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THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

# ANALOG

## COMPUTING

**SPECIAL  
GAMES ISSUE:**

**Sneak Attack  
Maze War  
Rafferty Run  
Nightshade**

**PLUS:  
More ST coverage**



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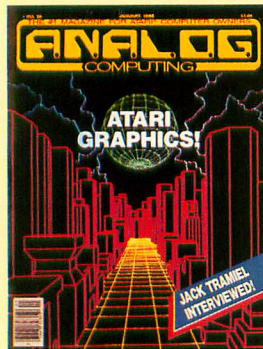
**ISSUE 23** • Fire Bug • Minicomp • Dark Horse • Climber • P/M Creator/Animator



**ISSUE 24** • Circuit Database • Cassette Compressor • XL-DOS • Bopatron! • Race in Space • Unicheck



**ISSUE 25** • Weather Forecaster • Andron • Miner Jack • BASIC Tutorial Part 1 • Adding BASIC Function Keys



**ISSUE 26** • BASIC Tutorial Part 2 • Robot Raid • Graphics Overlay • Popcorn • Magic Palette • PuLse in Action!



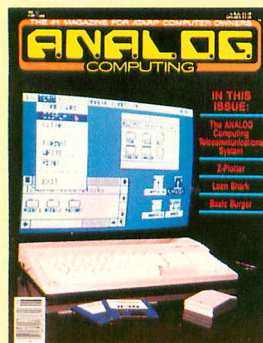
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**ISSUE 28** • MicroCheck Part 2 • TwoGun • Cascade • Monthly Mortgage Calculator • Demon Birds • MicroDOS XL



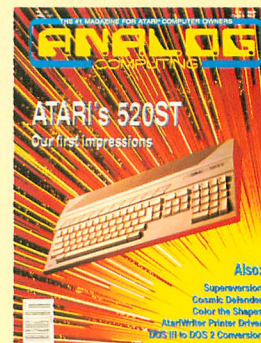
**ISSUE 29** • RAMCHECK • Revive Dragonlord • XL Expansion Connector • Cheep Talk



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# ANALOG

## COMPUTING

### FEATURES

- Sneak Attack . . . . . David Plotkin 33  
Your mission in this Action! game is to protect Earth's gunbases from the enemy's secret weapon—parachuting robots whose sole objective is to destroy you and the gunbases.
- Maze War . . . . . Mark Price 39  
The evil Mage Roklar has captured your group in this fast machine language game, and only one of you can escape before the maze dissipates.
- LOGO Demos . . . . . Sol Guber 67  
**ST** The ST shows off its speed and colors in this beginner's look at the graphics language, LOGO.
- Rafferty Run . . . . . Chuck Rosko 71  
In the annual St. Patty's day two-man race at Rafferty Downs, you must be fast and fill your pot with gold coins.
- Nightshade . . . . . Clayton Walnum 78  
A nonviolent text adventure, suitable for the entire family. You must guide the main character through the eerie realm of **Nightshade**.
- The Solid Gold Input Routine . . . . . Jim Dunion 90  
Finally, an input routine that shouldn't crash, break or cause errors.

### REVIEWS

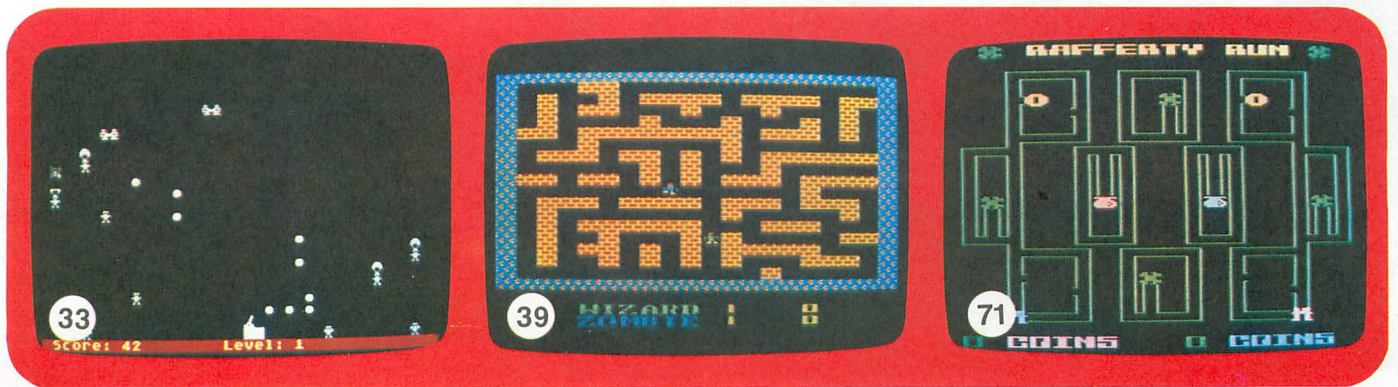
- Bargain Bin . . . . . Andy Eddy 17  
An overview of some of the once-popular entertainment software now available at bargain basement prices.
- Panak Strikes! . . . . . Steve Panak 23  
This month: from Infocom—**The Hitchhiker's Guide to the Galaxy** and **Wishbringer**. Also: **Space Shuttle** (Activision), **The Halley Project** (Mindcape, Inc.), and **Colossus Chess 3.0** (The English Software Co.).

### REVIEWS *continued*

- Express . . . . . Arthur Leyenberger 31  
**ST** (Mirage Concepts)  
The first word processor/mailling list/mail merge/typewriter/telecommunications program for the Atari ST. It almost sounds like too much, too soon. Is it?
- Combat Chess . . . . . Patrick J. Kelley 63  
(Avalon Hill)  
As the name implies, this new twist in wargames makes your armored units the pawns in the latest effort from the experts in the field.
- Hex . . . . . Monte Bank 65  
**ST** (Mark of the Unicorn Inc.)  
Could it be? A 120-level game for the ST—challenging, great graphics, mouse controlled. This is just the beginning.
- Powerstar . . . . . Charles Bachand 87  
(Pandora Software, Inc.)  
A 63-room graphics adventure that will amaze you with its speed and challenge you with its puzzles. . . all on cartridge!

### COLUMNS

- Editorial . . . . . Jon A. Bell 4
- Reader Comment . . . . . 6
- New Products . . . . . 10
- Griffin's Lair . . . . . Braden E. Griffin, M.D. 13
- ST News . . . . . 28
- Boot Camp . . . . . Matthew J.W. Ratcliff 97
- The End User . . . . . Arthur Leyenberger 100
- Index to Advertisers . . . . . 104



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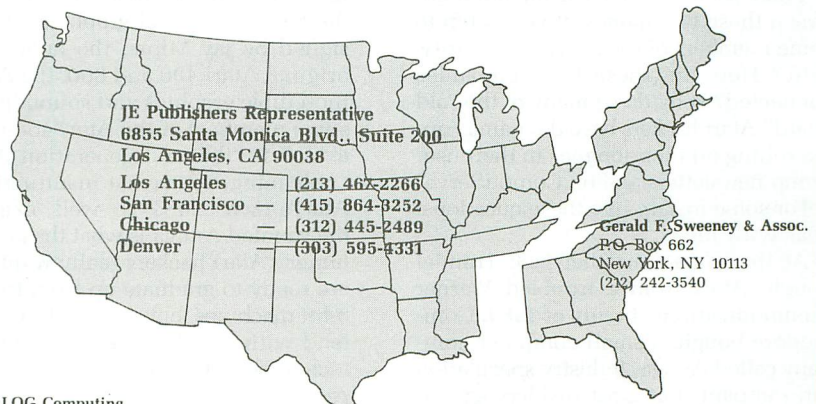
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# EDITORIAL

Atari and Amiga.

There seems to be a karmic bond between these two names, if you listen to some members of the Atari community. Why? How are these two companies connected? Why do so many of the "old guard" Atari hackers have the name Amiga rolling off their tongues in their user group newsletters and on CompuServe?

For some insight into these questions, bear with me. . .

At the same time that Jack Tramiel bought Atari from a troubled Warner Communications, in July of 1984, Commodore bought a small computer company called Amiga. Industry speculation ran rampant, but most insiders agreed on two things: first, that if anyone could whip Atari back into shape as a hot-shot company, it would be Jack Tramiel; and, second, Commodore knew this, and bought Amiga to keep Tramiel's Atari from getting it.

Smart move for Commodore. They lost the admiral who commanded the ship that: buried Texas Instruments, sent the Coleco Adam back to the Cabbage Patch orphanage and, ironically, almost sank Atari. Tramiel, Commodore's driving force for twenty-five years, was now their chief competitor, and he knew all the tricks of the computer industry.

Also, as we've mentioned before in our pages (**ANALOG Computing's** editorial, issue 27), Commodore couldn't survive forever on sales of the 64. With the deaths of the Commodore 16 and the Plus-4, they had to consider the long-term future of the personal computer in general.

Enter the Amiga. Utilizing the incredible speed of the Motorola 68000 (like the ST) and special graphics chips designed by Jay Miner, the father of the original Atari 400 and 800, the Amiga's incredible graphics and sound have led some members of the Atari community to dub it "the next generation Atari."

Meaning, somewhat insultingly, that Atari's own 520ST is "well, okay," but the vaunted Amiga is what the graphics-hungry Atari hackers really want. They are ready to graduate up from their old 8-bit machines, but aren't willing to contend with "the best personal computer technology of 1981" from IBM or with Apple's two-thousand-dollar, black-and-white Macintosh.

So here we sit, not just the Atari community but much of the 8-bit community as well, wanting to upgrade to the greater computing power, but waiting for two machines to slug it out for dominance.

Before I go on, I'd like to explain one thing. This is not a diatribe against the Commodore Amiga, because it has the Name of the Ancient Enemy (a stupid label) tacked in front of it, nor because we're some sort of "Atari fascists" who want to bully you into buying an Atari ST. Every member of our staff has seen what the Amiga can do, and we are well aware of its very fine capabilities—as a thirteen-hundred-dollar computer.

However, since we are an Atari magazine, our perspective on the whole Atari/Amiga phenomenon should be presented. Maybe there's something else going on here, something behind the scenes. We thought that we would clue you in.

As of this writing (August 21), there are around half a dozen magazines on the newsstands with cover stories on the Amiga. Some are affiliated with Commodore; some aren't. (One, however, is aligned with Commodore more than they would have, or want, you to believe. Suffice it to say, our publishers would have loved for Atari to have paid for the first year of **ANALOG Computing**. But then, we are an independent magazine—not a house organ.)

In all the articles I've read on the Amiga, nowhere have I seen a comparison between the Amiga and the 520ST. Comparison charts have shown the Amiga pitted against the IBM PC, the PC AT and Apple's Macintosh.

Should they be compared? Surely the 520ST, a computer that costs half as much as the Amiga, poses no threat to this mighty Commodore machine, right? No harm in comparing these two machines, is there?

All right, let's not compare them. Instead of throwing Commodore's and Atari's 16-bit machines into an arena to battle it out like bulldogs (as some members of the Atari community insist on doing), why not simply ignore the niche the Amiga is trying to fill and give equal time to the ST? Why not pit it against the IBM PC, the PC AT, the Macintosh? Where has the industry coverage been for the Atari ST?

Any chance that the magazines might have been swayed, just a little, by the prospect of getting a piece of a proposed twenty-million-dollar ad campaign from



Commodore? Atari would rather spend its money, at present, on its products instead of on a saturation ad campaign. Is this sufficient reason to completely ignore the ST, because the parent company won't guarantee four-color spreads for your magazine?

An industry source told us that Commodore demanded of a certain computer magazine that, in exchange for an Amiga development system, the magazine had to feature the Amiga alone on its cover, as well as allow Commodore to approve all pertinent articles before publication.

Another source informed us that a major computer magazine publisher approached Atari and offered the following odious suggestion: we'll do a magazine devoted to the ST, but only if you pay us a million and a half to do it. Perhaps they had just completed a similar deal with another computer company. . .

Let's have some equal time here, folks. If some members of the computer community want to compare the Commodore Amiga against the Atari 520ST, then do so. List—in a fair and impartial manner—the good and bad points of both machines.

But then, of course, you return right back to that price difference. . .

Okay, then, why don't you compare the ST *only* against other computers in its price range?

Uh, that wouldn't be fair to the Apple IIc and the Apple IIe. . .

I'd like to leave you with this little anecdote. A computer dealer friend of ours was demonstrating the 520ST to an IBM PC fanatic. After seeing the ST color graphics, the GEM operating system and the multitude of expansion ports, the IBM owner, suitably impressed, remarked, "Yeah, but how much does this 520ST cost?"

The dealer told him. ■

Jon A. Bell  
Managing Editor  
**ANALOG Computing**





# READER COMMENT

## Down and dirty.

In issue 29 (April), Bradly Pera asks if there is a way to store more than one game on a disk. I have seen and heard this same question many times in the three years I've been an **ANALOG Computing** reader. Well, I have a solution. It's not fancy and it does have its problems, but I find it quite effective.

Somewhere in the BASIC program, usually a few lines above the hex code, is a line that looks something like this:\*

```
100 ? "INSERT DISK WITH DO
S, PRESS RETURN";DIM IN$(
1):INPUT IN$:OPEN #1,8,0,"
D:AUTORUN.SYS"
```

When you RUN the BASIC program, it will store the game's BINARY FILE under the filename AUTORUN.SYS. But AUTORUN.SYS is more than a name; it acts like a command, telling the computer to do only this one thing after you boot the disk.

By changing AUTORUN.SYS to some other name, say POPCORN.BIN (I use BIN to mean binary), the game or utility will be stored on the disk with that new name. When you boot up the disk, as there should not be an AUTORUN.SYS file, control will be passed to DOS, and then to BASIC. You RUN the game by asking DOS for choice L. (binary load).

This does have its quirks, though.

When you binary load a game, it will POKE all sorts of memory locations. If you RESET, the computer goes through a warm start and looks for an AUTORUN.SYS that isn't there any more. In some cases, RESET will return you to BASIC, however many memory locations will be incorrectly set.

What it boils down to is that, to escape the game, you have to power down. Turn off your computer, wait a second or two, then power up again. This will reboot the disk, turn control back over to DOS, and then again to BASIC.

By changing the filespec, a few games (so far, only **Popcorn**) will have to be relayed after each completed game.

Okay, it's not the best solution, but it works pretty well for me. And having seven to ten games, including their BASIC programs, on the same disk is both a money and space saver. It's a down and dirty solution, but maybe it's just what you're looking for.

Keith Mosher  
Columbia, SC

\*Taken from **Fire Bug**, issue 23 of **ANALOG Computing**.

## Musorqa fixes.

I really enjoy **Musorqa** from **ANALOG Computing's** issue 34. My kids like the program, too! However, there are a couple of bugs that I've fixed.

The worst occurs when you press 0 to select an instrument. The input is accepted, and touching the surface of the touchpad will cause circles to be left all over the screen, messing up the display. To fix this, add the following line to the published listing:

```
485 IF I=K0 THEN I=I2
```

When using the **Musorqa** for extended periods, the computer goes into "attract" mode, making the screen hard to read.

To fix this, add the command: POKE 770 to the end of Lines 360, 470 and 520. This cancels the "attract" mode any time the pad's surface is touched, or when either button is pressed.

I was bothered by the way **Musorqa** responds when the bass octaves are selected. I didn't like the way that, at a certain point, the pitch would "jump" back to the upper octaves at the bottom of the bass register.

To fix this, change the variable K12 in Line 200 to K5 and change the variable K7 in Line 510 to K14. Make sure you

change *both occurrences* of these variables in the lines mentioned!

Pressing the START button on the console seemed inconvenient for a program that uses a touch pad. If you're using an Atari **Touch Tablet** and would rather use the button on the stylus to activate the SUSTAIN function, change Line 390 to:

```
390 IF STICK(K0)=K14 OR PE
EK(53279)=K6 THEN 390
```

If you'd rather use the left button to activate the SUSTAIN function, change Line 390 to:

```
390 IF NOT PTRIG(K0) OR P
EEK(53279)=K6 THEN 390
```

Either change will still allow the use of the START button to activate SUSTAIN, as well.

Finally, to allow use of the **KoalaPad** touch tablet with the **Musorqa**, add the following two lines to the listed program:

```
310 X=INT(PADDLE(K0)/45.6)
*K8+K4:Y=PADDLE(K1)/K10+1.
5:D=(X-K4)/K8+K5*(X=20)+K9
*(X=28)+20*(X=36)
1020 POSITION K5,K23:?"to
be used wi th the
KoalaPad";
```

The second modification for Line 390 will also allow users of the **KoalaPad** to use the left button for the SUSTAIN function.

I hope you find these fixes helpful.

