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penses icon, which works in the IceLady's favor, can add from 1 to 500 miles to her lead over you.

The flat tire screen is similar to the roulette and expenses routines in that it offers no action or player involvement. It consists of a picture of Eric standing next to his car, which has a flat tire. The number of flat tires add up throughout the game. Get four of them, and the caper is over. The number of flat tires is displayed on the main menu screen. Luckily, no mileage penalty is given for a flat tire.

The remaining icons, which consist of the IceLady's castle, driving, and gems, are the most enjoyable aspects in this program since they require some skill and offer you some chance of action. Each task starts with explanatory text and graphics which may be skipped later on.

In the IceLady's castle, Eric must battle against her henchmen who fight ninja-style to keep him from entering her castle. For each henchman that you defeat, you gain 100 miles and receive 150 points. Bars at the bottom of the screen indicate both the strength of Eric and the strength of the ninjas. When Eric's punches land, he experiences a moment of spiritual connection with Bruce Lee!

The driving event seems to have been inspired by Alfred Hitchcock. The challenge comes from avoiding a number of low-flying ducks that head straight for Eric's car. Luckily, you can move the car to avoid the ducks. You can even move it backward. In this event, you can gain up to 500 miles.

Finally, gems is a fairly entertaining segment which closely resembles Pac-Man. Eric is chased by a ghost through a dungeon maze. The objective of this timed event is to pick up as many as possible of the 25 gems strewn about the maze without being caught by the ghost. For each gem you pick up, you gain 20 miles and 50 points.

Each game takes up 1 day of the 21 which you have to solve the case, so landing on the expenses icon or getting hit by the piano too often can make it difficult for you to catch the IceLady. The game is rather simple, and the action is limited. The main complaint I have is the large amount of time it takes to load each segment. This is most frustrating when you repeatedly land on the roulette, expenses, or flat tire screens. After you've landed a couple of times, you know what to expect. The text doesn't change, only the numbers. But loading seems to take forever. As a result, the game is too simple for adults and too slow for children, who would lose interest waiting for the different segments to load.

The graphics are not too bad, and there are some pleasant sound effects and music scattered throughout the game. To make the game more appealing, however, I'd prefer to see more player interaction. As it is, it seems that most of the time spent with Escape Route is spent waiting for segments to load.

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THE LANDMARK SERIES: DUALTOP 64 AND 128

"He started to sing as he tackled the thing that couldn't be done and he did it." This quote from Edgar Guest appears on the title page of the manual for The Landmark Series. The title of the collection and even the name of the company itself announce the same thing: These utilities and games from program-

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mer Paul Murdaugh will perform like no other GEOS programs you've ever seen.

And they do. They have excellent RAM support, exceptional graphics, and lightning speed, and they're easy to use. To top it all off, they come with a clear and concise manual and a price to make you smile. The Landmark Series is a winner.

The star of the series unquestionably is DualTop, a file manager for both the 64 and the 128. DualTop's interface, as its name implies, presents you with two disk directories at once. The lists appear side by side, and you can scroll though each one. I might as well hit a negative point right off: To be honest, I'm not convinced I need this feature. I haven't found a practical advantage to it. Oh, I suppose it's handy to scroll through other directories looking for a file without closing your current disk, but I seldom have a need to do that.

The interface screen displays so much information that it looks cluttered and cramped. As for copying, it's just as easy to drop a file icon on a drive icon or, better yet, to use the keyboard shortcuts in GEOS 128. I certainly don't need to see the directory of a disk in order to do this. As a matter of fact, since you can't copy between disks in DualTop without opening both directories, this feature can actually slow you down.

If that were DualTop's sole claim to fame, I would leave it tucked away somewhere and never use it. Fortunately, this isn't the case. DualTop is a state-of-the-art file manager program. It's chock full of great, user-friendly features, the kind you'll find so intuitive and handy that you won't ever want to be without them.

Formatting disks is handled with a very straightforward, easy-to-understand control panel. You can't accidentally format the wrong disk, a problem sometimes with deskTop. DualTop 128 takes advantage of 64K video RAM if you have it, using it to store the DualTop screen. This lets the screen appear almost instantaneously whenever you return from an application.

The 128 version also can be set to switch to the appropriate video mode (40 or 80 columns) without tossing a dialog box at you. Both versions include a set of buttons down the middle of the screen that activate some of the most-used file-handling functions. Most functions have keyboard equivalents.

GEOS's operating system has always had a problem recognizing more than two drives. Programmer Paul Murdaugh tackled the problem by having GEOS "see" drives in pairs. If you double-click on a data file on drive B, for example, GEOS checks both drives A and B for the application to run that file. The same is true of drives C and D, but GEOS won't check drive B or A if you try to open a file on drive C. The deskTop skirts the issue by forcing you to swap drive C into position A or B, keeping things paired the way GEOS wants.

That wasn't good enough for Murdaugh, though. He wanted full four-drive support, with all four drives equally accessible from anywhere in the GEOS environment. The problem is only partially resolved in DualTop itself, but Murdaugh has released a series of upgrade patches for each of the main GEOS applications which will make them fully four-drive compatible.

DualTop supports four drives without the patches if you take care where you place your files. It will access the 1541, 1571, and 1581 drives as well as the Commodore 1700 series REUs. Creative Micro Design's RAM devices, the RAMLink and RAMDrive, are also supported, as is the new FD-series drives. As long as you use Gateway to boot your system, DualTop will even access native mode partitions of any size on the CMD devices. This level of device support is unprecedented outside CMD's Gateway, and Gateway can't use four drives.

One feature above all the others puts DualTop on the cutting edge of GEOS file management: the RAM drive priority system. Without this, if you double-click on a data file, the system will start looking for the required application on the same disk as the data file. Unfortunately, if you have your data file and application on a 1571, for example, it'll run from that drive even if you also have the application loaded on your RAM device. DualTop automatically looks for your applications in RAM first, regardless of which drive your data is on, running only from the physical drive if necessary. That means that no matter where you open your file, the application will run from the fastest possible location.

All of this adds up to an outstanding piece of work, despite what I consider an unnecessarily cluttered interface screen. Even with the clutter, DualTop is the perfect file manager application for GEOS. It easily has the power and features to efficiently—no, elegantly—handle the most high-powered GEOS systems. You can even set it up to load automatically on boot instead of the deskTop!

As if that weren't enough, the Landmark disk also includes several other GEOS utilities and games. Murdaugh's versions of Tetris and Solitaire are well designed. The 80-column versions require the 64K video upgrade to create magnificent color graphics.

Also requiring the video upgrade is a program called LaceII. This graphics display utility uses the extra video RAM to display BASIC 8 and I-Paint graphic images as well as large geoPaint pictures. Some modes involve interlacing, which meant a lot of flickering on my monitor, but the program certainly displays some impressive images. Unfortunately, the program doesn't import the various images into geoPaint, just displays them on your screen. If you're a graphics aficionado, however, and hate to leave GEOS to view your collection, LaceII is for you.

The Landmark Series is a good example of the skill and innovation of the current crop of GEOS programmers. DualTop is an outstanding program, at the top of its class. The games and LaceII are respectable additions to any GEOS library. Support of the top-of-the-line hardware such as the FD-series drives and a wealth of user-friendly features make this package one of the best to come along this year for serious GEOS users.

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FEEDBACK

Questions and answers about bugs in programs, a way to blank an inactive screen, and more.

Bug-Swatter

Kenneth Robinson of Keyport, New Jersey, pointed out a problem with the CHANGE command in DeMON (December 1992) that causes it to process BRANCH assembly code incorrectly.

To correct the problem, load DeMON back into MLX with the original starting and ending addresses of 8000 and 9967, respectively. Select the Enter Data option and enter the following line.

```
9168: BD 1F 99 86 71 85 FB A0 08
```

Be sure to save the program before you quit MLX.

Roger Mollen of Rogers, Minnesota, noticed a checksum error with the flashing message program in the November 1992 "Feedback" column. The problem was the DATA statement in line 70. Here's the correct listing.

```
70 DATA 4,41,15,197,6,208,
   9,177,2,41
```

Screen Blanker

If I leave the same screen displayed on my monitor for long periods of time, the image stays even after I clear the screen. Could you provide me with a machine language program for my 64 that will blank the screen if the user doesn't press a key after a specified time?

JOHN NESBITT
HICKORY, NC

The machine language program listed here blanks the screen to the current border color if a keypress doesn't occur within five minutes.

```
; Screen blanker
; First, redirect IRQ vector to
  BLANK.
    SEI ;disable IRQ interrupts
    LDA #<BLANK ;store BLANK
      address in vector
    STA 788
    LDA #>BLANK
    STA 789
    JSR ZEROCLK ;go zero jiffy
      clock
    CLI ;reenable IRQ interrupts
    RTS ;and return to BASIC
BLANK
    LDA 197 ;check for last
      keypress
    CMP #64 ;Has no key been
      pressed?
    BEQ SCRBLK ;Yes, so check
      screen
    JSR ZEROCLK ;A keypress has
      occurred. Reset timer
    LDA 53265 ;and turn on screen
    ORA #%00010000 ;turn on bit 4
    STA 53265
EXIT
    JMP 59953 ;execute normal IRQ
      interrupts
SCRBLK
    LDA 53265 ;Is screen blank?
    AND #%00010000 ;bit 4 controls
      screen blanking
    BEQ EXIT ;Yes, so leave
    LDA 161 ;Has time expired?
    CMP #71 ;timer set for 71 x
      4.2267 secs, or 5 min.
    BCC EXIT ;No, so exit
    LDA 53265 ;Yes, so blank
      screen
    AND #%11101111 ;turn off bit 4
    STA 53265
    BNE EXIT ;and leave
ZEROCLK
    LDA #0 ;Zero jiffy clock to
      "000000"
    STA 160
    STA 161
    STA 162
    RTS
```

The routine runs off the IRQ interrupt. IRQ interrupts take place once every 1/60 second on the 64. During the interrupt, the computer performs certain housekeeping routines: updating the jiffy clock, flashing the cursor, scanning the keyboard for a keypress, and so on. The 64 locates the code for these routines using the two-byte pointer, or vector, at location 788. Ordinarily, this vector points to 59953.

The first part of the program points the IRQ interrupt vector at 788 to our custom screen-blanking routine (BLANK). It also sets the jiffy clock (160–162), which serves as our timer, to 0.

Each time BLANK is called, it checks for a keypress. If one has occurred, it zeros the clock, turns on the video display by setting bit 4 of location 53265, and exits through the normal interrupt routine.

If no key has been pressed, the routine checks the screen display. If it's off, the routine exits to BASIC. Otherwise, it examines the timer to see whether it has reached the specified limits (in this case, five minutes). If it has, the routine blanks the screen display and exits.

If you'd prefer a longer or shorter delay before the screen blanks, adjust the number 71 in the SCRBLK part of the program. This byte represents the number of 256-jiffy intervals (4.2267 seconds) that take place between keystrokes before the screen is blanked. If you wanted the delay to be only two minutes (120 seconds), for instance, you'd change the 71 to a 28 (120 ÷ 4.2267 = 28.4).

For those readers who don't have a machine language monitor, here is the equivalent program in the form of a BASIC loader. To change the delay time, use the above formula and enter the number in the single DATA statement in line 180. The default, like the machine language version, is approximately five minutes.

```
AH 100 FOR X=0 TO 69:READ A:PO
       KE 49152+X,A:NEXT
HB 110 SYS49152:PRINT"{CLR}
       {WHT}{DOWN}SCREEN BLANK
       ER IN PLACE"
BX 120 DATA 120,169,16,141,20,
       3,169,192,141,21,3
PJ 130 REM CHANGE VALUE IN LIN
       E 180 TO CHANGE TIME TO
        BLANKING
QA 140 DATA 32,59,192,88,96,16
```


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```
        5,197,201,64,240,14
HB 150 DATA 32,59,192,173,17,2
       08,9,16,141,17,208
KR 160 DATA 76,49,234,173,17,2
       08,41,16,240,246,165
KJ 170 DATA 161,201
BG 180 DATA 71
FQ 190 DATA 144,240,173,17,208
       ,41,239,141
GG 200 DATA 17,208,208,230,169
       ,0,133,160,133,161,133
SJ 210 DATA 162,96,1,254
```

Old Software

I'm trying to find old programs such as accounting software, but it seems that most stores no longer carry them. Is there someone I can contact to buy old out-of-date software?

BETTY DESJARDIN
EAST GREENVILLE, PA

Contact Bare Bones Software, 940 4th Avenue, Suite 222, Huntington, West Virginia 25701; (800) 638-1123. It stocks a variety of used program for most computers. Call and ask about specific programs or request a free catalogue. Be sure to specify the type of computer you have.

Hex Converter

You've probably covered this several times already, but I'd like to have a short program that will let me convert decimal numbers to hexadecimal on my 64.

BRAD STAPLETON
LIMA, OHIO

We have printed a number of conversion programs over the years, but it's a common request. Here's a version that does what you ask followed by one that converts from hex to decimal.

```
10 INPUT"{CLR}DECIMAL NUM-
   BER TO CONVERT"; DC
20 HX$ = " ": DC=DC/4096: FOR
   K=1TO4: DC%=DC: HX$= HX$+
   CHR$ (48+DC%-(DC%>9)*7)
30 DC=16*(DC-DC%): NEXT
40 PRINT"{DOWN} HEX EQUIV-
   ALENT IS ";HX$

10 INPUT"{CLR}HEX NUMBER TO
   CONVERT"; HX$
20 DC=0: FOR K=1TOLEN(HX$):
   DC%=ASC(HX$): DC%=DC%-
   48+(DC%>64)*7
30 HX$=MID$(HX$,2): DC=16*
   DC+DC%: NEXT
40 PRINT"{DWN}DECIMAL EQUIV-
   ALENT IS ";DC
```

For a full-featured conversion program that allows you to convert between any numbering system from base 2 through base 64, see Number Base Conversions by Bruce Bowden in this issue's program listings.

Colorful Subroutines

I use a lot of subroutines when I program. I usually set them off with REM statements or lines that contain only colons, but I'd like to make them stand out even more so I can quickly locate them. I once saw a program listing whose routines appeared in various colors. How can I use this effect in my programs?

WINSTON SALE
SAN ANTONIO, TX

When you write a PRINT statement and want to change text colors, you press the Ctrl key and one of the number keys to select the desired color. When in quote mode, if you press Ctrl-2 for white, a reverse E *appears on screen. Press Ctrl-3 for red, and a reverse British pound sign (£) appears. These symbols are the computer's color tokens. You can use these tokens to make different sections of a program listing appear in different colors.*

First, load into memory or write a short program to use as a test. Then decide which tokens represent the colors you want. Let's use white and red in this example and arbitrarily select the lines after line 25 to appear in white and the lines after line 55 to appear in red.

Type the following line, but do not press Return.

```
25 REM " "
```

After typing the second quote, press the Del key once to delete it. This makes sure you are not in quote mode.

Now hold down the Ctrl key and press the 9 key (Rvs On). This turns on reverse character mode. Now press Shift-M. This prints a reversed back slash, which is the token for Return. Now enter the key that prints the color token for your desired color. In this case we want the listing to appear in white, so press the E key (not Ctrl-2) to print that token. Then press Return. Line 25 should look like this:

```
25 REM" ■E
```

This REM line will call for a color change to white.

Repeat the process at the next subroutine where you want a color change, line 55 in this example. To change it to red, repeat the process, but press the pound key to produce the token (£) for red. That line should look like this:

```
55 REM" ■£
```

Now list your program. Lines up through 25 should be in the color that your cursor was when you typed LIST. *At line 25 you should see REM" followed by a blank line with the text up to line 55 in white.*

At line 55 you should see another REM", a blank line, and then the remaining text printed in red.

A source for old software, another hexadecimal converter, and program listings in different colors

---

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

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D'IVERSIONS

Fred D'Ignazio

MULTIMEDIA ILLUMINATIONS

IBM asked me to present its Illuminated Books and Manuscripts at the company's recent EduQuest Executive Conference in Atlanta. This product is a collection of multimedia illuminated works that include Shakespeare's *Hamlet,* the essays titled "Black Elk Speaks," Martin Luther King's 1963 "Letter from a Birmingham Jail," Tennyson's poem *Ulysses,* and the Declaration of Independence. I have watched the way people take this magnificent product and become humbled.

Bill Lang with multimedia authors Attallah Price (left), Sara Comstock, Mariko Hachiya, and Dana Clifford.

The product is so stunning, so overwhelming, that you feel timid and uncreative in comparison. It's a little like entering a giant sports arena, or attending a Broadway play, or watching Michael Jordan swoop through the air toward the basket, or gazing in awe at the Grand Canyon.

But this feeling is wrong, wrong, wrong! The new media is not just a spectator sport for millions of hyper-couch potatoes. It's going to be cheap, fast, and easy to use. It doesn't have to be crafted by the likes of Lucas, Spielberg, and Schwarzenegger. It can be created by toddlers, teachers, by you and me. The new media is not meant to be another spectacle. It's an opportunity for all of us—the masses—to be artists, musicians, sculptors, and composers.

So when IBM approached me to demonstrate its product, the last thing I wanted to do was show it like a movie. So I called up a fourth-grade teacher, Bill Lang, and asked him if he could organize a field trip to my studio to see how his nine-year-old kids would do illuminating their own original works using IBM's product. Bill said yes, and the rest is history.

In Atlanta, I presented the fourth graders' illuminated works to hundreds of educators from all over America. On a giant nine-foot screen with a public-address system carrying the children's digitized voices, I demonstrated letters they had written to their newly inaugurated president and their poems about everyday life, including Grover, Charlie Brown, and ice cream. The children's multimedia illuminations were extraordinary. They taped segments of President Clinton's inaugural address and keyed them to words in their own letters. They captured clips of Maya Angelou's magnificent inaugural-day poem and replayed her rich voice ringing through the crisp capital air.

But the high point was seeing and hearing the children's own words. The children rehearsed their works and read them proudly into the computer microphone. And the words themselves were exceptional—free of sloppy misspellings, immature constructions, and embarrassing imperfections. The children had been writing all year long under Mr. Lang's guidance. They wrote every day in class and for homework. They wrote journals, biographies, poems, letters, and short stories. And it showed. Beneath all the multimedia illumination, it showed!

And it reminded me that words are the basis for all our thinking. The little voice that speaks to each of us in the hollows of our minds is a voice of words, not images, pictures, or music. We get the pictures, too, if we're lucky. But first of all come the words.

That started me thinking: What will be the result if all linguistic (or word-oriented) thinking is replaced by this multimedia Babel? What will we be like if we lose the primacy of words? What will happen if we each think in a different, multimedia tongue—some of us in images, some in sounds?

Maybe writing, at least, should be protected. Writing doesn't have to be the end of our young authors' creative expressions. They can use their words as a launch pad from which to illuminate their ideas. They can link written words to images, music, spoken words, and movies to illustrate and communicate rich and complicated ideas. Writing, it seems, is the basis for thinking. And Bill Lang's young writers have shown us some beautiful thinking through their multimedia illuminations but, most of all, through the words that they eloquently created. ❐

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MACHINE LANGUAGE

Jim Butterfield

SCREEN SCREAMER

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One of the first programs I wrote to show the power of machine language was a "screen screamer." Touch a key and the whole screen changes instantly.

This version of the program is for the 64. It works by poking screen memory directly. That's not always a good idea, but it's fast and effective here.

The program is written two different ways. The first is genteel; the second is brute force. We'll discuss their respective merits later.

The approach is the same in both cases. We call for a character from the keyboard by means of the GETIN subroutine at hexadecimal FFE4. If a key has been pressed, we send a thousand copies of it to screen memory. Here's the genteel code.

```
2000 : JSR $FFE4 : TAX : BEQ
       $2000
```

If a key has been received, we store the screen address ($0400 on the Commodore 64) into an indirect pointer at $FC/D.

```
LDY #$00 : STY $FC : LDY #$04 :
STY $FD
```

Here comes our big loop to store 250 values; we call it four times to get the 1000 screen memory locations.

```
200E : LDY #$00
```

Here comes our little loop.

```
2010 : 91 FC STA ($FC),Y : INY :
       CPY #$FA : BCC $2010
```

We must bump our indirect pointer 250 locations further along. While we're doing the arithmetic, the value in A may be pushed to the stack.

```
PHA : CLC : LDA $FC : ADC #$FA
: STA $FC
LDY $FD : BCC $2024 : INY
2024: STY $FD : PLA
```

The big loop tests to see if the indirect address has gone outside limits. If not, the program loops back.

```
CPY #$08 : BCC $200E
```

The key is now tested to see if it's a Return key being pressed. If not, we wait for another key. Otherwise, we exit the program.

```
CMP #$0D : BNE $2000
RTS
```

The above code wouldn't be hard to modify for differently sized screens. That's what makes it genteel. It could be made even better, however, by having it loop 25 times, each loop clearing 40 characters (one screen line). That way, the change to other screen aspects would be even simpler.

Here's the brute force method of programming.

```
3000 : JSR $FFE4 : TAX : BEQ
       $3000
```

This time, there's only one loop, containing four instructions that smash the data into the screen area.

```
LDY #$00
```

The four addresses need to be calculated carefully. Once in, they do the job efficiently.

```
3008 : STA $0400,Y : STA $04FA,Y
     : STA $05F4,Y : STA $06EE,Y
```

We walk the loop along in the usual way with the Y register.

```
INY : CPY #$FA : BCC $3008
```

As before, we test to see if the key pressed was Return. If not, we wait for another key.

```
CMP #$0D : BNE $3000
RTS
```

This program is visibly shorter than the previous one. It runs faster, although the average user isn't likely to notice the difference. But the program isn't so easy to change to fit a new screen configuration. An 80-column screen, for example, would need eight STA instructions in the loop.

If you have an older 64, this program might show some interesting effects. Both the screen memory and color arrangement were changed a couple of times.

If it sets all screen characters to the same color, you have a recent machine. If some parts of the screen show in white rather than the current color, you have an original 64. And if parts of the screen don't seem to have any characters, you have the in-between machine. (The characters are there, but they're printed blue-on-blue.)

Here is a BASIC loader for Screen Screamer. Watch the screen change instantly as you press various keys.

```
CB 100 DATA 32,228,255,170,240
       ,250,160,0,132,252,160,
       4,132,253,160,0
JB 110 DATA 145,252,200,192,25
       0,144,249,72,24,165,252
       ,105,250,133,252
CE 120 DATA 164,253,144,1,200,
       132,253,104,192,8,144,2
       27,201,13,208,209,96
BM 200 DATA 32,228,255,170,240
       ,250,160,0,153,0,4,153,
       250,4
KD 210 DATA 153,244,5,153,238,
       6,200,192,250,144,239,2
       01,13,208,227,96
FX 300 FOR J=8192 TO 8239
DS 310 READ X:T=T+X
DD 320 POKE J,X
PP 330 NEXT J
CE 350 FOR J=12288 TO 12317
EC 360 READ X:T=T+X
XE 370 POKE J,X
HS 380 NEXT J
BQ 390 IF T<>12130 THEN STOP
DH 400 PRINT "SCREEN SCREAMER
       {SPACE}..."
PP 410 PRINT "(PRESS RETURN TO
        END)"
BS 420 INPUT "PROGRAM 1 OR 2";
       P
DH 430 S=0
CC 440 IF P=1 THEN S=8192
KQ 450 IF P=2 THEN S=12288
XM 460 IF S=0 GOTO 420
CE 470 SYS S
```


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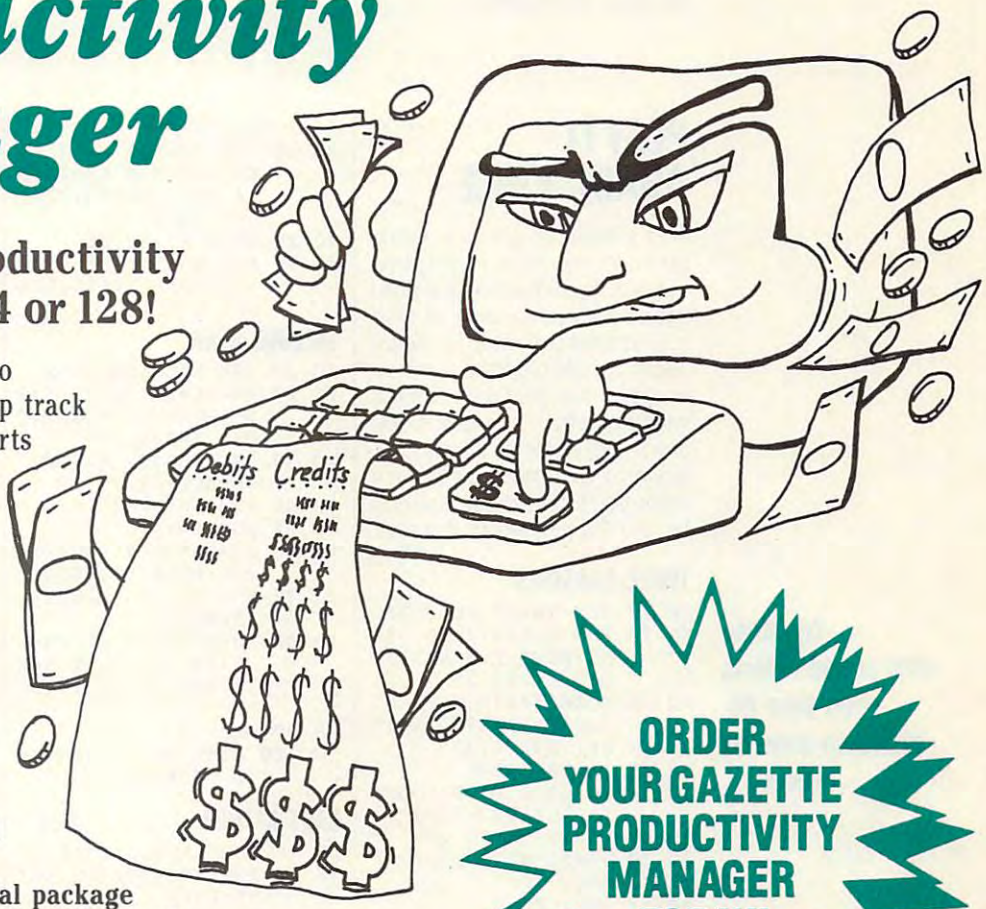

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PROGRAMMER'S PAGE

Randy Thompson

PLAY IT AGAIN, VINCE

This column might look familiar to some of our longtime readers, but when we first published this collection of wild sound effects written by Vince Tagle, we accidentally mixed some of the program listings with those from a previous column—oops! While it took us a while to discover our error, I think you'll find these sounds for the 64 well worth the wait.

Try these wild sound effects on your 64, and then send us your own.

THREE REASONS

```
XE 10 REM THREE REASONS
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
MX 30 POKE 54277,8:POKE
      {SPACE}54278,255:P
      OKE 54276,23
GX 40 F1=100:F2=4
JB 50 FOR Z=1 TO 3:POKE
      {SPACE}54287,F2
CD 60 FOR F1=1 TO 200
FD 70 POKE 54273,F1:F2=F
      2+.01
HB 80 NEXT F1,Z
RB 90 POKE 54278,15
```

RINGING ALARM

```
FC 10 REM RINGING ALARM
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
MX 30 POKE 54277,8:POKE
      {SPACE}54278,255:P
      OKE 54276,23
FM 40 POKE 54287,40
HD 50 FOR Z=1 TO 7
SD 60 FOR F1=255 TO 0 ST
      EP -6:POKE 54273,F
      1:NEXT F1
EP 70 FOR F1=0 TO 255 ST
      EP 20:POKE 54273,F
      1:NEXT F1,Z
KS 80 POKE 54278,15
```

HARMONICS

```
BP 10 REM HARMONICS
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
FP 30 AD=15:SR=190
AQ 40 POKE 54284,AD:POKE
       54291,AD:POKE 542
      92,SR
HX 50 POKE 54283,21:POKE
       54290,23
DB 60 FOR F1=200 TO 1 ST
      EP -10:POKE 54273,
      F1
RB 70 FOR F2=200 TO 1 ST
      EP -50:FOR F3=1 TO
       4:POKE 54280,F2:P
      OKE 54287,F3
MQ 80 NEXT F3,F2,F1
FJ 90 FOR Q=15 TO 0 STEP
       -1:POKE 54296,Q:N
      EXT Q
```

FALLING STAR

```
EQ 10 REM FALLING STAR
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
KD 30 POKE 54277,4:POKE
      {SPACE}54278,12
PE 40 F2=150:Q=50
PF 50 FOR Z=1 TO 50
KJ 60 F1=INT(100*RND(1))
      +10:POKE 54276,23
JJ 70 FOR T=1 TO Q:NEXT
      {SPACE}T
AB 80 POKE 54273,F1:POKE
       54287,F2:POKE 542
      76,20:Q=Q-1:F2=F2-
      3
SB 90 NEXT Z
CG 100 POKE 54273,30:POK
       E 54280,0
```

LAST XITHER

```
EC 10 REM LAST XITHER
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
MX 30 POKE 54277,8:POKE
      {SPACE}54278,255:P
      OKE 54276,23
QX 40 F1=10
AJ 50 FOR Z=1 TO 24:F2=3
      0:POKE 54273,F1
PD 60 FOR Y=1 TO 10:POKE
       54287,F2:F2=F2*1.
      01:NEXT Y
GS 70 F1=F1+8
FA 80 NEXT Z
RB 90 POKE 54278,15
```

STAR WALKER

