition to the Amazon has been attacked, he tells you, his hands clasped behind his back, fingers twitching restlessly. Your brother is missing.

So begins Jason's (and your) adventure to find his missing brother, Allen, in Amazon: Guardians of Eden. What separates this from other adventure games is that the scene with Thornick is a minimovie. Amazon has traditional adventure-type screens in which you direct your adventurer to Look, Open, Get, etc., combined with full-motion video sequences and synchronized speech that's anything but typical. As one of my friends put it, "Cool!"

Naturally, there's a price to pay for such coolness. Eight megabytes of hard disk space is just the beginning. You can play Amazon with the minimum of hardware recommended, but to really get all that this program offers, you'll need a 386/33 computer, a sound card, and an SVGA monitor supporting 640 x 400 or 640 x 480 in 256 colors, with VESA compatibility.

Amazon's story is patterned after the campy old serials from the 1940s and 1950s, such as Flash Gordon, The Lost City, and Rocketman. Our story takes place in 1957, and you'll find vintage cars and TVs—as well as a vintage plot. The adventure is broken down into chapters, each with its own cliffhanger ending. To assist you on your quest to find your brother in the depths of the jungle, there's a player's

guidebook and a pop-up online help window.

The online help consists of three levels of clues, so you can make the adventure as challenging as you can handle. Begin with an intriguing, obscure hint. If that's not enough, there are two more levels of progressively



You won't find a cooler system-resource hog than Amazon: Guardians of Eden.

easier hints. But beware: The easier the hint, the more points docked from your overall game score.

BETH C. FISHKIND

Access Software
(800) 800-4880
\$69.95

Circle Reader Service Number 442

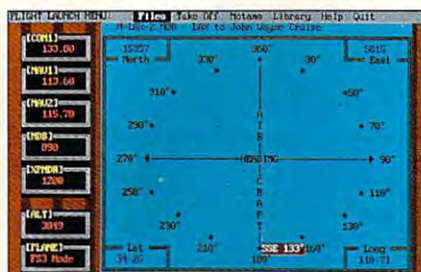
FLIGHT SIMULATOR ADD-ONS

While several companies produce add-on software for Microsoft's Flight Simulator, none is quite as prolific as Mallard. Recently, Mallard has released many new packages, including Air Traffic Controller (ATC) and Pilot's Power Tools (PPT).

ATC (originally called Tracon) is an impressive simulation that drops you into the seat of an air traffic controller, where it's up to you to get all aircraft in your sector safely to their destinations. To make the simulation as lifelike as possible, ATC's display includes a realistic-looking radar panel, complete with a continually circling radar sweep that updates critical data on the aircraft in your sector. In addition, menus across the top let you configure the simulation to your taste and skill.

As planes approach your sector, their flight plans appear in a pending queue to the right of the radar display. How you handle a flight depends on its flight plan. If a plane is just overflying your area en route to another location, you need do little more than keep it a safe distance from other flights and hand it off to the next controller. Takeoffs, on the other hand, must wait on the ground until you release them.

Landings are the real challenge in ATC. You must guide the plane into the airport at the proper altitude and angle for its final approach. As if this weren't difficult enough, you frequently have several planes landing at the same airport, one after another. To add to the realism, digitized radio voices represent your com-



Air Traffic Controller puts you behind the radar screen of a busy airport.

mands and the pilots' replies. ATC, which includes both a DOS version and a Windows version featuring much-improved graphics, offers a gripping and educational simulation.

If you've lost control of the dozens, or even hundreds, of files comprising the many scenery disks and other add-on modules you use with Flight Simulator, you might want to try Mallard's Pilot's Power Tools. Using PPT, you can use PKZIP to compress most files you need for Flight Simulator into related archives, allowing you not only to save huge amounts of disk space but also to organize files into directories and related ZIP files. Most of the tools included in PPT manipulate these compressed files.

You might, for example, want to have a directory containing all the files, in ZIP format, from a specific scenery package. Then, to use the scenery, you simply select PPT's Copy Selected ZIPs & Run FS option and tell PPT the file types you need for that current Flight Simulator session. PPT does all the dirty work, uncompressing the files into your Flight Simulator Directory and running Flight Simulator in the mode you've selected. After the Flight Simulator session, PPT deletes the files it copied, and, if necessary, updates your ZIP file with whatever files you may have changed during the session.

Also included in this package is Mallard's Flight Planner. There are also utilities to analyze and edit Aircraft & Scenery Designer files, convert Flight Planner files into adventures for Mallard's Aircraft & Adventure Factory (AAF), and cross-reference various elements of an AAF adventure, plus even more. Pilot's Power Tools offers serious fliers precise and convenient control over their Flight Simulator sessions.

CLAYTON WALNUM

Mallard Software
(800) WEB-FEET
Air Traffic Controller—\$59.95
Circle Reader Service Number 443

Pilot's Power Tools—\$39.95
Circle Reader Service Number 444

PEACHTREE ACCOUNTING FOR WINDOWS 2.0

It's not often that an upgrade of an existing software product looks like an entirely new package. Such is the case, though, with Peachtree Accounting for Windows 2.0. Peachtree built this new version from the ground up, and it shows.

Peachtree Accounting is targeted at companies that employ up to 25 people, with revenues of less than a million dollars, though it's capable of handling much larger businesses. It was designed—like most other products in the entry-level accounting genre—to be used by people with little or no prior accounting experience. The program's new user interface will also accommodate individuals with little or no PC experience.

A simple, friendly tutorial walks the new user through setting up the company's books (13 sample Charts of Accounts are included), and an ongoing checklist outlines the logical steps required to utilize features appropriate for the user's business. "Smart Guides," which can be turned on or off, offer extra help at selected screens.

All of Peachtree Accounting's financial functions—Accounts Receivable/Invoicing, Accounts Payable, Payroll, Inventory, Job/Project Tracking, Bank Reconciliation, General Ledger, and Financial Reporting—are fully integrated, so data entered in one area automatically updates any other affected areas. And unlike with most other accounting packages, you don't have to go through complex month-end closing procedures; the program automatically assigns transactions to the proper period by reading the date.