Sincerely,

Darryl W. Howerton  
Jonesboro, AR

## Atari 1027 product update — printing international characters.

In general, characters you type on the computer keyboard are what your Atari 1027 prints. When using Atari BASIC, however, you can print international

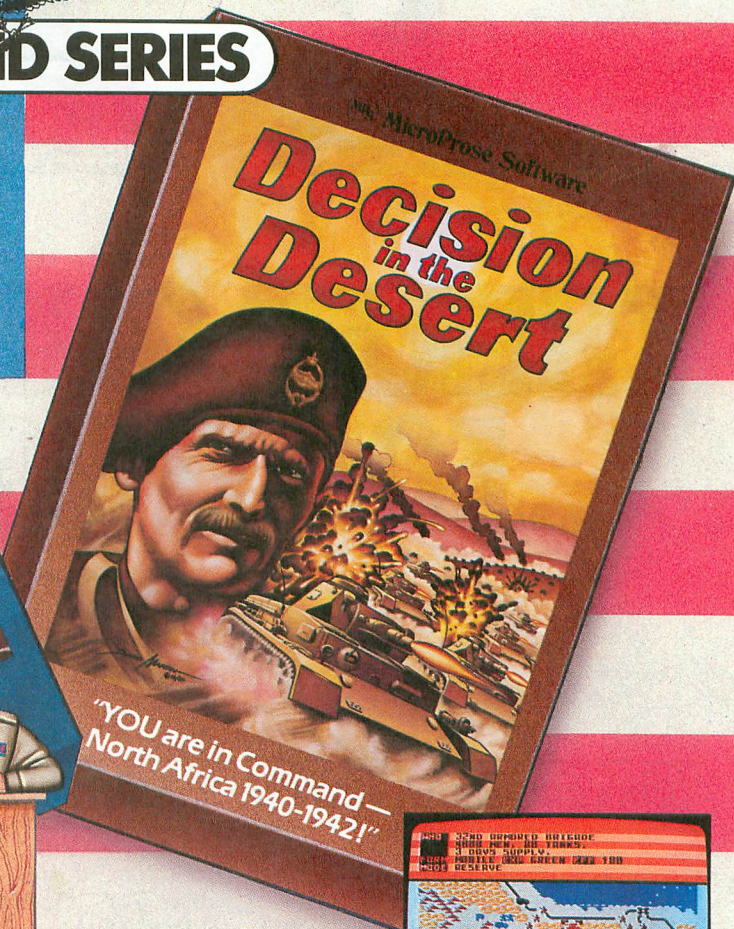
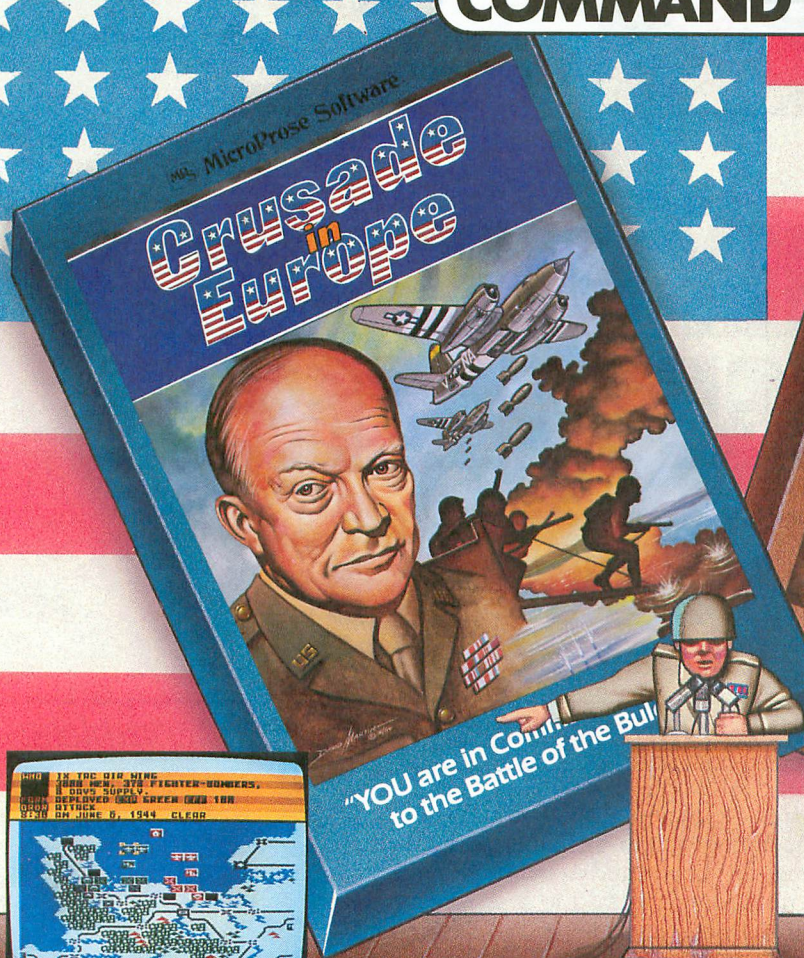
(continued on page 9)



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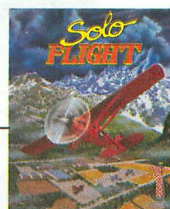
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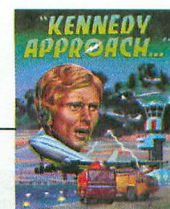
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characters not shown on the keyboard by entering this short program:

```
10 OPEN #2,8,0,"P":REM OP
ENS IOCB #2
20 PRINT #2;"ESC ESC CTRL
W"
```

Line 20 may be confusing to some. It may look like you type in the letters ESC twice and then CTRL. What this is instructing you to do is push the ESC key (upper left-hand corner) twice.

The first time you push it, nothing will happen; the second time, an escape character will appear on-screen.

Next, hold down the CTRL key (middle of the left-hand side) and, while holding down CTRL with one hand, push the W key with the other hand. Once again, nothing will happen when you hold down the CTRL key, but when you hit the W, a T-shaped graphics character will appear.

Then, using the chart below, print the character you want by entering either a command (ESC, CTRL) or a decimal code. For example, to print the first character, á, from the chart, type the two program statements above and enter one of the following lines:

```
30 PRINT #2;"CTRL ,"
OR
30 PRINT #2;CHR$(0)
```

To stop printing international characters while you're in BASIC, type:

```
PRINT #2;"ESC ESC CTRL X"
```

Hex characters are provided for ad-

vanced programmers using assembly language.

CHARACTER	DECIMAL CHARACTER		HEX CODE
	COMMAND	CODE	
a	CONTROL ,	00	00
â	CONTROL K	11	0B
ã	CONTROL Q	17	11
ä	CONTROL X	24	18
å	CONTROL Y	25	19
Ä	CONTROL Z	26	1A
Å	CONTROL ;	123	7B
ç	CONTROL D	04	04
é	CONTROL T	20	14

*Reprinted from an update sheet from Atari Corp.*

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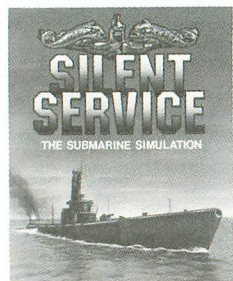
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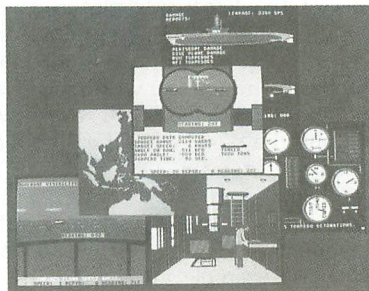
## ANOTHER HIT FROM MICROPROSE



Microprose calls **Silent Service** "the most detailed and realistic simulation for home computers." Single-ship attacks to multi-patrol missions are possible with graduated enemy skill levels, to give you both challenge and fun. Your patrol regions include the Mariana Islands and the coast of Japan, and you have your choice of surface or submerged attack.

Some of the many features include: views from conning tower and periscope, instruments on the bridge and in the engine room, and a damage control room screen. Complete maps of the entire Southwest Pacific area are displayed on-screen in various closeups. For the 400/800/XL/XE line. Available next for the Atari ST.

Retail is \$34.95, from Microprose Simulation Software, 120 Lakefront Drive, Hunt Valley, MD 21030 — (301) 667-1151.



## OTHER NEWS

Infocom completes its magical Enchanter series with **Spellbreaker**, the third and final release following **Enchanter** and **Sorcerer**. This new interactive fiction story is said to contain the most complicated puzzles in the series, and ties together the three tales in the Enchanter trilogy. The \$44.95 price tag includes an Enchanters' Guild pin, Frobozz Magic Equipment catalog and trading cards of big-name Enchanters. Available for the 400/800/XL/XE/ST lines. Infocom, Inc., 125 Cambridge Park Drive, Cambridge, MA 02140 — (617) 492-6000.



Big news on the game front is the release of Broderbund's **Karateka** and **Championship Lode Runner** on Atari 8-bit computers. An action game with a story line, **Karateka** features realistic sound and graphics designed by a former Disney animator. **Championship Lode Runner** is the sequel to the original **Lode Runner**, but, as the author of the game puts it, "any level in (this game) will take more ingenuity to complete than the most difficult level in **Lode Runner**." Both games are 48K, and they cost \$34.95 each. Broderbund Software, 17 Paul Dr., San Rafael, CA 94903 — (415) 479-1170.



J. V. Technologies offers **Coin Collector** and **Photo Collector**, two menu-driven inventory programs. Designed to organize coin or photograph collections into a database, these are cataloging and storing information systems. Each program can store up to 300 records in RAM at a time. Additional records can be easily accessed from disk. Retail is \$22.95 each, or both for \$40.00. A minimum of 48K is required, plus one disk drive. From J. V. Technologies, Inc., P.O. Box 563, Ludington, MI 49431 — (616) 843-9512.



Advanced Financial Planning has released **Plan Ahead**, a three-module program series consisting of **Retirement Planning**, **Life Insurance Planning** and **College Funding**. Some of the features include: analyzing the amount of insurance required by a family, determining the savings needed to ensure that all children will have adequate funds to attend the college of their choice, and the ability to create a full retirement plan. One module, for

(continued on next page)

## BIG BEN GAMES

The best entertainment programs developed in England are now being brought to you via Big Ben Games. The first of these include **Colossus Chess 3.0**, **Kissin' Kousins**, **Smash Hits 1, 2 and 3**.

**Smash Hits 1** is available on disk now for \$14.95, and it includes the games **Firefleet**, **Dan Strikes Back**, **Captain Sticky's Gold**, **Hyperblast** and **Jet-Boot Jack**. **Smash Hits 2** presents you with **Diamonds**, **Stranded**, **Citadel Warrior**, **Robin Hood** and **Jet-Boot Jack**. The third in the **Smash Hits** series invites you to play the following: **Airstrike 2**, **Batty Boulders**, **Breath of the Dragon**, **Neptune's Daughters** and **Jet-Boot Jack**.

For information on these British imports, contact: Big Ben Games, Ltd., P.O. Box 875, Wilmette, IL 60091 — (312) 446-6610.

## TRI MICRO

**The Write File** is an integrated word processor and database on one disk. Some of the word processor features include creating and editing up to 77 characters per line, the linking of files so that they can be printed or saved, allowing you nearly unlimited length, and word or phrase search. With the database (file manager), you can create and edit up to 999 records per file, search for any item, sort up to 3 records at a time, and merge files and records into the word processor to print letters, reports and forms.

**Your Home Office** is comprised of a word processor identical to the one in **The Write File**, but is combined with a spreadsheet rather than a file manager. The spreadsheet allows you to prepare annual and monthly budgets, balance checkbooks, edit and format data, and enter text, formulas and numbers in up to 850 cells (17 columns x 50 rows).

Both programs retail for \$29.95 each, from Tri Micro, Inc., 1010 N. Batavia, Suite C, Orange, CA 92667 — (714) 771-4038.



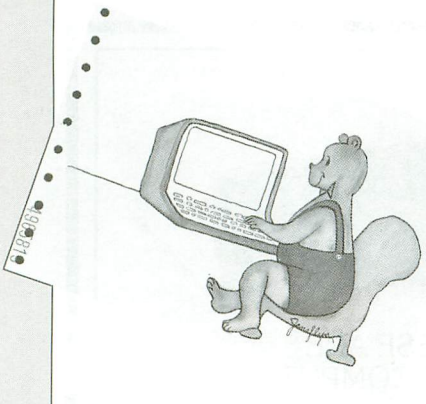


### COMPUTER STATIONERY AND GREETING CARDS

Classic Laid, 20-pound, watermarked bond stationery is available with matching #9 envelopes, and can be purchased in either continuous or noncontinuous formats. Fine edge perforation leaves little trace of "ragged" edges, and a detached size of 7 1/4 x 11" is suitable for business or personal use. Four colors offered are: tan, ivory, blue and gray.

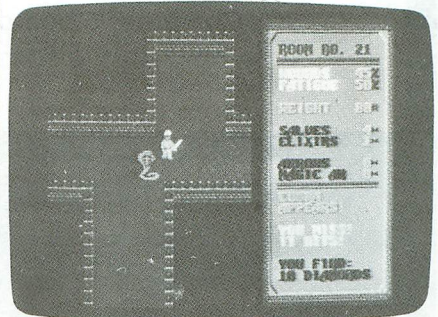
Computerized greeting cards are marketed in eight designs for Christmas, birthdays, announcements, invitations and thank-you notes. A package of twenty cards with envelopes costs \$9.95. A box of one hundred cards and envelopes is \$45.00. Larger quantities are also sold.

Additional prices, samples and information from Compugreet, P.O. Box 3357, Reston, VA 22090 — (703) 476-0044.



### THE GATES OF APSHAI LOOM BEFORE YOU

The complete Temple of Apshai Trilogy—The Temple of Apshai, The Upper Reaches of Apshai and The Curse of Ra—are available on disk from Epyx.



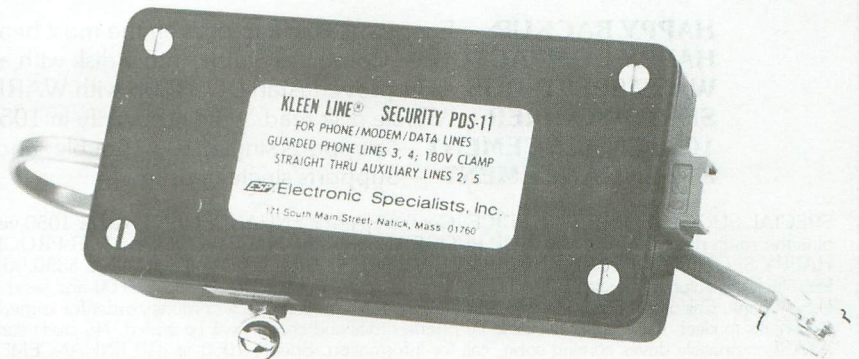
In this game of strategy, you'll encounter 12 levels, 568 rooms and 37 monsters. The trilogy has new graphics, enhanced sounds and faster play. And, of course, the classic cast of good guys and bad.

The trilogy of one-player games lists for \$29.95 to \$35.00. Epyx, Inc., 1043 Kiel Court, Sunnyvale, CA 94089.

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Kleen Line from Electronic Specialists is intended to suppress damaging telephone line spikes that are caused by lightning, phone office switch equipment, etc. A standard 4-pin telephone modular connector model is available, the RJ-11. There is also a wide 8-pin version for sale, the RJ-45.

For more information, contact Electronic Specialists, Inc., 1717 South Main Street, P.O. Box 389, Natick, MA 01760 — (800) 225-4876.



### OTHER NEWS continued

\$29.95; two for \$49.95; or all three for \$59.95. Advanced Financial Planning, 20922 Paseo Olma, El Toro, CA 92630.



Synapse is following up its Essex and Mindwheel interactive text adventures with Brimstone. Packaged in hardbound book form with a disk, Brimstone is a medieval adventure written by poet James Paul. Sir Gawain, Knight of King Arthur's Round Table, has been given the task of escaping from the underworld of Ulro with the five mystic words—or he will be condemned to Brimstone forever. Cost is \$39.95, from Synapse, 17 Paul Drive, San Rafael, CA 94903 — (415) 479-1170.