```
BF 10 REM STAR WALKER
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
MX 30 POKE 54277,8:POKE
      {SPACE}54278,255:P
      OKE 54276,23
SJ 40 FOR Z=1 TO 2:F1=10
PE 50 FOR Y=1 TO 6:F2=10
      :POKE 54273,F1
GJ 60 FOR X=1 TO 4:POKE
      {SPACE}54287,F2:F2
      =F2*1.02:NEXT X:F1
      =F1*1.2
PD 70 FOR W=1 TO 8:F2=20
      :POKE 54273,F1
FC 80 FOR V=1 TO 3:POKE
      {SPACE}54287,F2:F2
      =F2*1.2
MQ 90 NEXT V:F1=F1/1.2:N
      EXT W,Z
RH 100 POKE 54278,15
```

HYPER WARP

```
GM 10 REM HYPER WARP
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
PE 30 POKE 54277,8:POKE
      {SPACE}54278,255:P
      OKE 54276,21
PM 40 F1=2
QD 50 FOR Z=1 TO 24:F2=8
      0:POKE 54273,F1
FB 60 FOR Y=1 TO 5:POKE
      {SPACE}54287,F2:F2
      =F2*1.1
SF 70 NEXT Y:F1=F1+9:NEX
      T Z
KS 80 POKE 54278,15
```

STAR PRINTER

```
AD 10 REM STAR PRINTER
KE 20 FOR L=54272 TO 542
      95:POKE L,0:NEXT:P
      OKE 54296,15
MX 30 POKE 54277,8:POKE
      {SPACE}54278,255:P
      OKE 54276,23
XC 40 FOR Z=1 TO 3:F1=15
BX 50 FOR Y=1 TO 9:F2=15
      :POKE 54273,F1
BP 60 FOR X=1 TO 5:POKE
      {SPACE}54287,F2:F2
      =F2*1.5 :NEXT X:F1
      =F1*0.8
AP 70 FOR W=1 TO 12:F2=2
      0:POKE 54273,F1
HX 80 FOR V=1 TO 6:POKE
      {SPACE}54287,F2:F2
      =F2*0.8
MQ 90 NEXT V:F1=F1/1.2:N
      EXT W,Z
RH 100 POKE 54278,15
```

More, Please

I know there are more audio hackers lurking out there with some cool sound effects. How about sending them in and sharing them with our readers? Our address is listed below.

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GEOS

Steve Vander Ark

IMAGES IN LAYERS

GeoPublish is a powerful and exciting program, but don't let it baffle you.

No desktop publishing program or word processor can do as much with a blank sheet of paper as geoPublish. It's an amazing program, but it's also one of the more complicated programs around.

As a result, this program generates plenty of questions and plenty of frustrated users. This is because geoPublish pushes the limited resources of the 64 more than any other program. The result is a great program, but one that has a few quirks. So read on for the lowdown on that wonderful, powerful, exciting, and sometimes downright baffling marvel called geoPublish.

One of the key concepts behind geoPublish is the way it handles graphics. Most users come to geoPublish fresh from experiences with geoPaint. But geoPaint uses an entirely different type of graphics manipulation, and anyone who approaches geoPublish expecting geoPaint will be quickly confused.

Bear in mind that geoPaint is a bitmap editor, a program that lets you create patterns of dots in the shape of whatever you want to draw. Think of the geoPaint page as a large sheet of graph paper with tiny squares. You create pictures by using the various graphics tools to fill in the little squares to create dots. In fact, if you zoom in while you're in pixel edit mode, you'll see the grid that looks like graph paper, and you can fill or erase the dots with the cursor.

Everything you create with geoPaint is a large pattern of dots. Tools such as the polygon or the spray can fill in the dots to make whichever shape or design they're programmed to make. Even the text tool just fills in dots to make whichever letter you choose. If you want to change something on a geoPaint page, you have to eradicate it dot by dot. If you create one thing on top of another, the new image replaces the old.

All that sounds pretty straightforward, but there's a big difference between the way geoPaint handles images and the way geoPublish does it. GeoPublish uses what are called object-based graphics. This means that a geoPublish page doesn't exist as a large grid of dots but as a set of individual, mathematically defined shapes all lying in layers. Each shape or object is a separate entity, even if it's placed near or on top of another to create a larger image. Every image on a page is an object.

The fact that the image is stored in memory as a mathematical equation instead of a grid of dots has many advantages. For example, if you want the object to be bigger, you can resize it by mathematically changing the equation. Make a geoPaint object bigger, and you'll see jaggies where the individual dots have been enlarged. A geoPublish object is redrawn by the program using larger numbers, so there are no jaggies.

Even more helpful is the fact that you can change an object without changing anything around it. In fact, since each object has its own layer, changes won't affect anything under or above that object. If you want a line to be thicker, for example, you simply pick it up from the page, change it, and then put it back. A piece of text can be changed from one font or style to another without affecting the filled rectangle below it or even leaving a hole where the text used to be. Everything on a geoPublish page is adjustable, which means you can play with a page until every element is perfect. Go back to geoPaint and you'll miss this flexibility.

I've mentioned layers a few times. That's a concept that causes problems for people. After all, once you've plopped down a dozen objects to get the effect you want, it's easy to forget that the whole thing isn't just one big picture as it would be in geoPaint. The computer has no idea what you've created, so when you pull out an object near the bottom to make an adjustment and then put it back, the computer puts it on top. That's why, if you've just altered it, a drop shadow you created when you started now covers everything.

This happens a lot, and it really throws people. Here's another example. Suppose you laid down a dark gray rectangle and then placed some text in white on top of it. You'd have a great-looking effect. But if you pick up the rectangle, change its color to black, and then put it back down, the text will be gone. Where is it? It's underneath. How can you find it again? Select the box and then select the Move to Back tool from the toolbox. The box is now placed at the bottom of the stack, and the text becomes visible again. Of course, if you simply pick up and move the box, you still won't see the text because it's white text on a white background. See how the confusion starts?

Next month I'll talk about some of the other quirks of this wonderful program. I'll run through the various ways a bitmapped geoPaint image can be incorporated into your object-based geoPublish page. I'll also talk about the different modes you can use in geoPublish. In the meantime, break out your copy of geoPublish and give it another try. Make a few posters or a newsletter just for the sake of trying things out. Don't let this powerful and exciting program gather dust on a shelf! ❐

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BEGINNER BASIC

Larry Cotton

USER PORT ALARM CLOCK

Take a look at one of the 64's built-in clocks and learn how to use it to control the user port.

This month and next we'll take a look at one of the Commodore 64's superaccurate built-in clocks and learn how to set and read it in BASIC. At the request of a reader in Trinidad, we'll write a short program which uses that clock to control the user port.

We'll see how to control each of its eight lines independently, but what you control will be strictly up to you.

The 64's two Time of Day (TOD) clocks count in tenths of a second and are as accurate as the frequency of the AC power that your computer is plugged into. These clocks are relatively easy to program. We'll access the clock that uses memory registers 56328–56331. (The other TOD clock uses registers 56584–56587 and is accessed similarly.) To set the clock, poke values into the following registers.

Function	Register
Hours	56331
Minutes	56330
Seconds	56329
Tenths of Seconds	56328

To read the clock, we'll peek at these registers and print a digital clock on the screen based on what's there. Then we'll use an IF-THEN statement to take some action when the "alarm" goes off. Unlike a more sophisticated machine language clock that runs in the background, this one just counts elapsed seconds, and you can't do anything else while the clock is displayed. Here's the program listing.

```
DS 40 PRINTCHR$(147):POK
      E53281,14:POKE646,
      6
KR 50 PRINT"SET CLOCK AT
      :{DOWN}"
XC 60 R=8:GOSUB290:K=432
      00
GX 70 IFI$="PM"THENX=K
ER 80 FORI=1TO3:H=INT(T(
      I)/10):L=T(I)-10*H
      :T(I)=16*H+L:NEXT
MC 90 C=56331:POKEC,T(1)
      :POKEC-1,T(2):POKE
      C-2,T(3)
FA 100 PRINT"{DOWN}ACTIV
       ATE USER PORT AT:
       {DOWN}"
FD 110 R=18:GOSUB290
HS 120 IFI$="PM"THENY=K
JB 130 B=Y+T(1)*3600+T(2
       )*60+T(3)
SK 140 PRINT"{DOWN}PRESS
        ANY KEY TO START
        CLOCK.{DOWN}
RE 150 GETA$:IFA$=""THEN
       150
SB 160 POKEC-3,0
PH 170 H=PEEK(C):M=PEEK(
       C-1):S=PEEK(C-2):
       T=PEEK(C-3)
XG 180 C1$=CHR$((16ANDH)
       /16+48)+CHR$((15A
       NDH)+48)
XM 190 H=VAL(C1$)*3600
GJ 200 IFC1$="00"THENC1$
       ="12"
HD 210 C2$=CHR$((240ANDM
       )/16+48)+CHR$((15
       ANDM)+48):M=VAL(C
       2$)*60
FD 220 C3$=CHR$((240ANDS
       )/16+48)+CHR$((15
       ANDS)+48):S=VAL(C
       3$)
HA 230 A=X+H+M+S:IFA=2*K
       THENPOKEC,0:POKEC
       -3,0:X=0
SG 240 IFA=BTHEN420
BJ 250 IFA<KTHENJ$="AM":
       GOTO270
XX 260 J$="PM"
MD 270 PRINT"{WHT}TIME I
       S "C1$+":"+C2$+":
       "+C3$+":"T;J$+"
       {UP}"
HG 280 GOTO170
DE 290 H$="":INPUT"HOURS
       ";H$:IFH$<"0"ORH$
       >"9"THENPRINT"
       {2 UP}":GOTO290
KE 300 T(1)=VAL(H$):IFT(
       1)<0ORT(1)>12THEN
       PRINT"{2 UP}":GOT
       O290
RA 310 IFT(1)=12THENT(1)
       =0
HP 320 M$="":INPUT"
       {DOWN}MINUTES";M$
       :IFM$<"0"ORM$>"9"
       THENPRINT"{3 UP}"
       :GOTO320
PG 330 T(2)=VAL(M$):IFT(
       2)<0ORT(2)>59THEN
       PRINT"{3 UP}":GOT
       O320
CE 340 S$="":INPUT"
       {DOWN}SECONDS";S$
       :IFS$<"0"ORS$>"9"
       THENPRINT"{3 UP}"
       :GOTO340
GG 350 T(3)=VAL(S$):IFT(
       3)<0ORT(3)>59THEN
       PRINT"{3 UP}":GOT
       O340
DC 360 PRINT"{DOWN}AM OR
        PM (PRESS A OR P
       )"
HD 370 GETI$:IFI$<>"A"TH
       ENIFI$<>"P"THEN37
       0
EE 380 IFI$="A"THENI$="A
       M":GOTO400
FH 390 I$="PM"
JD 400 POKE214,R:PRINT:P
       OKE211,24:PRINTI$
EX 410 RETURN
XD 420 PRINT"{CLR}{DOWN}
       USER PORT ACTIVAT
       ED."
```

When you run this program, you're asked to enter three values and an *A* or *P* (for a.m. or p.m.) to set the clock, which will be accurate to the nearest second. The values that you enter can range from 0–12 for hours and 0–59 for both minutes and seconds. It's not necessary to enter all of the values as two digits. For instance, to set 1:06 p.m., just type *1, 6, 0,* and *P* at the four prompts. (Press Return after each number, but not after *P*.) To set 12:00:04 a.m. (four seconds past midnight), type *12, 0, 4* and *A*. I avoid setting exactly noon or midnight because I'm never sure if the time is a.m. or p.m. then.

Repeat this process to set the time for the user port to be activated. (Think of this as the alarm.) Like a new alarm clock, the port must be set to activate within 24 hours of starting the clock. Then press any key to start the clock.

At the selected time for the user port to be activated, the alarm goes off, and you'll see a message to that effect. However, the user port hasn't been set up yet; more programming is necessary.

Next month I'll explain the program, discuss the user port, and add the necessary code that actually turns on the user port lines. ❐

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Minesweeper

By Robert B. Cook

Minesweeper, despite its military-sounding theme, is an ideal alternative to shoot-'em-up games. Rather than dealing with destruction, this game for the 64 provides you with excellent mental exercise.

You are presented with a grid that must be cleared of hidden mines as quickly as possible. Use a joystick in port 2 to maneuver around the screen.

Minesweeper is written in machine language, but it loads and runs like a BASIC program. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following addresses.

Starting address: 0801
Ending address: 1400

Be sure to save the program before exiting MLX.

Begin Play

After the opening screen, you'll be prompted for the number of mines you want hidden on the playing screen. Move the joystick up and down to change the numbers. You may select 16–64 mines. Press the fire button to begin the game.

Start to play by exposing each of the squares. Do this by placing the arrow on a square and pressing the fire button. One of three things will happen when you do. You'll uncover a blank space, a number, or a mine.

If you expose a blank space, you can be sure that there are no mines in the immediate vicinity. If you uncover a number, it indicates the number of mines within the eight squares surrounding the number. For example, if you expose a 3, the squares surrounding it might look something like the following.

```
- * -
- 3 *
* - -
```

The 3 indicates that there are three mines (indicated here by asterisks) bordering this square. Of course, the mines won't necessarily be in the positions shown here.

Exposing a mine will cause it to explode and subtract points from your score. The amount deducted depends on the number of mines you choose at the start of the game. You lose 10 points each for 64 mines. The score varies on up to 40 points each when you have 16 mines on the board. Of course, speed helps, too. You'll notice that your score drops by one point for every second of play.

Flag It

If you think that there is a mine at a particular square, you can flag it. Do this by placing the arrow on that square and pressing the F key. You can't expose a square when it is flagged. To unflag a square, press F again. It isn't necessary to flag all of the mines to win the game.

An All Clear siren will signal the end of the game when you've exposed all of the blank and numbered squares. If you want to quit one game and play another, press the Stop key. To quit the game entirely, choose 00 for the number of mines.

Strategy

As you play, you may find yourself stuck in one area. If that happens, try working toward your goal from a different direction.

MINESWEEPER

```
0801:15 08 40 00 9E 32 30 37 FA
0809:31 3A 52 42 43 20 56 37 2D
0811:2E 39 32 00 00 00 20 70 7D
0819:0B 20 BF 0B 20 08 0C 20 B8
0821:3C 0B 20 64 0C A5 F7 D0 14
0829:03 4C 3C 0B 20 DB 0C 20 AE
0831:38 0C 20 9F 0D 20 EF 09 30
0839:A5 B6 D0 03 4C 0D 0B AD 6E
0841:00 DC 29 1F C9 1E F0 25 6D
0849:C9 1D F0 32 C9 1B F0 41 A4
0851:C9 17 F0 53 C9 0F F0 67 33
0859:A5 C5 C9 15 F0 61 20 E1 67
0861:FF D0 D2 4C 34 0B A0 40 14
0869:20 04 0B F0 C8 A5 B1 F0 2C
0871:C4 C6 B1 38 AD 01 D0 E9 4C
0879:08 8D 01 D0 D0 E8 A5 B1 45
0881:C9 0F F0 B1 E6 B1 18 AD 4F
0889:01 D0 69 08 8D 01 D0 D0 DE
0891:D5 A5 B0 F0 A0 C6 B0 38 D4
0899:AD 00 D0 E9 10 8D 00 D0 C0
08A1:B0 C4 CE 10 D0 10 BF A5 02
08A9:B0 C9 0F F0 88 E6 B0 18 CE
08B1:AD 00 D0 69 10 8D 00 D0 D0
08B9:90 AC EE 10 D0 10 A7 C9 FB
08C1:15 F0 55 20 74 09 A0 00 4E
08C9:B1 FD AA 29 30 D0 46 8A F5
08D1:29 40 F0 20 A9 00 8D 86 95
08D9:02 A9 3F 20 D2 FF A9 60 89
08E1:20 D2 FF 20 56 0A C6 F8 1A
08E9:20 A8 09 C6 FA A5 F8 D0 F2
08F1:19 4C 0D 0B A9 03 8D 86 EE
08F9:02 8A 0A A8 B9 B1 10 20 4E
0901:D2 FF B9 B2 10 20 D2 FF 85
0909:C6 FA A0 00 B1 FD 09 10 F8
0911:91 FD 4C 6B 09 4C 36 08 99
0919:20 74 09 A0 00 B1 FD AA F0
0921:29 10 D0 F1 8A 29 20 F0 2F
0929:22 A9 06 8D 86 02 A9 C1 A1
0931:20 D2 FF A9 C2 20 D2 FF DE
0939:20 95 0A C6 F9 20 CD 09 63
0941:A0 00 B1 FD 29 DF 91 FD A3
0949:4C 67 08 A9 02 8D 86 02 4C
0951:A9 3D 20 D2 FF A9 3E 20 FB
0959:D2 FF 20 7A 0A E6 F9 20 80
0961:CD 09 A0 00 B1 FD 09 20 68
0969:91 FD A5 FA C5 F8 D0 A5 81
0971:4C 0D 0B 18 A5 B0 0A 69 3D
0979:04 A8 A5 B1 69 07 AA 20 64
0981:F0 FF A5 FC 85 FE A5 FB FF
0989:85 FD 18 65 B0 85 FD 90 5F
0991:02 E6 FE A4 B1 D0 01 60 BB
0999:18 A5 FD 69 12 85 FD 90 AA
09A1:02 E6 FE 88 D0 F2 60 A4 8E
09A9:B5 38 A5 B2 F9 A1 10 85 80
09B1:B2 B0 0C C6 B3 10 08 A9 CE
09B9:00 85 B2 85 B3 85 B6 20 1D
09C1:23 0A A9 02 85 A5 A5 F8 44
09C9:85 A6 10 08 A9 03 85 A5 D4
09D1:A5 F9 85 A6 A9 02 8D 86 47
09D9:02 A0 09 A6 A5 18 20 F0 5F
09E1:FF A9 00 A6 A6 20 CD BD D7
09E9:A9 A0 20 D2 FF 60 A5 A2 99
09F1:C9 5A 90 57 A5 B3 D0 07 AB
09F9:A5 B2 D0 03 85 B6 60 A9 47
0A01:00 85 A2 A9 0F 8D 0D D4 03
0A09:A9 11 8D 0C D4 A9 81 8D 86
0A11:0B D4 A9 64 8D 08 D4 38 C9
0A19:A5 B2 E9 01 85 B2 B0 02 54
0A21:C6 B3 A9 02 8D 86 02 A0 06
0A29:22 A2 02 18 20 F0 FF A5 23
0A31:B3 A6 B2 20 CD BD A5 D3 A5
0A39:C9 25 B0 05 A9 A0 20 D2 C4
0A41:FF A0 20 20 04 0B A9 80 A3
0A49:8D 0B D4 60 A9 00 99 00 08
0A51:D4 88 10 FA 60 A9 20 8D 1B
0A59:06 D4 A9 0A 8D 05 D4 A9 4F
0A61:81 8D 04 D4 A9 12 8D 01 19
0A69:D4 A9 00 8D 00 D4 A0 7F 3F
0A71:20 04 0B A9 80 8D 04 D4 A9
0A79:60 A9 49 8D 06 D4 A9 0A 0B
0A81:8D 05 D4 A9 11 8D 04 D4 6E
0A89:A9 32 8D 01 D4 A9 00 8D 9B
0A91:00 D4 F0 19 A9 F0 8D 06 BC
0A99:D4 A9 0A 8D 05 D4 A9 11 7C
0AA1:8D 04 D4 A9 23 8D 01 D4 D8
0AA9:A9 21 8D 00 D4 A0 7F 20 D4
0AB1:04 0B A9 10 8D 04 D4 60 47
0AB9:A0 00 B9 D1 10 99 00 D4 2E
0AC1:99 00 D7 C8 C0 07 D0 F2 E0
0AC9:A9 08 8D 18 D4 A9 12 85 DE
0AD1:02 20 F6 0A E6 02 C9 50 91
0AD9:D0 F7 A9 4F 85 02 20 F6 E9
0AE1:0A C6 02 C9 0E D0 F7 A9 D6
0AE9:40 8D 04 D4 8D 0B D4 A9 3B
0AF1:0F 8D 18 D4 60 A0 20 20 27
0AF9:04 0B A5 02 8D 01 D4 8D 4F
0B01:08 D4 60 A2 00 CA D0 FD 51
0B09:88 D0 FA 60 A0 0D 20 4D C3
```


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```
0B11:0A 20 B9 0A 20 04 0B A4 D7
0B19:B4 B9 C3 10 C5 B3 90 09 98
0B21:D0 11 B9 C4 10 C5 B2 B0 15
0B29:0A A5 B3 99 C3 10 A5 B2 1A
0B31:99 C4 10 A9 00 8D 15 D0 13
0B39:4C 23 08 20 38 0C A0 00 74
0B41:A9 10 85 A5 A9 0C 85 D3 97
0B49:B9 FC 0F F0 0A 20 D2 FF E2
0B51:C8 C9 0D D0 F3 F0 ED 20 4C
0B59:7A 0A 20 04 0B 20 7A 0A 4B
0B61:20 04 0B C6 A5 D0 F9 A5 60
0B69:B5 D0 03 4C E2 FC 60 A9 29
0B71:00 8D 0E DC 85 58 85 5A 6D
0B79:A9 40 85 59 A9 D8 85 5B D1
0B81:A9 33 85 01 A2 09 A0 01 75
0B89:20 EC A3 A9 37 85 01 A9 75
0B91:01 8D 0E DC A2 00 BD 18 C3
0B99:11 9D 08 3C BD D0 11 9D 55
0BA1:C0 3C BD 88 12 9D 78 3D 9C
0BA9:BD 40 13 9D 30 3E E8 E0 18
0BB1:B8 D0 E3 A9 1E 8D 18 D0 97
0BB9:A9 CB 8D 19 03 60 A0 18 CD
0BC1:20 4D 0A A9 8F 8D 18 D4 CE
0BC9:A9 80 8D 0E D4 8D 0F D4 37
0BD1:8D 12 D4 A9 0A 8D 25 D0 0A
0BD9:A9 0F 8D 26 D0 A9 0B 8D 6D
0BE1:27 D0 A9 00 8D 17 D0 8D EC
0BE9:1D D0 8D 1B D0 A9 01 8D E2
0BF1:1C D0 A0 3F B9 D8 10 99 3D
0BF9:80 03 88 10 F7 A9 0E 8D 33
0C01:F8 07 A9 04 85 B5 60 A9 3A
0C09:93 20 D2 FF A9 0B 8D 20 02
0C11:D0 A9 01 8D 21 D0 A0 FA 7D
0C19:A9 A0 99 FF 03 99 F9 04 D7
0C21:99 F3 05 99 ED 06 A9 0B 23
0C29:99 FF D7 99 F9 D8 99 F3 FC
0C31:D9 99 ED DA 88 D0 E1 A0 F3
0C39:00 B9 EF 0D F0 06 20 D2 41
0C41:FF C8 D0 F5 A2 10 A0 00 9B
0C49:B9 BD 0E F0 06 20 D2 FF D4
0C51:C8 D0 F5 CA D0 F0 C8 B9 03
0C59:BD 0E F0 06 20 D2 FF C8 67
0C61:D0 F5 60 A0 00 A9 0A 85 B5
0C69:D3 B9 0E 0F F0 0A 20 D2 4F
0C71:FF C8 C9 0D D0 F3 F0 ED EB
0C79:20 95 0A A0 20 20 04 0B E6
0C81:20 95 0A A9 06 8D 86 02 60
0C89:18 A2 0E A0 13 20 F0 FF 1D
0C91:A4 B5 BE 99 10 86 F7 86 EB
0C99:F8 A9 00 20 CD BD A5 B5 01
0CA1:D0 05 A9 30 20 D2 FF A0 88
0CA9:7F 20 04 0B AD 00 DC 29 0B
0CB1:1F C9 0F F0 1C C9 1E F0 F1
0CB9:06 C9 1D F0 0C D0 ED A5 1F
0CC1:B5 C9 07 F0 C3 E6 B5 10 4C
0CC9:BF A5 B5 F0 BB C6 B5 10 65
0CD1:B7 A5 B5 85 B4 C6 B4 06 6E
0CD9:B4 60 A9 F8 85 A5 A9 0B 4A
0CE1:85 FB 85 A7 A9 13 85 A6 32
0CE9:A9 14 85 FC 85 A8 A2 12 82
0CF1:A0 11 A9 80 91 A5 88 10 20
0CF9:FB 18 A5 A5 69 12 85 A5 69
0D01:90 02 E6 A6 CA D0 E9 A2 3B
0D09:10 A0 0F A9 00 91 A7 88 ED
0D11:10 FB 18 A5 A7 69 12 85 1C
0D19:A7 90 02 E6 A8 CA D0 E9 D5
0D21:A6 F7 A5 FB 85 FD A5 FC 6D
0D29:85 FE AD 1B D4 85 A7 AD E6
0D31:1B D4 29 3F 18 65 FD 85 FE
0D39:FD 90 02 E6 FE A5 A7 A8 AB
0D41:B1 FD D0 DE A9 40 91 FD 2B
0D49:CA D0 D7 A2 10 86 A5 A9 B1
0D51:F8 85 FD A9 13 85 FE A0 F0
0D59:0F 84 A6 A9 00 85 A7 A2 93
0D61:07 A0 13 B1 FD D0 16 BC C0
0D69:A9 10 B1 FD C9 40 D0 02 65
0D71:E6 A7 CA 10 F2 A5 A7 F0 B1
0D79:04 A0 13 91 FD 18 A5 FD D2
0D81:69 01 85 FD 90 02 E6 FE 7A
0D89:C6 A6 A4 A6 10 CD 18 A5 3D
0D91:FD 69 02 85 FD 90 02 E6 BA
0D99:FE C6 A5 D0 BA 60 A9 00 51
0DA1:85 A2 85 F9 85 FA 85 B0 4B
0DA9:85 B1 8D 10 D0 A9 3F 8D DE
0DB1:00 D0 A9 6D 8D 01 D0 A9 C7
0DB9:01 8D 15 D0 A9 E8 85 B2 16
0DC1:A9 03 85 B3 85 B6 A9 02 B9
0DC9:8D 86 02 A0 09 A2 02 18 85
0DD1:20 F0 FF A9 00 A6 F8 20 7F
0DD9:CD BD A0 22 A2 03 18 20 F1
0DE1:F0 FF A4 B4 B9 C3 10 BE 10
0DE9:C4 10 20 CD BD 60 13 11 F1
0DF1:1D 1D 12 1C C4 CA CA CA 97
0DF9:CA CA CA CA CA CA CA CA 14
0E01:CA CA CA CA CA CA CA CA 1D
0E09:CA CA CA CA CA CA CA CA 25
0E11:CA CA CA CA CA CA CA C5 28
0E19:0D 1D 1D 12 C8 4D 49 4E 24
0E21:45 53 3A 30 30 20 20 B6 F7
0E29:CC CD CE CF D0 D1 D2 CF 39
0E31:D3 D4 D5 B5 20 20 53 43 ED
0E39:4F 52 45 3A 39 39 39 C9 C8
0E41:0D 1D 1D 12 C8 46 4C 41 29
0E49:47 53 3A 30 30 20 20 20 8A
0E51:B7 B8 D6 D7 D8 D9 DA D7 8B
0E59:DB B8 B7 20 20 20 20 48 94
0E61:49 47 48 3A 30 30 30 C9 0D
0E69:0D 1D 1D 12 C6 C3 C3 C3 A8
0E71:C3 C3 C3 C3 C3 C3 C3 C3 8D
0E79:C3 C3 C3 C3 C3 C3 C3 C3 95
0E81:C3 C3 C3 C3 C3 C3 C3 C3 9D
0E89:C3 C3 C3 C3 C3 C3 C3 C7 A9
0E91:0D 11 1D 1D 12 1F C4 CA 4F
0E99:CA CA CA CA CA CA CA CA B5
0EA1:CA CA CA CA CA CA CA CA BD
0EA9:CA CA CA CA CA CA CA CA C5
0EB1:CA CA CA CA CA CA CA CA CD
0EB9:CA C5 0D 00 1D 1D 12 C8 98
0EC1:20 C1 C2 C1 C2 C1 C2 C1 37
0EC9:C2 C1 C2 C1 C2 C1 C2 C1 90
0ED1:C2 C1 C2 C1 C2 C1 C2 C1 98
0ED9:C2 C1 C2 C1 C2 C1 C2 C1 A0
0EE1:C2 20 C9 0D 00 1D 1D 12 32
0EE9:C6 C3 CB CB CB CB CB CB 81
0EF1:CB CB CB CB CB CB CB CB 0E
0EF9:CB CB CB CB CB CB CB CB 16
0F01:CB CB CB CB CB CB CB CB 1F
0F09:CB CB C3 C7 00 13 11 11 74
0F11:11 11 11 11 11 11 11 9C BA
0F19:0D 12 C4 CA CA CA CA CA 69
0F21:CA CA CA CA CA CA CA CA 3F
0F29:CA CA CA CA CA C5 0D 12 FE
0F31:C8 20 4E 55 4D 42 45 52 2B
0F39:20 4F 46 20 4D 49 4E 45 77
0F41:53 3A 20 C9 0D 12 C8 20 9A
0F49:20 20 20 20 20 20 20 20 67
0F51:20 20 20 20 20 20 20 20 6F
0F59:20 C9 0D 12 C8 20 20 20 E3
0F61:20 20 20 A7 1F B7 B7 B7 15
0F69:B7 9C A5 20 20 A0 20 20 25
0F71:20 C9 0D 12 C8 20 20 20 FB
0F79:20 20 20 A7 1F 20 20 20 08
0F81:20 9C A5 20 20 20 20 20 6F
0F89:20 C9 0D 12 C8 20 20 20 14
0F91:20 20 20 A7 1F AF AF AF 0D
0F99:AF 9C A5 20 20 20 20 A0 CF
0FA1:20 C9 0D 12 C8 20 20 20 2C
0FA9:20 20 20 20 20 20 20 20 C7
0FB1:20 20 20 20 20 20 20 C9 79
0FB9:0D 12 C8 20 20 20 20 20 DF
0FC1:20 20 20 20 20 20 20 20 DF
0FC9:20 20 20 20 20 C9 0D 12 5A
0FD1:C8 20 20 20 20 20 55 53 E1
0FD9:45 20 4A 4F 59 32 20 20 D4
0FE1:20 20 20 C9 0D 12 C6 C3 BA
0FE9:C3 C3 C3 C3 C3 C3 C3 C3 08
0FF1:C3 C3 C3 C3 C3 C3 C3 C3 10
0FF9:C3 C7 00 13 11 11 11 11 1D
1001:11 11 11 11 11 11 9A 0D 30
1009:12 A3 A3 A3 A3 A3 A3 A3 60
1011:A3 A3 A3 A3 A3 A3 A3 A3 31
1019:A3 0D 12 20 20 20 20 20 74
1021:20 20 42 59 20 20 20 20 19
1029:20 20 20 0D 12 20 20 20 A7
1031:20 20 20 20 20 20 20 20 51
1039:20 20 20 20 20 0D 12 20 F0
1041:52 4F 42 45 52 54 20 42 61
1049:DC 20 43 4F 4F 4B A0 0D 33
1051:12 20 20 20 20 20 20 20 6A
1059:20 20 20 20 20 20 20 20 79
1061:20 0D 12 20 20 20 20 20 FA
1069:20 20 20 20 20 20 20 20 89
1071:20 20 20 0D 12 20 20 20 EF
1079:20 20 20 20 20 20 20 20 99
1081:20 20 20 20 20 0D 12 20 39
1089:20 20 20 20 20 20 20 20 A9
1091:20 20 20 20 20 20 20 00 91
1099:00 10 18 20 28 30 38 40 75
10A1:00 28 23 1E 19 14 0F 0A 53
10A9:26 25 24 14 12 02 01 00 86
10B1:5C 5C 5E 5F 21 23 24 25 DB
10B9:26 27 28 29 2A 2B 2C 2D D1
10C1:2E 2F 00 00 00 00 00 00 C4
10C9:00 00 00 00 00 00 00 00 E9
10D1:01 01 F0 01 41 11 F1 AA BD
10D9:A8 00 95 6C 00 95 BC 00 97
10E1:95 60 00 95 58 00 95 56 82
10E9:00 99 55 80 AE 55 60 BF 6E
10F1:95 B0 F3 E6 F0 C0 FB C0 39
10F9:00 3F 00 00 0C 00 00 00 4A
1101:00 00 00 00 00 00 00 00 23
1109:00 00 00 00 00 00 00 00 2B
1111:00 00 00 00 00 00 00 FF 33
1119:83 19 01 19 19 19 FF FF 22
1121:03 19 03 19 19 03 FF FF D1
1129:83 19 1F 1F 19 83 FF FF FF
1131:07 13 19 19 13 07 FF FF 05
1139:01 1F 07 1F 1F 01 FF FF 73
1141:01 1F 07 1F 1F 1F FF FF F3
1149:83 1F 11 19 19 83 FF FF 7F
1151:19 19 01 19 19 19 FF FF 25
1159:83 C7 C7 C7 C7 83 FF FF F0
1161:C1 E3 E3 E3 23 87 FF FF 4F
1169:13 07 0F 07 13 19 FF FF 26
1171:1F 1F 1F 1F 1F 01 FF FF BD
1179:39 11 01 01 29 39 FF FF DA
1181:19 09 01 11 19 19 FF FF D0
1189:83 19 19 19 19 83 FF FF 3F
1191:03 19 19 03 1F 1F FF FF 44
1199:83 19 19 19 83 F1 FF FF 5C
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11A1:03 19 19 03 11 19 FF FF CB
11A9:81 1F 83 F1 11 83 FF FF 7A
11B1:01 C7 C7 C7 C7 C7 FF FF 19
11B9:19 19 19 19 19 83 FF FF 3A
11C1:19 19 19 19 83 C7 FF FF A6
11C9:1C 1C 14 00 08 1C FF FF 34
11D1:39 11 83 83 11 39 FF FF EA
11D9:19 19 83 C7 C7 C7 FF FF 19
11E1:01 E3 C7 8F 1F 01 FF FF 6C
11E9:C3 CF CF CF CF C3 FF 00 66
11F1:00 00 00 00 00 00 00 FF 14
11F9:C3 F3 F3 F3 F3 C3 FF 00 67
1201:01 07 01 01 01 01 07 00 B1
1209:C0 C0 C0 C0 C0 C0 F0 FF CC
1211:FF FF FF FF FF FF FF 00 35
1219:03 06 00 01 03 07 07 99 2C
1221:99 99 FF FF FF FF FF 00 78
1229:E0 70 E0 C0 80 00 F0 00 E7
1231:03 06 00 00 06 06 03 00 A6
1239:E0 70 E0 70 70 70 E0 00 14
1241:01 03 06 0C 1F 00 00 00 21
1249:E0 E0 E0 E0 F0 E0 E0 00 0D
1251:07 07 07 00 06 06 03 00 E9
1259:F0 00 E0 70 70 70 E0 00 20
1261:03 07 07 06 06 06 03 00 58
1269:E0 00 E0 70 70 70 E0 00 28
1271:07 06 00 01 01 01 01 00 B8
1279:F0 70 E0 C0 80 80 80 00 61
1281:03 06 03 06 06 06 03 00 B7
1289:E0 70 E0 70 70 70 E0 FF 64
1291:83 19 19 19 19 83 FF FF 49
1299:C7 07 C7 C7 C7 01 FF FF 1B
12A1:83 31 E3 8F 1F 01 FF FF 46
12A9:83 31 E3 F1 31 83 FF FF 0F
12B1:E1 C1 91 00 F1 F1 FF FF C0
12B9:01 1F 03 F1 31 83 FF FF 3D
12C1:83 1F 03 19 19 83 FF FF 38
12C9:01 31 E3 C7 C7 C7 FF FF 11
12D1:83 19 83 19 19 83 FF FF D6
12D9:83 31 31 81 F1 83 FF FF E7
12E1:FF E7 FF FF E7 FF FF 00 3F
12E9:07 0C 00 00 01 00 01 00 9E
12F1:E0 30 60 C0 80 00 80 00 AF
12F9:0F 0F 0F 00 00 00 00 00 4B
1301:E0 E0 E0 20 20 70 F8 00 A2
1309:09 07 0F 6E 0F 07 09 00 E4
1311:90 E0 F0 76 F0 E0 90 00 69
1319:7F 7F 7F 7F 7F 7F 7F 00 BF
1321:FE FE FE FE FE FE FE FF 48
1329:FF FF FF 00 FF 00 FF FF 4F
1331:80 BF A0 A7 A7 A7 A7 FF 41
1339:01 FD 05 E5 E5 E5 E5 A7 98
1341:A7 A7 A7 A0 BF 80 FF E5 0A
1349:E5 E5 E5 05 FD 01 FF A7 84
1351:A7 A7 A7 A7 A7 A7 A7 E5 B5
1359:E5 E5 E5 E5 E5 E5 E5 FF 99
1361:00 FF 00 FF FF FF FF 00 87
1369:FF FF FF 00 FF 00 FF 00 8F
1371:C6 EE FE FE D6 C6 00 00 58
1379:7C 38 38 38 38 38 7C 00 12
1381:E6 E6 F6 FE EE E6 E6 00 84
1389:FE E0 E0 E0 F8 E0 E0 00 9E
1391:7C EE E0 E0 7C 0E 0E 00 14
1399:C6 C6 D6 D6 D6 FE FE 00 CD
13A1:FE E0 E0 E0 E0 F8 E0 00 56
13A9:FC E6 E6 E6 FC E0 E0 00 80
13B1:FE E0 E0 F8 E0 E0 FE 00 C3
13B9:FC E6 E6 FC EE E6 00 E6 BE
13C1:00 00 00 FF FF FF FF E0 C8
13C9:FE 00 00 00 FF FF FF 0E 7D
13D1:EE 7C 00 00 00 FF FF FE 8D
13D9:EE C6 C6 00 00 00 FF E0 E2
13E1:E0 FE 00 00 00 FF FF E0 19
13E9:00 00 00 FF FF FF FF FF 10
13F1:FF FF FF FF E7 E7 FF 00 F6
13F9:F3 C3 00 00 00 00 00 00 0B
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TURBODOS

By Hong H. Pham

The 1541 disk drive is a remarkable device. It's very reliable, it has a wealth of DOS commands, and it easily handles sequential and relative files. The only downside of the 1541 is its notoriously slow speed. The 1571 is significantly faster when used with a 128 in 128 mode, but it's just as slow as the 1541 when used with a 64.

TurboDOS can change all that so you'll no longer have to wait very long to load or save large programs. TurboDOS commands speed loading, saving, and verifying up to seven times faster than DOS commands. In addition, TurboDOS breaks the track-35 barrier, allowing you to use all 40 tracks on a standard 5¼-inch double density disk. With five more tracks available, you'll have another 85 blocks at your disposal, a total disk capacity of 749 blocks.

Getting Started

TurboDOS is written entirely in machine language. Enter it with MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When prompted for the starting and ending addresses, respond with the following values.

Starting address: 0801
Ending address: 2238

Before exiting MLX, be sure to save a copy of TurboDOS.

To run TurboDOS, load and run it like a BASIC program. TurboDOS installs itself and then displays a startup message. Note that the bottom of BASIC RAM is raised to $2B01 (11009) to provide a protected area for TurboDOS to reside.

New Commands

In addition to speeding up disk access times, TurboDOS adds 17 new commands to BASIC. This makes disk accessing more convenient. For most TurboDOS commands, it's not necessary to give the device parameter. If no device number is specified, TurboDOS will assume that you are using drive 8. If you are using LOAD, SAVE, or VERIFY commands in immediate mode, you can omit the device parameter following the filename. To use TurboDOS commands in a BASIC program, they must be preceded with a slash (/).

Because TurboDOS completely reprograms the disk drive, 6 of the 17 new commands will not work on disk drives which aren't 1541 compatible. Those 6 commands are BLOCK, DIR, FORMAT, LOCK, RENAME, and START. If you try to use the above commands on a non-1541–compatible disk drive, TurboDOS will report a *DEVICE NOT SUPPORTED* error message.

Seventeen Commands

Here are the new commands that you can use with TurboDOS.

DIR "string", device
DIR displays the disk directory on the screen. Entering DIR by itself will display the entire directory. You can specify which files to display with the string parameter. Wildcards are allowed.

BLOAD "filename", device, starting address
BLOAD loads a binary file and puts it at a specified location. If you don't specify the starting address, BLOAD will use the location specified by the file.

BSAVE "filename", device, starting address, ending address
Use BSAVE to save a file to a device from a specified memory location.

RESAVE "filename", device
When updating a BASIC program, you will have to scratch it before you can resave it. RESAVE does all this in one step by scratching the file first and then saving it.

FORMAT "ID","disk name", device
Because normal DOS cannot format tracks beyond 35, TurboDOS also is a custom disk formatter. A disk will format in about ten seconds. Use any two

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ASCII characters for the ID and up to 16 characters for the disk name.

BLOCK mode, track, sector, buffer, ID flag, device
BLOCK is like DOS's B–R or B–W commands. To read a sector, set mode to 0. To write, set mode to 1. Buffer indicates which location TurboDOS should put the sector to or which location to get data from when performing a read or write operation.

Because TurboDOS cannot tell if a new disk has been placed into the drive, an *ID MISMATCH* error message may appear when you use this command. If a new disk has been placed into the drive, set the ID flag parameter to 1. Set it to 0 for any other consecutive read or write attempts to the same disk. It isn't always best to set the ID flag to 1 for all read or write attempts. TurboDOS will take an extra second to identify the disk, and the extra seconds will add up.

You can omit the ID parameter, and it will have the same effect as setting ID to 0. For example, to read track 18, sector 0 and then put the sector's contents at location $4000 (16384), type in *BLOCK 0,18,0,16384,1*. To write this sector to track 35, sector 16, type in *BLOCK 1,35,16,16384*.

DISK "command string", device
DISK sends a disk command or displays the drive status. If entered by itself, the drive status will be displayed.

SCRATCH "filename", device
SCRATCH erases a file or multiple files from the disk directory. When using a TurboDOS formatted disk, you should use this command instead of the familiar S0: from DOS.

COLLECT device
COLLECT is much like DOS's V0 command. It validates the disk, updates the BAM, and deletes any splat files from the directory.

RENAME "old name" TO "new name", device
Use RENAME to change the name of a file on the disk directory.

LOCK "filename", mode, device
A locked file cannot be scratched. To lock a file, set mode to 0. Using wildcards, you can lock just one file or the entire directory.

LOCK can also unlock files. Set mode to 1 to unlock. If you omit the mode parameter, TurboDOS will assume that you want to lock a file.

START "filename", device, new load address
START displays a program's load address or changes it. If you wish to see the program's load address only, omit the last parameter.

TRACK highest track, directory track
You can set the highest track that TurboDOS will use or which track the directory is on by using TRACK. If entered by itself, the highest track and the directory track will be displayed.

If the head chatters when approaching track 40 on your disk drive, you should lower the highest track number to 39 or 38.

SKEW sector interleave, directory sector interleave
Files will load faster if they are saved at an optimum sector interleave. TurboDOS saves files at a 1 : 7 sector interleave, and it also saves the directory at a 1 : 7 sector interleave. However, some other fastloaders will work faster if you change the sector interleave value to 1 : 6.

DEFAULT device
TurboDOS usually defaults to drive 8 when no device number is specified, but you can change the default device with this command.

COLOR border, background, cursor
COLOR is used to set the border, background, and cursor color to your own preference. Use the Commodore color numbers 0–15.

KILL
KILL disables TurboDOS, and it restores the former load, save, and BASIC vectors.

Odds and Ends

When using TurboDOS commands which require a filename, such as LOAD, SAVE, LOCK, and SCRATCH, you should not specify the drive number. For example, you should not type *LOAD "0:*", 8*. Instead, you should just simply type *LOAD "*"*. TurboDOS will literally look for a file whose name is actually 0:*, and you will get a *FILE NOT FOUND* error message.

If you are using wildcards with TurboDOS, you cannot specify the file type. For example, *DIR "*=S"* will not display all sequential files on disk.

Although TurboDOS can access tracks 35 and beyond, it will not check for illegal tracks, tracks higher than 40. If TurboDOS encounters such errors, it will noisily slam the head against the headstop trying to look for a track that doesn't exist. If this happens, type *OPEN 15,8,15,"I0"*, and this will usually get your drive back in working order.

When scratching or collecting a TurboDOS formatted disk, you should use TurboDOS's SCRATCH or COLLECT command, rather than DOS's. Normal DOS will not scratch files or validate your disk properly if there are files saved beyond track 35. Although TurboDOS has its own disk-format routine to provide you with optimum storage space, this doesn't mean that you'll have to set aside several disks for exclusive TurboDOS use. TurboDOS can distinguish between regular format or TurboDOS format by looking at the third byte on track 18, sector 0, and it will act accordingly.

TURBODOS