Peachtree Accounting is also the first accounting product to take full advantage of three powerful Windows functions: Multiple Document Interface (MDI), Object Linking and Embedding (OLE), and Dynamic Data Exchange (DDE). This means you can keep multiple windows open onscreen simultaneously, customize forms by inserting graphic objects from other applications, and exchange data with other programs.

Though the documentation and the final version weren't available at this writ-

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ing, the beta I saw looked more intuitive and full featured than any similar product I've seen. The program's new look incorporates state-of-the-art Windows conventions: descriptive icons, real-life representations of graphic forms, and visual flow charts that guide you through an accounting process.

One of the most potentially powerful new features of this upgrade is the Manager Series, which lets you "drill down" through the many levels of your cash, collection, and payables records, and provides graphical analyses and overviews of your company's financial status. Moreover, several new capabilities have been added to every major function of Peachtree Accounting, enhancing the product's flexibility, ease of use, and speed.

There's a lot of competition in the small-business accounting field, and a shake-out is inevitable. When the dust finally settles, however, Peachtree Accounting will likely still be around.

KATHY YAKAL

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Circle Reader Service Number 445

DATA STOR 486-25SX

The Data Stor 486-25SX, built around the 486SX, 25-MHz, 32-bit microprocessor, is as powerful as it is fast and efficient.

While you'll want to note that this particular flavor of 486 has no math coprocessing capability built in, most common applications don't need one. If you required it at a later date, however, a coprocessor could always be added or the CPU could

be upgraded.

Above and beyond the standard 4MB of RAM, there are up to 32MB available by expansion. Expansion RAM is held in single inline memory modules (SIMMs), making upgrades and maintenance easy and efficient. A 64K hardware

ISA local bus slot, tied to the system's own memory bus and allowing direct access to the CPU by peripherals, accommodates local bus add-on cards. The local bus adapters run at the same speed as the CPU for consequent high performance.

To test speed and smooth-

Stor 486 showed enough improvement over its 386 equivalent to be the computer of choice if both were available and both were running the same software.

To obtain data not biased by my own interpretation, I also ran the Norton Utilities SYSINFO program and looked at the benchmark tests. What the benchmarks told me was essentially what I experienced—significant speed in both file access and processing. With the IBM XT 8088 running at 4.77 MHz as a base value of 1 in all indices, the Data Stor 486 has a computing index (CPU speed) value of 54, a disk-speed index of 7.5, and an overall performance-index value of 38.5. Compare this with the 386 values—which are, respectively, 34.8, 7, and 25.5—and you have a 50-percent improvement.

My review unit also came equipped with a Tseng 4000 local bus video board offering Super VGA capability, a high-resolution monitor, a 207MB hard drive, high-density 5¼- and 3½-inch floppy drives, and a Logitech Series 14 mouse. All of these were put through their paces, and nothing was found to be problematic or wanting. Also available for upgrades, but not included with the review unit, are fixed drives with capacities of up to two gigabytes, a Weitek math coprocessor, and, of course, multiple video displays and modems.

This computer is a member of a family of Data Stor 486 ISA Series computers. Depending on the flavor of 486 microprocessor you choose, clock speeds may be 25, 33, or 50 MHz. The computer is fully IBM compatible, attractive, well designed, and easy to use.



You're likely to find everything you need in the Data Stor 486-25SX, a computer that combines speed with power.

cache, using fast static RAM, is a part of the motherboard and can be upgraded to 256K.

Because each machine is configured based on the needs of the specific purchaser, there's no standard configuration for the Data Stor 486, other than the basic motherboard specifications: a 1 : 1 interleave IDE hard/floppy disk drive controller, a game port, a parallel port, and two serial ports.

Input and output is handled through AMI BIOS with on-board CMOS for storing the system configuration. An

ness of operation, I ran several common programs on the Data Stor 486 and a Gateway 2000 386DX/33. These included Windows applications such as MacDraft and Hollywood—which are heavily graphics and processing oriented—and DOS applications such as Dance of the Planets, Color Works, and DeluxePaint IIe, also heavily processing oriented. Dance of the Planets, in fact, needs a math coprocessor to run at its best, yet it moves along at an acceptable rate on the Data Stor 486. In all cases, the Data

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REVIEWS

There are three buttons at the front of the unit: a turbospeed button, a reset button, and the power button. Although a keyboard seems a mundane thing, it can make all the difference when you're using a computer, since it's the peripheral you have most immediate and lengthy contact with. The Data Stor 101 keyboard is IBM standard and has a terrific feel, with pleasing tactile feedback and a solid click.

Case dimensions are 16½ × 14½ × 7 inches. The interior is well laid out and is accessible with the removal of seven screws.

With attributes ranging from a fast operating speed to a keyboard with a nice feel, I found plenty to like about the Data Stor 486-25SX. It's a well-designed, powerful machine.

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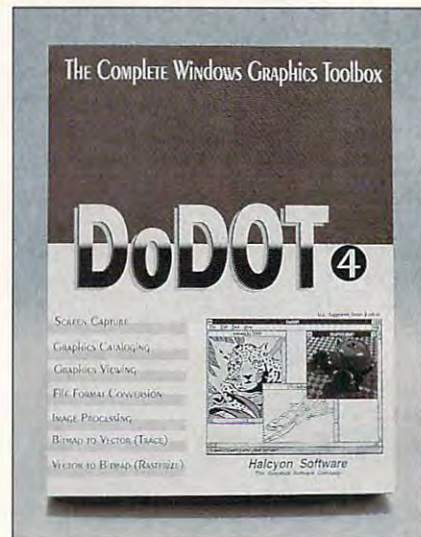
DODOT 4.0

If you do a lot work with graphics, you can surely benefit from a utility like Halcyon Software's DoDot 4.0. DoDot is a veritable Swiss Army knife of graphics utilities, consisting of five separate programs: DoDot, DoConvert, DoThumbnail, DoSnap, and DoView. They perform a host of graphics functions.