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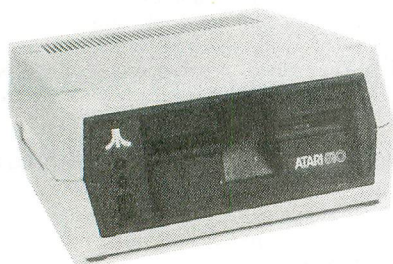
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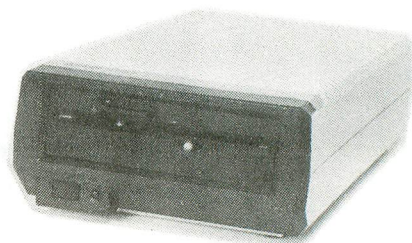
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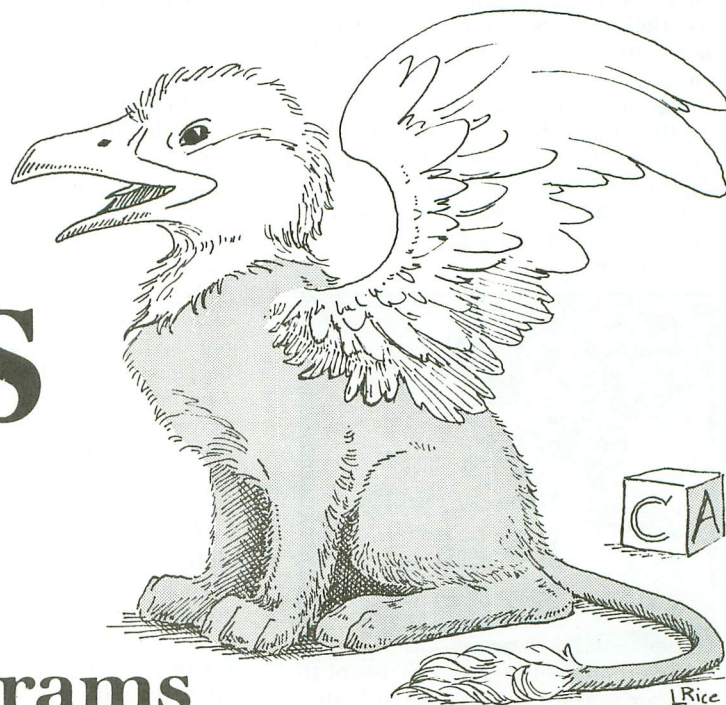
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# GRIFFIN'S LAIR



## Educational Programs Review

by Braden E. Griffin, M.D.

This month's column looks at the computer software entry into the recently popular pastime of the pursuit of trivia. Hnammm. . . an interesting phrase—the *pursuit of trivia*. Maybe there's a catchy game title in there somewhere. Pursuing Trivia? Pursuit into Trivia? Trivial Pursuit? Nahhhh. Nothing catchy there.

Trivia games have taken their place in the Hall of Fads, along with the Hula Hoop, the Frisbee, Rubik's Cube and the immensely entertaining sport of duck catching. For the most part, trivia games thrive on the desire of individuals to demonstrate their cerebral superiority over others by the ability to recall worthless information. It is an arena where members of Mensa (Mensites? Mensals? Mensheviks? Menswear?) compete on equal footing with *idiot savants*.

In spite of the inherent elitism fostered by such games, most people who play them do not take it seriously and do enjoy the mental calisthenics used in playing. The educational value of trivia games lies in the development of skills involving memory and quick recall.

The ability to think quickly and accurately is important, and here's a safe place to develop those skills. There may be some value in the knowledge gained from learning new facts, but, mostly, it's just a good workout for the old neurons.

I recall a line from a Limelighters concert in the early sixties (You probably think *I'm* one of those pretentious boors referred to above, don't you? Not moi!) . . . ahemm . . . that has become my motto in life. Sound Mind—Sound Body. Take your choice!

**PQ—THE PARTY QUIZ GAME**  
**SUNCOM**  
260 Holbrook Drive  
Wheeling, IL 60090  
32K Disk \$69.95

If you're a hardcore trivia player and are looking for a computer game to satisfy your craving, look no further. Suncom has successfully preserved the essence of the popular trivia board games while incorporating a variety of helpful computer features. This game is not for children, but that's cool. . . that's cool.

This isn't just a software package, but comes with its own special hardware to

use with the game. Four individual game control paddles are included, along with an interface module which attaches to the first two joystick ports. Good news for all you XL owners out there.

Each paddle has four large buttons facilitating quick responses. The paddles have relatively long cords that let players view the monitor screen and play the game without having to sit on top of one another.

The paddles are a definite asset to all aspects of the game, but are indispensable when playing the competitive mode which I'll discuss later. The quick response feature is appreciated most during the lightning rounds, eliminating fumbling around the keyboard or conventional joystick manipulations.

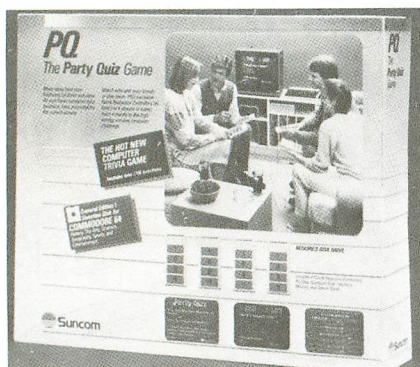
Several options are available, providing a wide variety of playing conditions. The number of players can vary from one to four, or even four players on two teams. In the one-player mode, all four paddles are functional, making it possible for others to collaborate on one score.

When the questions are displayed on the screen, a timer bar and countdown

# GRIFFIN'S LAIR *continued*

clock appear at the bottom. The clock is initially set at 500 points for true/false questions and at 1000 for the multiple choice.

The quicker the correct answer is given, the higher the score. The rate that the time decays, however, is based on the selected response time, which can be changed. It can be set at 3, 4, 5 or 10 seconds, depending on the sharpness of the competition.



Each round of the game consists of 10 questions. The number of rounds in a game is preset at 5, but can be increased to 8, 12, 16 or 20 rounds. The latter option would give a game that's 200 questions long. With the response time limited, as mentioned above, a round is completed very quickly.

A unique feature of this game is the availability of two game-playing modes, "competitive" and "social." The competitive mode has all four players competing at once to answer the question, with the first correct answer being the only one to score points.

In the social mode, all the players have an opportunity to answer the question, even after the correct reply is given. In this mode, the first correct answer will score the most points, but everybody has the chance to score something.

The correct response isn't displayed until all have attempted an answer, or when the time runs out. There's no way of knowing what answer someone else has entered. One only knows that an opponent's response was correct if a short tune is heard, or incorrect if an "error" tone is audible.

The last option allows certain players to be handicapped. The questions themselves cannot be made easier, since everyone has the opportunity to answer them. A very simple method is used to bring about some degree of equity.

A handicapped player is allotted only half the response time of those without

the handicap. Meaning that, if the response time is set for 10 seconds, the handicapped player's controller is inactivated for the first 5 seconds, giving the others a chance to answer first.

Playing the game is fairly straightforward. Questions appear on the screen, and, a moment later, the possible answers are displayed. The questions are either of the true/false type or multiple choice (four answers).

Across the top of the screen, scores of all the players are displayed throughout the question rounds. The game can be paused by hitting the SPACE BAR. Another interesting feature is that, if a player tries to answer a question not yet seen by holding down on one of the buttons too early, the word *CHEAT* appears in his score column, and his controller is disabled for the duration of that question.

In addition to the regular question rounds, there are periodic "lightning rounds." Here, each player is given the opportunity to answer 10 questions in 20 seconds, with the score being added to the total. Because of the rapid-fire nature of these rounds, the correct answer is not displayed as in the other rounds.

This is an extremely well designed game and comes with a very well written manual that fully explains the game's many features. As I mentioned earlier, this is not for kids. Over 2500 questions from a wide spectrum of categories will challenge even the most expert trivia buff. The questions are presented clearly and accurately. I was unable to detect any mistakes during the several hours I played it.

Interspersed among the classic flash of trivia trash are some interesting and informative facts. I do not use the word *trash* in a derogatory sense, but it helps to turn a phrase. **The Party Quiz** is stimulating and fun. So who was Coolidge's V.P., anyway?

**TRIVIA QUEST**  
**ROYAL SOFTWARE**  
**2160 W. 11th**  
**Eugene, OR 97402**  
**48K Disk \$39.95**

One of the best indices of a program's appeal is seeing just how long it takes me to get it away from my kids and their friends when I first bring it home. For two weeks, a slightly rowdy group of high schoolers had this game in use from just after school till the wee hours of the morning.

Once it was in my hands, I quickly learned the reason. Here was an exciting and challenging game which combined the stimulation of a trivia game with arcade action, in a healthy environment of competition.

**Trivia Quest** is a game for one to four players using joysticks. Atari XL users need not worry, since four players can share the two available joysticks with their computer.

Set in the Dark Ages, the game has each player assuming the role of a lord who sends for three of his lieges, a page, a knight and a prince on a quest. The object is for all three characters to individually complete the journey from their home castles through the perils of the Empire of Xandor, and back home again.

The journey is where the fun begins, as well it should. The trail through this enchanted land consists of a number of squares (170, to be exact), most of which are trivia question squares. The others represent dragon lairs.

To begin the journey, one must outfit the character with food and gold. These essentials are obtained by entering the wisdom round and successfully answering a trivia question.

The amount of gold and days of food attainable from correctly answering are displayed above the questions. The more difficult the question, the more gold it's worth. The number of days of food that can be earned decreases with time, an incentive for quick response. After a correct answer, the character moves around the "game board" a certain number of squares, determined by the amount of gold and food won.

Continuing the game consists of landing on the trivia question squares and entering the wisdom rounds. Landing on one of four different squares elicits a question from the following categories: sports and leisure, history and geography, TV (television, literature and the movies), and miscellany.

Each question has a choice of four answers. The correct answer is not displayed, and, since the joystick is used to point to the desired answer, one's opponents cannot tell which answer is selected, whether right or wrong.

One of the best features of this game is that the level of difficulty of the questions can be selected for individual players. At the beginning of the game, each player selects the appropriate level of difficulty from beginner, standard, tourna-



ment or random. This permits players with quite different skill levels to compete equally.

Throughout the journey are squares denoting dragon lairs. Landing on these begins a fight with a dragon. The screen changes, and the character is thrust into a wooded arena with a fire-breathing dragon.

The three characters have different strengths regarding their ability to fight. The dragons also vary in strength, depending on the amount of gold they're protecting. By using the trees as a shield and firing the arrows accurately, one can slay the dragon and add its gold to one's coffers. If one loses, then the dragon takes some gold from the player.

A wisdom round consists of attempting to answer a question from the category of square one is resting on and, if successful, advancing the determined number of squares.

After each player has completed the round, a summary screen appears. This displays the number of questions answered correctly, the number of dragons slain and the total gold earned. Then the next round begins. It may take thirty or more rounds for a player to successfully make the journey with all three characters.

The "wisdom duel" is another interesting feature. By landing on an opponent's castle square, landing on the same square as an opponent or pressing the joystick button just as an opponent passes over the square one is on, this head-to-head contest is initiated.

A question is presented, and the first to answer correctly takes gold from the other. The amount of gold at stake is determined by the difficulty of the question. But beware, Charles Van Doren-breath, if one answers incorrectly, then the gold goes to the opponent by default.

The pleasant graphics are accompanied by catchy music throughout the adventure. Documentation is more than adequate. The more than 2000 questions presented on three disk sides are very accurately compiled.

An optional data disk, with more questions and the ability to create one's own questions, is available. The different levels of difficulty are quite consistent throughout. The beginner level can be managed by a bright nine- or ten-year-old, but does offer some questions which may present a challenge even to adults. The tournament level is tough but fair, and includes some real zingers.

**Trivia Quest** is entertaining, and this form of exercise will keep everyone in shape.

**TRIVIA MANIA**  
**XLENT SOFTWARE**  
**P.O. Box 5228**  
**Springfield, VA 22150**  
**48K Disk \$29.95**

**Trivia Mania** isn't just a ready-to-play game of trivia, but is promoted as The Trivia Construction Set, enabling players to create their own trivia database. Sounds like a great idea. We shall see.

The trivia game itself allows from one to four players to compete, using the keyboard or a joystick. One is given the option of having the computer display the correct answer if an incorrect response is entered.

The flip side of the program disk and an additional disk provide three sides of separate databases with which to play. Each side contains six categories with 100 questions in each category. The six categories used are the same for each disk, focusing on general knowledge, sports, movies, TV, commercials and science.

Once a category is selected, the game begins. A question is randomly selected and displayed with four possible answers. The desired answer is chosen, using the keyboard or joystick. On the screen is a timer which counts down from 500 to 0. The quicker the response, the higher one's score—assuming, of course, that it was the correct response.

The number of players selected determines the questions each will be given during a session. One player alone has 100 questions in a session; two will have 50 questions each; three have 33 questions; and, with four players, each is given 25 questions.

The players do not alternate turns, i.e., a player is given all the allotted questions consecutively, while the others wait. This aspect eliminates much of the competitiveness of trivia games, and it becomes a "real drag" waiting for one's turn. After each player has completed his or her session, the scores are displayed to determine the winner.

The data disks contain 1800 questions in the aforementioned categories, with no differentiation of skill levels. The questions themselves are pretty standard trivia fare and offer a moderately challenging test of one's knowledge.

I found it disturbing that a number of entries had misspellings and typos. This

is simply a result of sloppy editing and is inexcusable in a game of this sort.

The come-on for this game appears to be the ability to create additional data disks. Each disk is limited to six categories of twenty characters in length. Once the categories have been selected, the "create/editor" option is used to prepare the database.

A question may contain up to thirty characters, with four twenty-character-long answers for each. One hundred questions are permitted in each category. The creation of the database is easily managed, and the programmers have made this feature quite user friendly. An "update" option allows for editing or deleting items from the database. Anyone familiar with the usual database filing systems will recognize this as simply an offspring of those programs.

The trivia game itself isn't particularly exciting. However, if one wants to cre-

*(continued on next page)*

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ate a much larger base of questions with relative ease, then this may just be the ticket. I only have one problem with that concept.

If I create this fantastic database, I will, obviously, know all the answers. Ergo, I will not get to play it. Or, I will play it against unknowing opponents and trounce them. That sounds like fun. Granted, this may be an ideal method for a teacher to involve students in an enjoyable educational activity that can cover various subjects. But otherwise, I'll be an uninvolved gamemaster without any purpose.

If one just wants to play a simple version of trivia similar to this and one is alone, then I would suggest going online and playing one of the myriad trivia games offered by CompuServe. Some of them are incredibly challenging. While you're at it, why not hook into the **ANALOG Computing TCS**; you'll enjoy it, too. **A**

---

*Dr. Griffin, as Chief of Newborn Medicine at a perinatal center, spends most of his time in the newborn intensive care ward. Off-hours, he's been using an Atari 800 for four years. In keeping with his gentle profession of nurturing preemies, Dr. Griffin's number one game is **Crush**, **Crumble**, **Chomp**.*

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#### **Educational conference.**

ACE, the Association of Computer Educators, a professional, nonprofit organization dedicated to advancing educational programs through technology, will hold its second annual conference, called "Computer Education in Transition, B.A.S.I.C.(s) and Beyond," at Fordham University, Lincoln Center Campus, on Saturday, November 9, 1985. For further information, contact ACT at 751 Bard Avenue, Staten Island, NY 10310.

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# WHAT IS CHECKSUM DATA?

Most program listings in **ANALOG Computing** are followed by a table of numbers appearing as DATA statements, called "CHECKSUM DATA." These numbers are to be used in conjunction with **D:CHECK** and **C:CHECK** (which appeared in **ANALOG Computing** issue 16 and the **ANALOG Compendium**) or with **Unicheck** (from issue 24).

**D:CHECK** and **C:CHECK** (written by Istvan Mohos and Tom Hudson) and **Unicheck** (by Tom Hudson) are designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of these articles, you may send for back issue 16 or 24 (\$4.00 each) or the **ANALOG Compendium** (\$14.95 plus \$2.00 shipping and handling from:

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# BARGAIN BIN

by Andy Eddy

In these days of inflation, new software can be very expensive, and sometimes disappointing. Many software manufacturers have fallen by the wayside, due to the shakeout that occurred in the computer market. Some companies that were riding the top of the charts found their popularity waning or totally gone.

In a desperate effort to recoup some of their investment, they would liquidate the inventory that sat in warehouses. For consumers, this created a market of low-cost, discounted software. Like the records that can be bought in the "cutout bin" of a record store for a couple of dollars, the quality of the product isn't necessarily reflected in the price.

This article reviews some of the "bargain bin" items and gives an opinion as to whether or not they're good deals at their new prices. I hope it proves to be of assistance to you.

And now, on with the show...

**SPACE EGGS**  
by Nasir Gebelli  
**SIRIUS SOFTWARE**  
10364 Rockingham Drive  
Sacramento, CA 95827  
(916) 366-1195  
48K Disk

Space Eggs is very similar to an arcade game of a few years ago called **Moon**

**Cresta**, which could be found under an assortment of names. They all had one thing in common: a high frustration level.

When I say "frustration," I don't mean the kind that makes you walk away in disgust, but gets under your skin, makes you break out in a sweat and causes you to mutter words not found in the dictionary... because you want to conquer it.

After the opening credits, your three-tiered spaceship enters the screen and separates at the bottom, leaving your first stage ready for battle. Your opponents seem harmless enough—seven eggs floating back and forth across the screen. Hitting one with your phaser breaks the egg open to reveal your real enemy.

Each level completed exposes you to a more dangerous foe, starting with spiders and progressing through to lips (?!), wolves and fuzzballs. Beating the fuzzballs (which isn't easy at all) brings a random combination of the aliens. Even though there isn't much on the screen to blow away, each creature must be struck twice—first to break the egg, then to destroy the attacker.

A bonus feature gives you the chance to dock your first stage with either your

second or third stage. This turns your ship into a devastating battle machine, spitting out a trio of bullets in each volley. The maneuver is difficult to accomplish and only occurs after various point goals—not easy pinnacles to reach and definitely for die-hard players only.