```
0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 20 96
0811:20 20 20 20 20 A0 C4 B9 06
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 FD 85 2D A9 28 85 A5
0839:2E 4C 00 01 1B E6 03 FD FB
0841:28 AD 20 B9 6E 09 99 E8 24
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 FC 65 A6 85 F7 58
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0C 20 34 C3
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08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8
0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C BE 1A A4 A8 F0 F4
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 42
0959:A9 F0 0A B1 F7 C6 FD C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 1B 08 93
0971:36 21 9E 20 36 38 34 36 ED
0979:20 E5 77 69 56 31 2E 30 9E
0981:31 00 00 00 20 47 08 4C A6
0989:2F 2F A9 DF A4 89 E2 8E D1
0991:43 44 A9 1F A2 AC 27 8E 22
0999:07 A8 83 A2 3A 01 A0 A9 B4
09A1:3F 8D 02 4D B5 23 36 8D FF
09A9:A4 AD 42 36 8D A4 AD 42 C1
09B1:36 8D A4 AD 42 36 8D A4 5C
09B9:60 AD DD C2 0A 30 A4 DE 88
09C1:08 8D 31 00 0B 1D A4 32 A9
09C9:03 AD 1E 0A 8D 33 03 A9 16
09D1:47 A2 FE 8D 18 03 8E 19 EB
09D9:03 60 48 8A 48 98 48 A9 16
09E1:7F 8D 00 DC AD 01 DC C9 D9
09E9:FD F0 21 C9 7F D0 C0 09 C1
09F1:8F 8D 88 02 20 81 D7 16 2D
09F9:96 21 20 8A FF 20 23 08 1B
0A01:20 84 FF EA EA EA 6C 40 11
0A09:7F 4C BC FE A2 FF 78 9A 18
0A11:D8 E8 8A 95 02 E8 D0 FB C7
0A19:A2 3C A0 03 86 B2 84 B3 8D
0A21:75 C1 53 1D A0 20 8C 27 62
0A29:15 FD 20 5B FF 58 6C 00 3B
0A31:A0 40 5C 12 7E 80 85 93 E6
0A39:5A 02 C2 C9 BB C9 24 F0 2E
0A41:ED 70 9D 20 0E 08 16 C0 9B
0A49:E3 20 AF F5 B4 55 85 B9 6C
0A51:20 3F 0F 90 12 A9 62 8A B6
0A59:D7 17 55 40 D8 43 7E 04 A2
0A61:4C 0D 0A 20 D2 F5 A9 01 E4
0A69:16 9F 12 E2 E2 EC A8 36 33
0A71:62 6C 88 FD 0C 95 2C 06 D7
0A79:04 60 E2 B9 F9 AC 14 62 AC
0A81:AE 03 29 4C 4D 09 A4 C3 33
0A89:A6 C4 84 E4 00 45 3C A2 31
0A91:04 50 43 35 0E FA 72 18 D0
0A99:A2 02 92 ED 50 8F 27 10 CF
0AA1:03 4C F9 B8 72 60 12 22 70
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1849:00 9E 23 08 45 BF 84 51 89
1851:A6 21 4C FF 50 3A 03 7D 95
1859:A8 20 B2 11 F8 35 4C 9E 21
1861:15 ED E1 54 55 52 42 4F E0
1869:44 4F 65 70 44 44 21 41 F9
1871:42 4C 45 44 2E 0D 00 14 7C
1879:5E 1B 2C AB B9 C3 44 CE 14
1881:03 4C 83 1C 69 92 01 0B 1B
1889:D4 A0 D4 00 85 B9 97 05 2E
1891:24 D5 3B 87 19 36 02 87 56
1899:58 A1 14 84 41 28 85 29 08
18A1:67 9F C3 85 C4 A9 28 A6 02
18A9:C3 A4 C4 C5 C5 DC 72 A4 05
18B1:A1 6F 43 AE 10 29 2C 45 A4
18B9:46 41 F3 F6 88 20 44 45 DD
18C1:56 49 43 45 20 4E 55 4D 5E
18C9:42 E5 A2 60 19 1A 0A F0 25
18D1:51 24 C6 81 BD FF A2 D6 AE
18D9:B1 25 81 0A 20 06 94 00 3F
18E1:B4 84 90 06 AE 04 22 4C 16
18E9:EC E1 4C E9 1E F7 00 0C 0E
18F1:A6 2D A4 2E A9 2B 20 D8 4B
18F9:FF E2 AE 4C F9 E0 C1 D9 2E
1901:2C A9 01 85 A0 E8 1C 4C 59
1909:6F E1 9A 5A 0B 1C B7 42 DE
1911:78 00 5C 46 FA 11 54 C0 F4
1919:02 18 53 39 1A 1B 39 30 30
1921:5E 60 7D 34 25 61 E2 71 73
1929:72 1D AE 7E 80 2F 41 E1 BE
1931:91 20 49 4E 54 45 52 4C EA
1939:45 41 56 45 3A 20 20 31 41
1941:3A 00 4A 9D 4B 86 0A B0 EC
1949:0A 32 52 E0 4A 30 4C 00 11
1951:4F 84 AE 85 AF 48 84 70 92
1959:F1 0A D0 24 23 13 38 54 8D
1961:D0 02 18 24 90 10 98 82 3A
1969:D0 8D 03 F3 29 70 A4 83 DE
1971:78 4C C6 14 B0 8D C2 A3 F1
1979:AE 99 00 29 C8 D0 F8 A5 1D
1981:0F E2 80 20 A5 0D A6 1C D0
1989:B0 D5 54 73 10 A8 00 C7 36
1991:39 8D E0 00 C8 09 8D BD 23
1999:F4 20 54 10 06 D8 51 08 18
19A1:1C 45 10 41 E0 20 20 59 6A
19A9:4F 55 20 53 55 52 45 3F CF
19B1:20 00 20 CF FF C9 0D F0 27
19B9:06 8D 68 2F 4C 2F 1E AD 5B
19C1:B0 1A C9 59 10 CE 56 AD B7
19C9:AE 1A AE AF 1A 38 20 1E BA
19D1:19 1C 3F 06 CB 1D 60 CE 42
19D9:6E 8E 84 13 06 BB 18 0D 05
19E1:09 78 CE 8A F0 03 A9 31 51
19E9:2C A9 30 1B 4E A9 56 58 72
19F1:E9 15 68 19 A3 A7 13 84 63
19F9:5B FC 00 60 A9 02 9E DF 91
1A01:A9 0F A6 BA A8 20 BA FF 89
1A09:3C 3C B0 90 20 C0 FF B0 3E
1A11:0B A2 0F 20 C6 FF 20 E5 B3
1A19:F3 FF 24 90 30 0E 50 D9 09
1A21:32 B0 00 E4 D2 39 53 AE B9
1A29:32 DC 21 A2 05 85 FF 73 AD
1A31:C4 86 C9 00 D0 9E 08 99 4D
1A39:B4 67 28 CD 20 14 11 B0 A7
1A41:06 20 CA 14 4C 84 1E C9 95
1A49:F1 85 53 8D B2 A9 3A 8D 59
1A51:A7 1A 57 F6 A8 86 C0 14 2F
1A59:F0 04 1D D1 F2 C8 C8 98 AC
1A61:A2 A6 A0 0B AE BD FF 43 05
1A69:1B 19 68 41 34 90 06 10 92
1A71:62 B7 F0 0B 57 0D 72 34 9B
1A79:66 9C 1E 0A 46 26 CE 2A FE
1A81:E0 29 50 96 20 BA EC 63 0D
1A89:01 A9 8E B2 00 5F CA EC A5
1A91:75 79 B0 E5 E8 8E E0 0E A4
1A99:74 48 49 47 48 45 53 54 0A
1AA1:64 F0 92 39 32 0A 11 7B 81
1AA9:11 89 A3 18 30 0A 83 38 A7
1AB1:0D 4F 52 59 0E 1A 4F 4E E5
1AB9:20 F0 76 43 20 00 6B AE C3
1AC1:68 00 6D A0 F0 40 01 27 93
1AC9:D0 48 0D 68 36 00 23 01 99
1AD1:98 E6 A5 0F 20 CE 16 75 8F
1AD9:1C A2 40 6A A3 80 03 0C A4
1AE1:5A D0 F0 79 00 C9 A4 34 D1
1AE9:A2 0B 6C 32 1D C3 E0 99 36
1AF1:A6 1A C8 C5 DF F6 A4 B7 51
1AF9:8C B2 20 73 00 CB 0E 01 A8
1B01:B0 9E 0C D0 03 20 CD 20 1A
1B09:2F 99 38 24 B6 94 6E 65 D0
1B11:7C 94 4A 12 20 A5 BB 3C 60
1B19:05 BC 48 A5 B7 48 A9 A6 3D
1B21:A2 84 1B BB 86 BC AD B6 22
1B29:1A 70 AE 7A 1A A0 01 91 EC
1B31:1A CF D1 20 D3 20 A0 02 07
1B39:B1 AE 08 20 DC 20 85 1C 85
1B41:E2 20 86 A8 4F 22 A9 1B BD
1B49:18 65 AE C6 90 E7 AE 00 A8
1B51:29 F0 06 AC 01 29 4C 5D 86
1B59:20 68 68 68 92 8E 2C A9 1E
1B61:63 20 D1 0A C8 91 85 B7 7B
1B69:80 08 BC 68 85 BB A0 00 5C
1B71:B1 BB 08 67 D8 F0 0D C4 50
1B79:B7 90 F3 A9 A0 91 AE C8 3A
1B81:C0 10 D0 F9 E8 82 05 5A 8B
1B89:8F 1C 4C BB 10 AD 04 22 35
1B91:85 C5 0B A0 66 63 A4 A2 14
1B99:29 4A 86 AF 60 18 A5 AE 20
1BA1:69 05 85 AE 30 EE F4 2D BD
1BA9:05 97 52 B0 99 33 02 12 4D
1BB1:8E 9B 24 00 DC 54 14 87 82
1BB9:45 42 11 20 F1 B7 86 BA 7D
1BC1:20 C3 21 B0 07 C9 59 0F 49
1BC9:9B 45 50 3F 0F A1 B8 62 EF
1BD1:26 AE AE 86 1A AC 87 1A B1
1BD9:B6 81 10 5F 03 01 24 0F 37
1BE1:10 11 A5 14 8D 2E B8 A5 96
1BE9:15 8D 8C 9D 00 D0 F8 0D BB
1BF1:20 92 17 0D 50 52 4F 47 42
1BF9:1E B7 4D 20 A6 70 10 20 10
1C01:41 44 44 C0 5F 53 11 80 6A
1C09:5F 20 24 00 9B C8 28 AD 7B
1C11:10 05 20 EF 21 A9 2F 20 C3
1C19:96 AE 02 29 AD 03 29 20 07
1C21:CD BD 4C 5B 18 20 E4 74 6E
1C29:2E D9 21 20 57 80 4C 43 AD
1C31:0C D4 A9 33 4C 95 85 4B 1C
1C39:DD 1E 4C 0B 1D A9 0B A2 6A
1C41:00 A0 0F 8D 20 D0 8E 21 DE
1C49:D0 8C 86 02 DA 11 D0 02 BC
1C51:C6 7B C6 7A 60 A5 7A 8D 68
1C59:BB 21 A5 7B 8D BF 21 60 32
1C61:BA 3E 7A D0 5C 02 7B C3 88
1C69:79 00 F0 06 C9 3A F0 00 F5
1C71:7C 57 38 60 20 0E E2 20 E9
1C79:8A AD 4C F7 B7 20 C7 20 59
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1C81:20 CC FF A9 0F 4C C3 FF C8
1C89:20 B0 0D 90 05 68 68 4C 8F
1C91:41 1C 60 48 28 C2 FF 0D 5B
1C99:20 FA 21 68 29 0F F8 18 DA
1CA1:69 90 69 40 D8 4C D2 FF 81
1CA9:08 2C 5E 9F 52 00 20 03 8C
1CB1:38 95 10 01 93 D9 80 01 83
1CB9:18 94 00 44 49 41 15 38 19
1CC1:43 91 15 54 43 48 0B CA 04
1CC9:4C 45 43 53 42 90 90 81 0E
1CD1:4D 41 3D 06 52 45 4E 41 8E
1CD9:4D 45 00 96 41 55 4C E4 50
1CE1:15 53 4B 45 57 00 54 52 EC
1CE9:41 C2 09 4C 4F 43 4B 00 77
1CF1:53 54 41 1A 4E FE AD 52 CE
1CF9:54 00 4B 49 4C 4C 00 D6 C4
1D01:00 43 4F 4C B0 00 00 D0 11
1D09:F5 13 1A 1D 08 1D 1D 1D 24
1D11:61 1C 94 1C 7D 21 17 1F 15
1D19:CB 1E 54 1E 87 1D F9 1D EE
1D21:CB 1F B4 1C 27 1D 33 1F 94
1D29:A2 1F 20 7C F7 20 46 1C 31
1D31:25 1C E4 20 80 F0 84 0A 7E
1D39:0F 82 0D 81 AA AA AA A5 50
1D41:22 D0 0E A9 C0 85 00 58 91
1D49:A5 00 30 FC 24 20 70 FC AB
1D51:78 A9 00 85 30 8D 95 6E DB
1D59:F0 06 02 85 31 36 32 A9 96
1D61:28 8D 9C 24 04 8D 9D 01 7B
1D69:A9 10 85 21 85 44 81 F1 71
1D71:3B 85 2D 12 17 0D 0E 01 7B
1D79:2C A2 30 85 23 30 1E CA B1
1D81:D0 F6 88 D0 F3 C6 21 D0 CD
1D89:EF E4 44 F0 EB 86 EB ED CB
1D91:28 04 04 93 F3 03 93 3B A8
1D99:03 4C 9B 59 2A A0 00 C8 0E
1DA1:78 F4 42 18 C9 FF D0 C0 CF
1DA9:20 88 0A AA BD 93 90 05 64
1DB1:86 03 BD 94 03 8D 87 C0 0F
1DB9:CD FF FF 28 8A E8 4C 2A 18
1DC1:03 9F 03 EC 03 19 04 DE F7
1DC9:05 F0 05 35 E7 56 81 01 53
1DD1:9F B1 03 2C 4C 5A C0 14 CC
1DD9:85 45 97 01 1D C6 45 D0 8A
1DE1:98 4F 43 20 A5 16 85 12 49
1DE9:A5 17 85 13 0A EF A5 12 0C
1DF1:A8 B6 03 13 47 23 48 98 AF
1DF9:91 3A 8C 68 9B 62 10 CD F7
1E01:DA C9 CB 03 62 B9 B0 10 32
1E09:20 CF 03 62 EF 06 D0 EC F5
1E11:60 09 F0 7E 02 02 88 1B 0A
1E19:02 26 8D 02 91 DE C1 01 3E
1E21:AC 01 71 06 20 93 D3 A0 1A
1E29:06 4C B6 06 A9 12 1D F8 7B
1E31:62 06 A3 3B 11 3A BA 63 92
1E39:E1 A8 85 44 B7 54 44 22 3F
1E41:A2 04 DD 2C 07 CA B0 FA 0E
1E49:55 5C 7C E0 31 07 9A 60 20
1E51:68 3E 87 21 9E CF 81 21 AC
1E59:67 28 44 C9 94 EF 73 44 08
1E61:98 CF B1 F0 60 A2 E2 A2 19
1E69:FF 48 33 B7 21 20 5D 04 E1
1E71:68 61 89 A1 10 88 E3 80 70
1E79:E6 B8 81 20 11 6B 81 2D EF
1E81:E0 03 13 78 68 80 49 39 E9
1E89:06 A5 80 85 06 A5 81 85 E9
1E91:07 4C 9F 04 4C DE C6 6A 6E
1E99:30 3B 24 2C 30 27 24 2D 97
1EA1:30 23 20 AF E9 7C 1E 49 84
1EA9:A6 C5 12 D0 11 A5 17 C5 0D
1EB1:13 D0 0B A5 18 85 22 9D 20
1EB9:1B 2D 4C 54 2A FF 85 6A 64
1EC1:A9 09 60 A6 6A F0 10 1D DF
1EC9:17 28 04 12 44 04 40 E6 D6
1ED1:80 14 0E 02 4C 84 04 A0 52
1ED9:01 2C A0 03 4C 87 04 72 E0
1EE1:F9 7F 1D 03 B0 3F 40 55 27
1EE9:3A E5 34 D4 71 18 F4 A0 07
1EF1:BA 9C E3 00 01 5C 20 20 09
1EF9:E0 F8 C0 21 AE 00 02 AC 35
1F01:01 02 86 06 84 07 C5 3A 77
1F09:D0 0A A9 EC 37 5D B8 08 DE
1F11:CC 78 03 14 3F A5 06 85 97
1F19:18 A5 07 85 19 E1 69 C5 EE
1F21:73 C0 5A CA F0 E4 A9 93 43
1F29:E4 A3 13 D9 24 00 D0 ED 73
1F31:2F 08 D0 F0 91 39 D0 35 7A
1F39:FB 10 0D 2C F1 2D 30 F6 79
1F41:11 47 B8 18 A0 00 60 38 70
1F49:A9 01 60 C5 17 83 0E 17 FE
1F51:8B 05 B0 28 5C 88 C9 52 1A
1F59:D0 F1 85 24 9B AD AD 11 6F
1F61:99 25 00 C8 C0 54 F8 20 AB
1F69:97 F4 20 A6 05 C5 1A D0 63
1F71:02 18 60 60 39 38 84 D8 55
1F79:82 E4 C6 45 B1 F6 2C 4B 6C
1F81:B8 50 9C 95 53 00 07 20 E5
1F89:71 81 7A 29 10 59 16 06 DA
1F91:A2 FF 86 6A 4C 6E 41 F0 28
1F99:33 28 07 20 2C 04 F9 54 18
1FA1:04 05 85 6A 20 5F 05 90 93
1FA9:09 20 C1 04 4E AE 45 10 B4
1FB1:F2 A2 09 D7 72 CC FF 8C 04
1FB9:03 1C AD 6B 00 F1 09 C0 87
1FC1:14 20 18 45 C1 E4 50 FE AA
1FC9:20 00 FE 4C A0 C1 89 32 0E
1FD1:CA 82 09 F9 1C 09 04 CD B1
1FD9:2C 09 F0 11 68 2B A0 AA 7B
1FE1:B0 1C 83 CA 30 F5 60 4E 05
1FE9:82 8C 0D 06 07 85 07 60 4B
1FF1:24 6A 30 03 A9 00 2C 09 C1
1FF9:F0 E7 04 22 20 59 04 A5 61
2001:19 4C F7 06 1A 54 E0 02 26
2009:2C 10 D0 10 4A 4A 40 0D 87
2011:48 39 AA A5 21 5B 0E AA B0
2019:BD 1D 07 AE 4A D0 FB 40 19
2021:09 68 F7 14 0A 34 B4 70 3B
2029:50 D8 CA 4A 0A 10 F0 80 B8
2031:20 F1 06 68 A0 FF D0 BE AA
2039:C3 15 4C 1A 2F A2 60 52 E2
2041:20 17 07 20 66 01 A2 99 50
2049:8E 94 01 60 68 B9 32 C0 6B
2051:0F 07 0D 05 0B 03 09 01 44
2059:0E 06 0C 04 0A 02 08 00 4C
2061:29 1F 19 12 DB 2F 82 60 43
2069:68 68 20 74 06 A9 06 E1 08
2071:0C 20 F5 30 80 26 5E 01 DB
2079:A9 03 8D B0 16 4C 46 01 7B
2081:78 A9 7A 8D 02 18 C4 77 02
2089:20 A3 40 FD 20 64 01 EE 2E
2091:54 01 AD 96 01 C9 F4 F3 68
2099:4C 26 19 C8 00 69 48 0A 79
20A1:84 30 2B D0 F9 24 80 DA DE
20A9:21 48 68 EB A1 08 0A 0A A3
20B1:85 21 AD 50 03 0A EA 72 40
20B9:4D 16 01 8E 69 29 0F 05 42
20C1:21 41 07 03 71 CC 60 20 93
20C9:9A 01 D0 3E A2 06 98 9B 8F
20D1:CC 98 EE A5 01 31 03 F4 9E
20D9:A2 B1 9A 48 05 FC 4C 4B AF
20E1:EB A9 00 65 0D 20 EC 85 21
20E9:18 85 1E AD 35 85 16 85 A7
20F1:12 AD A3 91 21 17 85 13 B7
20F9:CC 86 30 8A CB 2C 06 C4 D0
2101:FA 42 56 32 28 EA A2 BB 2D
2109:BD 0B 9D 15 24 E8 D0 F7 50
2111:E6 31 20 E9 F5 85 3A 20 10
2119:8F F7 E6 C2 20 21 04 A5 5D
2121:22 C9 12 D0 09 A9 05 C8 F7
2129:4F 8B 28 38 85 9B 03 86 A5
2131:CE 57 32 80 58 84 19 A1 A7
2139:23 84 1F A5 16 45 17 45 A5
2141:18 45 19 85 1A 20 34 F9 10
2149:E8 38 A4 1F B5 24 99 6A 70
2151:C8 22 39 08 02 E6 19 A5 AB
2159:19 C5 43 C6 CC A0 00 F4 4C
2161:02 14 05 0B C0 C4 A2 08 61
2169:A4 21 E9 B2 02 E3 92 F1 65
2171:F3 84 21 61 36 50 BD 04 7B
2179:06 D1 D9 0C EC D8 14 6A 8C
2181:05 12 B8 D1 1C CA D0 FA A7
2189:A0 BB B4 0B B9 00 95 09 54
2191:28 F4 E4 3C B1 30 54 0D 89
2199:C8 D0 F5 9D BD 01 06 50 5B
21A1:FE B8 8D 01 1C E8 E0 07 A0
21A9:D0 F2 9D 73 C2 A9 01 8D 48
21B1:D6 03 C6 19 D0 8C 20 00 83
21B9:FE A5 18 C9 28 F0 05 E6 7A
21C1:18 4C 45 03 7C C1 AF F7 3E
21C9:E4 70 08 E5 A0 18 60 48 68
21D1:A2 01 C5 22 F0 34 E5 22 C6
21D9:10 04 49 FF A2 FF 0A A8 20
21E1:A9 A0 85 45 8A 18 6D D0 86
21E9:E0 0D 03 85 1F BA 96 FC A6
21F1:05 1F 3C 97 A5 45 C9 90 E5
21F9:F0 02 C6 45 8D 8A 0B 2C 3B
2201:05 18 30 FB 88 D0 DA 68 39
2209:85 22 A2 00 A0 11 C9 24 ED
2211:B0 04 20 4B F2 A8 84 43 ED
2219:AD D0 E0 0F 29 9F 1D 82 F9
2221:04 8D 00 80 13 EE 8D 0C 4E
2229:1C A9 06 85 31 60 00 20 2A
2231:40 60 30 00 00 00 00 00 B3
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Hong H. Pham, 17, says he didn't want to shell out $60 for a speed-load cartridge, so he wrote TurboDOS instead. He enjoys Tae Kwon Do and table tennis in Antigonish, Nova Scotia, Canada.