The main application, DoDot, allows you to fine-tune and transform images. One example might be converting color images to gray scale or black-and-white. It also lets you fax and scan images. DoConvert is a conversion utility that supports conversion among 50 different graphics formats, including other platforms, such as Macintosh and Sun. DoThumbnail lets you catalog thumbnails of images and search terms into an easily navigated database. DoSnap is a screen-capture utility that lets you save captures in several different formats. You can also choose between sending the capture to the Clipboard or to a graphics file. DoView is a graphics-viewing utility that allows you to view graphics by selecting them from the Windows File Manager or another file-management utility.

Most impressive is the speed with which each DoDot application performs its allotted task. I converted several 24-bit images to gray scale in half the time it takes other similar utilities. Conversion between file formats is also quick, and DoConvert is a batch converter, which means you can set it

up to convert several files and walk away to do other tasks while the computer works. I was disappointed, however, that you can perform only one type of conversion—say, CGM to PCX—per batch. Also, in my tests converting EPS logos to CGM, DoConvert dropped several letters, making the conversions useless. But most of the file conversions worked fine.



DoDot performs just about every graphics function you can think of.

DoThumbnail is one of the most versatile cataloging utilities I've ever seen. It catalogs graphics not only on your hard disk, but also on other sources, such as CD-ROMs and removables. When you access an image not residing on your hard disk, DoThumbnail tells you where to find it. Few of us have big enough hard disks to allow seldom-used graphics to occupy valuable real estate. DoThumbnail is also faster than CorelMOSAIC and some other cataloging utilities.

Halcyon markets DoDot as the Complete Graphics Toolbox. While this program is both powerful and useful, it lacks a few basic features, such as simple bitmap and vector editors, to be complete. Also, DoDot itself misbehaved on my system, crashing often and causing me to reboot. Halcyon representatives say they haven't experienced this problem. Granted, my system is more complex than many, but other Windows programs run fine on it.

Those few minor drawbacks aside, this is a great utility. In particular, DoDot is stronger at managing graphics than some other utilities.

WILLIAM HARRELL

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DOSUTILS

There comes a time in every disk's life where it suddenly begins to show problems, at least every once in a while. If you're lucky, you've been keeping regular backups and can safely reformat your hard disk. If you haven't, you'll need a product like DosUtils.

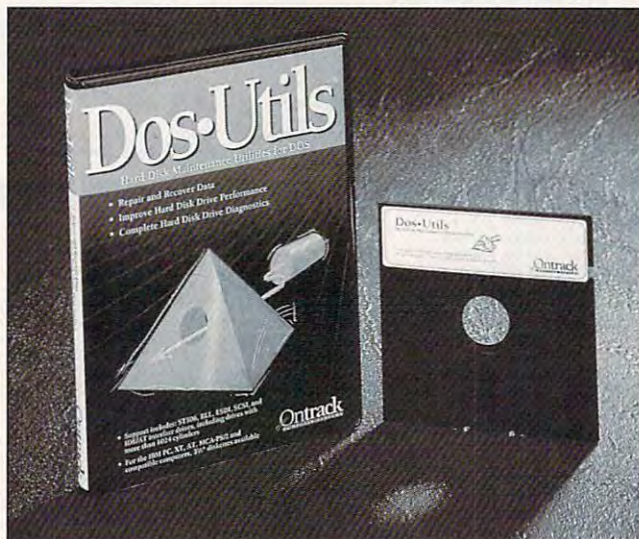
Sometimes just reformatting won't do the trick. Worse, the underused (and properly so) DOS VERIFY command doesn't do a very good job of verifying disk writes. What's more, DOS gives the hard disk several tries before it decides there's a problem writing to, or reading from, the disk. That why, for example, you might notice that a hard disk or a floppy has slowed down for no apparent reason before errors are reported. The disk may in fact have been defective for a while as DOS silently ignored the problem, stoically rereading or rewriting the disk until it got the job done.

DosUtils handles a wide variety of tasks. It lets you recover deleted files; acts as a kind of super-CHKDSK with its SCAN function; reads, writes, and searches the physical disk itself; changes file attributes; tests the disk controller; determines the speed of the disk controller; finds defects on the disk; and performs a number of related feats. It does these for all popular hard disk types: ST506 MFM and RLL, ESDI and IDE, and SCSI. It can low-level initialize the ST506 and ESDI, but not the IDE or SCSI. A companion product from Ontrack, Disk Manager, handles all drive types, including IDE and SCSI.

I've laid on the alphabet

soup for a reason: If you have no idea what kind of hard drive is in your computer or why you'd want drive diagnostics or a better CHKDSK, this product isn't for you. On the other hand, if you're the local power user and find yourself doing drive maintenance only be-

bag of tricks. Like CHKDSK, it cruises the entire disk in search of cross-linked files, bad sectors, and so on; but it roots deeper than CHKDSK. It's almost as fast, however, and well worth the very slight time penalty. It took only a few seconds longer than CHKDSK to



DosUtils is a powerful program for maintaining hard drives, but it may be more powerful than casual users need.

cause everyone knows you can do it, DosUtils might just be the product you need.

One very useful feature in DosUtils' DiskLook utility is the ability to back up critical sections of the hard disk: boot record, BIOS parameter block, file allocation table, and root directory. Since most disk problems originate in those areas, backing them up frequently could well make or break your efforts to recover data when the disk starts to lose its mind. DOS doesn't give you any means of backing up just these items, and the BACKUP/RESTORE programs found in DOS are best left untouched.

The SCAN utility will also find its way into your daily

scan my 400MB of disk space.