While the graphics leave a lot to be desired, and your imagination must be stretched to envision each of the characters, the actual gameplay is the feature here. **Space Eggs** is designed to allow you the choice of keyboard, paddle or joystick control. A nice addition for those with a stripped down, basic system.

A \$25.00 to \$30.00 price doesn't make this a great value compared to the quality of the latest waves of software offerings. But, at the discounted price of \$4.95, this game is an inexpensive addition to the library of any avid arcade player. Visually, the program is first generation, but it puts your patience and abilities to the test.

(continued on page 19)



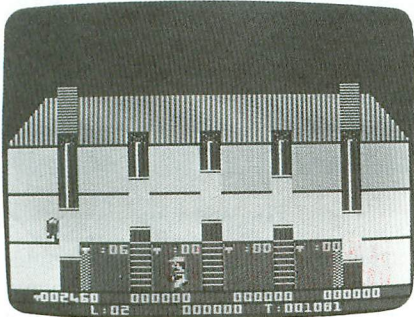


## Bargain Bin *continued*

### BRISTLES

by **Fernando Herrera**  
**FIRST STAR SOFTWARE**  
22 East 41st Street  
New York, NY 10017  
(212) 532-4666  
32K Disk

The task you've been enlisted for in this contest is to paint (as quickly as possible) the rooms of the building you (and up to three of your friends) are working in, all the while collecting any bonuses you come across. The faster it's completed, the higher the bonus awarded. If the timer should run out before you finish the job, you must take your brushes and try again.



Bristles.

To stress the nonviolent overtones of the contest, lives are not lost as in most video games. You're supplied at the start with ten paintbrushes, and you lose one upon each unsuccessful encounter with one of the many meanies you may bump into along the way.

To avoid having to move through the building or relying on your running and jumping ability alone, the structure is equipped with ladders and elevators. Missing or running into an elevator results in your falling into the basement to start again. In later stages, this results in the loss of a brush.

As an additional challenge, on completion each building will uncover a word (or words) to help you discover a hidden message. This phrase will only be totally revealed when all eight buildings in each skill level are painted. With six skill levels to work through, the finest display of your joystick talents would be to reveal all six messages.

Don't think that once the bad guys who chase you are handled, the game is without challenge—finishing the initial skill level moves you into a level that has you painting with clear varnish to test your memory, which is followed

by painting of the building in the dark. The only assistance you receive at this point is through the use of the many sound effects and musical passages that provide their own individual indication as to your painter's status.

The ability to choose the number of joysticks you'll use, regardless of the number of players, shows a sensitivity to the difference between the systems that users may have put together.

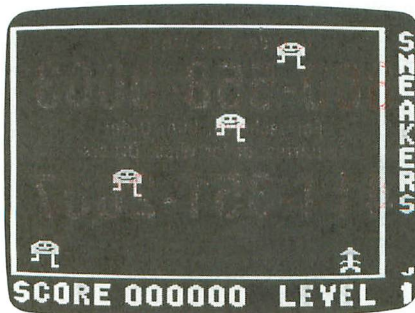
The detailed manual that accompanies **Bristles** is very simple to understand. It provides numerous hints that may help get you through the rough spots in your strategy.

The \$2.50 price hardly covers the cost of the disk used to store the program. It's an incredible value, if you can find it nearby. Many users will find **Bristles** too difficult and demanding, as it's a very hard game to master. But, for the player who isn't satisfied unless his or her abilities are tested to the limit, this one's certainly for you.

### SNEAKERS

by **Mark Turmell**  
**SIRIUS SOFTWARE**  
10364 Rockingham Drive  
Sacramento, CA 95827  
(916) 366-1195  
48K Disk

Though it may come as a surprise to many game designers, the popularity of a game is not necessarily dependent on how many ritzy features or what fancy graphics are written into it. Many games have found quite a following by merely including a well-designed challenge for the player—varying that challenge fast enough so as not to be boring, yet slowly enough so that the player isn't overwhelmed.



Sneakers.

**Sneakers**, as simple as it seems, lives up to that policy and offers a variety of tests that keep pushing the player to his or her maximum.

This program runs you through eight different tasks, ranging from "Sneakers," where you must shoot off the screen creatures that look like happy faces with legs, to "H-wings" that zigzag down from the top, bouncing off the sides of the screen toward your waiting craft (possibly the most difficult of all the screens).

Some of these battles are easy to complete, while others will take all your efforts to pull your remaining spaceships through. Many of the screens force you to arrange a strategy around the movements that your attackers make.

For example, the path of the enemy in "Sneakers" changes in relation to how long you hold down the trigger. This forces you to pick and choose the shots you'll take, or you'll find the saucers crashing into your ship. Needless to say, this isn't the best plan to use to move further into the game!

As simply as the game is laid out, you'll find its ability to raise the sweat of your brow worthy of your admiration. Since it's now exiled to the discount rack, where the price is within the range of anyone's wallet (our purchase price was \$6.95), it can be recommended for anyone who enjoys a fine arcadelike design. Just don't expect it to be solid gold... **Sneakers** only appears to be!

### NIGHTSTRIKE

by **A.Y. Kobayashi**  
**(Solitaire Group)**  
**TG SOFTWARE**  
1104 Summit Ave., Suite 110  
Plano, TX 75074  
(214) 424-8568  
16K Cartridge

**Nightstrike** resembles a slightly more polished version of the early 2600 release, **Air-Sea Battle**. Though its graphics aren't as blocky, the play of the game itself isn't enough to hold one's interest for too long.

You're equipped with tanks which roll out onto the screen one at a time. As with most games of this sort, when three tanks are destroyed, the game ends. At that point, you may breathe a sigh of relief that it's over!

Between the first push of the START button and the GAME OVER banner, you're exposed to waves of enemy aircraft crossing the night sky. Some of these attackers will drop bombs in an attempt to bring the battle to an earlier conclusion.



## Bargain Bin *continued*

You must use the weapons your tank has been equipped with: anti-aircraft guns (standard fare for games of this type) and shells that may be detonated aerially at an altitude of your choosing (though limited in number), in an attempt to destroy as many of these attackers as possible.

When each wave ends, you will be rewarded with bonus points corresponding to how good your ratio of shots taken to planes destroyed is. The guns will be your major utility in the battle, but must be used sparingly to elevate the bonus point rating.

As you proceed through the contest, each succeeding wave gets more difficult: faster and more erratic movement by the enemy bombers, attacking rocket bombs, and, most importantly, blindness due to nightfall. Flares can be exploded, leaving a lingering backlight in the sky which may or may not help you in your efforts.

**Nightstrike** can be played by one or two combatants (though not simultaneously, which would have allowed for better competition and action) and may be started at any level of your choosing, up to the maximum of the eighth level.

By starting the game at the highest level, the program's shortcomings become evident. Between the enemy's onslaught, the trouble with tank movement and firing (which are combined into a single joystick function), and the inability to see the offenders, you're just too overwhelmed to concentrate on the task at hand. It's over almost before it begins. To play up to this stage would be, in my eyes, humanly impossible.

Even discounted to \$2.99, **Nightstrike** can't be heartily recommended. Its goals are so lofty that the player gets tired of trying for an impossible dream. And, while at first the idea works, too much is thrown in to muddle the effort.

### DROIDS

by M. Mirzazadeh  
(Solitaire Group)

**TG SOFTWARE**  
1104 Summit Ave., Suite 110  
Plano, TX 75074  
(214) 424-8568  
16K Cartridge

**Droids** transports you from the comfort of your home to "the vast, starless void beyond the Mnemos Nebula." Here you're in control of your own spaceship, which comes equipped with its own slew of out-of-control robots. These ma-

chines are going around your craft shutting down the various control systems that maintain the communications, life-support, weapons and engineering functions.

You must move through the four-story ship reactivating all the systems that have been shut down, before the droids get to them. If a droid comes in contact with any of the systems (each represented by a symbol on one of the floors), the system is immediately powered down. Contact by your ship commander with any of the robots wandering the corridors results in instant death.

To fully activate a system, you move your captain to the "recharging station," then touch one of the symbols. The system icon will change color from red to yellow to green (when fully powered) to indicate its status. If you fail to have all of the systems working simultaneously within a three-minute period, the game ends.

Your shooter in this endeavor is an "integrator beam" (don't you just love these names?) that helps you keep the hapless robots at bay. But it's only a temporary fix; there are more where they came from.

If you complete a level successfully, you'll be advanced to the next, up to a maximum of seven. Each level provides more of a challenge, where you'll face droids that are increased in number and speedier, and you'll find your movement and shooting become restricted.

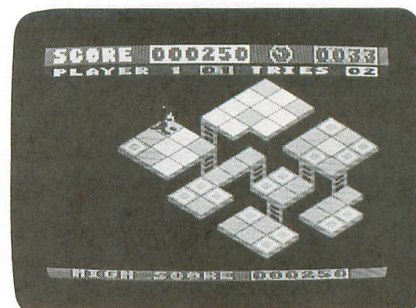
Documentation provides the barest of explanations, as you must discover by actual play the basic strategies involved. While I have mixed feelings about the quality of the challenge, for \$2.99 what can you lose?

At a higher price, I'd have reservations, as many games put out today easily surpass **Droids**, with more descriptive documentation and lack of play repetition. Unfortunately, this product is also accompanied by possibly the worst interlude music known to man.

**FLIP AND FLOP**  
by Jim Nangano  
**FIRST STAR SOFTWARE**  
22 East 41st Street  
New York, NY 10017  
(212) 532-4666  
32K Disk

At first, **Flip and Flop** appears to be a **Q\*bert** clone, but it has enough original thought behind it to put it beyond its predecessor.

The first difference (and, perhaps, the most important) lies in the playfield design. In **Q\*bert**, the simple pyramid became a monotonous graphic to play on and left experienced arcaders with the ability to find a pattern to defeat the system. **Flip and Flop** starts with a scattering of marked squares that must be jumped on to complete the task. As you finish each level, more platforms and marked squares are added, as well as more speed for your pursuer.



**Flip and Flop.**

The jumper you control in the odd-numbered levels is a kangaroo named Flip, and on even-numbered levels, a monkey named Mitch. The difference between the two is another plus for this program—Flip changes squares by hopping on top of the puzzle; on Mitch's turn, the whole thing is tossed upside-down, leaving him hanging and swinging from square to square. This optical illusion adds to the excitement that challenges you.

The task at hand sounds easy so far, but add in a zookeeper chasing Flip and a "flying net" on Mitch's heels, and this combination will have your joystick smoking in an attempt to elude capture.

If your character and the relentless pursuer come to rest on the same square, or if you jump off the maze's edge, you'll lose a "try." The design of the game is one which should be applauded by all computer gamers for its lack of a violence. No explosions, blasting lasers or blood lost... you just lose a "try." More programmers should take this to heart when they design.

Another innovation is the use of the "sticky squares" scattered throughout the maze. These will hold any of the game's characters (including you) like flypaper for a short period of time. This feature will either allow you to put some distance between yourself and the hunter or force you to be a sitting duck.

Little nuances, such as a change in playfield color each round, the colorful score displays and frequent animated intermissions, in addition to the above-mentioned features, show that **Flip and Flop** was designed by an artist who was interested in forming a game devoid of boring repetition.

The graphics are crisp 3-D simulations that pay attention to detail at every turn. All this, coupled with concise but effective documentation, provides you with a game that's fun and easy for all.

This disk was purchased from the discount table at a local toy outlet for the amazing price of \$2.50! It should be quickly picked up by anyone who sees it and immediately enjoyed for its ability to give much entertainment and endless hours of arcadelike thrills.

#### **FAST EDDIE**

by Mark Turmell

**SIRIUS SOFTWARE**

**10364 Rockingham Drive**

**Sacramento, CA 95827**

**(916) 366-1195**

**8K Cartridge**

While on the subject of games by Mark Turmell, here's another that he authored. According to the copyright dates on the products, **Fast Eddie** followed **Sneakers**, although in appearance and play quality, it would seem to have been written for the Atari 2600 and converted for the various computer systems in an attempt to make a few more bucks. *Bad choice!*

The first view of this game will take you back to when the 2600 was the rage. In light of the strides that have taken place in computer game graphics, you will find yourself extremely disappointed that this appears on your computer. The only consolation is that the game is a couple of years old, but even back then graphics quality was many steps above this.

Turmell has again used the "Sneakers" that were so popular in the previous game, but here you'll find them guarding the various treasures that float above their heads.

Your goal is to run, jump and climb your way to all the bonuses on the five floors of the structure. The trouble arises on the top floor, where the dreaded "high-top" appears (those who grew up playing basketball on playground courts would be most familiar with these). He's a "Sneaker" who can't be jumped over

till all the bonuses have been retrieved. At that point, he'll shrink to "normal" size, and a key will materialize above his head (?).

Leaping to this key safely will reward you with a free life (if you're not already holding the maximum three allowed). Play will proceed level by level, with the "Sneakers" multiplying and trying their hardest to impede your progress.

As you may have realized by this description, the game soon becomes boring in its repetition. It adds very little difficulty to the basic premise and shortly becomes very tiring. While the booklet provided helps you form a strategy with a bunch of helpful hints, the continuing "run, jump, run, jump" routine will ruin any enjoyment you may derive from it.

If any recommendation can be made, it's that you should buy **Fast Eddie** as a warm-up to more challenging programs you may have in your library. Even with a \$2.99 price tag, it's not good for much more than that.

#### **COMPUTER WAR**

by Colin Hume

**THORN EMI SOFTWARE**

**1370 Ave. of the Americas, 9th Fl.**

**New York, NY 10019**

**24K Disk**

These days, people all over the world are concerned about the possibility of nuclear war. Some have taken it upon themselves to try to profit from this concern (in a sense), by writing TV and movie scripts about it. It also seems that what appears on the screen will soon be found in the form of a computer product. **Computer Wars** falls into this group and does a fair job at pulling it off.

As a member of the military forces of the U.S.A., your job is to defend all the military bases in the country, to the end. As the enemy missiles approach, you must track them with the help of your computer, destroying them before the national defense system retaliates in an all-out effort that would, most likely, result in worldwide destruction.

If you complete a level by vanquishing all the bombs, you'll be tested with a crossword-puzzle-like grid where you must match a small grid with a portion of the main grid. Rotating the smaller section and visualizing where it belongs is hard enough, but add a time limit and you'll find yourself on the edge of losing your sanity in an effort to complete the puzzle.

If you accomplish this, the game will reward you by allowing you to pick a base and take it off your computer display of the U.S.A. defense structure, thereby reducing the number of installations that must be defended.

When all the bases have been safely locked up, you will be rewarded with bonus points. Don't rest...the battle gets more difficult as more bases are added, and more missiles are dispatched by the enemy to wipe them out.

It certainly is disappointing that the game can't end with a successful defense. Inevitable destruction is accompanied by catchy phrases that are subtle reminders of the movie *Wargames*.

This game is well designed, with some dazzling graphic displays, but it's not without some faults. When a missile is located on the main map, the cursor is manipulated to circle the rocket. A push of the trigger will then switch the screen to show a panoramic view of the terrain.

This is where you attempt to blow up the attacking missiles. A few tries at the latter segment will improve your shooting, but the bombs are still very difficult to destroy. Sometimes, they seem to elude your firings magically.

The other annoyance comes when the enemy has succeeded in causing some severe damage to your bases. When this damage reaches a high level, the game will keep you aware of it by a constant and annoying siren that continues until you "catch up" and restore some of your defense capabilities.

Other than these problems, **Computer War** has some very challenging thrills built into it. It also carries a cost of \$5.95, which is a small price to pay for the entertainment it provides.

With luck, this has given you an opportunity to pick and choose from a portion of the discount software available. As with any item you buy, you should remember the phrase *caveat emptor* (let the buyer beware). Until the next time...enjoy. **☐**

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*Andy Eddy works as a cable television technician, with a long-time interest in computers. While his family's 800 is three years old, he's been avidly playing since **Space Invaders** and is a former record holder on **Battlezone**.*

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# PANAK STRIKES!

## Reviews of the latest software

by Steve Panak

This month, as I emerge from my subterranean lair, I am blinded by the light. Not from the sun, although that would be pleasant since it's always dark here, but from the glow of good games. I get such junk at times that I'm sure I'll go mad. But not this month—not a dud in the bunch.

So, as the last ghastly glow grows dim on my phosphor tube, I can barely remember that I am still trapped here, with no escape except that in my own twisted mind. Yet it's with peaceful resignation that I write this to you from beyond—a feeling that, at least for a time, I will be free...through these games.

I will, of course, only awaken and find myself trapped again.

### THE HITCHHIKER'S GUIDE TO THE GALAXY

by Douglas Adams and Steven Meretzky

### WISHBRINGER

by Brian Moriarty

### INFOCOM

125 Cambridge Park Drive  
Cambridge, MA 02140  
48K Disk \$34.95 each

See what I mean? This month, not one but two games from the only company that can really turn me on. The graph-

ics which Infocom's prose sends scorching into my mind make all my arcade action games obsolete. So, without further ado, let's get into the first one.