INSTANT ART

By Larry Cotton

Instant Art for the 64 creates fascinating multicolor high-resolution pictures based on a branch of mathematics known as linear cellular automata. The hypnotic patterns and colors can be varied almost endlessly and then saved to disk for a future "slide show."

Typing It In

Instant Art and its companion program, IA Slide Show, are both written in BASIC with machine language loaders.

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To save you some typing, be aware that both programs share the same DATA statements. To help avoid typing errors, enter the programs with The Automatic Proofreader; see "Typing Aids" elsewhere in this section.

Begin by typing in the DATA statements in lines 10–180. Save them to disk with the filename DATA. Continue typing in Instant Art, and then save the entire program to disk with the filename INSTANT ART.

To begin entering IA Slide Show, first load DATA with the ,8 extension. Then, continue entering lines 190–310 of the listing. Save IA Slide Show to disk with that name.

Creating Art

After you've finished typing and saving, load and run Instant Art. Read the menu while the machine language portion loads. To create your first picture, press the up-arrow (↑) key. This switches the program from the text (menu) screen to the hi-res screen, where pictures are created. Then press Return to create a picture. Pressing Return generates a new random-pattern picture in a few seconds.

Color Control

All menu options are available from the hi-res screen. Pictures have the potential of being displayed in up to 3 of the 64's 16 available colors. Only the first picture created after the program is run exhibits randomly generated colors. Each succeeding new picture is drawn in the same three colors as the previous one. You can change the colors with the function keys. Color can often greatly enhance what may otherwise be a so-so creation. Each function key cycles certain portions of the pictures in the same particular 16-color order. If you want to return to a particular color, just keep pressing the appropriate function key.

Variants and Automatic Mode

Pressing V creates a variant of the existing picture in the same four colors. Often even a seemingly dull picture can be transformed into a work of art by pressing V. When you get tired of the manual mode, press A. Then sit back and watch the pictures appear in automatic mode.

Saving and Loading

You can save and load pictures from disk by pressing S or L, respectively. Unlike normal hi-res screens, each of these consumes only one or two blocks of disk space. Naturally, any picture must be loaded using the exact name under which it was saved. If you want to view all of your creations sequentially, you must save them with consecutive filenames starting with A 1, A 2, A 3, and so on. Be sure to leave a space between the A and the number!

Other Menu Options

Pressing P dumps your creation (unfortunately, in black-and-white) to any Epson-compatible printer. Simpler patterns create more interesting printouts. Printouts work fine with my Star NX-1000 printer and Xetec Super Graphic interface.

If a picture evolving onscreen seems dull, you can stop it at any point by pressing any menu key—Return or V are good choices. If you press a key not mentioned in the menu, the picture stops, and the program returns to the menu. Press Q to end the program.

IA Slide Show

As mentioned above, you can sequentially view your masterpieces with IA Slide Show. You must have saved some screens as A 1, A 2, and so on from Instant Art. Load IA Slide Show now and run it. At the prompt, enter the number of screens that you want to see and press Return. Then sit back and enjoy a beautiful show! Press the Run/Stop–Restore combination to end the program.

INSTANT ART

```
PK 5 REM COPYRIGHT 1993 - COMP
     UTE PUBLICATIONS INTL LTD
     - ALL RIGHTS RESERVED
GM 10 DATA160,32,132,251,132,2
     53,160,1,132,252,136,132
     ,250,162,199,134,166,162
     ,39
QB 20 DATA134,167,132,169,177,
     250,133,168,165,167,240,
     4,160,8,177,250,10,38,16
     8,42
XX 30 DATA38,168,42,41,3,133,1
     70,160,4,169,0,38,168,42
     ,38,168,42,72,101,170,10
     1
BA 40 DATA169,170,165,170,133,
     169,104,133,170,189,0,23
     ,6,254,6,254,5,254,133,2
     54
XK 50 DATA136,208,221,145,252,
     24,198,167,16,40,162,2,1
     81,250,41,7,201,7,240,15
     ,56
BB 60 DATA181,250,233,55,149,2
     50,181,251,233,1,149,251
     ,208,6,246,250,208,2,246
     ,251
AQ 70 DATA202,202,240,223,198,
     166,208,144,96,162,2,181
     ,250,105,8,149,250,144,3
     ,246
PQ 80 DATA251,24,202,202,240,2
     41,76,172,23,27,65,8,13,
     10,27,75,64,1,0,165,197,
     201
HC 90 DATA64,208,219,76,35,23,
     160,32,132,251,160,0,132
     ,250,160,25,132,252,160,
     0
MM 100 DATA185,162,23,32,210,2
     55,200,192,9,208,245,16
     0,40,132,253,160,7,177,
     250
HH 110 DATA162,7,42,118,166,20
     2,16,250,136,16,243,169
     ,7,170,56,101,250,133,2
     50,144
DX 120 DATA2,230,251,181,166,3
     2,210,255,202,16,248,19
     8,253,208,217,198,252,2
     08,196
GG 130 DATA96,173,58,3,160,0,1
     53,0,4,153,251,4,153,24
     5,5,153,239,6,200,192,2
     51,208
QR 140 DATA239,96,173,59,3,160
     ,0,153,0,216,153,251,21
     6,153,245,217,153,239,2
     18,200
QR 150 DATA192,251,208,239,96,
     169,8,13,24,208,141,24,
     208,169,32,13,17,208,14
     1,17
XR 160 DATA208,169,63,133,216,
     169,0,133,215,168,145,2
     15,160,63,162,32,145,21
     5,136
SD 170 DATA208,251,198,216,202
     ,208,246,169,4,133,232,
     169,0,133,231,168,173,5
     2,3
JG 180 DATA162,4,145,231,200,2
     08,251,230,232,202,208,
     246,96
CG 190 CH=INT(154*RND(1))+1:CO
     =INT(16*RND(1))+0:G=INT
     (16*RND(1))+0:W=8192:X=
     8504
AK 200 V=53265:GOSUB600:R=RND(
     -TI):FE=255
KA 210 S=5900:FORI=STOS+241:RE
     ADA:POKEI,A:NEXT
XE 220 T=828:FORI=TTOT+45:READ
```


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```
      A:POKEI,A:NEXT
KC 230 GETC$:IFC$=""THEN230
CJ 240 I=ABS(ASC(C$)-132):IFI<
       5THENONIGOSUB410,410,44
       0,460:GOTO230
DC 250 IFC$=CHR$(13)THENGOSUB3
       40:GOTO230
PK 260 IFC$="A"THENGOSUB580:GO
       SUB760:GOTO230
HC 270 IFC$="L"THENGOSUB480:GO
       SUB520:GOTO230
HH 280 IFC$="P"THENGOSUB790:GO
       TO230
DH 290 IFC$="Q"THENCLOSE4:SYS8
       32
PR 300 IFC$="S"THENGOSUB480:GO
       SUB490:GOTO230
QB 310 IFC$="V"THENGOSUB580:GO
       SUB360:GOTO230
SA 320 IFC$="↑"THENGOSUB580:GO
       TO230
DH 330 GOSUB480:GOSUB600:GOTO2
       30
SP 340 GOSUB580:Q$="":Z$="":FO
       RL=1TO10:Z$=RIGHT$(STR$
       (INT(RND(1)*4)),1)
DK 350 Q$=Q$+Z$:NEXT
HC 360 GOSUB550:Q=4*RND(1)+1:O
       NQGOTO370,380,390,400
MD 370 Y=FE*RND(1)+1:FORI=WTOX
       STEP8:POKEI,Y:NEXT:SYSS
       :RETURN
QJ 380 Q=RND(1)*5:FORI=1TOQ:PO
       KE8184+8*(INT(RND(1)*40
       )),RND(1)*FE:NEXT:SYSS:
       RETURN
PP 390 FORI=WTOXSTEP8:POKEI,FE
       *RND(1):NEXT:SYSS:RETUR
       N
MP 400 FORI=WTOXSTEP8:POKEI,0:
       NEXT:POKE8352,FE*RND(1)
       :SYSS:RETURN
JQ 410 IFI=1THENC1=C1+1:IFC1=1
       6THENC1=0
EC 420 IFI=2THENC2=C2+1:IFC2=1
       6THENC2=0
FM 430 CH=C1*16+C2:GOSUB580:RE
       TURN
FS 440 CO=CO+1:IFCO=16THENCO=0
MS 450 GOSUB580:RETURN
RG 460 G=G+1:IFG=16THENG=0
CQ 470 GOSUB580:RETURN
RP 480 POKEV,27:POKEV+5,200:PO
       KEV+7,21:POKEV+15,15:PO
       KEV+16,1:POKE646,6:RETU
       RN
AA 490 F$="":PRINT"{CLR}":INPU
       T"{9 DOWN}{2 SPACES}PAT
       TERN TO SAVE";F$:IFF$="
       "THEN560
FF 500 OPEN3,8,1,F$:FORI=WTOXS
       TEP8:PRINT#3,PEEK(I):NE
       XT:PRINT#3,CH:PRINT#3,C
       O
DD 510 PRINT#3,G:PRINT#3,Q$:CL
       OSE3:PRINT"{CLR}":GOSUB
       580:RETURN
QE 520 F$="":PRINT"{CLR}":INPU
       T"{9 DOWN}{2 SPACES}PAT
       TERN TO LOAD";F$:IFF$="
       "THEN560
RB 530 OPEN3,8,0,F$:FORI=WTOXS
       TEP8:INPUT#3,J:POKEI,J:
       NEXT:INPUT#3,CH:INPUT#3
       ,CO
SG 540 INPUT#3,G:INPUT#3,Q$:GO
       SUB550:GOTO560
KM 550 A=5887:FORI=1TO10:POKEA
       +I,VAL(MID$(Q$,I,1)):NE
       XT:RETURN
JK 560 CLOSE3:GOSUB580:IFF$=""
       THENRETURN
FD 570 SYSS:RETURN
GM 580 POKE826,CH:SYST:POKE827
       ,CO:SYS851:POKEV+15,G:P
       OKEV+16,G:POKEV,59
PG 590 POKEV+5,216:POKEV+7,24:
       RETURN
ER 600 POKEV+15,15:POKEV+16,1:
       PRINTCHR$(142)"{CLR}
       {3 DOWN}{CYN}"TAB(7)"IN
       STANT ART INSTRUCTIONS
MA 610 PRINT"{BLK}"TAB(7)"
       {24 T}
SK 620 PRINT"{RED}"TAB(7)"F1 -
        CYCLE COLOR 1
PQ 630 PRINTTAB(7)"F3 - CYCLE
       {SPACE}COLOR 2
MB 640 PRINTTAB(7)"F5 - CYCLE
       {SPACE}COLOR 3
RG 650 PRINTTAB(7)"F7 - CYCLE
       {SPACE}COLOR 4 & BORDER
GK 660 PRINT"{DOWN}{BLU}"TAB(7
       )"↑ - HI-RES SCREEN
EB 670 PRINTTAB(7)"V - VARIANT
MQ 680 PRINTTAB(7)"A - AUTOMAT
       IC
SA 690 PRINTTAB(7)"P - PRINT
GX 700 PRINTTAB(7)"S - SAVE
AE 710 PRINTTAB(7)"L - LOAD
HC 720 PRINTTAB(7)"Q - QUIT
JC 730 PRINT"{DOWN}{GRN}"TAB(7
       )"RETURN - NEW SCREEN
RF 740 PRINT"{DOWN}{CYN}"TAB(7
       )"OTHER KEYS RETURN TO
       {SPACE}MENU
DH 750 PRINT"{BLK}"TAB(7)"
       {25 T}":RETURN
QB 760 ONRND(1)*3+1GOSUB410,44
       0,460:GOSUB340
RR 770 IFPEEK(198)THENRETURN
KK 780 GOTO760
SK 790 GOSUB480:PRINT"{CLR}
       {10 DOWN}"TAB(7)"MAKE S
       URE PRINTER IS READY
KF 800 PRINT"{DOWN}"TAB(9)"AND
        PRESS ANY KEY. . .
MF 810 GETR$:IFR$=""THEN810
HR 820 PRINT"{DOWN}"TAB(13)"PR
       INTING. . .":A$=CHR$(10
       ):OPEN4,4,5:CMD4:SYS606
       9
MP 830 PRINT:PRINT:PRINT:CLOSE
       4:GOSUB580:RETURN
XB 840 C=INT(16*RND(1))+0:PRIN
       TC:GOTO840
```

IA SLIDE SHOW

```
PK 5 REM COPYRIGHT 1993 - COMP
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GM 10 DATA160,32,132,251,132,2
      53,160,1,132,252,136,132
      ,250,162,199,134,166,162
      ,39
QB 20 DATA134,167,132,169,177,
      250,133,168,165,167,240,
      4,160,8,177,250,10,38,16
      8,42
XX 30 DATA38,168,42,41,3,133,1
      70,160,4,169,0,38,168,42
      ,38,168,42,72,101,170,10
      1
BA 40 DATA169,170,165,170,133,
      169,104,133,170,189,0,23
      ,6,254,6,254,5,254,133,2
      54
XK 50 DATA136,208,221,145,252,
      24,198,167,16,40,162,2,1
      81,250,41,7,201,7,240,15
      ,56
BB 60 DATA181,250,233,55,149,2
      50,181,251,233,1,149,251
      ,208,6,246,250,208,2,246
      ,251
AQ 70 DATA202,202,240,223,198,
      166,208,144,96,162,2,181
      ,250,105,8,149,250,144,3
      ,246
PQ 80 DATA251,24,202,202,240,2
      41,76,172,23,27,65,8,13,
      10,27,75,64,1,0,165,197,
      201
HC 90 DATA64,208,219,76,35,23,
      160,32,132,251,160,0,132
      ,250,160,25,132,252,160,
      0
MM 100 DATA185,162,23,32,210,2
       55,200,192,9,208,245,16
       0,40,132,253,160,7,177,
       250
HH 110 DATA162,7,42,118,166,20
       2,16,250,136,16,243,169
       ,7,170,56,101,250,133,2
       50,144
DX 120 DATA2,230,251,181,166,3
       2,210,255,202,16,248,19
       8,253,208,217,198,252,2
       08,196
GG 130 DATA96,173,58,3,160,0,1
       53,0,4,153,251,4,153,24
       5,5,153,239,6,200,192,2
       51,208
QR 140 DATA239,96,173,59,3,160
       ,0,153,0,216,153,251,21
       6,153,245,217,153,239,2
       18,200
QR 150 DATA192,251,208,239,96,
       169,8,13,24,208,141,24,
       208,169,32,13,17,208,14
       1,17
```


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```
XR 160 DATA208,169,63,133,216,
       169,0,133,215,168,145,2
       15,160,63,162,32,145,21
       5,136
SD 170 DATA208,251,198,216,202
       ,208,246,169,4,133,232,
       169,0,133,231,168,173,5
       2,3
JG 180 DATA162,4,145,231,200,2
       08,251,230,232,202,208,
       246,96
EH 190 W=8192:E=8:V=53265:POKE
       V+15,6:DIMJ(39)
PD 200 PRINT"{CLR}{WHT}
       {3 DOWN}"TAB(10)"PLEASE
        WAIT 3 SEC.
KA 210 S=5900:FORI=STOS+241:RE
       ADA:POKEI,A:NEXT
XE 220 T=828:FORI=TTOT+45:READ
       A:POKEI,A:NEXT
MR 230 U=36906:FORI=UTOU+65:RE
       ADA:POKEI,A:NEXT
JG 240 PRINT"{DOWN}"TAB(10);:I
       NPUT"NO. OF SLIDES";NS:
       SYSU
SX 250 POKEV,59:POKEV+5,216:PO
       KEV+7,24
PG 260 FORN=1TONS:OPEN3,8,0,"A
       "+STR$(N)
FX 270 FORI=0TO39:INPUT#3,J(I)
       :NEXT:INPUT#3,CH:INPUT#
       3,CO:INPUT#3,G
RG 280 INPUT#3,Q$:CLOSE3:SYSU:
       POKE826,CH:SYST:POKE827
       ,CO:SYS851
DR 290 POKEV+15,G:POKEV+16,G:F
       ORI=1TO10:POKE5887+I,VA
       L(MID$(Q$,I,1)):NEXT
SM 300 FORI=0TO39:POKEW+I*E,J(
       I):NEXT:SYSS:NEXT
MF 310 GOTO310
```

Larry Cotton is the author of Gazette's "Beginner BASIC" column. He lives in New Bern, North Carolina.

NUMBER BASE CONVERSIONS

By Bruce M. Bowden

Make conversions quickly and easily between any two number bases with this interesting utility for the 64. Even fractions are converted! A printer is optional.

There are many ways of representing numbers such as one-to-one correspondences, additive groupings, and so on. But every system centers around some definite basis for counting. In everyday work, for example, the majority of the civilized world counts by 10s. A very reasonable suggestion has been made that we use a number system built of ten basic symbols (0, 1, 2, 3, 4, 5, 6, 7, 8, and 9) because we have ten fingers.

In our system of numeration, which has a base of 10, any number that we wish to represent is written as a collection of multiples of powers of 10. For example, the number 324 may also be written as 4×10^0 (any number to the power of 0 is equal to 1) plus 2×10^1 (any number to the first power is just the number itself) plus 3×10^2.

If there are digits to the right of the decimal point, they may also be represented as multiples of negative powers of 10. Hence, the fraction .175 may be written out as 1×10^{-1}, plus 7×10^{-2}, plus 5×10^{-3}. Combine these two numbers into one, and above each digit write the exponent of 10 that corresponds to each digit's multiplier to see the following pattern.

$3^2\ 2^1\ 4^0\ .1^{-1}\ 7^{-2}\ 5^{-3}$

So you see, there's a specific way in which our numbers are written—first grouped by powers of the base and then with symbols representing multipliers of those powers. There are as many symbols as are needed to fill the gaps between the powers of the number base.

The positional method outlined above is a standard of the modern world. Of course, the choice of 10 as a base is purely arbitrary. The Mesopotamians used the sexagesimal system (base 60); the Mayans used a vigesimal (base 20) system mixed with a secondary base 5. The Roman system of numeration is a combination of base 5 with base 10.

Sometimes, even now, practical need requires that we deviate from 10 as our base. In computing, the on-and-off state of electrical switches lends itself naturally to a binary (base 2) method of numeric representation. An example of this is the compact representation of binary numbers in bases which are powers of 2, such as the octal (base 8) and hexadecimal (base 16) numbers.

In any base system, however, the same positional notation is applied as detailed above. The binary number 11010, for example, can be read from the right as 0×2^0 plus 1×2^1 plus 0×2^2 plus 1×2^3 plus 1×2^4.

Of course, for every base N in positional notation there must be N symbols. What happens when the base is larger than 10? In other words, what digit follows 9? Those familiar with hexadecimal numbers know that, by convention, the letters of the alphabet are used for these numbers.

Hexadecimal digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F. Extending this scheme, we can write numbers for any base ranging up to 36—at which point we reach the end of the alphabet, and no standard exists for continuation. Number Base Conversions will allow you to enter numbers from any base within the range of 2–36 and convert to any other base within the same range. Both the integer and fractional parts are converted for you.

Typing It In

Number Base Conversions is written entirely in BASIC. To avoid typing errors, enter it with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. When you've finished, save the program before running it.

Getting Started

When the NBC title screen appears, press any key to get a brief description of what the program does. Press a key again, and you'll be prompted to enter a starting base. We'll start at base 10, so type in *10* and press Return. Next is a prompt for the ending base. Let's use base 2, so type *2* and press Return. A prompt appears asking for the number which is to be converted from base 10 to base 2. For this example, type *85*. After a brief pause, you'll see that 85 in base 10 converted to base 2 is 1010101.

Options

Now that you've tried one conversion, you have a screen full of options to choose from by pressing the appropriate function key. By pressing f1, you can convert the same number in the same starting base you just used to a value in a different base. Let's do that.

Press f1, and you're prompted for the ending base. Type in *8* this time. The program does a quick calculation and reports that the decimal number 85 is 125 in octal, or base 8, notation.

There's every kind of option available from the function key menu. You can change the starting base, the ending base, and the number and ending base, or you can keep both the

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source and target bases but change the number being converted. You may also send your results to a printer or begin again fresh.

Encryption

An interesting application of a base converter program like this is that since base 36 includes the entire alphabet, it's possible to encrypt messages.

Let's try an example by converting my name, Bruce Bowden. NBC prefers lowercase letters. Let's put a decimal between the names so the final result won't be too large. Let's enter *bruce.bowden* as a base 36 number, convert it to base 10, and then convert it to base 2. In base 10, the base 36 bruce.bowden that we enter becomes 19774814.324767927.