I appreciated DosUtil's wide variety of command line options. While switches like Force XT mode or Force DOS 4 rules may sound like arcana, they're life-savers when you're working with a clone drive mechanism that didn't quite copy the programming interface correctly or you're working on a system that has acquired more than one version of DOS. (I once fixed a machine that was sputtering along with hidden system files from DOS 2.11, a COMMAND.COM from DOS 3.3, utilities from DOS 4.0, and some leftover files from DOS 3.0.) Unfortunately the Force DOS 4 rules option isn't explained anywhere in

the manual, and I had to call tech support to find out what it does.

The documentation is slim and missing a lot of tutorial information that might sell more copies of DosUtils to slightly less experienced users. Many important functions are given no explanation at all—the programmer and the person who wrote the manual might have known what *Scans (Write-read) all UN-USED data clusters* meant, but I sure didn't. There are other significant problems with the manual. There's no index, the print is very small, and some useful illustrations are marred by their execution—they literally look as if they were done on a typewriter. I still found them quite useful, though, because they explain different configurations of cables and interface cards.

Is DosUtils worth your money? If you know you need it—if you need to revive hard disks on the job—probably so. If your computer is new, and you couldn't tell a cylinder from a file if it jumped out of your system unit and bit you, then you should save your money.

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SPACE QUEST V: THE NEXT MUTATION

Hold on to your mops, boys and girls: Roger Wilco's in command. Yes, the bumbling but earnest goof from the other Space Quests returns, this time for a stint at StarCon Academy where, as usual, he's on cleaning detail. But wait! Our hero grad-

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REVIEWS

uates and, because of a computer error in his favor, receives his first assignment: to captain the garbage scow Eureka. Once on board, Roger faces an insolent crew and a perplexing mystery: Someone out there wants to put an end to StarCon.

As always full of wry and often irrelevant humor, this latest Space Quest



Space Quest V offers a neorealistic approach akin to Star Trek, plus humor.

installment goes further than any adventure game has gone before, perhaps with the exception of Star Trek, the 25th Anniversary Edition. The gags are uniformly hilarious, the animated shorts hysterical, and many of the problems you must solve seem ridiculous. Those constitute the differences between Space Quest V and something like Star Trek.

These two games hold in common a revolutionary approach to puzzle-solving: neorealism. For instance, to open a locked door, instead of employing a bizarre gimmick, you must take a hole punch found aboard the Eureka and punch a specific pattern in a business card.

The once-useless plastic card becomes a key that opens the door. You'll discover the necessary pattern through extreme and unusual circumstances, but those conditions make Space Quest V what it is: funny. The logic involved augments the slapstick and elevates the game well beyond the mundane horde of other adventures on the market—many from Sierra itself.

Space Quest V utilizes Sierra's impeccable interface, allowing for nearly transparent character actions. And, like most other Sierra games, this one features a nonstop and appropriate musical score. The graphics rank among the best standard 256-color VGA work done to date, while the animations rarely seem to "take over" and leave you with nothing to do but watch.

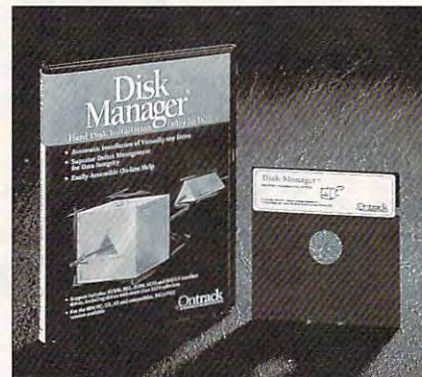
A number of Space Quest V puzzles do require absurd timing—even saving games won't alleviate your frustration

at Roger's 33rd death from pukoid spittle or the hours of dead-end maze-crawling. These tedious arcade sequences aside, anybody with a hankering to explore an alternate and spoof-filled universe must sign aboard the Eureka.

DAVID SEARS

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Circle Reader Service Number 449



It helps if you have a fairly high level of expertise to make the most of Disk Manager's disk-recover capabilities.

DISK MANAGER

Disk Manager saved my skin.

As a fairly competent programmer and an acknowledged power user, I tend to be pretty good at diagnosing problems, weighing the values of various solutions, and advising others on both hardware and software matters. So the other night when my system hung and the IDE hard drive died while I was racing for a deadline, I was calm and collected enough to do what few of my peers would do in that situation . . . I panicked. Some heretofore unknown Mr. Hyde leapt out from a deep crevasse within my soul and took over my consciousness. When I awoke, I realized I had done a FORMAT C: on my hard drive. This isn't a problem with most hard disks, but IDE drives are a noteworthy exception. Doing a low-level format is a no-no, rendering the disk unusable.

Unless you have the astounding Disk Manager, which saved my bacon at 3:30 the next morning. Disk Manager would be worth its price if only for that feature because the IDE manual mentions dispassionately that the only recourse to a formatted IDE is to send the drive back to its manufacturer. Not a good sign when it's 3:30 a.m. and your deadline is at 7:30. But Disk Manager does a lot more than just low-level-format IDE drives. It will do the same for any ST506, ESDI, IDE, or SCSI drive. It will add a soft extension to

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REVIEWS

your BIOS to tweak drives with more than 1024 cylinders, allow you to boot from up to four operating systems, repartition your disk, change the interleave and cluster sizes for each partition, and more. It even checks itself for a virus infection on startup.

The documentation is much too slim, relying almost solely on the online help, which isn't the greatest. It has no index and omits a lot of tutorial information that, say, the Norton Utilities and many similar programs offer. And some of the items simply aren't covered at all. For example, the Machine Information option gathers certain version data from the BIOS and DOS and displays it without explanation.

The online help gives only vague information about that particular feature, so I'll test you: Do you know what the "Model byte" is? I didn't think so. (It's a byte written into the BIOS by IBM; for example, 255 means it's an original PC, 254 designates an XT, and so on.) Not only that, but the model byte is given in hexadecimal or base 16 notation, so you're shown not the value 255, but FF, which is 255 in base 16.