**The Hitchhiker's Guide to the Galaxy** is Infocom's fourteenth work of interactive fiction (and they said it wouldn't last). However, it also marks a first for Infocom. It's the first time they've used a best-selling author's book as a basis for one of their games, and they've even had the author co-write the game itself.

Douglas Adams is the man behind the madness, and the four books which comprise the *Hitchhiker* trilogy have been best-sellers—both in the U.S.A. and in the author's native England. They have spawned, in addition to the Babel fish, a public radio series and a PBS television mini-series (imported from England). Rumors continue to circulate as to the possibility of a motion picture again reuniting Arthur Dent and his cohorts.

The game itself takes you into the tor-

mented world of Arthur Dent, who, on one sunny morning, got up on the wrong side of his bed to find his clothes, his house and his planet utterly destroyed by bureaucrats bent on progress. To cap it all off, he discovers that his friend, Ford Prefect, is not from Guildford after all, but from a small planet somewhere near Betelgeuse. As in the series, the two are joined by Zaphod Beeblebrox, the universe's cleverest two-headed man, and by Marvin, the paranoid android, who often has a pain down all the diodes in his left side.

The four band together and are joined by other memorable characters, as they move in and out of improbable situations as easily as most of us get out of our old socks. And, all the time, they slyly poke fun at every science fiction gadget and concept ever created.

The characters come to life as the story unravels before your awaiting eyes. One problem, however, is inherent. The characters in the trilogy are extremely complex—more than a computer game can handle, even one from Infocom.

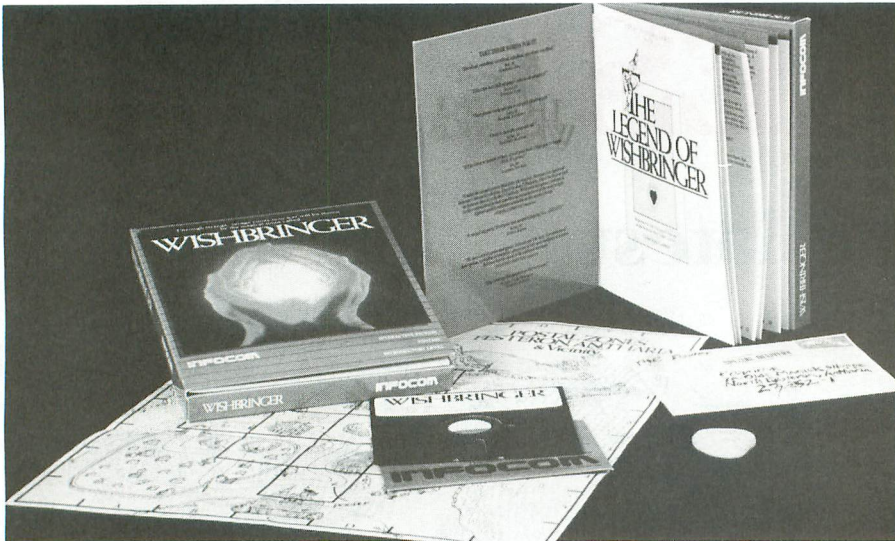
So, in order to understand many of the





## PANAK STRIKES! *continued*

events, you have to have read the books. How else could you know what truly repulsive creatures the Vogons are? But, once you've read the books, you've also learned solutions to some of the puzzles.



Not all the puzzles, though, and there are more than enough riddles to keep the game gnawing at you for at least a couple of weeks. Some of the puzzles are extremely humorous (as well as difficult), as they taunt you after each incorrect solution attempt. And, for those of you who've played the game, I want you to know the Babel fish is still tormenting me.

Infocom followed *Hitchhiker* (as if that was possible, but then, achieving the impossible is an Infocom exclusive) with *Wishbringer*, a fantasy game in their introductory (formerly "junior") level.

In this game, you're a postal clerk who is ordered one day, none too politely, to deliver a mysterious letter to the town's Magick Shoppe. But this letter turns out to be a ransom note for the proprietor's kidnapped cat.

Upon your return from delivering the letter, you discover that the town has changed—for the worse. It's no longer the friendly city of your youth, but has mutated into a malignant metropolis, whose livid life-forms have no good plans for your future.

*Wishbringer* also takes you through a labyrinth of twists and turns that wind through other familiar Infocom locales. Suddenly, you find yourself outside a white wood house (*Zork*), or on a sultry pier (*Cutthroats*). But each of these places has also changed strangely. Mail-

boxes, in particular, take on a life of their own as they skip and jump about, demanding to be fed.

If you evade the boot patrol and have the *Wishbringer* stone, you're in com-

this is necessary. Sometimes it even enhances the game, providing a tension-building delay before you find out that you've inadvertently killed yourself.

mand of its power. It allows you to cast seven spells, some of which can only be used once. It's not easy; all the spells require additional items, such as grue's milk. And, if you've ever tried to get milk from a grue, you know how painful that can be. Only the wise warrior will find all the items, then wait and use the spells at the correct time, finally completing the game.

The puzzles are generally easy, especially if you've challenged Infocom before. However, the prose is entertaining, and the game is fun and full of surprises, more than making up for the quick completion time.

Both programs function smoothly. Infocom has left little room for improvement, although *Wishbringer* introduces a new cursor. As usual, time is always spent loading data from the disk, but

The Infocom production staff has outdone itself again in the packaging of these two games. Both utilize their new packaging design, which resembles a book, with a front cover that opens to display the manual.

The disk and other game goodies are secured in a compartment in the back. *Hitchhiker's* manual is especially good, with humorous prose and drawings. Also included are the peril-sensitive sun-

glasses (which become opaque when danger approaches, so you won't be unnecessarily alarmed) and a "Don't Panic" button. I was slightly disappointed that the glasses were only cardboard. I was unable to wear them out on the town, but costs must be kept down. At least the button could be worn—and was!

*Wishbringer's* manual isn't quite as impressive. It contains the local history of Festeron, as it concerns the Magick Dream-Stone. This, of course, added something to the story, but, while imaginative, wasn't as much fun to read. It lacked the twisted Infocom humor I've grown to love.

Other *Wishbringer* paraphernalia include postal maps of the town, the letter you must deliver and the stone itself, which I found fascinating. It glows in the dark, but not that age-old glowing green I've grown accustomed to since childhood. It glowed purple. This was unsettling enough to make me recharge it and watch it glow a number of times. I suggest setting it nearby and playing *Wishbringer* in its eerie radiation.

So, while both these games are identically superb, I have to give the slight edge to *The Hitchhiker's Guide to the Galaxy*. Its sarcastic blend of humor and torment often sent me screaming from the room, with clumps of hair between my fingers.

**SPACE SHUTTLE**  
**by Steve Kitchen**  
**ACTIVISION**  
**Drawer No. 7287**  
**Mountain View, CA 94039**  
**16K Cartridge \$29.95**

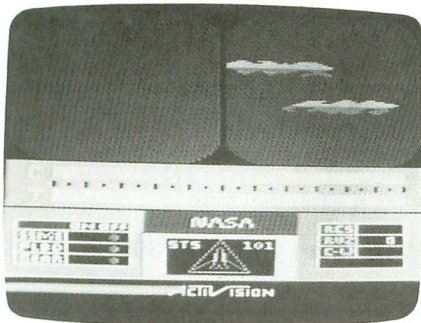
After testing and reviewing scores of games, I've often caught myself falling into the trap of judging a game just by the company which puts it out. I feel that some companies put out good quality, and others, well . . .

Activision has been one company that I've come to expect very little from—that is, until I boarded their *Space Shuttle*. Now excuse me, while I extract a foot from my mouth.

*Space Shuttle* is a welcome surprise, and an unexpected pleasure greeted me, when I opened the carton. This wasn't the simple video game I'd expected, but a complete program, essentially a junior outer space version of *Flight Simulator*.

In *Space Shuttle*, you are at the controls of the shuttle *Discovery* on a mission to rendezvous and dock with an

orbiting satellite, then return safely to Earth. There are no enemy crafts to destroy, no space mutants to fry. This is real life; the slightest error will burn you up in the atmosphere, scattering your ashes from Pittsburgh to Morocco.



Space Shuttle.

You pilot the shuttle using the joystick and the keyboard. What distinguishes this program, though, is the complexity. While it's unlikely that, on completing a couple of successful missions, you'll be ready to step into the real thing, the program is complex enough to challenge even the avid astronaut for a substantial time.

Indeed, the program is too complex to even begin to describe in any detail. The manual is thirty-one pages, containing detailed information on each phase of your mission. Launch, docking, de-orbit burn, reentry and more are covered in depth, with full details and colorful, informative illustrations. Error codes, problem resolution and a glossary complete the booklet.

To start, your best bet is the Autosimulator. In this mode, the computer does most of the work, allowing you to sit back and get acquainted with the various displays.

When you think you're ready, you can move on to one of the two difficulty levels. The more difficult level places you in command of every aspect of the flight. You must shut down the engines at the right time to achieve a proper orbit; you must utilize the correct entry angle to avoid burning up in the atmosphere.

And you might even learn a thing or two in the progress. One thing's for sure: you must read the manual before you're even close to ready for command. **Pac-Man** this isn't, and trying to play before reading the directions will only frustrate you and waste your time.

The screen is fairly detailed, and control is rapid and sure. I really can find little to complain about, and that bothers

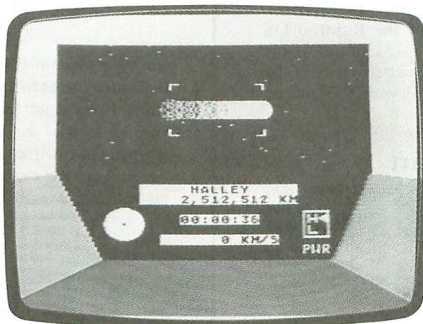
me. Have I missed something?

I don't think so. I'll have to reevaluate my feeling about Activision. But first, I'll take *one more* turn at the commands of the **Space Shuttle**. *Bon voyage*.

**THE HALLEY PROJECT**  
by Tom Snyder Productions  
**MINDSCAPE, INC.**  
3444 Dundee Road  
Northbrook, IL 60062  
48K Disk \$44.95

While the shuttle can only achieve Earth orbit, my calling has always come from farther out. **The Halley Project** took me far out . . . into our solar system. On the way, it both stunned my senses and simulated my mind in a way unlike that of any other game on the market.

In addition to being a complex game, it's an educational program, teaching such concepts as space travel and the composition of our solar system. Also included is a challenge, but more on that later.



The Halley Project.

The game begins even before you boot the disk. A cassette contains your secret mission (a hardcopy is included, for those who lack a tape deck), and you're instructed to listen to this before you begin. You're asked if you wish to accept the mission, and, if you do, you're made a member of P.L.A.N.E.T. (Planetary and Lunar Aerospace Navigation and Exploration Team). Boot the disk and blast off.

You visit and land on a number of planetary bodies in our solar system. There are ten increasingly difficult missions, each with a different destination. Sometimes your next destination is given to you outright; at other times it's only cryptically revealed (i.e., go to any planet without a moon), leaving you to solve the riddle and proceed onward.

After you've determined what planet (or moon) is your destination, you must find out where it is. Using the radar, you

locate your object and ascertain its relation to you. A backdrop of constellations supplies you with reference points, and the enclosed star map helps you recognize the constellations until they become familiar. Then you rocket toward the stars—and your landing pad.

As you near the planet, it becomes visible through your viewscreen and grows larger until you crash into it (if you forget to brake via the **SPACE BAR**). If you wisely decide to achieve orbit, you can circle the planet until you find the landing area.

Remember that, if the planet is between you and the sun, it will appear black (invisible). After you land (just press A) and take a look around, blast off for your destination.

It is rather difficult to complete a mission until you've memorized the controls, but it soon becomes easy. I'm quite familiar with the planets and moons of our solar system, though; someone less informed might have a tougher time. Research would probably be necessary to determine where you're to go, and a bibliography is included in the manual.

The viewscreen is much like that in "Star Trek," but lacks Sulu and Chekov to pilot the ship. Readouts indicate your speed, whether you're in high or low power mode, and how far away the body in front of you is.

The graphics themselves aren't that spectacular, but are probably representative of what you'd see in space. It's really not that exciting out there without space invaders hurtling toward you.

I haven't seen, with the exception of Infocom games, a program package as elaborate as this one. A binder holds two sealed packets containing your mission.

The manual itself is a masterpiece, an extraordinary combination of knowledge and instruction written with a sly wit that makes the whole thing easy and fun to read. An easy reference card helps you navigate until you learn the simple controls.

Another feature traces your progress, as well as the progress of up to ten of your friends, updating it after each successful mission.

Oh, yes. . . I almost forgot about the challenge. Once you finish the tenth mission (rather, *if* you finish), you mail in your score, and P.L.A.N.E.T. will return the special instruction which will allow you to complete **The Halley Project**. If you mail by December 31, 1985,

(continued on page 27)

# Original 400/800 Owners Rejoice! CDY Has Not Forgotten You!

## OMNIVIEW XL/XE & SpeedScript 80

**WARNING:** No 800XL/130XE owner should read this ad unless they have 60 bucks to invest in their computer! Due to the outstanding value of this product, you may find it too irresistible to be without.

OK, don't say you were not warned. We are now going to entice you with some of OMNIVIEW XL/XE's bountiful features:

- ★ **800 compatible operating system** that runs virtually every piece of commercial ATARI software. Press a console switch to copy the OS into RAM and free up the SC000 page (i.e., a built-in translator disk).
- ★ **Theresident ramdisk handlers** can be used by XE owners with many popular programs and DOS's to treat the extra 64K of RAM as an ultra-fast disk drive.
- ★ **The FASTCHIP floating point package** is provided for significantly faster and more accurate math operations.
- ★ **80 columns operation** under many environments including Letter/Data Perfect, BASIC, MAC65, and ATR8000 CPM.
- ★ **And here comes the real teaser!** For a long time people have been asking if OMNIVIEW can be used to give ATARIWRITER 80 column screen output. Regretfully we have always had to say no. In fact, we must still say no, but we have got something even better to offer! *SpeedScript 80* is a wonderful new word processor designed for use with OMNIVIEW. It is as easy to use as ATARIWRITER and much more powerful! And CDY will provide *SpeedScript 80* with every OMNIVIEW at no extra charge! Current OMNIVIEW owners can purchase *SpeedScript 80* directly from us for only \$10.

Of course, 400/800 owners can also enjoy the power and convenience of OMNIVIEW (including *SpeedScript 80*) by adding the 4K or 8K OMNIVIEW to the OMNIMON piggyback board or the Ramrod OS board. These OMNIVIEWS also include resident ramdisk handlers for use with the AXLON Ramdisk. If you are serious about enhancing the performance of your computer, you will be delighted with the unique features of OMNIVIEW!

### Feature Comparison Chart

	OMNIMON Piggyback		-----Upgrades for----- ---OMNIMON or Ramrod---			Ramrod XL Add-on for Piggyback Ramrod XL	
	400/800	800	8K OMNI	8K VIEW	4K VIEW	800XL	VIEWXLXE
Enhanced OS		*				*	*
Includes FASTCHIP FP		*				*	*
80 Column Emulation		*		*	*	*	*
Ramdisk Handlers		*	*	*	*	*	*
OMNIMON Features:							
A.Alter Memory	*	*	*	*	*	*	*
B.Boot (Ram) disk	*	*	*	*	*	*	*
C.CPU Registers	*	*	*	*	*	*	*
D.Display Memory	*	*	*	*	*	*	*
E.Single Step Execution	*	*	*	*	*	*	*
F.Fill Program Buffer	*	*	*	*	*	*	*
G.Binary Load/Directory	*	*	*	*	*	*	*
H.Hex Conversion	*	*	*	*	*	*	*
H.Hex Arithmetic	*	*	*	*	*	*	*
I.Install Ramdisk Handlers	*	*	*	*	*	*	*
J.Jump Subroutine (JSR)	*	*	*	*	*	*	*
L.Drive Selection/Control	*	*	*	*	*	*	*
M.Move Block of Memory	*	*	*	*	*	*	*
N.Relocate 6502 Code	*	*	*	*	*	*	*
O.Operate from Prog. Buffer	*	*	*	*	*	*	*
P.Printer Control	*	*	*	*	*	*	*
R/Read Sector(s) from Disk	*	*	*	*	*	*	*
S.Search Mem. for Sequence	*	*	*	*	*	*	*
T.Tog. Hex Char Display Mode	*	*	*	*	*	*	*
U>User's Custom Command	*	*	*	*	*	*	*
V.Verify 2 Blocks of Memory	*	*	*	*	*	*	*
W.Write Sector(s) to Disk	*	*	*	*	*	*	*
X.Disassemble Memory	*	*	*	*	*	*	*
Y.Line Assembler	*	*	*	*	*	*	*
Z.Exit Monitor	*	*	*	*	*	*	*
Lockup Recovery	*	*	*	*	*	*	*
Redirection of Printer I/O	*	*	*	*	*	*	*
Talk to Happy Ram Buffer	*	*	*	*	*	*	*
80 Column ATRMON for		ATR8000					*
Includes SpeedScript 80				*	*		*

### How To Order

Add \$2.00 shipping (\$4.00 for 2 day delivery). We accept Visa or Master Card orders but would prefer to send COD (cash or M.O. only). We will gladly pay all shipping charges for COD orders over \$20.00.