To further convert this base 10 number to base 2, press f5 and enter *2* at the prompt. NBC keeps track of the number so that we're not required to enter it manually. The conversion to binary produces 10010110110111101 01011110.01010011001000111111110110101001. (Whew!)

You may find several useful applications for NBC, but it also has theoretical applications. Here are some questions you may want to investigate: If the prime factors of the number 10 are 2 and 5, the base 10 representation of ½ is .5, and the base 10 representation of 1/10 is .2, does a similar relationship exist between a base, its prime factors, and the reciprocals of the prime factors in other base systems?

Are there recognizable patterns in the fractional parts of numbers that suggest that they may be more simply represented in a different base system?

How might two or more base systems be combined to create ciphers that are difficult to crack? There are deeper questions that you may wish to ponder also, such as properties of numeric representation which are invariant over different bases. See what you can discover!

NUMBER BASE CONVERSIONS

```
MS 10 REM COPYRIGHT 1993 - COM
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SP 20 PRINT"{CLR}{3 DOWN}{N}":
      POKE 53280,6:POKE 53281,
      6
PF 30 PRINT"{YEL}":MS$="NUMBER
       BASE CONVERSIONS":GOSUB
      960
KD 40 PRINT"{CYN}":MS$="BY BRU
      CE M. BOWDEN":GOSUB960:P
      RINT"{2 DOWN}{WHT}"
FA 50 MS$="COPYRIGHT, 1992":GO
      SUB960:MS$="COMPUTE PUBL
      ICATIONS INTL LTD":GOSUB
      960
GK 60 MS$="ALL RIGHTS RESERVED
      ":GOSUB 960:GOSUB980
ER 70 PRINT"{CLR}{4 DOWN}"
BR 80 MS$="BASECON WILL CONVER
      T NUMBERS FROM ANY":GOSU
      B960
AD 90 MS$="NUMBER BASE LESS TH
      AN OR EQUAL TO 36":GOSUB
      960
SE 100 MS$="TO ANOTHER BASE IN
       THE SAME RANGE":GOSUB9
      60
QB 110 GOSUB 980:IF S=0 THEN 2
      30
JG 120 PRINT"{CLR}{2 DOWN}SELE
      CT FROM ONE OF THESE FU
      NCTION KEYS:"
KP 130 PRINT"{2 DOWN}F1 ** USE
       THE SAME STARTING BASE
       AND{10 SPACES}NUMBER A
      S BEFORE"
EQ 140 PRINT"{DOWN}F3 ** USE J
      UST THE SAME STARTING B
      ASE"
SH 150 PRINT"{DOWN}F5 ** USE T
      HE ENDING BASE AS THE N
      EW{10 SPACES}BASE AND T
      HE SOLUTION"
RH 160 PRINT"{6 SPACES}AS THE
      {SPACE}NEW NUMBER"
GB 170 PRINT"{DOWN}F7 ** KEEP
      {SPACE}THE SAME STARTIN
      G AND ENDING"
DS 180 PRINT"{6 SPACES}BASES":
      PRINT"{DOWN}F2 ** SEND
      {SPACE}RESULTS TO PRINT
      ER"
DJ 190 PRINT"{DOWN}F4 ** EVERY
      THING FRESH"
QK 200 GETA$:IFA$=""ORA$<"{F1}
      "ORA$>"{F4}"THEN200
SC 210 XX=ASC(A$)-132:ONXXGOTO
      370,300,860,440,890,220
GG 220 RUN230
JM 230 PRINT"{CLR}{2 DOWN}PLEA
      SE ENTER THE STARTING B
      ASE HERE:"
CK 240 PRINT"{2 DOWN}";TAB(12)
      :INPUTS:IFS>=2THEN260
HA 250 PRINTTAB(8);"{2 DOWN}";
      S;"IS LESS THAN 2.":GOT
      O280
SM 260 IFS<=36THEN290
EA 270 PRINTTAB(8);"{2 DOWN}";
      S;"IS GREATER THAN 36."
MD 280 PRINT"{2 SPACES}THE BAS
      E MUST BE BETWEEN 2 AND
       36!":GOSUB 980:GOTO230
FM 290 S=INT(S)
HC 300 PRINT"{CLR}{2 DOWN}PLEA
      SE ENTER THE ENDING BAS
      E HERE:"
KR 310 PRINT"{2 DOWN}";TAB(12)
      :INPUTE:IFE>=2THEN330
PQ 320 PRINTTAB(8);"{2 DOWN}";
      E;"IS LESS THAN 2.":GOT
      O350
CH 330 IFE<=36THEN360
AC 340 PRINTTAB(8);"{2 DOWN}";
      E;"IS GREATER THAN 36."
GH 350 PRINT"{2 SPACES}THE BAS
      E MUST BE BETWEEN 2 AND
       36!":GOSUB 980:GOTO300
SG 360 E=INT(E):GOTO440
DH 370 PRINT"{CLR}{2 DOWN}PLEA
      SE ENTER THE ENDING BAS
      E HERE:"
QS 380 PRINT"{2 DOWN}";TAB(12)
      :INPUTE:IFE>=2THEN410
BB 390 PRINTTAB(8);"{2 DOWN}";
      E;"IS LESS THAN 2."
FJ 400 PRINT"{2 SPACES}THE BAS
      E MUST BE BETWEEN 2 AND
       36!":GOSUB 980:GOTO370
GM 410 IFE<=36THEN430
DD 420 PRINTTAB(8);"{2 DOWN}";
      E;"IS GREATER THAN 36."
      :GOTO400
FS 430 E=INT(E):GOTO470
BH 440 PRINT"{CLR}{2 DOWN}"
QQ 450 PRINT"YOU MAY NOW ENTER
       THE NUMBER WHICH IS
      {3 SPACES}BEING CONVERT
      ED FROM BASE";S
BX 460 PRINT"TO BASE";E;"BELOW
      ":PRINT"{2 DOWN}";TAB(1
      2):INPUTN$
CJ 470 PRINT"{2 DOWN}
      {2 SPACES}PLEASE STANDB
      Y FOR COMPUTATION...":X
      =1
RR 480 IFMID$(N$,X,1)="."THEN6
      90
PX 490 X=X+1:IFX<>LEN(N$)+1THE
      N480
RH 500 I$=N$:F$="0":V=0
DB 510 IFS=ETHEN820
KB 520 IFS<>10THEN560
HE 530 IFI$<>""THEN550
FC 540 I$="0"
CK 550 T=VAL(I$):V=VAL("."+F$)
      :GOTO700
JX 560 T=0:FORX=LEN(I$)TO1STEP
      -1:D=ASC(MID$(I$,X,1)):
      IFD<48ORD>57THEN580
DM 570 T=T+(D-48)*S↑(LEN(I$)-X
      )
GC 580 IFD<65ORD>90THENNEXT:GO
      TO600
PR 590 T=T+(D-55)*S↑(LEN(I$)-X
      ):NEXT
GM 600 IFT<1E10THEN620
XS 610 PRINT"THIS NUMBER IS TO
      O LONG TO BE EVALUATED"
```


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```
        :GOTO110
GF 620  IFF$="0"THEN670
DF 630  V=0:FORX=1TOLEN(F$):D=A
        SC(MID$(F$,X,1)):IFD<48
        ORD>57THEN650
SQ 640  V=V+(D-48)/S↑X
ED 650  IFD<65ORD>90THENNEXT:GO
        TO670
BR 660  V=V+(D-55)/S↑X:NEXT
GX 670  I$=STR$(T):F$=STR$(V):F
        $=MID$(F$,2,LEN(F$)-1):
        IFE=10THEN820
BS 680  GOTO700
QH 690  I$=MID$(N$,1,X-1):F$=MI
        D$(N$,X+1,LEN(N$)-X):GO
        TO510
SX 700  I$="":F$=""
CH 710  A=T/E:DP=INT(E*(A-INT(A
        ))+.5):IFDP<0ORDP>9THEN
        730
HD 720  I$=CHR$(DP+48)+I$:GOTO7
        40
QE 730  I$=CHR$(DP+55)+I$
RQ 740  T=INT(A):IFT<>0THEN710
MS 750  X=1:A=V*E
MM 760  IFINT(A)<0ORINT(A)>9THE
        N780
DM 770  F$=F$+MID$(STR$(INT(A))
        ,2,LEN(STR$(INT(A)))):G
        OTO790
RK 780  F$=F$+CHR$(INT(A)+55)
HR 790  V=A-INT(A):IFV=0THEN820
AF 800  X=X+1:IFX<15ITHENA=V*E:
        GOTO760
GR 810  F$=F$+"..."
GR 820  PRINT"{CLR}{2 DOWN}THE
        {SPACE}BASE";S;"NUMBER
        {SPACE}";N$;" IS"
BK 830  IF E=10 AND F$<>"0" THE
        N PRINT"{2 DOWN}{RVS} "
        ;I$;F$;" {OFF}{2 DOWN}"
EJ 840  IF E<>10 OR F$="0" THEN
         PRINT"{2 DOWN}{RVS} ";
        I$;".";F$;" {OFF}
        {2 DOWN}"
HD 850  PRINT"WHEN EXPRESSED IN
         BASE";E:GOTO110
QE 860  S=E:IF E=10 AND F$<>"0"
         THEN N$=I$+F$
HH 870  IF E<>10 OR F$="0" THEN
        N$=I$+"."+F$
JX 880  T=0:V=0:I$="":F$="":GOT
        O370
QP 890  PRINT"{CLR}{2 DOWN}
        {RVS}{7 SPACES}PRINTOUT
        {SHIFT-SPACE}OF
        {SHIFT-SPACE}THE
        {SHIFT-SPACE}RESULTS
        {10 SPACES}{OFF}"
XA 900  PRINT"{3 DOWN}"
SS 910  PRINT"BE SURE THAT THE
        {SPACE}PRINTER IS SWITC
        HED ON AND IS DEVICE #4
        ":GOSUB 980
MK 920  OPEN3,4,7:PRINT#3,"THE
        {SPACE}BASE";S;"NUMBER
        {SPACE}";N$;" IS"
JK 930  IF E=10 AND F$<>"0" THE
        N PRINT#3,I$;F$
MF 940  IF E<>10 OR F$="0" THEN
         PRINT#3,I$;".";F$
DP 950  PRINT#3,"WHEN EXPRESSED
         IN BASE";E:PRINT#3,:CL
        OSE3:GOTO110
AS 960  REM MESSAGE CENTERING R
        OUTINE
KB 970  FOR MX=1 TO 20-LEN(MS$)
        /2:PRINTCHR$(32);:NEXT:
        PRINTMS$:RETURN
XX 980  PRINT"{HOME}{21 DOWN}
        {YEL}"
JF 990  MS$="PRESS ANY KEY TO C
        ONTINUE":GOSUB 960
GE 1000 GET A$:IF A$="" THEN 1
         000
BX 1010 PRINT"{WHT}":RETURN
```

Bruce M. Bowden is a programmer at COMPUTE.

QUICKSCREEN

By Danny English

Say goodbye to boring titles, text screens, and menus. Quickscreen is a short machine language program that's easy to use and will add excitement to almost any 64 program. A simple SYS command can zoom text or character graphics on and off the screen at the touch of a key.

Getting Started

Quickscreen is written entirely in machine language. To enter it, use MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following addresses.

Starting address: C000
Ending address: C3B7

Be sure to save a copy of the program before you exit MLX. Load the program with the ,8,1 extension, type *NEW*, and then use the SYS commands that are listed below.

Quick Demo is a demonstration program that will give you a better idea of what Quickscreen can do and how to use it in your own BASIC programs. It is written in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; again see "Typing Aids." Save the demo on the same disk that Quickscreen is on because the demo loads and runs the main program. The demo also shows you how to load Quickscreen into your own BASIC programs as they run.

Using the Program

To use Quickscreen in your programs, refer to the table of commands printed below. As you start to program a title screen, for instance, first hide the screen with SYS 49152,7. This prevents any images from appearing on-screen until you're ready.

Next, create your title screen, menu, or text screen, using POKEs or PRINT statements as you normally would. Then store the screen to the Quickscreen buffer (SYS 49152,0). The next steps are to clear the screen and then to return the screen to normal with SYS 49152,8. Your screen is now ready to animate.

You have three methods (like those found in commercial programs) of scrolling text onto the screen. When it is time to clear the screen, a call to another command will scroll the screen out. Be aware that the buffer will be cleared as you clear the screen.

Ideas

As you use Quickscreen, you'll find dozens of other uses for it. In addition to giving your title screens a professional look, you can also use Quickscreen in adventure games to scroll text in and out. Creating a custom character slide show would be a cinch with Quickscreen. The commands that scroll the screen out can be used to clear any screen. You can also use Quickscreen commands in direct mode.

SYS Command	Function
SYS 49152,0	Store screen in buffer
SYS 49152,1	Scroll in 1
SYS 49152,2	Scroll out 1
SYS 49152,3	Scroll in 2
SYS 49152,4	Scroll out 2
SYS 49152,5	Scroll in 3
SYS 49152,6	Scroll out 3
SYS 49152,7	Hide screen
SYS 49152,8	Return screen

QUICKSCREEN

```
C000:20 9B B7 8A C9 00 F0 2D 75
C008:C9 01 F0 2C C9 02 F0 2B F2
C010:C9 03 F0 2A C9 04 F0 29 61
```


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```
C018:C9 05 F0 28 C9 06 F0 27 CF
C020:C9 07 F0 05 C9 08 F0 07 0E
C028:60 A9 00 8D 11 D0 60 A9 53
C030:1B 8D 11 D0 60 4C 48 C2 59
C038:4C BE C2 4C EA C2 4C F3 9B
C040:C2 4C 4A C3 4C 57 C3 4C 4F
C048:A7 C3 20 C2 C0 C0 00 F0 B8
C050:1E A5 F8 18 69 28 85 F8 DA
C058:A5 F9 69 00 85 F9 A5 FC B4
C060:18 69 28 85 FC A5 FD 69 89
C068:00 85 FD 88 4C 4D C0 E0 8D
C070:00 F0 1E A5 FA 18 69 28 7F
C078:85 FA A5 FB 69 00 85 FB 42
C080:A5 FE 18 69 28 85 FE A5 29
C088:FF 69 00 85 FF CA 4C 6F EF
C090:C0 A0 00 B1 FA 91 F8 B1 77
C098:FE 91 FC C8 C0 28 D0 F3 66
C0A0:60 A2 07 A0 98 84 F8 86 35
C0A8:F9 A2 07 A0 C0 84 FA 86 4F
C0B0:FB A2 DB A0 98 84 FC 86 B5
C0B8:FD A2 DB A0 C0 84 FE 86 04
C0C0:FF 60 A9 00 85 F8 85 FA A5
C0C8:85 FC A9 04 85 F9 A9 C8 F1
C0D0:85 FB A9 D8 85 FD A9 E8 37
C0D8:85 FE A9 CB 85 FF 60 20 DB
C0E0:A1 C0 A0 00 B1 F8 91 FA 07
C0E8:B1 FC 91 FE C8 C0 28 D0 0F
C0F0:F3 20 13 C2 A5 FB C9 04 B7
C0F8:D0 E8 A5 FA C9 00 D0 E2 54
C100:60 20 A1 C0 A0 00 B1 F8 5D
C108:91 FA B1 FC 91 FE C8 C0 F3
C110:28 D0 F3 20 13 C2 A5 FB 47
C118:C9 05 D0 E8 A5 FA C9 E0 F7
C120:D0 E2 A2 04 A0 28 84 F8 01
C128:86 F9 A2 04 A0 00 84 FA 0B
C130:86 FB A2 D8 A0 28 84 FC 83
C138:86 FD A2 D8 A0 00 84 FE 6D
C140:86 FF A0 00 B1 F8 91 FA AA
C148:B1 FC 91 FE C8 C0 28 D0 70
C150:F3 20 DE C1 A5 FB C9 05 83
C158:D0 E8 A5 FA C9 B8 D0 E2 98
C160:60 A2 05 A0 90 84 F8 86 76
C168:F9 A2 05 A0 B8 84 FA 86 90
C170:FB A2 D9 A0 90 84 FC 86 F6
C178:FD A2 D9 A0 B8 84 FE 86 45
C180:FF A0 00 B1 F8 91 FA B1 FC
C188:FC 91 FE C8 C0 28 D0 F3 97
C190:20 13 C2 A5 FB C9 04 D0 7B
C198:E8 A5 FA C9 00 D0 E2 A2 A1
C1A0:06 A0 30 84 F8 86 F9 A2 16
C1A8:06 A0 08 84 FA 86 FB A2 2D
C1B0:DA A0 30 84 FC 86 FD A2 B8
C1B8:DA A0 08 84 FE 86 FF A0 CD
C1C0:00 B1 F8 91 FA B1 FC 91 13
C1C8:FE C8 C0 28 D0 F3 20 DE 0E
C1D0:C1 A5 FB C9 07 D0 E8 A5 AD
C1D8:FA C9 C0 D0 E2 60 A5 F8 4E
C1E0:18 69 28 85 F8 A5 F9 69 E3
C1E8:00 85 F9 A5 FA 18 69 28 9A
C1F0:85 FA A5 FB 69 00 85 FB BC
C1F8:A5 FC 18 69 28 85 FC A5 1F
C200:FD 69 00 85 FD A5 FE 18 D3
C208:69 28 85 FE A5 FF 69 00 EC
C210:85 FF 60 A5 F8 38 E9 28 63
C218:85 F8 A5 F9 E9 00 85 F9 47
C220:A5 FA 38 E9 28 85 FA A5 CF
C228:FB E9 00 85 FB A5 FC 38 27
C230:E9 28 85 FC A5 FD E9 00 2E
C238:85 FD A5 FE 38 E9 28 85 E3
C240:FE A5 FF E9 00 85 FF 60 C3
C248:20 C2 C0 A0 00 B1 F8 91 FA
C250:FA B1 FC 91 FE A5 F8 18 11
C258:69 01 85 F8 A5 F9 69 00 FA
C260:85 F9 A5 FA 18 69 01 85 79
C268:FA A5 FB 69 00 85 FB A5 9E
C270:FC 18 69 01 85 FC A5 FD 21
C278:69 00 85 FD A5 FE 18 69 06
C280:01 85 FE A5 FF 69 00 85 4D
C288:FF A5 F9 C9 07 D0 BE A5 F1
C290:F8 C9 E8 D0 B8 60 A2 C8 84
C298:A0 00 86 FB 84 FA A0 00 50
C2A0:A9 20 91 FA A5 FA 18 69 97
C2A8:01 85 FA A5 FB 69 00 85 D4
C2B0:FB A5 FB C9 CB D0 E9 A5 D4
C2B8:FA C9 E8 D0 E3 60 A9 93 DF
C2C0:20 D2 FF A9 18 8D F1 CF 50
C2C8:A9 00 8D F2 CF AE F1 CF F0
C2D0:AC F2 CF 20 4A C0 20 DF DA
C2D8:C0 CE F1 CF AD F1 CF C9 4C
C2E0:00 D0 EA A2 00 A0 00 4C F0
C2E8:4A C0 20 96 C2 20 DF C0 48
C2F0:4C C3 C2 A9 93 20 D2 FF 43
C2F8:A2 00 A0 0B 8E F1 CF 8C FC
C300:F2 CF A2 18 A0 0D 8E F3 15
C308:CF 8C F4 CF AE F1 CF AC BF
C310:F2 CF 20 4A C0 AE F3 CF 26
C318:AC F4 CF 20 4A C0 20 01 C5
C320:C1 EE F1 CF CE F3 CF AD 13
C328:F1 CF C9 0B D0 DE A2 0D DA
C330:A0 0D 20 4A C0 A2 0C A0 3D
C338:0C 20 4A C0 A2 0A A0 0A AB
C340:20 4A C0 A2 0B A0 0B 4C E9
C348:4A C0 20 96 C2 A2 0C A0 EB
C350:0C 20 4A C0 4C 5C C3 A9 40
C358:93 20 D2 FF A2 0B A0 00 8E
C360:8E F1 CF 8C F2 CF A2 0D 97
C368:A0 18 8E F3 CF 8C F4 CF C1
C370:AE F1 CF AC F2 CF 20 4A F1
C378:C0 AE F3 CF AC F4 CF 20 80
C380:4A C0 20 61 C1 CE F1 CF 74
C388:EE F3 CF AD F1 CF C9 00 BB
C390:D0 DE A2 00 A0 00 20 4A 1C
C398:C0 A2 0C A0 0C 20 4A C0 EA
C3A0:A2 18 A0 18 4C 4A C0 20 42
C3A8:96 C2 A2 0C A0 0C 20 4A 01
C3B0:C0 4C F8 C2 00 00 00 00 F6
```

QUICK DEMO

```
PK 5 REM COPYRIGHT 1993 - COMP
     UTE PUBLICATIONS INTL LTD
     - ALL RIGHTS RESERVED
ES 10 IF PEEK(49152) <> 32 THE
     N LOAD"QUICKSCREEN",8,1
AS 20 D$="{HOME}{24 DOWN}":A$=
     "**********************
     ***************{HOME}"
EG 30 POKE53280,0:POKE53281,0
DC 40 PRINT"{CLR}":FOR X=0 TO
     {SPACE}250:NEXT X
KC 50 PRINT"{4 DOWN}{YEL}"SPC(
     14)"{RVS}QUICKSCREEN!
     {OFF}"
BK 60 PRINT"{2 DOWN}{CYN}
     {5 SPACES}BORING TEXT DI
     SPLAYS COME ALIVE!"
SA 70 PRINT"{DOWN}{3}
     {5 SPACES}CHARACTER GRAP
     HIC DISPLAYS ZOOM!"
MQ 80 PRINT"{3 DOWN}{WHT}"SPC(
     14)"{RVS}SELECT DEMO:
     {OFF}"
DJ 90 PRINT"{2 DOWN}{6}"SPC(5)
     "1) DEMO # 1 {GRN}- SCRE
     EN ROLL IN"
XE 100 PRINT"{DOWN}{6}"SPC(5)"
     2) DEMO # 2 {GRN}- SCRE
     EN SPLIT"
XM 110 PRINT"{DOWN}{6}"SPC(5)"
     3) DEMO # 3 {GRN}- SCRE
     EN MERGE"
PC 120 GET K$:IF K$="1"THEN 31
     0
DP 130 IF K$="2"THEN 370
BF 140 IF K$="3"THEN 430
SP 150 GOTO120
MS 160 REM ** DRAW & STORE SCR
     EEN **
AS 170 SYS 49152,7: REM *** SC
     REEN OFF
MK 180 PRINT"{CYN}{CLR}"A$;D$;
     A$
RA 190 FOR X=1024 TO 1984 STEP
      40:POKE X,42:NEXT
QC 200 FOR X=1063 TO 2023 STEP
      40:POKE X,42:NEXT
JH 210 PRINT"{HOME}{4 DOWN}"SP
     C(12)"{3}{RVS}QUICKSCRE
     EN DEMO"
HQ 220 PRINT"{2 DOWN}{WHT}"SPC
     (6)"A QUICK SYS COMMAND
      MOVES THE"
QC 230 PRINT"{2 DOWN}"SPC(12)"
     SCREEN IN OR OUT."
JJ 240 PRINT"{4 DOWN}{YEL}
     {4 RIGHT}CAN BE USED IN
      BASIC OR MACHINE"
DS 250 PRINT"{2 DOWN}"SPC(12)"
     LANGUAGE PROGRAMS."
RP 260 PRINT"{2 DOWN}{PUR}"SPC
     (9)"{RVS}{DOWN} PRESS A
      KEY CONTINUE {HOME}"
JH 270 SYS 49152,0: REM *** ST
     ORE SCREEN
GB 280 PRINT"{CLR}":{4 SPACES}
     REM *** CLEAR SCREEN
GG 290 SYS 49152,8: REM *** SC
     REEN ON
HJ 300 RETURN
MX 310 REM ** DEMO # 1 **
GG 320 GOSUB 160: REM *** DRAW
      & STORE SCR
PC 330 SYS 49152,1: REM *** MO
     VE IN # 1
QR 340 GET K$:IFK$=""THEN 340
EJ 350 SYS 49152,2: REM *** MO
     VE OUT # 1
DM 360 GOTO 40
FC 370 REM ** DEMO # 2 **
BM 380 GOSUB 160: REM *** DRAW
      & STORE SCR
FM 390 SYS 49152,3: REM *** MO
     VE IN # 2
SQ 400 GET K$:IFK$=""THEN 400
PD 410 SYS 49152,4: REM *** MO
     VE OUT # 2
```


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```
JS 420 GOTO 40
CG 430 REM ** DEMO # 3 **
GR 440 GOSUB 160: REM *** DRAW
       & STORE SCR
FF 450 SYS 49152,5: REM *** MO
       VE IN # 3
KB 460 GET K$:IFK$=""THEN 460
MP 470 SYS 49152,6: REM *** MO
       VE OUT # 3
BC 480 GOTO 40
```

Danny English is the author of Powersprite (March 1993). He lives in Moreno Valley, California.

ALTKEY

By Ron Loughran

The programmable function keys on the 128 are a great convenience. I liked them so much I wanted more of them. AltKey is the result.

The program uses the 128's Alt (Alternate) key in combination with any alphanumeric key (A–Z and 0–9) or other unshifted key, such as the comma, period, or semicolon. With them you can print anything, up to 16 characters in length, that you've assigned to that key. A few keys cannot be programmed. These include the space, the back and up arrows, the At key (@), and the British pound key.

AltKey can be used to print commands in immediate mode, to construct a program line, or to help you while you're working with the 128's machine language monitor. When you call up a defined key, it's only necessary to press Return to execute any command or series of commands assigned to that key. AltKey works on the 128 in 40-column mode.

Typing It In

AltKey consists of three machine language programs that must be entered with MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. For the first program, when MLX prompts, respond with the following values.

Starting address: 0C00
Ending address: 0C8F

When you've finished typing, be sure to save the program to disk with the filename PREP before you exit MLX.

For the second program, Juker, when MLX prompts, respond with the values printed below.

Starting address: 1620
Ending address: 1677

When you've finished typing this program, save it to disk with the filename JUKER.ML.

For the third program, AltKey, when MLX prompts, respond with the values printed below.

Starting address: FA29
Ending address: FB00

When you've finished typing, be sure to save this program to disk with the filename ALTKEY.ML.

The first program, Prep, prepares the area of memory where the key data will be stored by filling it with zeros. It then identifies the memory used for each key, marks the keys that aren't available, and installs data that is used for saves. Prep's 140 bytes save you from entering more than 800 bytes.

Preparing Disks

When you first run AltKey, BLOAD all three programs and activate Prep by typing *SYS 3072*. Then put in a disk on which you want the finished AltKey program to reside. Type *SYS 5725* to turn on AltKey. Enter the machine language monitor by pressing f8. If your function keys have been redefined, type *MONITOR* and press Return.

Move the cursor to a clear area of the screen at least five lines above the bottom, hold down the Alt key and simultaneously press the At key (@). Two lines will appear onscreen. Move the cursor down to the line that reads *S"ALTKEY.ML" 8 FA29 FE2A* and press Return. Move the cursor back to that same line and change it to read *S"JUKER.ML" 8 1620 1674* and press Return.

This saves copies of AltKey and Juker to your work disk. Whenever you want to put AltKey on another disk, use this method, but don't use Prep. Prep will erase any key definitions that you may have entered.

Using AltKey

BLOAD both JUKER.ML and ALTKEY.ML and type *SYS 5725* to start the program; *SYS 5719* to exit.

To assign characters to a key, type the desired key at the left margin followed immediately by up to 16 characters of whatever you want that key to type. Mark the end of your text with a back-arrow key (←). Then hold down the Alt key and simultaneously press the back-arrow key. For example, type in the following line with four spaces between the quotation marks. Remember to hold down the Alt key while pressing the second (←)key.

D?DEC(" ")←←

This will define the D key to print code for converting a four-digit hexadecimal number into its decimal equivalent. Move the cursor anywhere on the screen, hold down the Alt key, and simultaneously press the D key. You should see the following line onscreen.

?DEC(" ")

Enter a hex address between the quotation marks—C000 for example—and then press Return. The 128 will print the decimal location, which in this example is 49152. You could have used the word *PRINT* instead of the question mark shorthand symbol, but it would have used more of your 16 characters.

What's Been Defined?

After you've defined a number of keys, it may be difficult to remember which keys do what. Hold down Alt and press the up-arrow key (↑) to see a list of all the available keys and their definitions.

To save your defined keys, enter the ML monitor and remember to scroll the screen so that the cursor is at least five lines above the bottom of the screen. Then use the At key (@) as above. You'll see *@,S0:ALTKEY.ML* on the screen. Then, without moving the cursor, press Return. After the *SCRATCHED FILE* message appears, press Return again to save the new version of AltKey. Then, whenever you load AltKey in the future, you'll have those defined keys ready for use.

Caveats

AltKey doesn't use the Kernal. It writes directly to the screen, so at times the first character will appear in reverse video. This is cosmetic only and doesn't affect anything. If whatever prints wraps

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to the next line, that line will not be linked. Move the cursor until it wraps to a new line and then use AltKey.

PREP