Another problem is that the sequence of a particularly crucial set of operations (Initialize Disk Surface, Defect Management, and Verify Disk Surface) all listed on the same menu wasn't given in the online help and certainly not in the manual, so I had to learn by time-consuming (and potentially dangerous) trial and error. In other words, you'd better be a power user if you buy this product because the documentation doesn't take your hand and lead you through each step the way Norton does. (To be fair, Disk Manager's manual states that you're expected to be an advanced DOS user, and Disk Manager handles many cases that Norton doesn't. For example, it can read the disk even without a partition.)

But what Disk Manager does, it does very well. It dispatched with the low-level format of both my 212MB hard drives quickly and efficiently. Ditto for the resuscitation of the old Seagate hard disk on my seven-year-old AT, which I'd planned to shoot and bury in the backyard. It also determined correctly the disk types of several other machines I tried, although it lets you override parameters that you determine to be incorrect.

Other miscellaneous features are equally useful. For example, you can write-protect whole sections of your disk. While there's no password protection or encryption involved, this is

enough to prevent the casual or even accidental tampering that can trash a disk in seconds flat. Another fairly advanced feature is the ability to alter the cluster size of your hard disk (in English, that means you can choose between speed and more efficient use of hard disk space).

Disk Manager is a great companion to higher-level disk-recover tools like Norton or PC Tools. If you're comfortable enough around DOS and PC hardware to know whether you need it, Disk Manager does the job.

TOM CAMPBELL

Ontrack Computer Systems
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Circle Reader Service Number 450

DOUBLERES 4

Get 600 dots per inch from a 300-dpi HP LaserJet Series II or III! That's the claim LPAC makes for its doubleRES 4. But the board does more than just improve the resolution of Windows printing; it also speeds up the process.

As a computing veteran with years of experience, I've heard my share of unfulfilled claims. As a result, I installed doubleRES 4 with a bit of skepticism.

For me, installation meant loading up the doubleRES 4 printer driver in the usual manner and inserting the doubleRES 4 board into the Optional I/O port of my LaserJet Series II printer. Both of these tasks were relatively painless. Completing the installation process required changing the LaserJet's configuration using the control panel on the printer. (This was probably the most difficult part of the process.)

With everything in place, I loaded a 20-page PageMaker 4.0 file, which included a variety of line drawings and used several Adobe fonts, as well as about six screen captures. I was very impressed with the increased printing speed. The doubleRES 4 board includes an Intel i960 microprocessor that does much of the work the computer usually does, speeding up printing.

Once I finished my initial test, I began exploring the options available with the doubleRES 4 printer driver. These included the capabilities of selecting either 300 or 600 dpi and choosing halftone quality printing options of 53, 71, 85, or 106 lines per inch, an important feature if you print halftones with a LaserJet.

I did have an opportunity to try LPAC technical support. I use a Gateway 2000 486 with an ATI video card that has an SVGA BIOS incompatible with the doubleRES 4 printer driver. LPAC did have an alternate driver that

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I downloaded from its BBS. The new driver solved a problem I was having printing PageMaker files with running heads.

I also had a very simple-to-explain problem printing from Quattro Pro for Windows: DoubleRES 4 simply didn't work with that program! LPAC has discussed the problem with Borland, and both companies are working on it. While I experienced no problems serious enough to scare me away from doubleRES 4, you should probably check to be sure that it will work with the software you need it for.

I did, however, successfully use doubleRES 4 with all the other programs I tried. Printing multiple-page documents with doubleRES 4 was about five times faster than with the standard driver at 300 dpi printing from PageMaker, Word for Windows, and WordPerfect for Windows. The quality of the printing was also improved, as you would expect with the increased resolution, although the visual differences to the naked eye depend on the font, style, and size of the characters, especially if you use Adobe fonts.

At \$599, doubleRES 4 isn't a cheap add-on. But if you need to upgrade your HP LaserJet for increased speed in Windows printing and for 600-dpi resolution (and still be able to print DOS applications at 300 dpi) and if doubleRES 4 will work smoothly with the applications you use, it's an excellent alternative to buying a new printer.

STEPHEN LEVY

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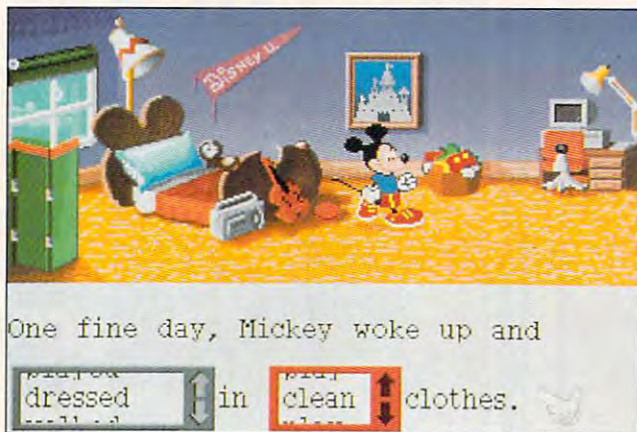
Circle Reader Service Number 451

106 COMPUTE AUGUST 1993

FOLLOW THE READER

Dick and Jane had better get a new agent. For people with access to computers, at least, educational software has made some old-school learning techniques

park. Spring for a Sound Source (an extra \$20 if you buy the Follow the Reader combination pack), and you can hear sound effects, as well as a narrator reading the sentences your child helps create. The program also supports other major sound boards, though I nev-



Tell Mickey Mouse where to go and he'll help you learn to read in *Follow the Reader*, a sequel to *Mickey's ABC's*.

seem as archaic as horse-drawn transportation. A leader in the field has been Disney Software, employing the most recognizable corporate symbols this side of Joe Camel to make learning fun and multidimensional.

In *Follow the Reader*, a sequel to *Mickey's ABC's* aimed at ages 5-8, Mickey Mouse and the usual suspects traipse through a series of gentle, child-guided adventures. The program is easy to install and use, requiring a 286 machine and only rudimentary mouse or keyboard skills. Each screen offers a sentence with one or two variable words, giving options for Mickey to do something where he is or to haul his oversized ears elsewhere and do something there.