## New Low Price on 128K Ramdisk for 800!

OK, so you love your old faithful 800 and don't want to give it up, but at the same time you are covetous of all that cheap memory in the 130XE. Well now you can succumb to your desires without needing to buy another computer! By purchasing the AXLON Rampower 128 at our new low price, you can **upgrade your 48K 800 to an awesome 160K** for about the same price as an XE. And with that amount of memory you can do things that a 130XE owner can only dream about! Like emulating a full 720 sector drive (whereas the 130XE supports only 512 sectors) And this can be used to great advantage in environments like DOS, Happy Warp Speed Software (copy an entire disk in less than 1 minute!), SynFile and SynCalc (133K spreadsheet), and BBS's. And many more environments (like Letter and Data Perfect) are supported with the addition of either an OMNIVIEW (see our special offer below) or 8K OMNIMON. Some of us bought our Ramdisks back when they cost about \$700, and even at that price they have been worth every penny! So don't retire your trusty 800. Upgrade it with an AXLON Rampower 128 and be the envy of every 130XE owner!

## Free OMNIVIEW for your 400/800!

OMNIVIEW has been steadily gaining in popularity, especially since the introduction of SpeedScript 80 (see left column of this ad). CDY now makes beautiful 80 column screen output even more affordable by providing a 4K OMNIVIEW (including SpeedScript 80) free of charge with every OMNIMON piggyback board sold! And since this OMNIVIEW also has resident ramdisk handlers, it is especially powerful in conjunction with the AXLON Rampower 128, allowing you to interface it with almost any DOS. However, OMNIMON piggyback boards are in limited supply, so order soon to take advantage of this great opportunity. Remember, Christmas is right around the corner! Avoid the rush!

## OMNIMON Resident Monitor

We make an OMNIMON for every 8 bit ATARI except the 1200XL. **This is the most powerful machine language available!** It gives you a wealth of tools for program development and customization of existing programs and it has the unique ability to interrupt, examine and manipulate any program in memory. In other words, it gives you **complete control** over your machine! Thousands of OMNIMON owners have sworn by them for years and wouldn't dream of having an ATARI without one. If you are a programmer or are interested in learning more about your machine, you can make no better investment!

### Pricing

- 400/800: Piggyback board plugs into existing OS board. Inexpensive and easily disabled.
- OMNIMON piggyback board & OMNIVIEW** **\$69.95**
  - OMNIMON piggyback board & 8K OMNIVIEW \$109.95
  - OMNIMON piggyback board & 8K OMNIMON \$109.95
  - Add FASTCHIP floating point to any of the above \$15.00
  - FASTCHIP floating point package by itself \$19.95
  - OMNIVIEW for piggyback or Ramrod OS board \$29.95
  - 8K OMNIVIEW or 8K OMNIMON for piggyback or Ramrod \$44.95
- 800: Ramrod OS board replaces existing OS board and comes with enhanced OS in EPROMs. It has 2 sockets for OMNIMON/OMNIVIEW enhancements which can be selected with a switch.
- Ramrod OS & OMNIVIEW \$89.95
  - Ramrod OS & 8K OMNIVIEW \$104.95
  - Ramrod OS & 8K OMNIMON \$104.95
  - Ramrod OS & 8K OMNIMON & OMNIVIEW \$129.95
  - Add FASTCHIP floating point to any of the above \$15.00
- 600XL/800XL/130XE: Replace existing OS chip or add Ramrod XL to select between 3 possible OS's.
- OMNIVIEW XL/XE (includes FASTCHIP and 800 compatible OS) \$59.95
  - Ramrod XL & OMNIMONXL (includes FASTCHIP & 800 compatible OS) \$79.95
  - Ramrod XL & OMNIVIEW XL/XE \$99.95
- Other fine products:
- OSS BASIC XL, MAC 65 or ACTION or BASIC XE \$69.95
  - OSS BASIC XL, MAC 65 or ACTION tool kit \$34.95
  - AXLON Rampower 128 (Ramdisk)** **\$179.00**
  - SpeedScript 80 (for current owners of OMNIVIEW) \$10.00
  - SD/DD 130XE Sector Copier \$17.95



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DEALERS INQUIRIES SOLICITED



## PANAK STRIKES! *continued*

you'll receive a ranking against all other astronauts who made it.

Overall, **The Halley Project** is an outstanding package. Although it might be a little simple for anyone out of high school, it will, nonetheless, teach its owner all about our solar system and a little about basic physics and astronomy. It's a learning tool, cleverly disguised as a game which challenges, in fact, taunts the player onward as he reaches for the stars.

**COLOSSUS CHESS 3.0**  
by Martin Bryant  
**THE ENGLISH**  
**SOFTWARE COMPANY**  
Imported by Big Ben Games  
1765 Maple Street  
Northfield, IL 60093  
48K Disk \$14.95

Last month, I reviewed a number of chess games. Well, just when I thought my mind had recovered (although my brain was still numb from the experience), another chess game fell into my hands, **Colossus Chess 3.0**. What a stroke of good luck. And, after playing this one, my head felt like it had had a stroke.

I've always had trouble with these games; they challenge me. The thought of a machine beating a man in chess is vulgar. Next thing we know, they'll be wanting to drive a car, form their own union, and write this column.

The thing is that I get started and can't stop, except for a few bodily functions not easily controlled (for additional ranting and raving on the trials and tribulations of computer chess, see last month's column).

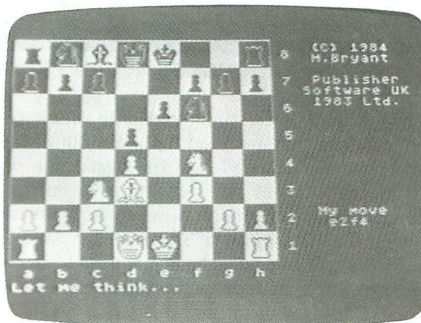
**Colossus** proved to be a challenging opponent, although, like most chess programs, it was a little weak on the end-game. What distinguished it from the others I've played was, not its claims of superiority as to power (it claims to be the computer chess champion), but the number of options the program has.

In addition to the usual required options, like move take-back, being able to alter the board, and allowing you to choose to play black or white, **Colossus** offers a couple of unique features.

The first is a clock which times your moves. It lets you limit the amount of time either you or the computer is allowed in considering possible moves. Another is a teaching option showing all possible moves a given piece may make.

You can also alter screen colors and save a game to disk or tape. You can flip

the board, placing black at the bottom, and you can force the computer to take its next best move—repeatedly, until it uses its worst move. You can make either or both sides invisible to simulate blindfolded chess. But the most amazing options go right to the core of the program itself.



Colossus Chess.

You can change some of the values that **Colossus** uses to make its moves, effectively making it smarter or stupider. This is done simply through the "qualify parameters" option.

Also, utilizing a secondary screen which you can toggle on and off with the SPACE BAR, you can watch **Colossus** consider thousands of moves on its way to another crushing victory. It displays the number of half moves ahead it's looking (measured in "ply"). The screen also displays, in chess notation, the current best series of moves it's considering, as well as the current move.

The only problem with this is that, often, the line of moves is replaced by another before you can read the first. But you can always see the final line of the moves it picked, and this will give you clues—both as to possible moves for you, and what **Colossus** thinks you'll do.

After booting the disk, you pick the skill level at which you wish to challenge **Colossus**. It has six, from easy to hard, and some modes allow you to give **Colossus** a time limit in which to make all its moves.

It also has an "infinite" mode, which searches all possible moves to 14 ply, or until you tell it to stop. Using the ARROW keys, you position the cursor at the piece you wish to move. Press RETURN, then move the cursor to the square you are headed for.

If you make an illegal move, you start choosing over. If you wish to take back your move, simply press CTRL-B. The pieces are well defined and of the classic design—very easy to recognize.

Now, look up at the price. I'll wait. Yes, that's right—\$14.95! Apparently, English software prices are much lower than those here. And, while the (incredibly) low price isn't completely indicative of its worth, it's packaged and marketed very Spartanly. Don't be fooled; ask to boot it up and take a look.

Because of the many features of **Colossus**, in addition to a spectacular price, I felt it was one of the best buys in chess programs today. Needless to say, it was able to crush me repeatedly, but that's necessary. If I could beat it all the time, I would quickly lose interest.

Well, gang, that winds it up for this month, but stay tuned . . . I've got another good bunch of games next month to blow your circuits. **A**

*I must again thank Magic One Computer Shoppe, 176 Second Street, Barberton, Ohio for their invaluable assistance in creating this installment.*

FROM

**SENECOM**

## The **OPPORTUNITY** DISK

For \$2.95 (plus \$1.00 for postage) you get to see the opportunity of a lifetime. Just boot the disk into a 48K or 64K Atari, and watch the show.

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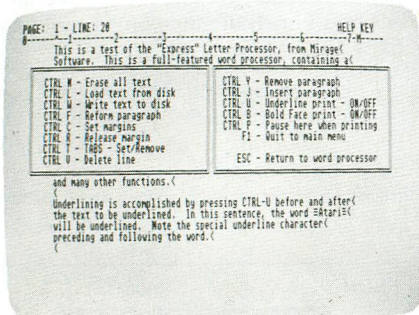
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# ST NEWS!

## EXPRESS

Mirage Concepts has released **Express**, the first word processor for the ST line. Though not a full-featured program (see the review on page 31), it includes several additional programs, consisting of a mailing list and merge, typewriter and terminal mode.



Mail list allows you to add names, addresses and other pertinent information into your letter or document, enabling multiple printouts to be accomplished, without the chore of adding each name manually.

Typewriter simply permits the computer to print out each character or line of text immediately when the RETURN key is pressed. Thus, you don't have to wait for whole documents or paragraphs to be completed before printing.

Terminal mode allows you to communicate with other computers via a modem. Downloading, uploading and printer functions are all built into this program, along with download disk storage.

**Express** comes on a single disk with a 49-page, spiral-bound manual and lists for \$49.95. Mirage Concepts, Inc., 4055 W. Shaw #108, Fresno, CA 93711 — (209) 227-8369.

## CHAT TELECOMMUNICATIONS

With **CHAT**, your ST can talk to other computers, access databases, download information and use electronic mail services. Designed for advanced users, **CHAT** doesn't leave beginners behind. ASCII file transfers using XON/XOFF protocols, X-modem compatibility and uploading are feasible, using dumb or Hayes-compatible smart modems.

SST Systems is also planning **SWR**, a BBS package for the ST and a simple database for home record keeping.

**CHAT** retails for \$19.95 from SST Systems, P.O. Box 2315, Titusville, FL 32781.

## MICHTRON ANNOUNCES SEVEN PROGRAMS FOR THE ATARI ST

In order to diversify their product line, MichTron has spent the past six months looking at various computers, trying to decide which to support. After thoroughly evaluating all the different models, they decided that the 68000 was the best chip on the market at the present time, and that the Atari ST had the best value-per-dollar performance of any computer available.

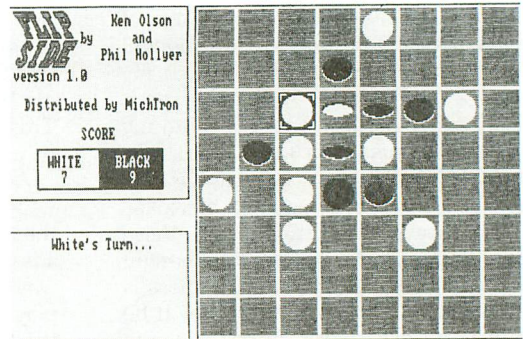
MichTron plans on releasing seven programs through mid-autumn, with five about to be shipped as we approach press time. **Transfer IBM/Atari** allows you to transfer ASCII files between the IBM and the Atari ST for \$39.95.

**M-Disk**, at \$34.95, is basically a RAMdisk which sets aside memory in the computer, to make it think it's a disk drive. **Softspool** is a RAM buffer which can be used while printing hard copy. Data is sent to the buffer, freeing the computer for other tasks while the printer works. Retail is \$34.95.

In MichTron's first arcade game, **Mudpies**, you attempt to avoid danger by using mud pies to ward off angry clowns. Touted in this game are advanced graphics and sound effects, challenge rounds, special "prizes" and mudslinging rounds, for \$29.95. Three other games to be released include **Flip Side**, \$34.95; **Gold Runner**, \$29.95; and **Flight Simulator**, \$39.95.

Finally, **Mi-Term** is a smart-terminal modem program using ASCII, DFT or X-modem protocols, allowing program and message transfer or computer linkup, at \$79.95.

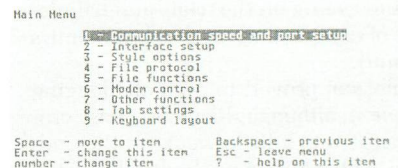
Contact MichTron, 576 S. Telegraph, Pontiac, MI 48053 — (313) 334-5700.



## MARK OF THE UNICORN

The first graphics-oriented game for the Atari ST line, **Hex**, was recently introduced by Mark of the Unicorn (see the review on page 65 of this issue), retailing for \$39.95. They also released **Mince**, a text editor aimed primarily at developers, for a suggested retail price of \$179.00.

Now, that same company is shipping **PC/InterComm**, a communications package that emulates the Digital Equipment Corporation's



This Set Up is for: unknown  
 PC/InterComm V3.01 Help-Setup Undo-Exit Full 1154en P.0103

## DEVELOPERS PACKAGE

Atari has announced that they'll be offering their **ST software developers' package** for \$300.00.

Included in the package are: the C compiler, 68000 assembler, linking loader, C and GEM library files, several utilities, and the new MicroEmac Editor.

You'll also find an incredible amount of documentation. There's enough for you to fill several loose-leaf notebooks.

All this can be yours to experiment with. Contact: Richard Frick, Atari Corp., 1194 Borregas Avenue, Sunnyvale, CA 94086.

VT102 video terminal. This smart terminal can communicate with DEC mainframes such as the VAX, the PDP-11 series and the multi-tude of machines running UNIX. Accounting, spreadsheet applications, menu systems and other programs that run on a VT102 terminal can all be used on your ST with the help of **PC/InterComm**.

Downloading and remembering data is easily accomplished, along with many other features. For \$124.00, from Mark of the Unicorn, 222 Third Street, Cambridge, MA 02146.



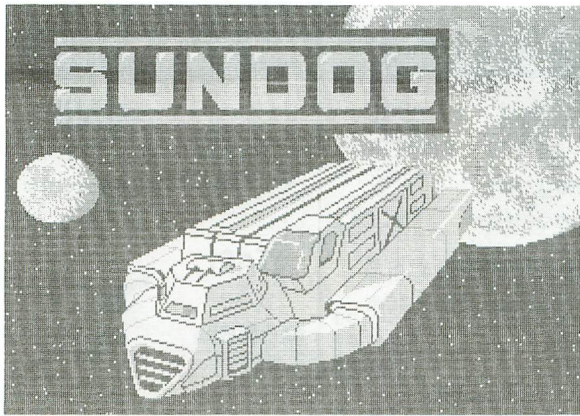
### YOU OLD SUNDOG

Quite popular on Apple II for a year now, **Sundog: The Frozen Legacy** is shipping for the ST. Per FTL Games, **Sundog** developers "leapt at (the) opportunity to revolutionize the look and play of graphic adventure games, using the redefined color graphics that Atari makes available for less than \$1000."

You play an adventurer as Captain of the **Sundog**, earning a living by transporting cargo between the Drahew Region's eighteen planets, including over fifty cities. Fighting pirates and keeping the ship running are some of the challenges you'll encounter.

Utilizing the ST's crisp colors and graphics abilities, windows assist in text handling and improved user interaction.

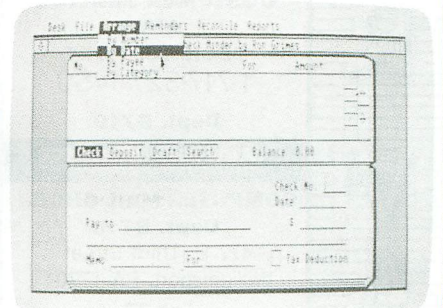
Priced at \$39.95 from FTL Games/Software Heaven, 7907 Ostrow Street F, San Diego, CA 92111 — (619) 279-5711.



### SOFTWARE/HARDWARE FROM HABA SYSTEMS

**Hippo-C** is a friendly, integrated C development system for the ST, allowing for the creation of large, stand-alone Atari ST application programs.

Assembly routines can be combined with C, viewed and modified. Included are complete documentation and sample programs for a list price of \$74.95.



**Checkminder.**

A simple-to-use home accounting program, **Checkminder** is designed for those who like to have the computer keep track of their finances. With **Checkminder**, checks, deposits and withdrawals are recorded, and you're reminded when bills are due. Reconciling balances and generating tax-deductible expenses are also accomplished with this program. Your checkbook can be arranged by payee, date, number or expense category. Suggested retail is \$74.95.