```
0C00:A2 2A A9 FB 85 FC A9 00 5C
0C08:85 FB A0 00 A9 00 91 FB 62
0C10:C8 C0 0F D0 F9 8A 91 FB C4
0C18:18 A9 10 65 FB 85 FB 90 7D
0C20:02 E6 FC E8 E0 3C F0 18 13
0C28:E0 3E F0 14 E0 3F F0 10 95
0C30:E0 40 F0 08 E0 5B D0 D2 50
0C38:A9 67 D0 06 A9 80 D0 02 6C
0C40:A9 59 86 FA A0 00 AA BD 1C
0C48:00 0C 91 FB F0 04 C8 E8 67
0C50:D0 F5 A6 FA E0 5B D0 B6 9F
0C58:60 0E 0F 14 20 01 16 01 79
0C60:09 0C 01 02 0C 05 00 13 C7
0C68:22 01 0C 14 0B 05 19 2E 61
0C70:0D 0C 22 20 38 20 06 01 A7
0C78:32 39 20 06 05 32 39 00 BF
0C80:20 2C 13 30 3A 01 0C 14 1B
0C88:0B 05 19 2E 0D 0C 00 00 06
```

JUKER.ML

```
1620:E0 08 F0 03 4C AD C6 AA 5E
1628:8D 01 FF 4C 3D FA A0 FE 36
1630:84 FE A9 10 2C A9 20 85 62
1638:FD 60 A9 04 A2 00 85 FC 0E
1640:86 FB 60 A5 E0 85 FB A5 CF
1648:E1 85 FC A5 EC 18 65 FB 4F
1650:85 FB 90 02 E6 FC 60 A9 06
1658:C6 A0 AD D0 04 A9 16 A0 66
1660:20 A2 3C 78 9D 01 03 98 E3
1668:9D 00 03 58 60 20 DD 02 8A
1670:A8 91 E0 60 00 00 00 00 77
```

ALTKEY.ML