Mickey can wash his ears in the bathroom, write a letter to a friend in his bedroom, or pick up trash in the

er was able to get it to work properly using my Covox Sound Master II.

It sounded great through the Sound Source, though. The graphics aren't quite as good as the sound, offering rich color but moderately jaggy illustrations. Jaggy or not, though, the characters move and make noises in a way that kept my five-year-old son happy. He had no trouble with the interface, and I'm confident that *Follow the Reader's* intuitive, no-wrong-answers method of instruction will boost his reading skills over time.

Good help for grownups comes from the well-illustrated manual and an extra activity guide for parents and teachers, the capping virtues of a satisfying package. For young readers, *Follow the Reader* offers a good lead.

EDDIE HUFFMAN

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Circle Reader Service Number 452

INTERNATIONAL SPORTS CHALLENGE

International Sports Challenge is another in a long line of sports simulations that attempt to reduce Olympic-level competitions to joystick tapping, twisting, and wiggling. In this omnibus contest you can compete in six events, including marathon running, diving, show jumping (horses), swimming, cycling, and shooting. Although all events must be played in a four-player mode, your computer will be thrilled to fill in for missing humans.

Unfortunately, *International Sports Challenge* has little to add to a leisure software market already glutted with superior titles. Fact is, this game is one frustration after another. The hassles begin from the moment you try to install it onto your hard drive, since the manual only includes instructions for running the game, not for installing it. Luckily, typing the usual *install* reads the needed instructions from the disk.

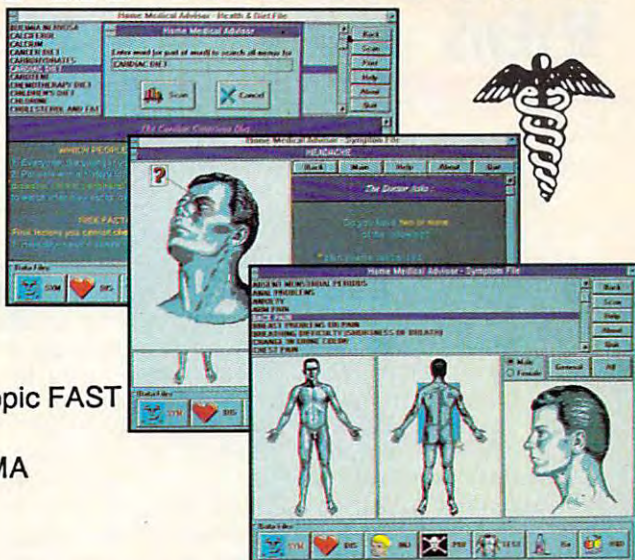
Installing the game is only half the battle, though. Once you get the title screen up, you have to figure out how the menu screens work. They, too, are not documented in the manual, except in the sentence "Simply follow the onscreen prompts." Too bad the onscreen prompts neglect to provide the information you need.

Once you get the game running, you face some of the most contrived controls

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seen in a sports game. In many events the controls are impossibly frustrating. In the diving competition, for example, you must first get the diver into the air by tapping the joystick button when a circlelike object expands to its largest size. The circle expands so quickly, however, that the results boil down to chance. Once your diver is airborne, you must try to line up two small balls on the circle in order to execute the dive properly. Forget watching your diver; if you even glance away from the control circle, your dive will be as professional as a belly flop.

The show-jumping event is equally frustrating. Here, you try to keep a horse on course, making its jumps in the assigned order. Although the 3-D graphics are OK, the horse is ridiculously difficult to keep on track, making the event more frustrating than it's worth. The other events suffer equally (I never did figure out exactly



Experience the kind of pleasure normally associated with dental work when you play International Sports Challenge.

how the swimming event worked), with the possible exception of the shooting match, which is nothing more than pointing and shooting.

Finally, although the game claims to support keyboard controls, there is no documentation on how those controls are implemented. If you don't own a joystick, plan to spend an hour

or two figuring out which keys work with which events—a nearly impossible task. Having a mouse won't save you, either, since the mouse works only intermittently. You have to wonder why they even bothered to include such meager mouse support.

In summary, this game's overly difficult controls, incomplete and confusing man-

ual, and borderline graphics and sound yield a leisure product that's more work than entertainment. I haven't had this much fun since I had a tooth pulled.

CLAYTON WALNUM

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Circle Reader Service Number 453

PUTT-PUTT JOINS THE PARADE

If only we could relive our childhoods! Instead of deploying plastic army men or posing Barbie dolls, we'd play Putt-Putt Joins the Parade, an instructive charmer chock full of bells and whistles. Even if your problem-solving and reading skills don't require further development, you owe it to your kid ages 5-7 to bring home a copy of this Humongous Entertainment product.

Putt-Putt, a cute little talking convertible, wants to

join the Cartown Pet Parade—quite the gala affair. To participate, he must find a pet, pay for a car wash, and snag a balloon. Kids take the wheel, using the mouse to move Putt-Putt around Cartown and activate secret Click-Points. In urban areas, kids have plenty to do mowing yards, delivering groceries, and finding their way around town. Out on the open road, youngsters will find that almost every butterfly and flower animates when touched.

The problems Putt-Putt encounters won't stump an eager seven-year-old, but for younger adventurers, figuring ways around balky cows, tacks in the street, and busy intersections can take some time. Successfully solving such simple dilemmas results in rewards of clever animated sequences and clear digitized speech. Putt-Putt also manages to teach a few ethics lessons without preachiness. For example, Putt-Putt must locate a missing child. Kids might notice that the distraught mother has a red balloon perfect for the parade, but the game itself never mentions rewards for noble actions—until after they're performed. Putt-Putt finds the child and gets the balloon; kids just might learn that valorous action makes them feel better about themselves. Besides, doing the right thing is the only way to "win" the game. Throughout, Putt-Putt and friends talk to kids via quality digitized speech, offering hints and encouragement. Putt-Putt often reads words on signs aloud so that kids who can't read will be able to make valuable word/object associations.