**Business Letters** consists of fifty professionally written, predefined letter and memo formats. Designed for use in the business field, this software package is aimed toward communicating with employees, customers, stock-holders, vendors, and so on. Abilities include customizing letters for your own personal needs.

Using **Business Letters**, font, style and size of the type can be changed as in any GEM Write document, and each file can be used as a mail-merged form letter. Price is \$49.95.

The big news is Haba's **10-megabyte hard disk drive**. The Winchester drive plugs right into the ST, giving you the equivalent of more than twelve dual-sided 800K disks with incredibly fast transfer rates. At \$699.95, it includes an interface cable power supply.

From Haba Systems, 15154 Stagg St., Van Nuys, CA 91405-1025 — (818) 989-5822.

### INFOCOM INTERACTION FICTION AVAILABLE FOR THE ST

Infocom, the largest third-party entertainment software company in the world (well known for their high quality software packages) has released all seventeen of their titles for the ST. According to ST Assistant Product Manager Barry Star, "The Atari ST, with its high power at an affordable price, will appeal to a more serious user than previous home machines. The level of sophistication and richness of prose in Infocom's products make them perfect stories for the 520ST customer."

The Infocom product line consists of: **Zork I, II & III, Planetfall, Starcross, Sorcerer, Enchanter, Suspended, Suspect, Infidel, Cutthroats, Wishbringer, A Mind Forever Voyaging, Seastalker, Deadline, The Witness** and **The Hitchhiker's Guide to the Galaxy**.

The ST versions, along with the always impressive Infocom packaging, also give the players the ability to change the text and background colors to their own preference.

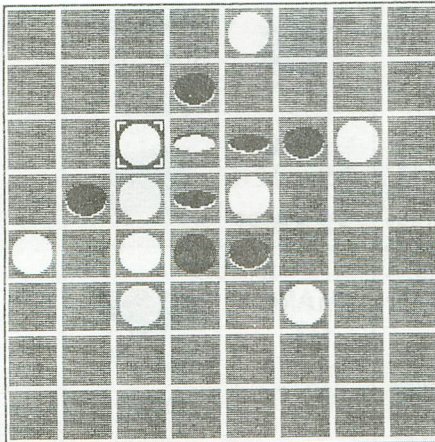
Suggested retail prices for the new games range from \$39.95 to \$49.95.

For more information, you should contact:

Infocom, Inc.,  
125 Cambridge  
Park Drive,  
Cambridge, MA  
02140 — (617)  
492-6000.

**STAR SIDE** by Ken Olson and Phil Hollyer  
version 1.0  
Distributed by MichIron

SCORE  
WHITE 7 BLACK 9



White's Turn...

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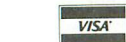
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AAB4024 GALAXIAN  
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## SPECIALS

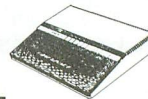
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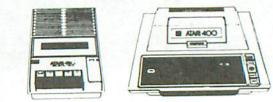
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by Arthur Leyenberger

Finally. Software for the Atari 520ST computer is starting to appear. The first product for the ST was the FORTH language by the Dragon Group. **4xForth** was available at my favorite retailer's within a week of the ST's arrival. Why mention a programming language in a software application review? Because it just so happens that the first useful program for the ST is written in **4xForth**.

It's no secret: the award for the first Atari ST software product goes to **Express** by Mirage Concepts. The folks at Mirage told me the entire tale.

It seems that **Express** has been available for the Apple Macintosh and IBM computers for several months. It's written in FORTH, a language whose advocates border on being described by some as mystics and fanatics. Anyway, Mirage Concepts knew that the Atari ST computer had great potential, but that it desperately needed software.

So what did they do? They ported the Macintosh FORTH code over to Dragon's version of FORTH in just three weeks. A miracle of modern science, you say? Well, yes and no. Read on to determine if **Express** is for you.

#### So what is a letter processor?

According to Mirage, the **Express** letter processor is a combination of the most commonly used word processing and database management functions. It is meant for producing letters and short documents. You can have multiple mailing lists, which can each be inserted into the body of a letter or document at print time. Sorting can be done either alphabetically or by zip code.

**Express** also doubles as a "memory" typewriter. Labels, forms and envelopes can be printed in real time, just as if you were using an electric typewriter. When you type a line of text and press RETURN, the information is immediately sent to your printer.

In addition to the word processing, mail merge and typewriter modes, **Express** also provides a terminal program function that allows you to send and receive files (text only, no XModem file transfer protocol) and simultaneously print text on your printer as it appears on the screen.

In all fairness, the terminal portion of **Express** was not intended to be a full communication program. It's an electronic mail system designed for text transfer, not for the transfer of program or binary files.

**Express** does not use any of the special features of GEM on the Atari 520ST. It has no drop-down menus, no movable, sizable windows or cute icons to play with. It's a utilitarian product that provides bare bones features for a number of tasks.

#### How does it work?

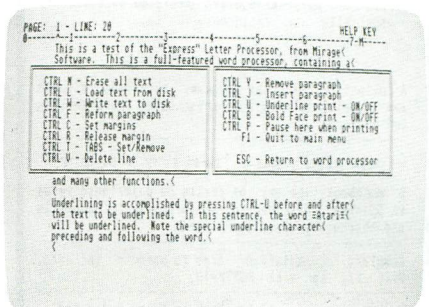
The program is straightforward to use and provides you with the means for doing *something* with your brand new ST. After you've booted TOS on your ST and see the desktop, you insert the **Express** program disk. Double-clicking on the **Express** icon takes you right into the program.

One caveat that isn't explained in the manual, but which can prevent the program from working is that you must use an unadulterated version of TOS. My normal working copy has Breakout installed as a desk accessory. Unfortunately,

the extra memory used by Breakout doesn't leave enough room in memory for **Express** to run. When TOS becomes available on ROM, this problem should be eliminated.

As mentioned before, **Express** does not take advantage of any of the special features of GEM. When the program begins, you choose from a menu of six items. Choosing the word processing option displays a new screen with a ruler at the top and indications of tab settings. You can begin typing at this point.

**Express** uses the mouse for moving the cursor around. This is my first experience using a mouse when writing, and it's a somewhat strange experience. Although it is relatively fast, the cursor only moves over existing text. It takes a while to get the hang of it, and I initially found that I would overshoot the particular character I was aiming for.



**Express.**

One very useful feature is the ability to use the right mouse button for deleting text. Pressing this button functions as a "delete" key, erasing one character at a time and shifting the text to the left. Although not a reflection of the **Express**



program itself, I find that I'm growing to like my new rodent friend.

You can also move the cursor and jump around in your text by using control key combinations. For example, hold the CTRL key and press E, X, S and D—the cursor will move up, down, left and right, respectively.

Looking at the keyboard, these four keys form a diamond-shaped pattern (use a little imagination), and the diamond shape is a good way to remember what these keys do. The well-known word processor **Wordstar** uses these same control key combinations.

However, where **Wordstar** uses CTRL-F and CTRL-A to move the cursor one word right and one word left, **Express** does not do this. CTRL-F will reformat the current paragraph, and CTRL-A has no effect. It would have been nice if **Express** maintained keystroke compatibility with **Wordstar**.

Commands for moving the cursor to the beginning and end of your document, or up and down one screen, are not easily remembered. The letters O, K, Q and Z, when used with the CTRL key, move the cursor in the previously mentioned directions. There is no way that these particular letter commands are intuitively obvious.

**Express** takes advantage of the HELP key on the ST keyboard. When HELP is pressed, a list of commands for saving, loading and deleting files—and other

functions—is presented. Unfortunately, the difficult-to-remember cursor movement commands aren't given. A two-level HELP function would have been more useful.

Also, the HELP function is not a toggle command. You press the HELP key for help, but must remember to press the ESCape key to get out of HELP. Pressing the HELP key as if it were a toggle command will put a garbage character on the screen.

### The good, the bad and the ugly.

Good points about the word processor are: you're warned if you try to SAVE your text to an already existing file; you can get a file directory (but no file size or date information, and no mention of the remaining disk space) from another menu; and you've got the use of the mouse for cursor positioning. There's also a simple yet effective way to delete a paragraph and reinsert it somewhere else.

When using the **Express's** word processor, you're always in the insert mode. As you type, all text to the right and below is pushed over and down. If you type too fast, the program will lose characters. Touch typing is definitely out of the question.

The only solution to this problem is to insert a carriage RETURN where the new text is to go, move the cursor back to just before that new RETURN and continue typing. Then you can type at normal speed, and the program won't lose any text.

There are a few things I don't like about **Express**. You must insert an extra carriage RETURN between the paragraphs, in order to be able to reformat the paragraph. If you forget to do this, like I did a couple times while writing this review, you end up with the world's longest paragraph.

Another aspect that I don't like is that there are a number of customary word processing functions missing from the program. You cannot double space your document; headers and footers are not available; and there's no page numbering. Also, the filename isn't displayed on the text entry screen, which makes it slightly confusing when you periodically SAVE your document.

### What else can it do?

The memory typewriter feature works as advertised. Envelopes can be easily addressed. The terminal program is functional, but not chock full of features. Again, the intent of **Express** is to offer

easy-to-use features, not to be the ultimate program.

The terminal program and text file up/download functions are really meant for "electronic mail" activities, rather than for program file transfers.

I had no difficulty using the terminal program at either 300 or 1200 baud. However, I was unsuccessful at using the text uploading and downloading feature on CompuServe. Mirage told me that the terminal program was added at the last minute as an extra feature. Perhaps they should have become familiar with the necessary protocols on CompuServe before they offered this particular feature.

The mailing list and mail merge programs are also useful and straightforward. For form letters and keeping an address book, the program functions nicely.

### The bottom line.

**Express** is a serviceable letter processor, but, quite frankly, if this product had appeared for the Atari 8-bit computers, it would not have stood a chance in the marketplace. Of course, the intent of the program is not to be a full-featured word processor.

For the low price of \$49.95, and given that there's currently no other program that will allow you to perform word processing and other such capabilities on the ST, **Express** is worth considering.

At the time this was written, the only alternative was to spend over \$150 for the text editor called **Mince** from Mark of the Unicorn. **Mince** is more powerful but difficult to use, and is meant primarily for programmers.

Mirage Concepts is working on an improved version of **Express** that will take advantage of the GEM's special features. They have a sensible upgrade policy that allows you to purchase the new version of the program for only \$10.00. The upgraded version is planned to be available by November.

Mirage is also working on some utility programs for the Atari ST. All that can be said at this time is that they'll be offering a fast copy program with automatic formatting.

They also plan to have a "disk doctor" type of program that will allow you to examine, modify and move any part of a disk to another location on that or another disk. These utility products are currently planned for sale at inexpensive prices of about \$20.00. **A**

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# Sneak Attack

by David Plotkin

You knew it had been too quiet. Nothing had shown on the scanner for the whole watch. That in and of itself wasn't unusual, but intelligence had reported increased enemy activity. It seemed that a major move to capture and destroy the gunbases that protected the Interior was being planned.

Further, the enemy had developed a new type of intelligent robot, which could stand the shock of being parachuted to Earth and, once there, could team up with other robots to destroy the gunbases. Intelligence reports indicated that each robot could carry one-quarter of the explosives necessary to pierce the armor of the gunbase you manned.

The anticipated plan is that the enemy choppers will drop robots, which, if they land successfully, will wait until three more robots have also landed, then team up to destroy your base. Since radio silence must be maintained, the robots only "know" about other robots in their direct line of sight, so four robots must land successfully on one side of your base.

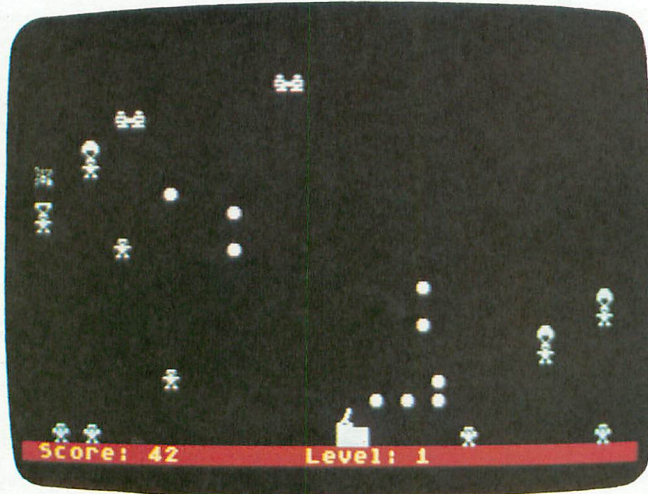
These robots are not invulnerable, however. If one parachuting robot lands on another, the one underneath will be crushed and immobilized.

Your gunbase is a pretty awesome weapon. The gun is mounted on a concrete pedestal and is aimed by your joystick. The missiles unleashed by your fire button are steerable—they will travel left and right



## Sneak Attack *continued*

if you press the joystick control in the appropriate direction, and rise toward the top of your scanner screen if you center the stick.



Sneak Attack.

The missiles are powerful, capable of obliterating the enemy's helicopters, as well as the robots. One strategic trick, learned in advanced gunnery class, is to use a missile to destroy a parachute by careful aiming, thus causing the robot to plummet to Earth, destroying any robots that happen to be beneath it.

This is really the only method of destroying robots that are already on the ground. The enemy has split the attack into levels, and each level is faster and fiercer than the previous one. Duty calls, so plug your joystick into port 1 and prepare to defend your home as the attack commences! Good luck.

### Programming information.

Each procedure is commented with a brief description of what it does. Some of the procedures illustrate interesting programming tricks, however, and I want to expand on them.

The first is the procedure Title(). As stated, it prints the title screen. Notice that it checks the location of the vertical scan VCOUNT and puts color information directly into the hardware registers COLPF0-COLPF3. This causes each scan line on the TV screen to be drawn in a different color. Action! is so fast that you can do this without resorting to machine language display list interrupts.

By using the built-in jiffy timer (RTCLOCK), which advances by one each time a new screen is drawn, in the equation to compute what color is actually used, the colors are made to "scroll" up the screen, providing a rather neat effect. The speed of the scroll is determined by the RSH portion of the color term.

RSH essentially does a divide, so the more times you RSH the RTCLOCK, the slower the scroll will be.

The other interesting procedure is MoveTroopers(), which moves the robots down the screen. As you can see by looking at the program listing, **Sneak Attack** is written in graphics 0, with a redefined character set. Yet the robots scroll smoothly down.

The way it works is this: each robot is two characters high (chute and robot) and is initially put on the screen by simply printing three characters one above the other—the two characters which make up the shape and a third character which is initially blank. These three characters appear one after the other in the character set.

To move the robot in what looks like a smooth scroll down the screen, the 16 bytes which make up the shape (two characters at 8 bytes per character) are shifted 1 byte further into the 24 bytes of the three characters which were printed on the screen.

This "dynamic character redefinition" goes on until the figure has been shifted 8 bytes down, at which time the top character of the three is blank, and the 16-byte figure resides in the lower two characters. Then, you move the 16 bytes back into the top two characters, and then print the three characters one position lower on the screen.

The shifting of 16 byte blocks is done using MOVEBLOCK. The location of the character set and the location of the 16 bytes which make up the shape are passed to MOVEBLOCK by using the names of the arrays which contain the data. Used in this manner, array names are treated as the memory addresses of the data in the array.

### Sneaking around.

I've been programming Atari home computers for four years. The very first video game I ever saw running on a home computer was a little something from Sierra (then OnLine), called **Sabotage**. It was only available on the Apple and was never translated.

I've always enjoyed **Sabotage** and several times tried to program something similar myself. I was never very successful, mostly because BASIC just isn't up to the job. But Action! is, and I think you'll enjoy this version of a venerable game.