```
FA29:20 E5 FA 20 43 16 A0 00 BD
FA31:B1 FD F0 07 91 FB C8 C0 DC
FA39:10 D0 F5 60 E0 40 F0 0E 28
FA41:E0 5E F0 2A E0 5F F0 68 CE
FA49:20 29 FA 4C DD 02 20 43 38
FA51:16 A9 78 20 4D 16 20 2E FE
FA59:16 20 2F FA 98 20 4D 16 ED
FA61:20 35 16 20 2F FA A2 40 64
FA69:20 29 FA 4C 6D 16 20 3A 1C
FA71:16 A2 29 86 FA A0 00 E6 E9
FA79:FA A5 FA C9 5B F0 CC C9 54
FA81:40 F0 F2 90 02 E9 40 91 05
FA89:FB 20 AA FA A6 FA A9 02 01
FA91:20 4D 16 20 E5 FA 20 2F 3A
FA99:FA C0 12 B0 05 20 AB FA 85
FAA1:D0 F7 A9 12 20 4D 16 D0 87
FAA9:CC C8 A9 20 91 FB C8 60 DD
FAB1:A0 00 B1 E0 F0 95 C9 3E EB
FAB9:B0 91 C9 2A B0 06 C9 1B 94
FAC1:B0 89 69 40 20 E6 FA A5 DB
FAC9:FD D0 02 C6 FE C6 FD C8 77
FAD1:C0 11 F0 E0 B1 E0 C9 1F 5C
FAD9:F0 06 91 FD D0 F1 F0 D4 E0
FAE1:A9 00 F0 F6 8A 38 E9 2A 6D
FAE9:0A 0A 85 FD A9 00 85 FE 4F
FAF1:06 FD 26 FE 06 FD 26 FE 92
FAF9:A9 FB 65 FE 85 FE 60 00 49
```

Ron Loughran lives in Flemington, West Virginia. ❐

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.

If you don't have access to a back issue or to one of our disks, write to us, and we'll send you free printed copies of both of these handy programs for you to type in. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope. Send a self-addressed disk mailer with appropriate postage to receive these programs on disk.

Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

ATTENTION WRITERS PROGRAMMERS

Gazette wants to purchase and publish your utilities, applications, games, educational programs, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it and the documentation on disk to

Gazette Submissions Reviewer
COMPUTE Publications
324 W. Wendover, Ste. 200
Greensboro, NC 27408

Please enclose an SASE if you want to have your materials returned.

ONLY ON DISK

Here are bonus programs that you'll find only on this month's Gazette Disk.

Video Tape Supervisor
By Tom Rich
Austin, TX

Video Tape Supervisor is a great database program for the film buff who has a large video library. With VTS you can inventory and organize your videotapes. Use it to display movies alphabetically; by tape number; or by category, such as adventure, comedy, Western, drama, and so on. Create your own specialized film lists, locate the tape on which a film is recorded, and track data for up to 200 tapes and 450 movies.

Stock Holdings
By William F. Rose
Wantagh, NY

A few months ago Gazette called for useful applications to use with COMPUTE's SpeedCalc spreadsheet. Stock Holdings is a template that William Rose has used for more than five years to track his stock portfolio. Stock Holdings tracks the dollar value of each stock and calculates the total value of all holdings for each week during a year. The template can be easily edited to suit your own portfolio.

Screen Gems
Henning Vahlenkamp
Matawan, NJ

These graphical programs for the 128 appeared in a tutorial in last month's Gazette, but several readers asked to have these BASIC 7.0 gems on disk. Here they are for your convenience.

You can have these program and all the others that appear in this issue by ordering the June 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.

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AST POWEREXEC

I've always felt that the only fair way to evaluate a laptop is to take it on the road and see how well it performs. I wasn't disappointed with the AST PowerExec.

This handsome little computer has all the features you'd expect in a top-of-the-line desktop, and it makes for a very powerful piece of carry-on luggage. The unit I reviewed, the 3/25SL Model 123/W, came equipped with a 123MB hard drive, a 25-MHz Intel 386SL processor, VGA LCD display, a 2400-bps modem, and a built-in mouse. As for software, it comes with Microsoft Windows 3.1, MS-DOS 5.0, and Smart Help online documentation.

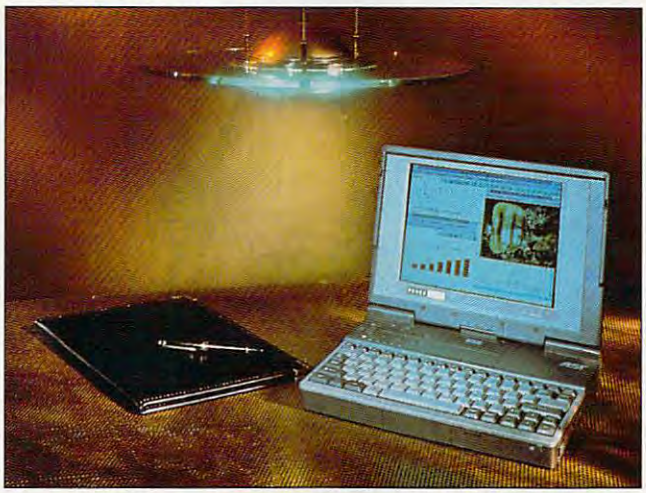
For me, perhaps the best feature of the PowerExec is the built-in mouse. It's comfortably mounted on the computer case just below the space bar and operates in the same fashion as the one on the Apple Powerbook.

The PowerExec's Intel microprocessor has a 64K CPU cache and is upgradeable. It's the first laptop in the industry that allows you to upgrade to a high-performance 486, 32-bit processor with 3-volt technology. This feature gives you added power when you need it, conserves battery life, and offers a little insurance in an ever-changing computer market.

AST has included the wonderful new PCMCIA technology in the PowerExec. PCMCIA slots work in much the same way as the ISA slots do in your desktop computer, except that instead of plugging in huge expansion cards, you use credit-card–sized ones.

Besides the two PCMCIA expansion slots, you get plenty of standard ports. There's a serial port; a parallel port; an external VGA video port; an expansion port; and a selectable port for 101-key enhanced keyboard adapter, numeric keypad, or PS/2 mouse.

The PowerExec comes standard with a 9½-inch CCFT side-lit film-compensated triple-supertwist LCD VGA display. It's upgradeable to a passive- or an active-matrix color LCD display.



The AST PowerExec passes the road test, offering a wealth of impressive features that deliver when they're needed.

The PowerExec provides a significantly longer battery life than most laptops on the market. With a single 90-minute charge from the provided PowerCharge, you can use the computer from four to six hours. The nickel metal hydride battery pack, more efficient power supply, low-power components, and host of intelligent power-management features allow the PowerExec to offer exceptionally long battery life.

A powerful multifeatured notebook like the PowerExec just isn't complete without security features. AST provides several. One renders the computer completely useless if stolen. You have the ability to establish two unbreakable passwords, one for the end user and another for an MIS administrator. For added protection, there are no hidden overrides to password protection, and there are no hardware jumpers in the system to disable password protection.

Last, but certainly not least, a computer needs an excellent service program. I believe AST has a good one: AST ExeCare Plus. You get free, 48-hour repair/replace service for the first year; it costs $130 each additional year. Should something happen, all you pay is the Federal Express delivery charges required to get the computer to AST; the return postage is paid by AST.

In my opinion, the AST PowerExec has everything you could ask for in a notebook computer, including an attractive list price of $2,795. You get great speed, excellent power management, security, an upgradeable architecture, and great service—and all those advantages are backed by a name that you can trust.

TROY TUCKER

AST
(800) 876-4278
$2,795 (modem $279)
Circle Reader Service Number 434

STEPWAY

You're a hard sell, you home computer user, and who can blame you? Like so many other not-so-affluent PC owners, you'd rather not spend major bucks on Windows, GeoWorks, or any other fancy task swapper, but you still want a multifeatured package. The kids need to write term papers, you need an address manager to keep up with friends and distant family, and, of course, you all could use a calendar maker to keep one step ahead of schedule. That's what you bought a PC for, right?

Want more? How about a household inventory program, a powerful paint program, a recipe filer, a card shop, and a banner maker? Stepway from Step One packs these modules and then some into a single package. Too good to be true? Perhaps. Like other all-in-one solutions, some Stepway features have room for improvement.

Consider the Art Shop module. Far more advanced than its Windows counterpart, Art Shop considers your every scribble an object. Later, you just click on one of these objects to move, resize, delete, or shuffle images from back to front. Multiple fill types and flexible text-manipulation options make sophisticated effects painless to perform—you can rotate and slant your words at will. Everything you might need for original painting waits right

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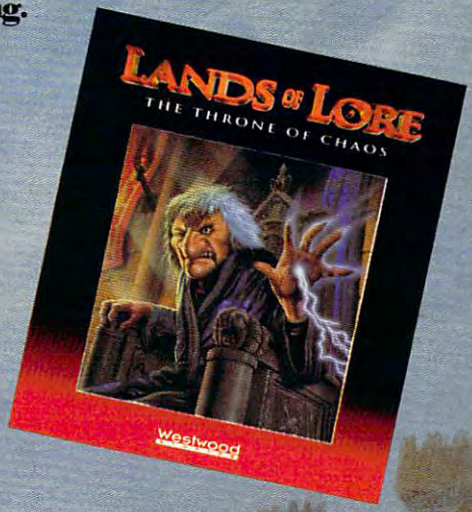

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here, but no import-export options exist outside the Stepway program itself. Saved Art Shop files transfer to Word Shop or Card Shop, but not to other paint programs. Nor can you import an image file in PCX or BMP format—troublesome for artists who'd like to mix and match visual data.

Card Shop offers many of the same options you might find in a product such as Brøderbund's Print Shop: borders, multiple card layouts, text input, and freehand drawing. Not bad—except for the shortage of quality clip art. Again, an image import option would make this module far more useful. On the other hand, Sign Shop does just fine without any special graphics: The filled polygons and outsized text at your disposal here can generate some effective banners and posters.

The Inventory module tracks your possessions readily with data fields for values, descriptions, and the other pertinent information you'll need should you ever suffer the ravages of fire or theft. The Address Book program offers multiple fields. When you need a hard copy, you choose and arrange which data to print. This allows for customized lists that require very little paper.

For kitchen help, Stepway's Recipe module arrives with a list of common recipe ingredients, ready for you to click them into your own foodstuff formulas. A spacious area for instructions ensures that cooks will know with a glance what steps they must take next. The To Do module renders shopping trips and spring cleaning simple affairs with high and low priorities for each task. And when you desire a vacation, the Calendar program can show you your commitments on a monthly, weekly, or daily basis. No time for an extended break? Try your hand at one of the seven solitaire variations available—everything from Klondike to Demon and Beleaguered Castle, all of them engaging games.

Though some of its features could stand improvement, Stepway offers an inexpensive alternative to Windows or GeoWorks.

Least impressive of all the Stepway modules, Word Shop feels a bit clumsy to experienced word processor users. Instead of using a flashing cursor, Word Shop indicates your position on the page with a below-line arrow—disconcerting at first. The familiar cut-and-paste options are here, but again, no recourse for importing non-Stepway files, even vanilla ASCII text. Some of the included fonts print well enough for school reports, but without stronger scaling you might hesitate to submit them in a corporate setting. Word Shop will not wrap text around Art Shop art, but it does an acceptable job of printing graphics and text within the same document. Otherwise, this word processor handles the chores and pleasures of correspondence without a grumble. Most domestic uses won't strain its resources.

Ever present in Stepway, the notepad, calculator, and clock allow you to pass notes, numerical data, and alarm settings from one application to another. The one-click approach to computing—Stepway doesn't distinguish between left and right mouse buttons—puts you where you want to be with a minimum of fuss. Perhaps best of all niceties, however, Stepway's exhaustive online help, with its highlighted hypertextual keywords, means you'll never need the manuals. The 11 flimsy leaflets would profit from three-ring binding, though their internal layout proves logical enough.

Step One promises more Stepway modules; hopefully, a file-conversion or import utility and a slicker word processor will be among them. For now, minor failings such as these shouldn't stop anyone in the market for a multipurpose home-computing solution. After all, where else can you get all of the above and screen savers, too?

DAVID SEARS

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JDR 33-MHZ 486 CACHE SYSTEM

If you're in the market for a 486DX/33 computer with quality components and support at a mail-order price, consider this JDR system. With 4MB RAM, a 210MB IDE hard drive, a 64K external cache, a Super VGA monitor, a mouse, and Windows 3.1 and DOS 5.0 preinstalled, it packs power and value.

One of the great things about the 486 microprocessor is that it zips Windows apps right along, something you'll notice and appreciate if, like me, you've found yourself staring at the Windows hourglass too much on a 386 system. This JDR system ran Ami Pro, Excel, and the other Windows apps I tried without a hiccup and without undue waiting for screen redraws. Because this is a DX system, it offers the built-in coprocessing capabilities of the microprocessor for those programs that take advantage of one.

Inside the system box, you'll find an AMI BIOS with shadow RAM and password protection. Two of the eight bus slots on the motherboard are occupied, leaving three 8-bit slots and three 16-bit slots available for expansion. The motherboard accommodates up to 32MB of RAM using the increasingly familiar (and easy-to-install) SIMMS, and, with the memory board fully populated, you can have a total of 64MB of RAM. Of the three

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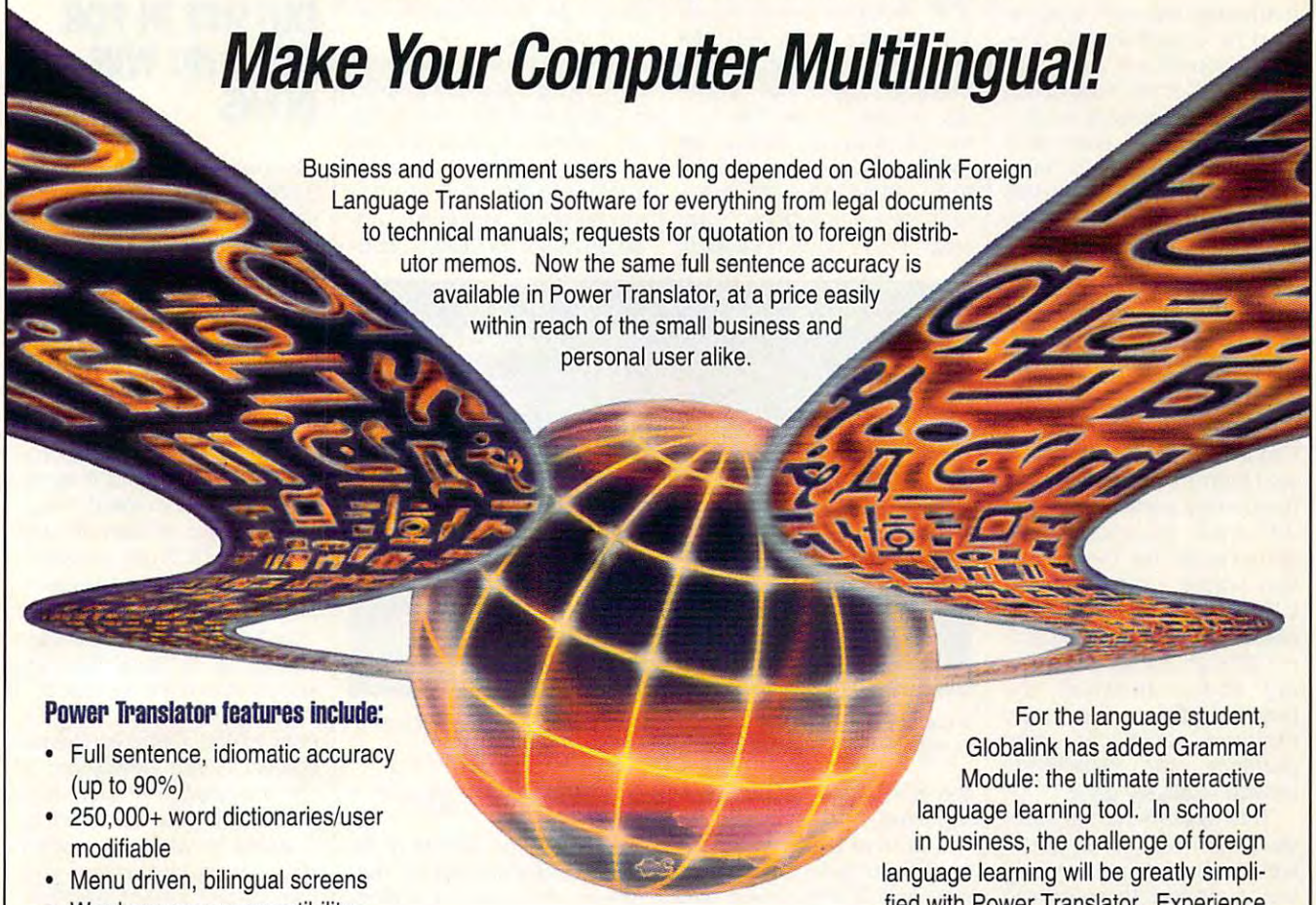

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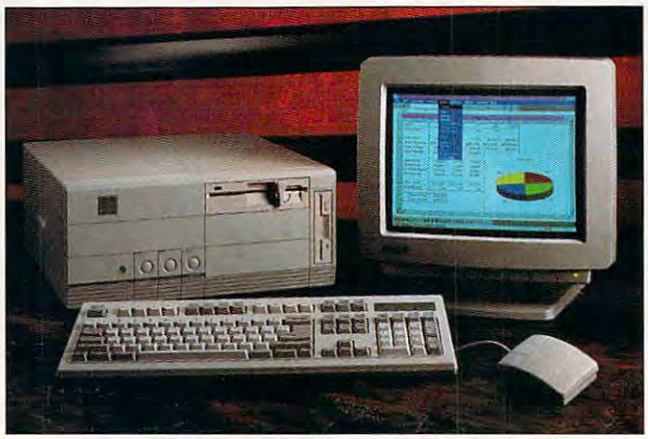
horizontal bays, one is occupied by a high-density 5¼-inch floppy drive, one contains the Conner hard drive, and one is available for another peripheral, such as a CD-ROM drive or a tape drive. The 3½-inch high-density floppy drive mounts to the right of the other bays.

Seven screws must be removed to get inside the box, more than I'm accustomed to. But it's a sturdy box, roomy enough for good ventilation and relatively easy access. I added a Creative Labs Sound Blaster Upgrade Kit and had to remove the vertically mounted drive to access the screw holes for the middle bay where I mounted the CD-ROM drive. That turned out to be easier than expected, though. While the working space between the bays and the power supply required some care and patience, the installation proved relatively easy.

This system comes standard with two serial ports, which allowed me to install the supplied three-button JDR serial mouse and a portable fax/modem. I found the mouse comfortable and responsive, the buttons just a tad more difficult to press than those on a Microsoft mouse. You also get a parallel port, a game port, and, of course, a port for the keyboard. JDR supplies a BTC 101-key enhanced keyboard with status lights for Num Lock, Caps Lock, and Scroll Lock. I would've preferred a slightly firmer action in the keyboard, but otherwise it was just fine.

Video has come to play an increasingly important role in computing comfort and satisfaction, and the JDR system delivers on both counts. Equipped with a 14-inch .28-mm dot-pitch JDR noninterlaced Super VGA monitor and a 16-bit Super VGA card capable of displaying 1024 × 768 graphics in 256 colors, this system is ready to handle today's demanding applications. While the card manufacturer's name doesn't appear in the documentation, the STB PowerGraph name appears on the labels for the drivers disks. I like the front controls for STB's monitor, and it performed well for me. A pronounced screen bounce proved to be the only disconcerting problem for me; it occurred when I switched between text and graphics modes.



Expect efficiently packaged power in the JDR 33-MHz 486 Cache System, which comes loaded with software and features.

According to PC Probe's microprocessor benchmark test, this computer performs as if it were a 110.82-MHz IBM AT. The disk benchmark test turned in a fast 15-ms random seek time and 3-ms track-to-track time, with a disk-to-memory data-transfer rate of 1031.33K per second.

In addition to the speed, power, and storage, this system offers one of the better internal speakers I've heard. It's clearer and louder than most, though you really should invest in one of today's inexpensive sound cards to fully appreciate your software.

JDR's system comes with concise guides to MS-DOS 5.0 and Microsoft Windows 3.1, as well as floppy copies of DOS (but not Windows). You'll also find disks with a mouse driver and utilities, video drivers and utilities, special Windows drivers, and a driver for EMS.

I found the JDR manual good on most counts: diagrams, descriptions, a glossary, and troubleshooting. For questions not answered in the manual, I found courteous and responsive help through JDR's tech support line (a toll-free number). The system comes with a 30-day money-back guarantee and a limited one-year warranty. Need accessories or peripheral upgrades? JDR has a catalog full of them, along with a lot of tips.

JDR has been around since 1979, and its experience selling quality components is evident in this solid system. I recommend it.

MIKE HUDNALL

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OUTSIDE IN FOR DOS AND WINDOWS

The original Outside In from Systems Compatibility Corporation (SCC) is a DOS memory-resident utility that allows you to view and insert into your word processor text or data from other applications. SCC has now released an upgraded DOS version and an enhanced Windows version. Each has the ability to view and copy data from a file into a word processing document.

This latest version of Outside In for DOS has a few improvements over earlier versions. The most important change is that it now allows you to define noncontiguous sections of a file to import.

Outside In for DOS is easy to use. Once you've installed it, you simply press Ctrl-I to view or import text or data. If you switched to Outside In while in a word processing document, you can easily select another file to view and import from. Outside In retains character attributes such as bold, underline, and italics. The program will allow you to view almost any type of file, whether it be another word processing document, spreadsheet data, or a database file. In fact, the documentation lists more than six dozen file formats Outside In will read.

Outside In for DOS is highly intuitive. If you can't figure out the easiest way to accomplish the task at hand, you can access the program's good onscreen help.

I tried importing data from Lotus 1-2-3, Quattro Pro, dBASE III+, and several DOS word processing documents. Outside In did a

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good job importing data from all of these files. I tried viewing and inserting from one Windows application, Word for Windows. Outside In did view the file—and you certainly could read and import the Word document—but the program couldn't read the formatting codes and gave cryptic codes such as *SYMBOL 183 \f 'Symbol' \s 10 \h.* I can't recommend Outside In for DOS if you plan to import data from Windows applications into a DOS word processor. But if you use DOS applications extensively and you need the ability to view data from another file or to import data from one file to your DOS word processor, Outside In for DOS is an easy-to-use option.

The original Outside In for Windows has some of the same strengths as its DOS sibling. However, many of its functions simply duplicate tasks that can be accomplished with functions built into Windows. The latest version retains the original's ability to, automatically on installation, add a macro to Ami Pro, Word for Windows, and WordPerfect for Windows. The Outside In macro allows you to bring up Outside In from these word processors instantly.

Outside In for Windows Version 2 includes some important enhancements. Its strengths are its ability to view, search, copy, and launch applications, as well as allowing you to view and copy data from DOS applications into your Windows word processor—a useful and handy utility. More than 30 text formats are supported, as well as seven spreadsheet, five database, and five integrated formats, such as Enable. Outside In also works with all major electronic mail programs to provide a simple way to view mail attachments.

But Version 2's most compelling feature may be its ability to view graphics and compressed files. I tried viewing and copying several graphics to Word for Windows with no difficulty. The advantage to using Outside In to add graphics to Word over the Insert Picture feature of Word is Outside In's view feature. With Outside In you can look at the graphic before inserting it. Viewing and copying from compressed files was also effortless.

Outside In for Windows Version 2 performs as advertised. Its interface is easy to use, especially if you're familiar with Windows. I recommend Outside In for Windows Version 2 if you do a lot of copying from one Windows application to another, need to copy from DOS applications into Windows, or regularly import pictures into your word processing files.

STEPHEN LEVY

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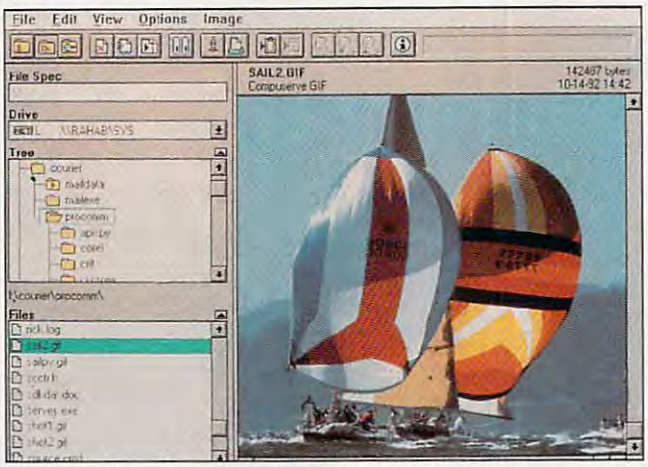
FLY THE GRAND CANYON

How many of us have flown over the Grand Canyon on a commercial flight to Los Angeles or New York? The view, even from the wing, can take your breath away. What would you give for a leisurely tour of that same spectacle? Now an excursion into natural wonder requires little more than a PC and 3-D glasses as poor man's virtual reality comes home. Fly the Grand Canyon puts you in the cockpit and sets the limits of exploration at the horizon.



The upgraded version of Outside In makes it easier than ever to import things to your word processing documents.

Utilizing not one but two variations on the old 3-D imaging system, Fly the Grand Canyon comes complete with a sturdy pair of red lens/blue lens glasses for you and a cardboard pair for your passengers. According to the manual, the filtering effects of the lenses tricks the human brain into seeing a stereo image onscreen. In truth, the CRT displays a mass of red and blue lines. This stereo effect might well work for some, but for many others 3-D glasses bring only headaches and eyestrain. For these unfortunates, Fly the Grand Canyon offers two monochromatic modes, yellow and white. The resulting maps possess almost as much depth as their stereo counterparts.

Flight along the treacherous Snake River can result in more than a few crashes, but, as a simulation, Fly the Grand Canyon proves quite forgiving: It starts you over in the same vicinity immediately after a crash. The controls of your plane allow for simple banking, but you can't roll this craft. Climb too high and you'll likely crash—the program, that is. Otherwise, the canyon scrolls below and, should you hover at zero knots per hour, you can choose to have the program display the rugged cliffs in greater detail for your viewing pleasure. Normally the terrain moves past in perhaps half of the maximum resolution—an attempt to engender greater speed in slower machines.

For the most part, Fly the Grand Canyon simply isn't the next best thing to being there. The simplified maps, though based on accurate geological survey data, lack sufficient shading, texture, and density to support any such illusions. Push the throttle forward for more speed and the landscape begins to jump past; smooth scrolling would make all the difference in this flight simulator. Gaps between lines seem paltry enough when you can skim precipices with the speed of wind. Here you sometimes pass through an obstacle before the controls can respond.

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to afternoon lighting effects, and shadows fill the valleys. You can't fly through a shadow, however, as they're visible only in pause mode. Still, the most convincing 3-D effects occur at this point; you might find yourself reaching for the screen just to touch them.

The flight recorder will save memorable jaunts to disk, and you'll want to save them to show your friends. The Grand Canyon offers some amazing sights, and even from the limited perspective of Fly the Grand Canyon they're worth paying to see.

DAVID SEARS

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INTERPRETER TAPEXCHANGE 300TX TAPE BACKUP

Discriminating users looking for what may well be the ultimate in external, portable tape backup units would do well to turn their attention to the sleek TapeXchange 300TX Tape Backup from Interpreter.

This unit combines form and function by putting blazing performance in a package that's easy to carry (and look at). The 300TX is lightning fast, not only in its backup and restore times, but also in its installation time: under five minutes for both the hardware and software phases.

Once the software installation is complete, several read/write tests are automatically performed by the software to ensure that all of the connections are solid. These tests take about four or five minutes to complete, but they're good insurance because the data transfers in both directions will be at speeds up to 10MB per minute, depending on your CPU speed and use of data compression. These safety checks are exactly what you'd expect from a high-quality, high-performance product like this.

Cover your ears and rest easy: It may be noisy, but you know your data's secure with the TapeXchange 300TX Tape Backup.

Calling the 300TX a screamer is a good way to describe both its performance and its noise level. Make no mistake about it: This is a noisy drive. In operation, it emanates a high-pitched sound throughout the entire backup or restore operations. However, this noise doesn't usually last too long, thanks to the drive's high speed.

The 300TX also gives you a choice of the type of media you can use: cassette, QIC cartridge, or DAT. If you elect to use DAT cartridges, you can store up to four gigabytes per tape.

A backup can be instituted and underway in well under a minute with just a couple of menu selections. For example, using the preassigned default values, to do a complete backup of the entire hard drive, all you do is select Full Backup, choose Overwrite, and hit Return. Full override of all default options is possible, of course.

The user manual is adequate in its coverage of the hardware installation (two paragraphs are sufficient for covering it, since it only entails plugging the drive into the parallel port and attaching the power adapter to the 300TX). The portion devoted to using the software is also adequate, augmented by screen shots of important sections and full explanations of possible error messages within the pages. No mention of Windows can be found anywhere in the manual—or anywhere in the package, for that matter—so all activity connected with the drive takes place from the DOS prompt.

The 300TX has a built-in carrying handle for easy transportation. This feature, combined with its external connection via the PC's parallel port, makes it ideal for office settings where several PCs need to be backed up on a regular basis. It's also a most serviceable and convenient way of transporting large blocks of data from one PC to another without having to rely on floppies. This drive's real ace in the hole, however, is its speed. During a full backup of the 250MB hard disk on the 486/33 I used for the review, the 300TX reached a transfer rate of more than 6MB per minute.

If speed and portability are the name of the game for you and you don't mind some noise, the Interpreter TapeXchange 300TX Tape Backup might be just what you're looking for.

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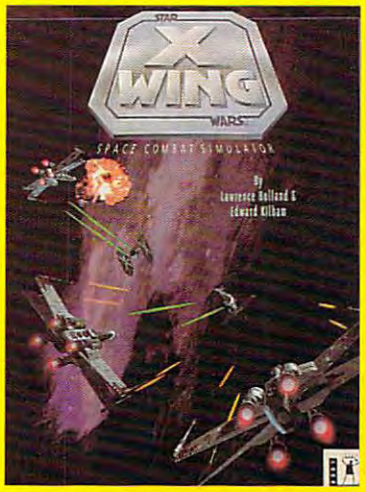

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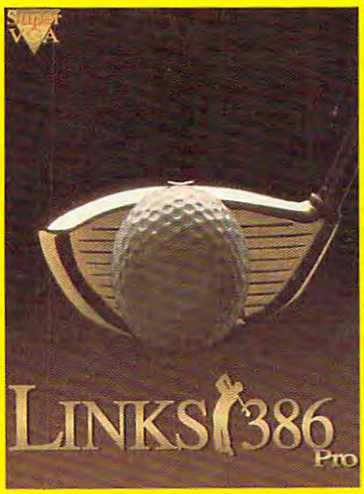

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mind, including battle, diplomacy, and espionage. (This is not a politically correct game; most people today would characterize taking countries by armed aggression as evil.)

PowerMonger is from Bullfrog, the maker of the prize-winning Populous. PowerMonger uses the same basic interface, built around an entertaining 3-D terrain map on a war-room tabletop. From your overhead perspective, you see small people, houses, workshops, sheep, trees, boats, and other objects as they move through their daily activities. A palette of game control icons surrounds the map, and the figures of your general and his captains loom over the table.

You use the icons to control your followers and wrest control of the land from the natives. When you attack a small settlement, for example, an army of tiny animated vassals marches across the countryside to the target and engages in battle. Little souls fly into heaven as soldiers die. Once you've won the settlement, you commandeer its equipment (weapons, boats), seize its food (soldiers have hearty appetites), and move on. The degree of aggressiveness you've assigned to your captain controls his rapaciousness. Only at the highest aggression setting does he completely strip the settlement of food and supplies, leaving the peasants to starve.

It sounds simple, and it is—for a while. The first few of the 195 territories fall easily, but as you continue, the natives become stronger and wilier. You encounter marauding armies suspiciously similar to your own. Simple methods of attacking, seizing resources, and advancing no longer work. You must become more clever.

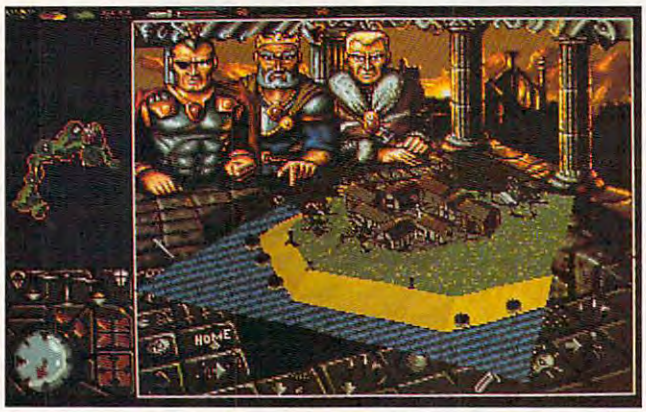
The far-reaching effects of your decisions come back to haunt you. If you order your craftsmen to make catapults, for instance, they're likely to strip the neighboring forests; this alters the weather patterns and delicate ecological balance of the land. Inattention to proper routes to new battle sites can string your men out too far and leave them open to attack. Tribes you've allied with can become too strong, forcing you into battles you cannot win.

You won't learn the nuances necessary to succeed at PowerMonger overnight. There's plenty of challenge in the ever-increasing need to fine-tune aggressive tendencies, battle strategies, logistics management, ecological management, and diplomatic relations. As you progress, the antics of the little people who populate your tabletop map are a joy to watch—except, of course, when the angel-winged souls gently rising into heaven happen to be those of your soldiers.

The game's documentation is excellent. It includes a detailed strategy guide that explains how to gain control of the first 30 or so territories. You can add a whole new dimension to the game by hooking up with a second player by modem.

So, wait for a day when the Saddam Hussein in you needs some exercising—or exorcising. PowerMonger can relieve those tensions and teach valuable lessons about the consequences of wielding power.

RICHARD O. MANN



Sack and pillage with impunity playing PowerMonger from Electronic Arts, a game that rewards your worst impulses.

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ACMA 486SX/25

Impressive speed, storage, power, and graphic capabilities—that's what makes the Acma 486SX/25 a real muscle machine. While the configuration I tested is more expensive (by $1,000) than ACMA's standard 486SX, it also boasts a number of features that many people will find attractive.

If desk space is in short supply, you'll appreciate the small footprint of the system box—a modest 15 inches wide by 16½ inches long. Still, Acma has managed to pack plenty of impressive goodies into this system.

The system comes standard with 4MB of RAM (expandable to 64MB), a reasonable amount for most of your computing needs, even in Windows. The hefty 240MB hard drive that came with this system offers twice the storage of the standard hard drive. With today's enormous apps, this drive gives me all the elbow room I need. Another upgrade for this muscle machine, the Promise SuperIDE caching hard drive controller (with 512K of cache RAM, expandable to 8.5MB), gives me lightning-fast performance.

To speed up graphics performance, Acma included another extra: a Diamond Stealth VRAM accelerated video adapter capable of resolutions of 1280 × 1024 with 16 colors, 1024 × 768 in 256 colors, 640 × 480 with 32,000 colors).

One of the current computing jokes making the rounds—"The magic of Windows: It turns a 486 into an XT"—doesn't apply here at all. Thanks to the Stealth video card, Windows operations are considerably accelerated, as are the majority of the complex graphics and animation displays currently available for the PC.

The 15-inch MAG MX15F noninterlaced SVGA monitor, yet another extra, provides significant sharpness and subtlety in graphics display, not only enhancing GIFs and gameplay, but also greatly reducing eye-strain in text-based operations. If you use Windows much, your eyes will appreciate this larger display.

For extra fast communications, Acma includes a Quick-

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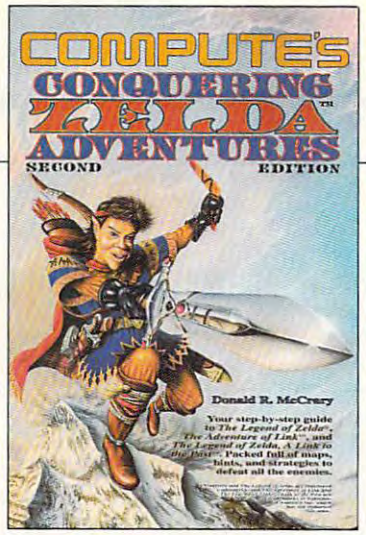

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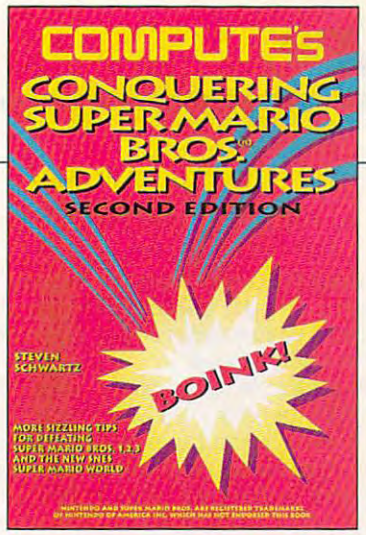

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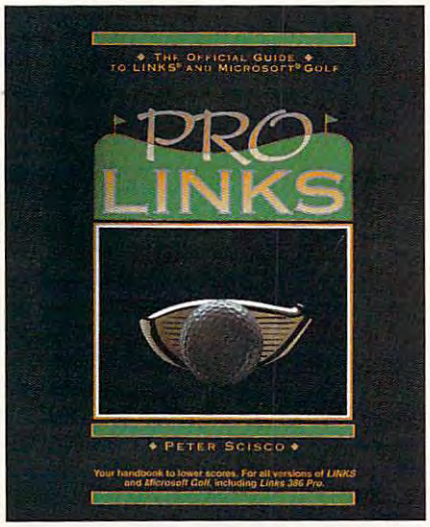

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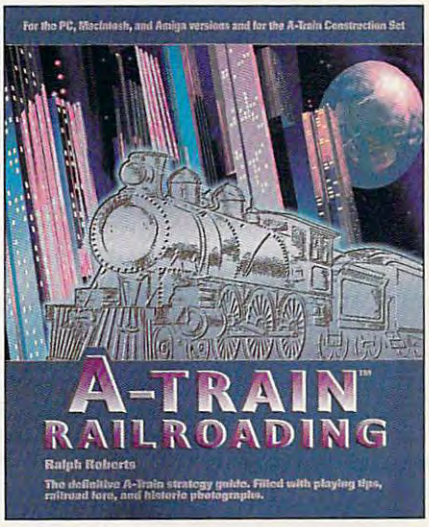

A-Train Railroading $16.95

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com Spirit 9600-bps internal modem package. QModem 4.5 Lite communications software is also included.

The system box contains two high-density (1.2MB and 1.44MB) floppy disk drives. There's also the now standard enhanced keyboard, which I found quite satisfactory—quiet, firm, and fast.

The system comes already loaded with DOS 5.0 (set up to use high memory) and Microsoft Windows 3.1, the latter containing an online glossary of computer terms, courtesy of Acma.

While the unit I used didn't contain documentation for either DOS or Windows, Acma's support line assures me that documentation for both is routinely included with each system. The Acma 486SX/25 is certainly well-documented in every other area, from the Acma user's manual through individual manuals for the ISA-486 main board, Stealth video card, KW-524H serial/parallel adapter, Spirit modem, and Promise caching controller. In addition to QModem, Acma includes software for the installation of the Stealth card, the disk controller, and WinRix-DCS, a graphics application for use with Windows.

Whether or not the Acma 486SX/25 has any significant weaknesses depends on what you intend to do with it. If a lot of your work involves number-crunching, you may decide that you really need a 486DX, which has a built-in math coprocessor. If you measure a machine chiefly by how far you can expand it, you'll find the Acma 486SX/25 to be moderately expandable. The motherboard comes with seven 16-bit expansion slots and one 32-bit slot designed to accommodate a memory board. However, since the unit I tried included the video card, the modem, the I/O card, and the hard drive controller already in four of these slots, there were only three 16-bit slots available to be used for expansion.

It's worth paying extra for the ACMA 486SX/25, a high-powered 486 that does a lot in a relatively small amount of space.

The small footprint of the CPU, while taking up less desk space, also means that things are a bit crowded inside. Digging around in its guts may result in a rather high PUI (Profanity-Usage Index) for ham-handed technophobes like myself. The potential for internal drive addition is also a bit limited: The CPU contains three 5¼-inch drive bays and one 3½-inch bay; three of these are occupied by the two floppy drives and the hard drive, so there's just one 5¼-inch bay available for a CD-ROM drive, a tape backup drive, or other add-on.

The configuration of the Acma 486SX/25 I tried differs from the standard configuration chiefly in that the latter has half as much hard drive space (120MB), a slightly smaller (14-inch) SVGA monitor with a lower resolution (1024 × 768), a standard SVGA card, a standard IDE controller instead of the caching controller, and no modem.

It also differs in the trifling matter of price—about $1,000 worth. The standard Acma 486SX/25 runs $1,495, while the unit sent for review checks in at $2,495 with the fun stuff added—but the fun stuff just might make the extra expense worthwhile.

With this much muscle available, you'd expect the Acma 486SX/25 to be a delight to play and work with—and it is.

ANTHONY MOSES

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VISUAL BASIC FOR DOS

It wasn't much of a stretch for DOS die-hards to look wistfully at Microsoft's Visual Basic, the most popular Windows programming environment on the market, and wish that some of the pixie dust would rub off on QuickBASIC. Five years old and counting, QuickBASIC is an excellent value, but lately it's really been showing its age. When Microsoft, with its huge investment in Windows, announced that QuickBASIC wouldn't be updated, my heart sank; this didn't bode well for me and millions of other QuickBASIC programmers.

What I didn't know was that QuickBASIC was to be replaced by Visual Basic for DOS, a worthy successor with advantages even its Windows counterpart lacks. If you're not familiar with Visual Basic for Windows, here's a brief rundown on how it works. This description will also apply to Visual Basic for DOS.

A Visual Basic program, like a Windows program, is inextricably tied to its user interface. The program is made up of windows (which Visual Basic calls forms); controls, such as buttons and scroll bars; and BASIC code. Typically, you design the user interface first by "drawing" it in form view—adding forms (a.k.a. windows), check boxes, combo boxes, and so on. You've probably already figured out that this is an incredible time and money saver because you don't have to buy a windowing library and it allows you to create a prototype of the application at the very start. This eliminates a lot of communica-

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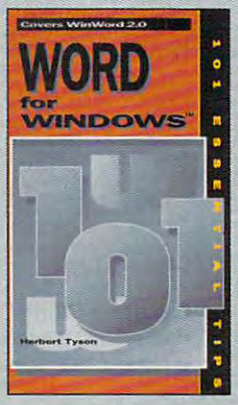

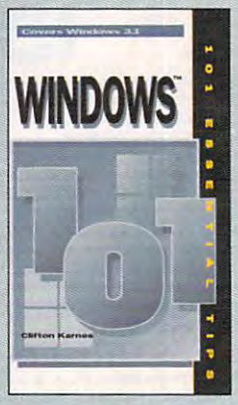

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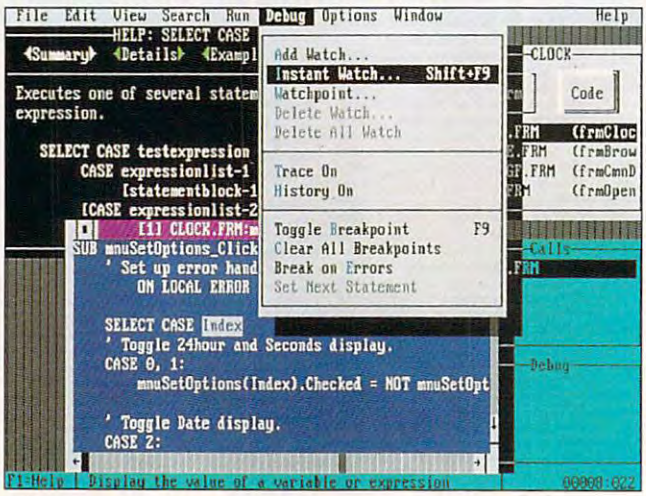
REVIEWS

tions problems if anyone else is involved in the design of your application (for example, the person paying you!).

And let's face it—it's a lot more fun than laboriously designing the user interface on graph paper and then figuring out endless function calls to the windowing system. (There's also the potential drawback that the windowing interface isn't to your liking, but that can happen with any code library. In Windows, that's not a concern because the whole point is that all applications share a common GUI. The DOS world is more individualistic—so consider yourself warned. I will say that Microsoft has created a text-windowing scheme that's snappy and well designed, with the added benefit that it's one that works almost the same under DOS as it does under Windows.)