Putt-Putt Joins the Parade seems to borrow from the Little Golden Books tradition of

charm with its anthropomorphic fire engines and automobiles, all of which smile jovially. As mentioned, the whimsical backgrounds bristle with Click-Points that trigger amusing animations. The manual, suitably titled *The Junior Adventurer's Handbook*, consists of connect-the-dots activities, pages to color, and counting games, to name just a few items. The Junior Adventurer's Toolkit completes the package with a Putt-Putt pencil, sharpener, and box of crayons—quite an assortment of goodies sure to delight any child.

So when the route chosen calls for a gentle introduction to computer interfaces and hours of light-hearted play, Putt-Putt looks like the king of the road.

DAVID SEARS

Humongous Entertainment
(800) 245-4525
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Circle Reader Service Number 454

ROBOCOP 3D

Inspired by Orion Pictures' science-fiction thriller, *RoboCop 3D* unfolds in the crime-infested streets of Old Detroit. Here, the OCP Corporation plans to construct a new urban paradise, Delta City. Numerous project delays, however, threaten to cost the company billions of dollars unless it begins immediate demolition of existing buildings. When residents refuse to leave their homes, OCP sends armed Urban Rehab units to violently expel all resisters. As *RoboCop*, you turn renegade to help the hapless citizens and risk brutal retribution from your greedy employer.

Gameplay consists of separate Arcade and Movie sections. Arcade mode offers

practice in five self-contained action scenarios: Driving, Street Fights, Hostage Rescue, Flying, and Hand-to-Hand Combat. Whether buzzing skyscrapers in simulated air combat, cruising the lunatic fringe in your police cruiser, or busting down doors to search buildings, you'll find that the designers successfully evoke the movie's gut-level sensation of danger and despair. Both driving and flying—in your experimental, combat-ready gyropack—offer the most visually dynamic action, while the so-called urban pacification scenarios prove utterly chilling. Only hand-to-hand fighting fails to excite, suffering from inadequate design and a clumsy control scheme.

Movie mode brings all game elements together in an open-ended adventure spiced with cinematic-style segues, subplots, and seedy peripheral characters. The only rules are to follow your prime directives: Protect the innocent, uphold the law, and serve the public trust. Failure to do so promptly ends your tour of duty. Movie mode offers enough variety, mystery,

and explosive action to ensure repeated play. The biggest drawback, lack of a save-game option, is sadly indicative of the game's European design.

Graphics are rendered with a pleasing blend of 256-color bitmapped static screens and fast-moving 3-D polygons. Though the game is considerably less detailed than others of its type, the first-person perspective and murky monotonies give this virtual world its dark, jagged edge. Missing from the IBM version, unfortunately, are the spine-tingling music and sound effects that enlivened the original Amiga edition. The only other major weakness is strictly a matter of taste: Thick with violence and harsh ambiance, the game could prove too grim.

Though decidedly not for all tastes, *RoboCop 3D* delivers enough diverse challenges and heavy atmosphere to make it Ocean's best movie conversion yet.

SCOTT A. MAY

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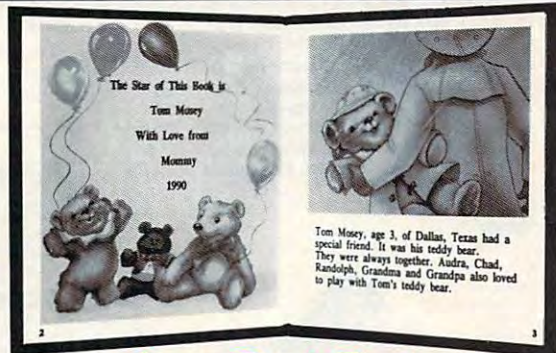
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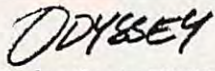
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DOS 6 has caused quite a stir recently. Judging from the sales figures, it's clearly an upgrade that a vast number of DOS users want, but some people have reported problems, especially with two modules: DoubleSpace and MemMaker.

At COMPUTE, six editors have installed DOS 6. All have used MemMaker, three have installed DoubleSpace, and none have had any problems. But since problems have been reported, we advise caution. Here's some advice on how to save your system if you have problems with DOS 6's DoubleSpace or MemMaker.

First, MemMaker and DoubleSpace are complex applications. If you're not familiar with drive letters, paths, and memory addresses, don't install these programs yourself. Get a knowledgeable friend or co-worker to help you.

The best defense is a recent backup. So before you do anything else, make a backup of your hard disk.

After you make the backup, restore a few files to make sure the backup is reliable. This is extremely important. If you need to restore later, you want to know how to do it, and you want to be sure your backup is OK. Now, make a copy on floppies of the software you used to make the backup, put the backup and the software aside, and relax.

Let's tackle DoubleSpace first. This utility compresses and decompresses data on the fly and, for all practical purposes, nearly doubles the size of most hard disks. It will also slow down some 386 machines. We recommend at least a 25-MHz 386SX with a minimum of 2MB RAM (so you can run SMARTDrive or another disk cache) for installing

DoubleSpace.

The first step is to install DOS 6, if you haven't already done so. Do this, and use your system for a day or two before you try installing DoubleSpace or MemMaker. After you and your system have adjusted to DOS 6, defragment your hard disk.

Next, before you run DoubleSpace, make sure you're also running any software that normally creates virtual drives on your system (CD-ROM or network drives). This will help DoubleSpace choose a drive letter for its physical drive that won't conflict with your usual environment. At COMPUTE, we've had no problems running SMARTDrive when installing DoubleSpace, but it seems wise to disable SMARTDrive for the installation. Creating your DoubleSpace volume may take several hours, so be prepared.

Hopefully, everything will go smoothly. After the installation, you should be able to run SMARTDrive again without problems. If you do have problems, refer to the paragraph after the next.

Consider the next month a DoubleSpace-testing period. Back up your important files every day and look for any signs of trouble on your compressed volume. At least twice a day, run DBLSPACE /CHKDSK on the compressed volume to test it for integrity. If you notice lost clusters, don't panic. Try disabling SMARTDrive's write-caching feature with the line *smartdrv i*, where *i* is the letter of your physical drive. (You can easily reenabling write caching with the line *smartdrv i+*.)

If you do have severe problems with your DoubleSpace volume, you can recover by following these steps: Install DOS 6 on a freshly formatted floppy, boot from the floppy, reformat your hard disk using the /s switch, reinstall DOS 6 on your

hard disk, and restore your backup. If you want to go back to a previous version of DOS, install that version on the formatted floppy and then on your hard drive.

Now to MemMaker. First determine whether you need to run MemMaker at all. Do you have DOS programs that run out of memory? If you don't or if you're using Windows almost exclusively, you probably don't need to load device drivers and TSRs high.

If you do need to load some programs into upper memory, do it manually first. Load the largest drivers first and use the keywords DEVICEHIGH in CONFIG.SYS and LOADHIGH in AUTOEXEC.BAT. To see how much memory you've freed, use the command MEM/C I MORE.

Experiment with the order of the programs, too. This can make a big difference. If you can free enough memory this way, don't bother running MemMaker. If you can't free enough conventional memory, you'll want to run MemMaker, but first, do this: Create a subdirectory off your root directory called BACKUP and copy your CONFIG.SYS and AUTOEXEC.BAT files into it. (If you're running Windows, it's a good idea to copy your WIN.INI and SYSTEM.INI files here, too.) If there's trouble with MemMaker, you'll still have your original copies.

Now, run MemMaker and follow the onscreen instructions. After MemMaker is finished, check your memory situation again. If MemMaker garnered more conventional memory for you, fine. If it didn't, go back to your backups. If MemMaker locks up when it's running, reboot your computer and bypass your CONFIG.SYS file by pressing F5 when you see *Now starting MS-DOS...* Next, copy your backups and reboot your computer. □

Keep this handy if you're installing DOS 6. To find out more about DoubleSpace, see "Windows Workshop" in the next issue.

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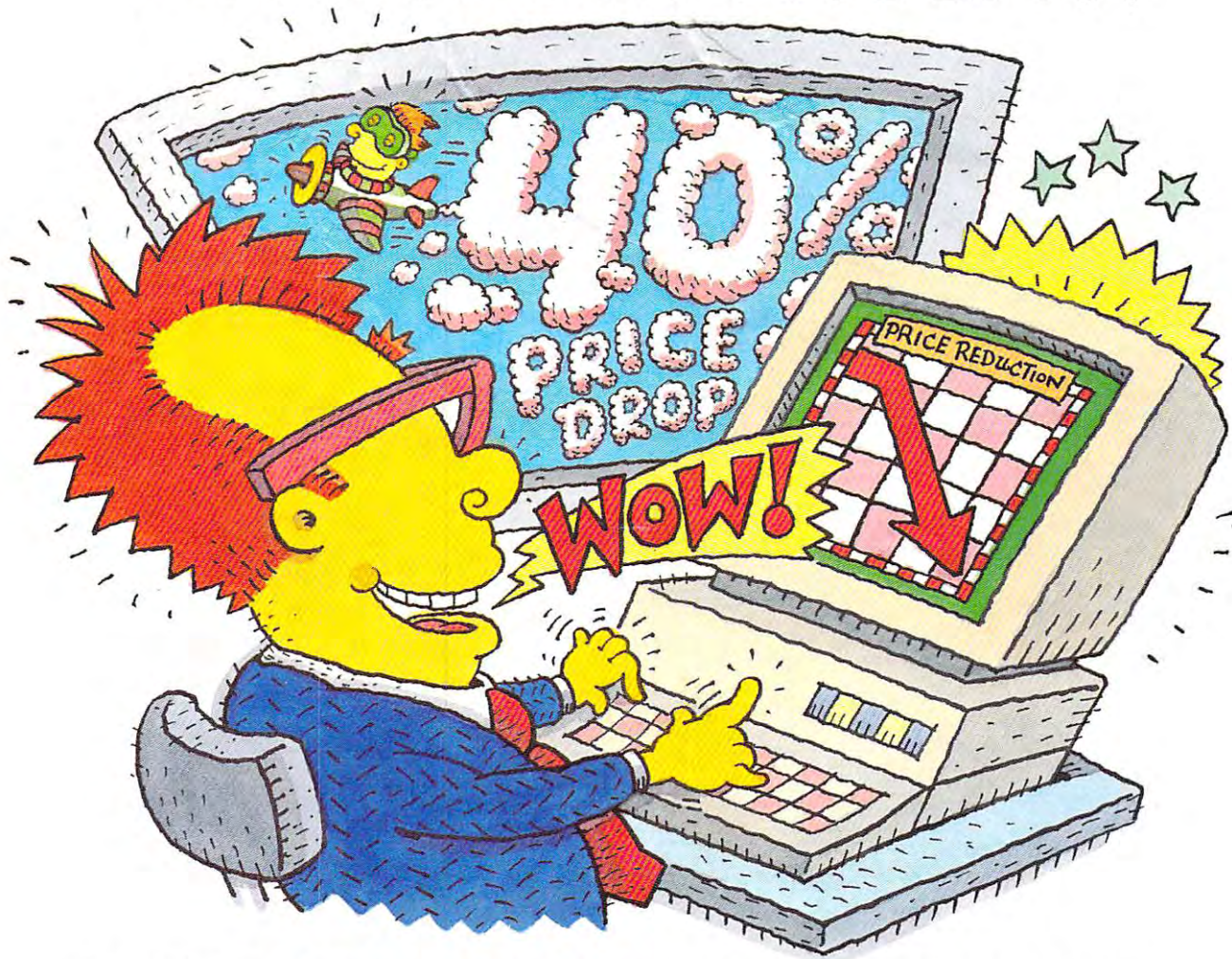
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