Take heart, QuickBASIC programmers: Microsoft's Visual Basic for DOS more than adequately replaces your old favorite.

Program code gets triggered by events in the user interface—a click of a button, the cursor passing over a control, the user's entering text into an edit field, and so on.

What makes it all happen so smoothly is the way code is attached to forms and controls. For each conceivable event, the user interface object has its own method, or subroutine. For example, one of the button methods is called Click. To run code when that button is clicked, double-click on it in form view and you're switched to code view (in DOS, they're two separate programs due to memory limitations, but the context switch is quite rapid).

If you've just added the first button to the form, you'll be popped into a program-editing window for a subroutine already named SUB Command1_Click(). Enter whatever code you want, and that's it. No muss, no fuss. There are no resource editors and WM_PAINT routines à la Windows and C, and it's substantially easier even than BASIC add-on windowing libraries.

Visual Basic for Windows lets you create your own control types, but you must do so in C—and programming Windows in C is not a pretty sight. You can graft them onto Visual Basic's palette as if they were born there, however, and Visual Basic won't know the difference. Amazingly, Visual Basic for DOS lets you create custom controls in BASIC—a boon for users who bought BASIC to get away from C in the first place. My favorite control with Visual Basic for DOS is the text editor, which is a

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complete editor—mouse and all—that you can roll into your compiled applications (royalty free!) and which will handle up to 32K of text.

The forms/controls/code paradigm is a good one. I'm a slow learner, but I caught on to it fast, and I prowled CompuServe's MSBASIC forum for weeks without finding anyone who had problems with it. The toughest nut to crack is realizing that you lack control over the user's actions: You must be ready for any button click at any time or for the window to be resized at the user's whim. What surprised me about writing programs this way was that they become much better organized and easier to understand, and the slight amount of extra code is more than made up for by the thousands of lines of code saved by the windowing and control code Visual Basic for DOS already has built into each application.

The worst aspect of Visual Basic for Windows was its incompatibility with the DOS version, but amazingly, the DOS version doesn't have that problem. Your old, non-windowed code will compile exactly as it did before, so moving to Visual Basic for DOS is utterly painless. The documentation helps here, too; the world-class docs that came with Professional Basic 7.1 but not QuickBASIC are back, and they're better than ever. Ditto for the online help, which obviated my need for the manual. Code quality is the same as its DOS predecessors.

Visual Basic for DOS is a worthy and splendid successor to QuickBASIC. Don't hesitate to make the upgrade if you were concerned about documentation, speed, overall quality, or ease of learning.

TOM CAMPBELL

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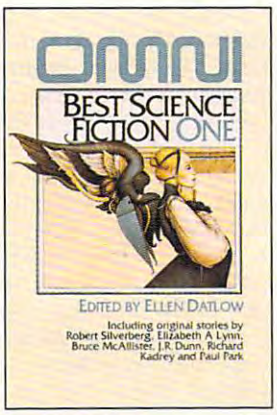
PARADISE ACCELERATOR CARD FOR WINDOWS

Are you tired of waiting for your video display to catch up with your fingers when you're word processing or desktop publishing in Windows? Can you take a snooze in the time it takes for your paint or draw applications to bring a complex graphic up on your monitor? Do you sometimes think your system has gone out to lunch while you're waiting for a screen refresh or redraw in your CAD or rendering program? If you answered yes to any or all of these questions, then you're suffering from the slow-video blues. The good news is that the Paradise Accelerator Card for Windows is a sure cure for what ails you—so cheer up!

This half-length card installs easily into any available 16-bit expansion slot and has a standard 15-pin D connector on its mounting bracket. A five-position DIP switch is also located on the bracket, and the switches set the active video mode on the card. Using combinations of switch settings, it's possible to select Super VGA modes of 800 × 600 or 1024 × 768 at different timing rates to accommodate the timings of different monitors.

In addition to the DIP switches, the Paradise Accelerator Card also has a pair of jumper blocks that can be configured to further tailor the card's operation to specific system requirements. The first jumper block is used for generating a zero-wait state if the host PC is fast enough to operate that quickly (most 386SX and higher machines are), and the default configuration for this jumper is with the cap on the pins (feature enabled). The second jumper is used for selecting the address-latch enable line to work via the video controller



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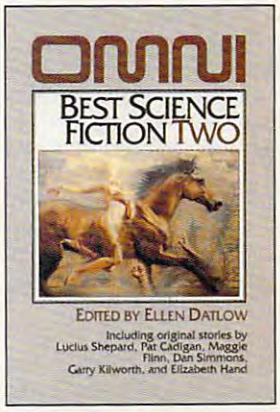

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card or the expansion bus; the default setting is with pins 1–2 capped to enable the line tied to the card. This is the configuration that should work with the vast majority of PCs, with only a few odd machines requiring a change to jumper pins 2–3 instead.

Installation is easy and should take less than half an hour even for a novice user, since the factory default settings will work perfectly for most installations.

The software drivers that accompany the card are also easy to install. The Windows drivers install directly from the Windows Setup section, and they're ready for use upon restarting Windows after the file copy is completed. DOS drivers are also provided for AutoCAD and AutoShade, Cadvance 3.0, Generic Cadd Level 3, Lotus 1-2-3 and Symphony, MicroStation, PCAD Level 2, VersaCAD Design, VersaCAD 386, Microsoft Word 5.0 and 5.5, and WordPerfect 5.0 and 5.1. A disk with video utilities is also provided. It includes the VESA utility as well as a VGA mode-switching utility.

By virtue of its built-in high-color capabilities, the Paradise Accelerator Card for Windows proves that computing can be a colorful activity indeed. The card boasts a 32,768-color palette and is capable of resolutions up to and including 1280 × 1024. Refresh rates up to 72 Hz in 1024 × 768 256-color mode are supported for flicker-free viewing on noninterlaced monitors.

Western Digital puts 1MB of RAM on the board to give it the oomph required for really fast video processing, and this combination works well. I ran some impromptu comparisons against a standard 512K VGA card I've used for quite some time, and the Paradise card was 8–10 times faster for DOS applications and 10–15 times faster for some Windows applications. The increase in speed was particularly dramatic with complex graphics-oriented programs like GEM Artline 2.0 and Ventura Publisher.

So, if you're down in the dumps with the slow-video blues, isn't it about time you took a trip to Paradise? This accelerator card is the only ticket you'll need.

TOM BENFORD

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The Paradise Accelerator Card for Windows makes it easy for you to speed up graphics-intensive activities.

MOSES PROMISELAN

Looking for a low-cost plug-and-play network for your home or office? Moses Computers has recently released a powerful peer-to-peer LAN called PromiseLAN. The package comes complete with a network card, 25 feet of two-pair telephone wire, installation software, and a large scroll of documentation.

At a cost of $99 per node, you can affordably connect as many as eight PCs. Adaptive Throughput Control optimizes communication speed between networked PCs, which prevents slower computers from bogging down your network.

PromiseLAN comes with an easy menu installation program. It works with all IBM PCs and 100-percent compatibles (XT, AT, 286, 386, 486). It meets all IBM NetBIOS standards and provides file and record locking. You can easily add additional PCs to the network. For added versatility, any PC in the network can be configured as a server, redirector, or peer. With PromiseLAN you can quickly connect computers and begin sharing peripherals, data, and software.

We installed the network in a four-person technical department. Since the computers are all close to one another, we used the 25-foot, two-pair telephone wire included in the packages. PromiseLAN can be installed on nodes that are up to 150 feet apart or up to 500 feet total for all nodes.

The first order of business was to install the special network cards in each computer. These cards allow the network to pass information between the connected computers. PromiseLAN uses 1.79-Mbps (million bits per second) DUAL Netcards that have two connector ports. Installation was quite easy. The factory settings worked with three of the four computers in our network. For heavy network usage you can purchase a high-performance version of PromiseLAN called PromiseLAN Fast, which features a 4-Mbps net card. It retails for $299.

Moses also offers a network that's a step up from PromiseLAN called (drumroll, please) ChosenLAN. You can upgrade PromiseLAN to it. ChosenLAN, which lists for $399 and comes with DaVinci E-mail, accommodates 53 users—increasing to 250 users in 1993. It comes with a four-port hub card and a single-port card, and it can be daisychained to expand the network. It's a 4-Mbps system compared to the 1.79-Mbps PromiseLAN. A like-priced network called SwiftLAN (sorry, no more Biblical allusions) designed for use with laptop and notebook computers comes with two external adapters. All of Moses's network products are compatible with each other. Moses offers information about its network products through an automated fax line (800-882-6673, extension 200) that immediately sends a fax containing information you request.

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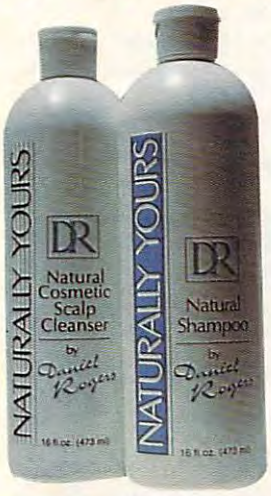

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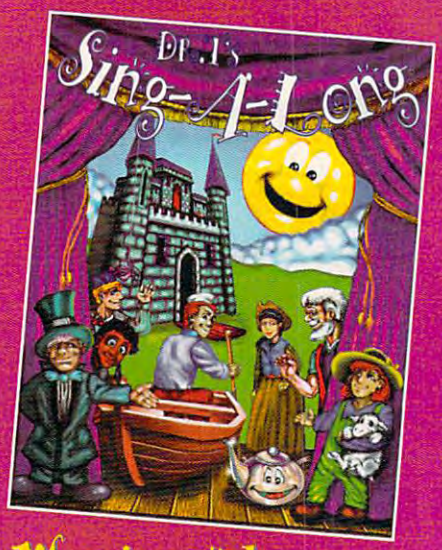

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REVIEWS

ing up PromiseLAN. With the network cards installed, all that was left to do was run the telephone wire. The PCs were as easy to connect as a telephone. They were daisychained together, with each having two possible connections—one from the network and the other to the next node.

Software installation proved similarly painless. All it takes is inserting the installation disk in a floppy drive and typing *install*. The appropriate directories are created, and the software is copied to your hard disk. The final step is to configure the software on each computer. NetMenu walks you through the process. In a nutshell, you must select a unique network name (we used first names), choose the option to configure as a peer, and specify which of your resources will be shared by other network members.

PromiseLAN claims to be 100 percent compatible with Windows. The network uses the LAN network driver for IBM PCs provided with Windows 3.1. Unfortunately, this wasn't clear at the time we were installing PromiseLAN, and we couldn't get all network features to work. For example, we couldn't use a network printer under Windows. We contacted Moses's technical support personnel, but they couldn't answer our questions and said they would contact us. Well, we never heard from them and have since removed PromiseLAN from our computers until we receive a legitimate response or Moses parts the Red Sea again, whichever comes first.

To get an idea of the network performance, we decided to copy the contents of one network hard drive to another. Not surprisingly, this brought PromiseLAN to the floor. Peer-to-peer LANs aren't designed to carry this kind of burden, of course, but we wanted to see what would happen. Keep this in mind if you're in the market for a network. If it's high performance you seek, you'll have to shell out some bucks to get it. Otherwise, we had no trouble either with running software from remote machines or with file maintenance.

Low-cost peer-to-peer LANs, like PromiseLAN, are designed for convenience. They're great for transferring files between computers and for sharing peripherals. If you're thinking about buying a couple of printers for the office, you may want to consider purchasing a low-cost LAN instead. You could save money by sharing a single printer through a network, rather than buying more printers. Other benefits include sharing software and files. Keep in mind that there will be some memory overhead and an overall loss of performance, although Moses claims that PromiseLAN has the lowest RAM requirement of any network in the industry. It uses 10K RAM for a workstation, 16K for a server, and 26K for a peer.

PromiseLAN did everything that it claims, with the exception of being 100 percent compatible with Windows. We found out later that the problem had an easy solution, but technical support never returned our calls to tell us about it. The network is easy to install and easy to operate, and it comes with a lot of documentation. So if you're in the market for a peer-to-peer LAN, PromiseLAN is a low-cost option.

BRADLEY M. SMALL and TROY TUCKER

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CREATIVITY KIT: LITTLE PEOPLE FARM
CREATIVITY KIT: LITTLE PEOPLE MAIN ST.

What is it with Fisher-Price's Little People? They have no apparent appendages, Day-Glo clothes, and molded plastic hair that would make even Wayne Newton cringe. Yet they're perennially popular, their peg bodies never failing to fit perfectly into the wells of the cars, tractors, and jumbo jets they pilot around the floors of America's living rooms.

My five-year-old son has liked Little People since he was old enough not to choke on them, playing with the wee ones' Farm at home and Main St. at day care. It seemed natural that animated versions in a computer program would go over big, and the little studs didn't let me down.

These Fisher-Price Creativity Kits combine limited animation with print capabilities, and a few sheets of heavy paper and drawing tools are also thrown in. As a printing and coloring program, the Creativity Kits work about as well as the ubiquitous print kits available for everything from *Beauty and the Beast* to "The Itchy and Scratchy Show."

As character animation programs, they're pretty much what you'd expect from the big F-P: A little slow and elementary for grownups, just right for kids.

The programs are recommended for ages 3–8. Both work on the same ba-

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sic principles. Each provides a tour of its respective setting, allowing you to zoom in on different features of Main St. or the Farm. On Main St. you can see what's shakin' inside the pet shop or the grocery store. Down on the Farm, you can view various animals in action or examine the nooks and crannies on different sides of the barn. Even on a 486, the Creativity Kits plod along at the kind of methodical pace five-year-olds appreciate, offering slow, smooth zooms in and out of different scenes.

As with Fisher-Price's molded plastic toys, you get plenty of bright colors and crisp, well-designed scenes. The various shops on Main St. offer a more interesting set of views, though on the Farm you get more details for each scene, with four separate screens appearing at once representing the animal or object in each of the four seasons. Both games display a gentle sense of humor: The Farm's summer cow is a scuba cow decked out in snorkel and face mask; inside Main St.'s barber shop, you can open a cabinet to find a little barber mouse cutting the hair of a little mouse customer.

If your child can maneuver a computer mouse, he or she will be able to use these programs immediately. They'll work with a keyboard, though a mouse is recommended for good reason. It helps if your child can read a few words, including animal names and such directions as "go back," though even that's not essential. Once you've pointed out the "go back" button, your child should be able to find it easily whether or not literacy has been achieved.

Even if you're new to computers or you're just introducing their capabilities to your child, the Creativity Kits are almost as easy to use as the toys they serve as tie-ins. Running the programs from a floppy or installing them to a hard drive is equally painless and swift. After answering a few basic questions about your system's capabilities, you'll be ready to enter the world of the Little People.

It's a nice place to be, even if nobody there can open a door for you. If your child falls within the suggested age range of the Creativity Kits, either the Farm or Main St. would be a good way for a child to direct his or her attention to the computer screen without having to leave the comfortable surroundings of familiar toys.

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PRINTSPRINT

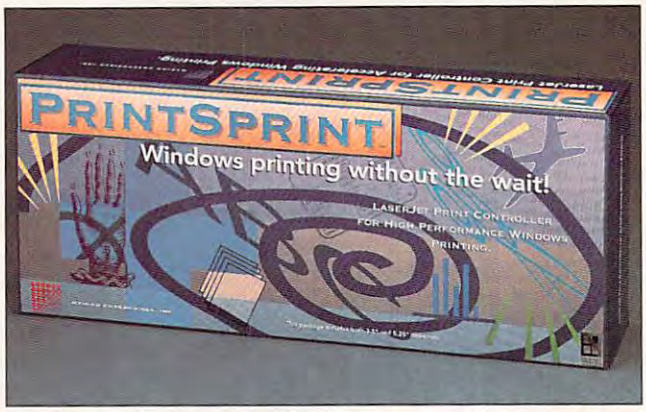
Tired of waiting for your Windows application to print to your HP LaserJet? Need a solution that's transparent? If you've tried speeding up your printing by disabling the Window's Print Manager but still aren't happy with the speed, you may want to consider installing PrintSprint.

To use PrintSprint, you'll need to install both hardware and software. You have to install both a printer controller card in your PC (you must have available a full-length 16-bit expansion slot) and the PrintSprint HP video interface adapter. The interface adapter installs in the printer's optional I/O slot. If you've never installed a card in your PC, you may find the experience a bit intimidating, but the installation instructions included are clear, concise, and easy to follow.

Installing the PC controller card in our PC required that we change the preset I/O jumper address in order to get PrintSprint to work with our network. The default address is 300–30F, which should work for most systems. But if you're connected to a network or have some other configuration that might be using this address, you'll need to change the I/O address jumper on the PC controller. Again, this wasn't difficult with help from the documentation.

Once you've installed the two hardware cards and connected the cable included with PrintSprint, all that's left to do is install the PrintSprint printer driver—another simple task given the easy-to-follow documentation.

After spending 20 minutes installing PrintSprint, we were ready to see if it lived up to its claims of printing "2, 3, even 10 times faster." On a Gateway 2000 386SX/16, most Windows applications printed about twice as fast. Generally, we were pleased with the results. With the Windows Print Manager disabled and PrintSprint in place, printing from PageMaker was noticeably faster.



Windows users looking for more speed from their HP LaserJet printers may find what they need in PrintSprint.

Since PrintSprint is designed to work only with Windows applications, the documentation says that you must leave both your original cable (whether serial or parallel) and the PrintSprint cable connected so you can print from non-Windows applications. PrintSprint isn't designed to have any effect on printing from non-Windows applications.

Should you go to the expense of purchasing and installing PrintSprint? Like anything else, it depends on the speed of your computer, how much printing you do, and from what applications you print. If you do a lot of printing from your 386, you'll find PrintSprint worth investigating.

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DRIVEPRO

DrivePro, a hard disk set/diagnostic/maintenance product, more than lives up to its name. At $129.95 suggested retail, its superb documentation (both online and printed), extensive capabilities, and pile-on-the-bells-and-whistles design makes it perhaps the best deal around.

If you don't know an ESDI from an IDE or whether a sector editor might come in handy, you probably don't need DrivePro. If you're still with me and if you have at least a 286 (it won't work on a slower CPU), read on, because DrivePro is a real barn burner. You're expected to operate it from a high-density floppy disk. DrivePro has a dazzling user interface and comes with a lot of extras, so it takes up just short of a megabyte of disk space. Don't expect to run it on a 360K floppy, although DrivePro will squeak by on a 720K low-density 3½-inch drive.

DrivePro has everything you need to diagnose a hard disk, repartition it (even to boot from multiple operating systems), replace FDISK with a far superior utility, examine the BIOS drive table, search or edit particular sectors of the disk, and so on. There are some even more interesting features, however. Unlike most other such programs, its disk analysis can be adjusted from a quick look-see to a downright anal-retentive thoroughness. DrivePro can also low-level format just *parts* of a drive. That's a fantastic help in the case of a drive that doesn't work because of bad sectors, but which still has intact data on it you can't get to. Another intriguing feature is the ability to create a master boot record for a custom hard disk that's not in the BIOS table. So if your BIOS is slightly out of date and the disk is new, you can patch information about the disk into the boot record—even though the BIOS itself doesn't support that disk type—and still use the disk.

I continue to be impressed by the printed documentation, which is rife with all of the illustrations, tables, and definitions I needed, right where I needed them. One of my favorites lists cluster and partition sizes for all major versions of DOS, including the wacky Compaq 3.31. Why was I so happy? Because it's typical of DrivePro's documentation in that it made the difference between my being able to fix or not fix a DOS 4.0 hard disk.

Another very strong area is the chapter on physical drive installation, which shows every kind of controller cable, power-supply socket, and interface connections you need to know about. So if you're faced with a hard disk of unknown origin and have never before seen an ESDI, you can use this chapter to identify it correctly (as I did). Other

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REVIEWS

pluses include an extensive, well-illustrated glossary and plenty of screen dumps, right where you'd expect to find them. Nothing is gratuitous or out of place in DrivePro's manual—a rarity, especially for highly technical tools such as this one. My only complaint is with the index, which covers only a dozen and a half topics (but covers them extensively).

Owners of IDE drives will find a host of new features mentioned in the READ-ME file but not in the manual. One of the most amazing is the /IDE command line switch. It figures out which drive type to write to the CMOS, partitions that drive, and does a high-level format of each partition—*in a minute.*

Another useful option I wish I'd known about (I forgot to read the READ-ME until later) is the /G switch, which steps you through the installation of a hard disk automatically. This is the perfect solution for in-between users like me, those who aren't afraid of playing with the precious innards of a hard disk but who aren't yet experts at it. I hope the next version of DrivePro makes it a menu option.

Perhaps the best freebie is DrivePro's Tables and Databases option. This alone is worth the product's price if you're involved in the ongoing process of maintaining systems. It's an online listing of drive-controller card specifications, names and address of hardware companies, an interrupt table, a list of BIOS calls used by the hard disk, and 80x86 assembly language opcodes! Bells and whistles to be sure, but bells and whistles that could save you hours or even days of research.

DrivePro is truly a pro, and it represents a great value for its price.

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SUMMER CHALLENGE

The spirit of competition shines brightly in this dynamic sports simulation, the latest from Jeff Sember and Mike Benna, designers of Hardball III and Joe Montana Football. A perfect party game, up to ten players compete in eight Olympic-style events. Although each sport has seen action in previous titles, rarely have they been presented with such style and vivacity.

Key to the game's success is an outstanding blend of bitmapped animation and ultrafast 3-D polygon backgrounds rendered in brilliantly shaded 256-color VGA. Onscreen characters move with lifelike agility, complemented by a full range of digitized sound effects. Another major asset is the streamlined control system, making each event instantly accessible to all players, regardless of experience. A short-throw joystick, such as the Gravis PC GamePad, is highly recommended.

It's hard to know where to begin lavishing praises on Summer Challenge.

The game offers both practice and tournament play, complete with opening and closing ceremonies. Players choose their alter egos from male or female athletes representing 16 countries. Computer competition is culled from the same stable, divided into three skill levels: amateur, professional, and world class. These computerized opponents are merely benchmarks, however, providing formidable records for you to break. Instant replays of particularly valiant efforts can also be saved to disk for later review. Use this feature's incremental forward and rewind to pinpoint performance strengths and weaknesses.

The designers score their first bull's eye in the Archery event, a surprisingly accurate simulation of strength, controlled tension, and precision aiming. Equestrian competition offers the best depiction yet of this challenging sport. Viewed from behind horse and rider, the event requires a flawless combination of speed, position, and meticulous timing to survive the 16-obstacle course.

Kayaking makes a big splash in its breakneck run down a one-kilometer flume, through a series of 25 gates and hairpin turns. The illusion of speed and buoyancy is magnificent, created by rapidly changing sections of shaded polygons. Similar effects are used in the 400-meter Hurdles and Cycling, two events that showcase the game's smooth animation. Both contests require constant button action to maintain top running and pedaling speed. Use an autofire joystick to limit fatigue and get an edge on the competition.

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Pole Vaulting is by far the game's toughest event—an arduous blend of speed, agility, and timing, with little margin for error. Players are given three chances to clear the bar, which can be adjusted from 4 to 6.2 meters in height. High Jumping requires comparable strengths and is only slightly less demanding. Once again, bar height can be changed from 1.7 to 2.5 meters. Jump too soon and your onscreen athlete will perform a painful back flop in the cinders, yelling, "Agh! That hurt!"

An event many will consider a favorite, javelin competition, rounds out the series. Superb animation and simple play mechanics compel players to try "just one more time" to top their longest throw.

Flawlessly presented, Summer Challenge is as exciting to watch as it is fun to play.

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DVORAK ON TYPING, TYPING TUTOR 5+

Typing lessons have certainly come a long way since the early 1980s: Back then, I sat in a windowless basement room at my high school, clattering away on elderly electrics along with 25 or 30 other teenagers. (I always sat near the back so I could trade insults with a cheerleader I knew.) With Interplay's Dvorak on Typing and Typing Tutor 5+ from Que Software, you get everything Mrs. McIntyre taught in the privacy of your own pod, along with such niceties as digitized speech prompts and typing games.

The programs work on similar principles, although there are clear differences in their interfaces, teaching styles, and games. Dvorak on Typing is the chatty one, talking you through the entire program (unless you turn the sound off). Typing Tutor 5+, its mute competitor, keeps mum but offers a more conventional, Windows-like interface.

Dvorak on Typing trades on the name of the alternative keyboard, boasting development input from "world-renowned computer columnist" John C. Dvorak. Its speech capabilities resemble those of a speech-equipped car—you know, "Your key is in the ignition." It begins by asking, "What is your name?" and concludes by prompting, "Are you ready to quit?"

In between, you get a test to determine whether you're a beginner, an intermediate, or an advanced typist; helpful typing drills; dictation practice from the digitized voices; progress reports; and the Sword Fighting Game, in which your typing prowess can boost the efforts of a saber-wielding knight. While its interface differs from the Windows standard—you merely type *L* to begin Lessons, for instance, with no Alt-key combination—it's an intuitive setup that requires no effort to learn using either a keyboard or a mouse. The program has an attractive, uncluttered feel.

Dvorak on Typing's voice prompts amount to aural clutter, for the most part, although the program's speech capabilities give it an edge when it comes to actual teaching. During typing drills, it says errant keystrokes out loud and changes their color. While the Windows version doesn't precisely match the descriptions on the box and manual, there are no substantive failings. You don't get to choose the child's voice for speech prompts, for example, but that's no great loss.

I never did get to try the "faster-to-use but exotic and uncommon" Dvorak keyboard, unfortunately. While the manual indicates it can be loaded from the program's Preferences screen, a supplementary Windows information sheet indicates that the keyboard must be loaded in Windows (if you have the necessary driver; I don't), at which point Dvorak on Typing will employ it automatically.

I discovered no such discrepancies using either the DOS or the Windows version of Typing Tutor 5+. I mostly used the Windows version of Typing Tutor 5+, but the DOS version appeared roughly equivalent—despite a markedly less attractive interface. The program lacks Dvorak on Typing's speech capabilities, and its user interface is relatively more complicated, though nothing that will surprise anyone familiar with graphical user interfaces. To start a lesson, you must select New or Open from the File menu rather than answer a prompt as you do at the beginning of Dvorak on Typing. Once you're in, Typing Tutor 5+ lets you begin just as easily as Dvorak on Typing to learn basic typing skills or, if you're experienced, improve your work on everything from ampersands to asterisks.

Typing Tutor 5+ includes elements I love and loathe. Unlike Dvorak on Typing, which indicates finger positions with an unobtrusive graphic of two static hands moving slowly, Typing Tutor 5+ shows a graphic of ghostly hands flying over the keyboard—a terrible distraction. It's easy to turn off, fortunately. Some of the sentences in the Typing Tutor 5+ lessons are horribly wordy and convoluted, making it unnecessarily difficult to practice your typing (unless you find it natural to type *poetic tachism, neoconstructivism, poptical art, or realism!*).

It bothers me that both programs' drills require you to type two spaces after each sentence, an outdated holdover from the days before word processers. But I like the way Typing Tutor 5+ allows you to do warmup typing sessions before beginning skills tests. And I loved its game: Unlike Dvorak on Typing's diffuse, nebulous knight contest, Typing Tutor 5+ features a terrific Space Invaders knockoff called Letter Invaders. In it, you zap killer characters and words by typing them before they hit the ground.

Both programs have strengths and weaknesses, but I don't think you'd stray with either. Whether you're a novice interested in learning to type or a veteran looking to hone your skills, either Dvorak on Typing or Typing Tutor 5+ should provide all the instruction you need. You'll have to provide your own cheerleader.

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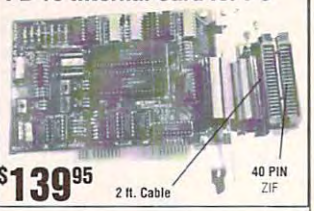

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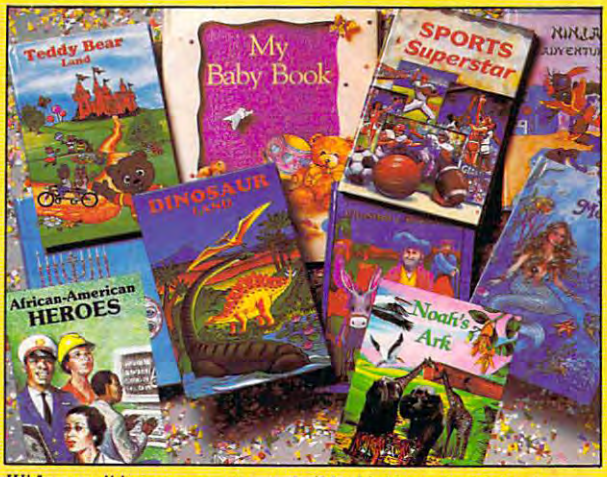

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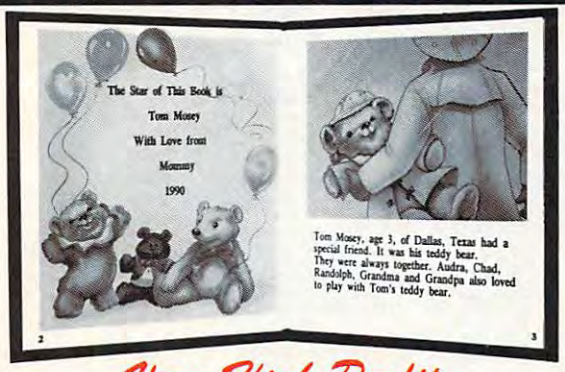

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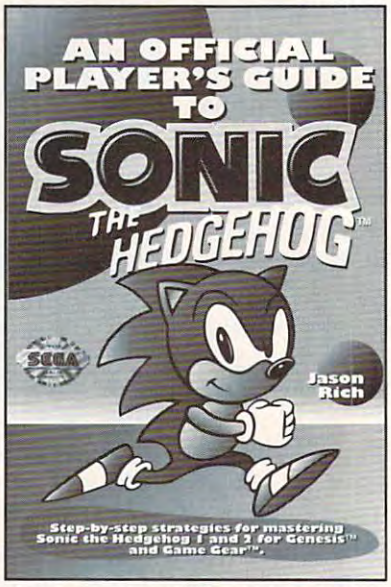

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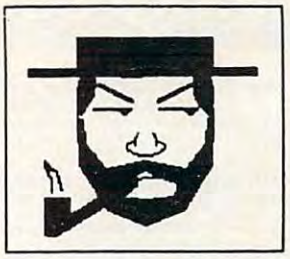

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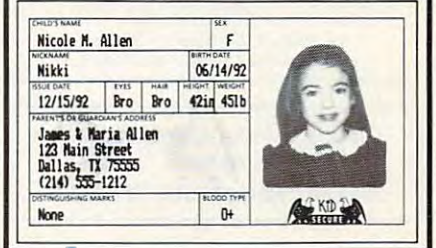

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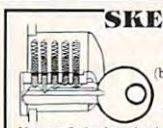

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MBS Technologies of McMurray, Pennsylvania, offered its FileRunner software free to World Trade Center companies whose operations were disrupted by the February 26 bombing. FileRunner is a sophisticated file-transfer program that allows computer files to be transferred error free from one PC or Mac to as many others as necessary. The software aided disaster recovery by allowing companies to keep track of their latest versions of Mac and PC files while they worked out of temporary offices.

Design a Dungeon

Strategic Simulations Incorporated (SSI), best known for its line of Advanced Dungeons & Dragons fantasy role-playing games and products, is holding a "Dungeon Design Contest." Running from April 1 to June 30, 1993, the contest challenges players to create a one-level, one-map dungeon using SSI's Unlimited Adventures: Fantasy Construction Kit. A panel of judges will choose the top six designs, based on challenge and originality of art and monsters, which will then be uploaded to America Online for its 150,000 subscribers to play and select the grand-prize winner. Prizes will also be awarded for best monsters, best art, and best dungeon. For more details, contact SSI at 675 Almanor Avenue, Suite 201, Sunnyvale, California 94086; (408) 737-6800, (408) 737-6814 (fax).

It Does Windows

Dynasty, the home-computerizing software from Home Automation Laboratories (HAL), is now Windows-friendly. Once it's installed, running your home security, audio, video, weather-monitoring, and communications systems along with lighting and appliances can now be as easy as pointing and clicking on a button in Windows.

Renting Is Big Business

The computer-rental business is now a $500 million industry growing at a 35-percent annual rate, according to PCR, a Cranbury, New Jersey, company that specializes in renting computer equipment and peripherals anywhere in the United States. Businesses need extra computers for seminars, trade shows, seasonal peaks, and for employees on sick or maternity leave (a growing market segment). And there are also the home users and freelancers who rent laptops for travel. What questions should you ask before renting? First, suggests PCR, know the processing speed you require (for instance, for desktop publishing or for spreadsheet work), and decide beforehand if you need color. When you're ready to make a selection, find out whether brand names or clones are available, if the equipment is tested prior to each rental, what support and maintenance are available, how soon you can get the equipment, how it will be delivered, and what, if any, delivery restrictions apply.

Talk Radio on the PC

Internet Talk Radio, an entirely new dimension in broadcasting, was scheduled to begin airing a weekly half-hour interview program over Internet in late March. With the sound support offered by Sun Microsystems, Apple, NeXT, IBM, and other vendors, and with Internet's electronic mail protocols' support for multiple data types, the Talk Radio program will use encoding formats and conversion programs to support audio playback in all major environments. For now, Internet Talk Radio, which is sponsored by Sun Microsystems and O'Reilly & Associates, will air its program "Geek of the Week," featuring interviews with notable members of the Internet community. Later programs will air more frequently and include book reviews, short features, and such nontechnical features as reviews of restaurants in exotic places.

The Future of Floppy Drives

Signaling what will surely be a future trend, Dell Computer is now offering Sony's 3½-inch 4MB floppy drives as a custom option for Dell's new 486-based family of computers. The new 4MB floppy (2.88MB formatted capacity) offers 100 percent more capacity than conventional 2MB floppies, along with full backward compatibility with 1MB and 2MB disks.

CompuServe Provides Knowledge Index

CompuServe and Dialog Information Services announced that beginning in early April, CompuServe would become the exclusive U.S. carrier of Knowledge Index, Dialog's after-hours online research service for consumers.

Knowledge Index provides access to more than 120 of the most popular databases on DIALOG, an online information service used by professional research specialists. Research databases include the complete text of 33 major newspapers, scientific abstracts, corporate news, government publications, legal information, and reference sources.

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☐ Other IBM/PC Compatible (5) ☐ Laptop/Notebook (6)

B. At home, do you use your computer mostly for ☐ Personal Finance (7) ☐ Work/Home Business (8)
☐ Entertainment (9) ☐ All of the Above (10)

C. Would you classify yourself as a(n) ☐ Entrepreneur (11) ☐ Telecommuter (12) ☐ Moonlighter (13)
☐ Corporate Employee who brings work home (14)

D. Which online service(s) do you use? ☐ CompuServe (15) ☐ GEnie (16) ☐ America Online (17) ☐ Prodigy (18)

E. What other computer magazines do you subscribe to? ☐ PC/Computing (19) ☐ MPC World (20)
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F. Which Graphical User Interface do you use? ☐ Windows (25) ☐ GeoWorks (26) ☐ Other (27) ☐ None (28)

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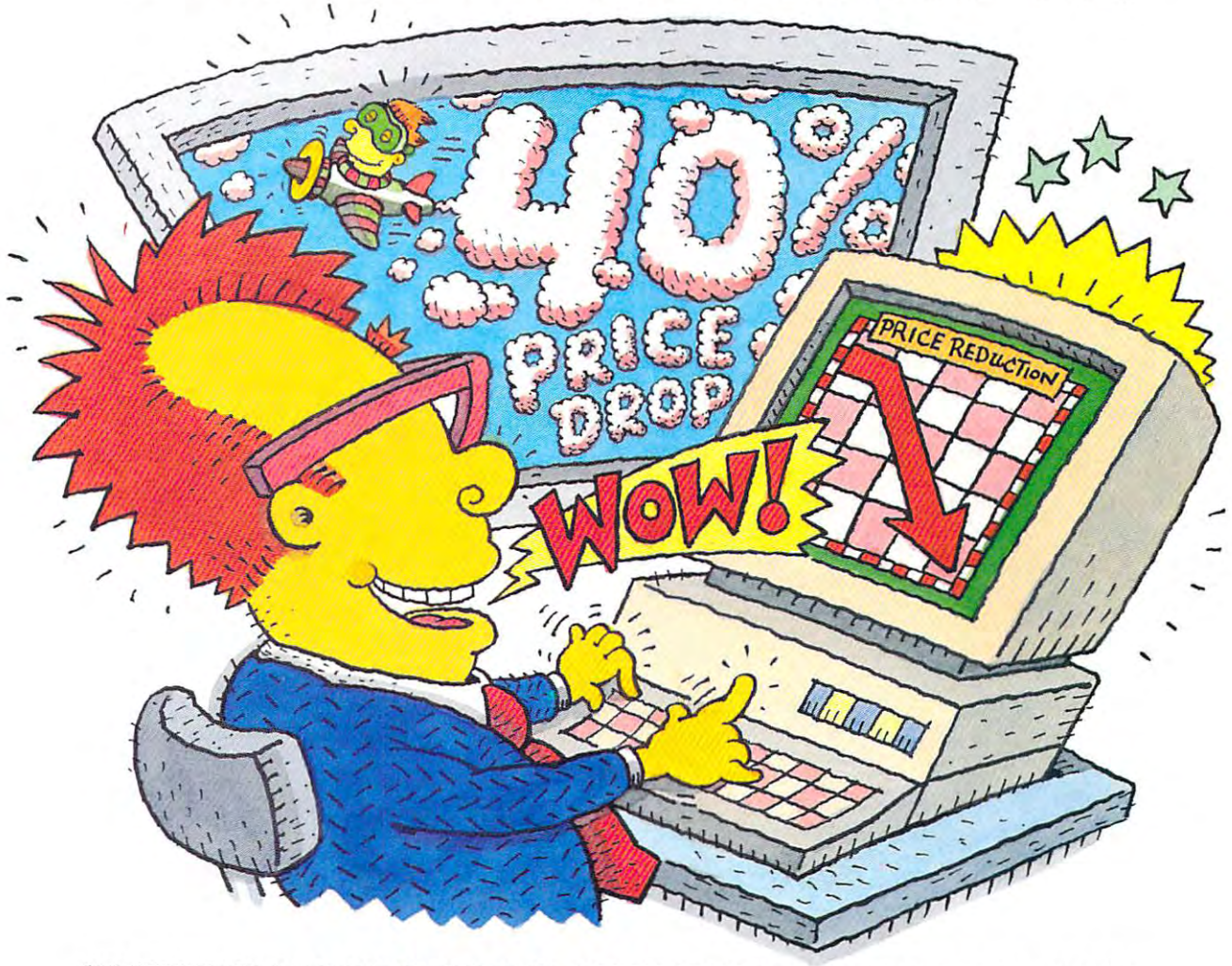

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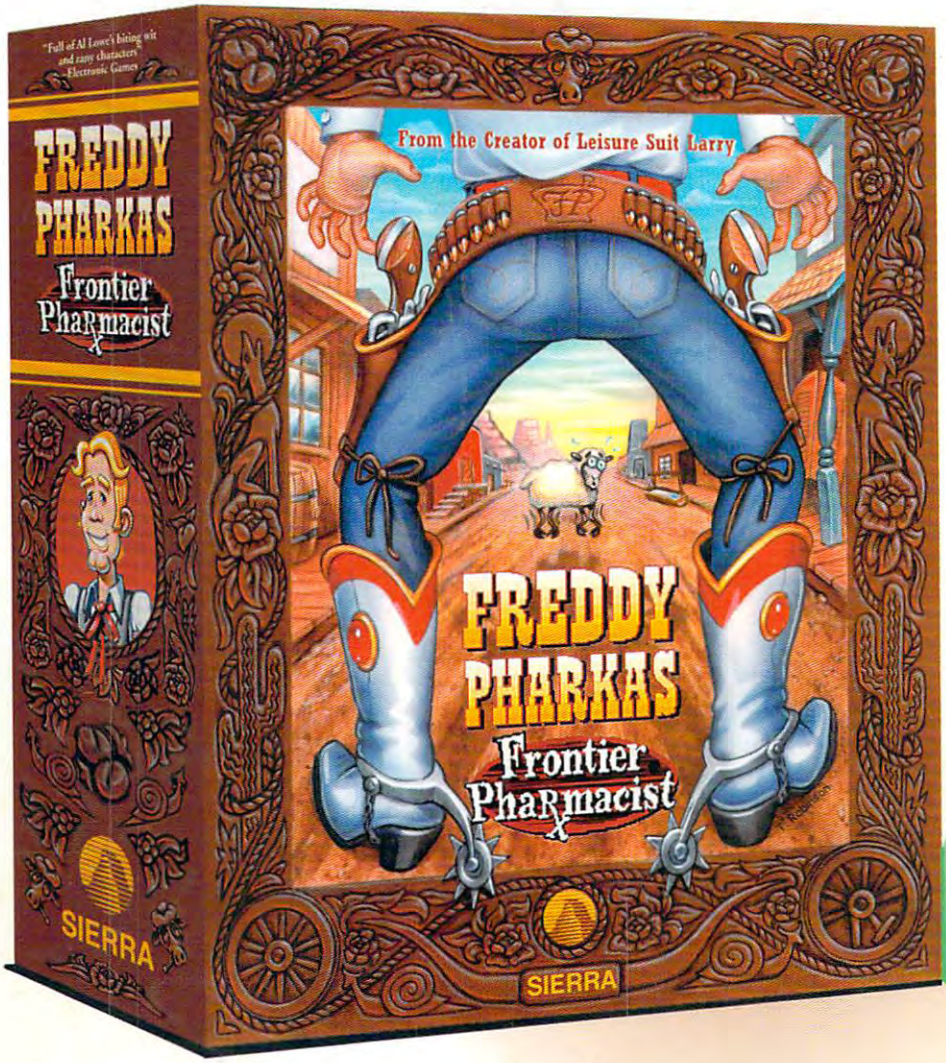

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