One more thing. The end is worth waiting for. **A**

*David Plotkin is a Project Engineer for Chevron U.S.A., with a Master's in Chemical Engineering. He bought his Atari in 1980 and is interested in programming and design of games, as well as word processing. His work has been seen in **ANALOG Computing**, **Compute!** and other computer magazines.*

Listing 1.

```

; Sneak Attack by David Plotkin

MODULE

BYTE
ChrBase=756,Max,Bkgrnd=710,
Fate=53770,Level=[1],CursIn=752,
Stick=632,Ps,Loud=[0],Indx=[0],
DownL=[0],DownR=[0],Loud1=[0],
Snd1=$D200,Snd2=$D20F,Freq=[169],
Msync=$D40A,Colbk=$D018,
Nmien=$D40E,Hard=[15],
Consol=53279

CARD
Scrn=88,RamSet,HiMem=$2E5,
Score=[0],Comp=[300],Sdlst=560,
Vdslst=512

CARD ARRAY Linept(24)

BYTE ARRAY
Charset,Chopperstatus(30),
Chopperx(30),Choppery(30),
Exp(60),Expy(60),Exp5status(60),
Tr5status(30),Trx(30),Try(30),
Mis5status(30),Misx(30),Misy(30),
Ll(20),Rr(20),Dlist,
ShapeTable(0)=
[254 16 124 71 127 12 62 0
127 8 62 226 254 24 126 0
96 96 48 48 24 60 231 255
24 24 24 24 24 60 231 255
6 6 12 12 24 60 231 255
128 85 17 66 24 170 91 131
60 126 255 255 195 66 36 24
60 36 24 255 60 24 36 102
0 0 0 0 0 0 0 0
60 36 24 255 60 24 36 102
60 36 219 255 60 24 36 102
60 60 24 60 60 24 24 28
60 60 24 60 60 60 102 195]

PROC Download()
;Step back HiMem and move the
;character set into RAM
CARD Index
BYTE Val
RamSet=(HiMem-$400)&$FC00
ChrBase=RamSet RSH 8
HiMem=RamSet
FOR Index=0 TO 1023 DO
Val=Peek(57344+Index)
Poke(RamSet+Index,Val)
OD
Charset=RamSet
RETURN

PROC Dlist()
;the display list interrupt routine
[$48 $8A $48 $98 $48]
Msync=1
Colbk=50
[$68 $A8 $68 $AA $68 $40]

PROC ScoreLine()
;set up the dli
Dlist=Sdlst
Vdslst=Dlist
Dlist(27)=130
Nmien=$C0

```

RETURN

```

PROC Update()
;print score and level
Position(1,23)
Print("Score: ")
Position(8,23)
PrintC(Score)
Position(18,23)
Print("Level: ")
Position(25,23)
PrintB(Level)
RETURN

PROC Title()
BYTE colpf0=53270,colpf1=53271,
colpf2=53273,colpf3=53273,
rtclock=20,vcount=54283
Graphics(18)
Position(3,4)
PrintD(6,"SNEAK ATTACK")
Position(8,5)
PrintD(6,"BY")
Position(3,7)
PrintD(6,"david plotkin")
Position(3,9)
PrintD(6,"PRESS START")
WHILE Consol<>6 DO
colpf3=Fate
Msync=0
colpf0=128-vcount+rtclock RSH 2
colpf1=vcount+rtclock RSH 2
OD
RETURN

PROC Gr0Init()
;Set up the address of each screen
;line and initialize
CARD xx
Graphics(0)
CursIn=1
Print(" ")
FOR xx=0 TO 23 DO
Linept(xx)=Scrn+(40*xx)
OD
FOR xx=0 TO 29 DO
Chopperstatus(xx)=0
Chopperx(xx)=0
Choppery(xx)=0
Misx(xx)=0
Misy(xx)=0
Mis5status(xx)=0
Tr5status(xx)=0
OD
FOR xx=0 TO 59 DO
Exp5status(xx)=0
OD
FOR xx=0 TO 19 DO
Ll(xx)=0
Rr(xx)=0
OD
Bkgrnd=0
Update()
RETURN

PROC Plot0(BYTE x,y,ch)
;Plot a char at location x,y
BYTE ARRAY line
line=Linept(y)
line(x)=ch
RETURN

BYTE FUNC Locate0(BYTE x,y)

```



# Sneak Attack *continued*

```
;Returns the value of the char at x,y
BYTE ARRAY line
  line=Linept(y)
RETURN(line(x))
```

```
PROC Noise()
;the explosion noises
  IF Loud=0 AND Loud1=0
    AND Freq=169 THEN
    RETURN
  FI
  IF Loud THEN
    Loud=-2
    Sound(0,90,8,Loud)
  FI
  IF Loud1 THEN
    Loud1=-2
    Sound(1,150,8,Loud1)
  FI
  IF Freq<168 THEN
    Freq=+8
    Sound(2,Freq,10,4)
  ELSE
    Freq=169
    Sound(2,0,0,0)
  FI
RETURN
```

```
PROC HitChute(BYTE wh)
;see which chute was hit by missile wh
BYTE lp
  FOR lp=0 TO 29 DO
    IF Misx(wh)=Trx(lp) AND
      (Misy(wh)=Try(lp) OR
      Misy(wh)=Try(lp)+1) THEN
      TrStatus(lp)=2
      Plot0(Trx(lp),Try(lp),0)
      Plot0(Trx(lp),Try(lp)+1,10)
      Plot0(Trx(lp),Try(lp)+2,0)
      EXIT
    FI
  OD
  IF Try(lp) LSH 3 < Freq THEN
    Freq=Try(lp) LSH 3
  FI
RETURN
```

```
PROC HitMan(BYTE wh)
;see which man was hit by missile wh
BYTE lp
  FOR lp=0 TO 29 DO
    IF Misx(wh)=Trx(lp) AND
      (Misy(wh)=Try(lp)+1 OR
      Misy(wh)=Try(lp)+2) THEN
      TrStatus(lp)=3
      Plot0(Trx(lp),Try(lp)+1,6)
      Plot0(Trx(lp),Try(lp),0)
      Plot0(Trx(lp),Try(lp)+2,0)
    FI
  OD
  Loud1=12
RETURN
```

```
PROC ExplodeChopper(BYTE lp)
;explosions in place of Chopper lp
BYTE lq
  FOR lq=0 TO 59 STEP 2 DO ;find empty
    IF ExpStatus(lq)=0 THEN
      ExpStatus(lq)=1
      ExpStatus(lq+1)=1
      ExpStatus(lq+2)=1
      ExpStatus(lq+3)=1
      ExpStatus(lq+4)=1
      ExpStatus(lq+5)=1
      ExpStatus(lq+6)=1
      ExpStatus(lq+7)=1
      ExpStatus(lq+8)=1
      ExpStatus(lq+9)=1
      ExpStatus(lq+10)=1
      ExpStatus(lq+11)=1
      ExpStatus(lq+12)=1
      ExpStatus(lq+13)=1
      ExpStatus(lq+14)=1
      ExpStatus(lq+15)=1
      ExpStatus(lq+16)=1
      ExpStatus(lq+17)=1
      ExpStatus(lq+18)=1
      ExpStatus(lq+19)=1
      ExpStatus(lq+20)=1
      ExpStatus(lq+21)=1
      ExpStatus(lq+22)=1
      ExpStatus(lq+23)=1
      ExpStatus(lq+24)=1
      ExpStatus(lq+25)=1
      ExpStatus(lq+26)=1
      ExpStatus(lq+27)=1
      ExpStatus(lq+28)=1
      ExpStatus(lq+29)=1
      ExpStatus(lq+30)=1
      ExpStatus(lq+31)=1
      ExpStatus(lq+32)=1
      ExpStatus(lq+33)=1
      ExpStatus(lq+34)=1
      ExpStatus(lq+35)=1
      ExpStatus(lq+36)=1
      ExpStatus(lq+37)=1
      ExpStatus(lq+38)=1
      ExpStatus(lq+39)=1
      ExpStatus(lq+40)=1
      ExpStatus(lq+41)=1
      ExpStatus(lq+42)=1
      ExpStatus(lq+43)=1
      ExpStatus(lq+44)=1
      ExpStatus(lq+45)=1
      ExpStatus(lq+46)=1
      ExpStatus(lq+47)=1
      ExpStatus(lq+48)=1
      ExpStatus(lq+49)=1
      ExpStatus(lq+50)=1
      ExpStatus(lq+51)=1
      ExpStatus(lq+52)=1
      ExpStatus(lq+53)=1
      ExpStatus(lq+54)=1
      ExpStatus(lq+55)=1
      ExpStatus(lq+56)=1
      ExpStatus(lq+57)=1
      ExpStatus(lq+58)=1
      ExpStatus(lq+59)=1
    FI
  OD
```

```
Chopperstatus(lp)=0
Plot0(ExpX(lq),ExpY(lq),6)
Plot0(ExpX(lq+1),ExpY(lq+1),6)
EXIT
  FI
OD
RETURN
PROC HitChopper(BYTE wh)
;which chopper was hit by missile wh
BYTE lp
  FOR lp=0 TO 29 DO
    IF Misy(wh)=Chopperry(lp) AND
      (Misx(wh)=Chopperx(lp) OR
      Misx(wh)=Chopperx(lp)+1) THEN
      ExplodeChopper(lp)
      EXIT
    FI
  OD
  Loud=12
RETURN
```

```
PROC MissileHit(BYTE wh)
;see if missile wh hit anything
BYTE dum
  dum=Locate0(Misx(wh),Misy(wh))
  IF dum=0 THEN
    Plot0(Misx(wh),Misy(wh),84)
    RETURN
  FI
  MisStatus(wh)=0
  IF dum=1 OR dum=2 THEN
    HitChopper(wh)
    Score=+1
  ELSEIF (dum=7 AND Indx<6 OR
    dum=8 AND Indx>3) THEN
    HitChute(wh)
    Score=+2
  ELSEIF (dum=8 AND Indx<4 OR
    dum=9 AND Indx>1) THEN
    HitMan(wh)
    Score=+1
  FI
RETURN
```

```
PROC Modify()
;Modify the RAM character set
CARD xx
  FOR xx=0 TO 103 DO
    Charset(xx+8)=ShapeTable(xx)
  OD
RETURN
```

```
PROC LaunchTrooper(BYTE wh)
;drop a paratrooper from chopper wh
BYTE lp
  IF Fate>240-(Level LSH 1) THEN
    FOR lp=0 TO 29 DO ;find MT trooper
      IF TrStatus(lp)=0 THEN ;got one
        TrStatus(lp)=1
        Trx(lp)=Chopperx(wh)
        IF Trx(lp)=0 THEN
          Trx(lp)=1
        FI
        Try(lp)=Chopperry(wh)+1
        Plot0(Trx(lp),Try(lp),7)
        Plot0(Trx(lp),Try(lp)+1,8)
        Plot0(Trx(lp),Try(lp)+2,9)
        EXIT
      FI
    OD
  FI
RETURN
```

```
PROC EraseChopper(BYTE wh)
```

```

;erase chopper number wh
Plot0(Chopperx(wh),Chopperry(wh),0)
Plot0(Chopperx(wh)+1,Chopperry(wh),0)
Chopperstatus(wh)=0
Chopperx(wh)=0
Chopperry(wh)=0
RETURN

```

```

PROC DrawChopper(BYTE wh)
;draw chopper number wh
Plot0(Chopperx(wh),Chopperry(wh),1)
Plot0(Chopperx(wh)+1,Chopperry(wh),2)
RETURN

```

```

PROC ClearScreen()
;clear the screen
BYTE lp
FOR lp=0 TO 29
DO
IF Chopperstatus(lp) THEN
EraseChopper(lp)
FI
IF Tr5status(lp) THEN
Tr5status(lp)=0
Plot0(Trx(lp),Try(lp),0)
Plot0(Trx(lp),Try(lp)+1,0)
Plot0(Trx(lp),Try(lp)+2,0)
FI
IF Mis5status(lp)=1 THEN
Mis5status(lp)=0
Plot0(Misx(lp),Misy(lp),0)
FI
OD
FOR lp=0 TO 59 STEP 2 DO
IF Exp5status(lp)=1 THEN
Exp5status(lp)=0
Exp5status(lp+1)=0
Plot0(Exp5(lp),Exp5(lp),0)
Plot0(Exp5(lp+1),Exp5(lp+1),0)
FI
OD
RETURN

```

```

PROC MoveChopper()
;move the choppers
BYTE lp,ps={0}
FOR lp=0 TO 29 DO
IF Chopperstatus(lp)=1 THEN ;right
IF Chopperx(lp)=38 THEN
EraseChopper(lp)
ELSE
Plot0(Chopperx(lp),
Chopperry(lp),0)
Chopperx(lp)=+1
DrawChopper(lp)
LaunchTrooper(lp)
FI
FI
IF Chopperstatus(lp)=2 THEN ;left
IF Chopperx(lp)=0 THEN
EraseChopper(lp)
ELSE
Plot0(Chopperx(lp)+1,
Chopperry(lp),0)
Chopperx(lp)=-1
DrawChopper(lp)
LaunchTrooper(lp)
FI
FI
OD
IF ps=0 THEN
Charset(8)=56
Charset(16)=28
ps=1
ELSE

```

```

ps=0
Charset(8)=254
Charset(16)=127
FI
RETURN

```

```

PROC LaunchChopper()
;Decide whether to send off a new
;chopper, which side, how high up
BYTE lp
IF Fate>230-(Level LSH 1) THEN
FOR lp=0 TO 29 DO ;find MT chopper
IF Chopperstatus(lp)=0 THEN
Chopperry(lp)=Rand(Hard)
IF Fate>128 THEN
Chopperx(lp)=38 ;right side
Chopperstatus(lp)=2
ELSE
Chopperx(lp)=0 ;left side
Chopperstatus(lp)=1
FI
DrawChopper(lp)
EXIT
FI
OD
FI
RETURN

```

```

PROC DrawBase()
;draw the base
BYTE lp
FOR lp=19 TO 21 DO
Plot0(lp,22,128)
OD
Plot0(20,21,4)
RETURN

```

```

PROC AimGun()
;read the joystick and move the base
IF Stick=11 THEN
Ps=3
ELSEIF Stick=7 THEN
Ps=5
ELSE
Ps=4
FI
Plot0(20,21,Ps)
RETURN

```

```

PROC Shoot()
;send off a bullet
BYTE trig=644,lp,flg={0}
IF trig=1 OR flg=0 THEN
flg=1
RETURN
FI
FOR lp=0 TO 29 DO ;find empty shot
IF Mis5status(lp)=0 THEN ;got one
Mis5status(lp)=1
Misy(lp)=20
IF Ps=3 THEN
Misx(lp)=19
ELSEIF Ps=5 THEN
Misx(lp)=21
ELSE
Misx(lp)=20
FI
MissileHit(lp)
EXIT
FI
OD
flg=0
RETURN

```

(Listing continued  
on page 60)

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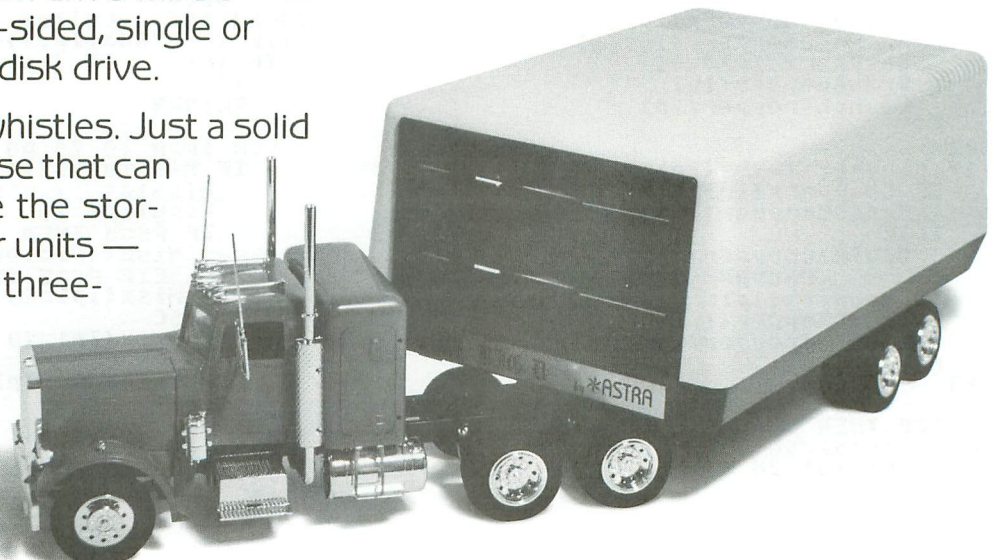
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# Maze War

by Mark Price

Our story so far. . . The evil Mage Roklar must have more backing than you thought, because somehow he captured you and the other members of the Circle of Wizards. You really don't know how long you were out, but when you awoke, you found yourselves in a tenuous construct.

From its mazelike pattern, it was immediately recognized to be one of Roklar's favorite disposal places, a pocket dimension bridging between the elemental planes of fire and ice. It was then that Roklar made his projected appearance before the group.

His image said, "You have all stood in my way too long. Now it is my turn to stand in yours. This area will not last long, and there is only enough magical

energy here to carry but one of you away! Knowing how you always so adamantly refuse to part company, though, I doubt that any of you will escape." The image laughed wickedly as it faded away.

After a quick survey of the area, you found that Roklar had spoken the truth for once. The place itself was beginning to fray at the edges as its remaining magic seeped away. Very soon, there wouldn't be enough to take any of you back home.

Obviously, only one of you would be able to escape to make Roklar pay, so it was decided to hold a quick tourney to find which it would be. It was lucky that you had finished constructing your Wands of Havoc before being captured. They would serve excellently for the tourney. You all drew them from your vests and prepared.



# Maze War *continued*

Then Roklar reappeared. This time he said, "I never thought I'd see you so prepared to abandon and certainly not threaten violence to each other. No matter. Since you are being so amiable, I'll make this a little more interesting. . ."

There was a low rumble some distance away in the maze, and then the slow shuffling of feet coming your way. You looked at each other and, all at the same moment, said, "Zombies!"

Roklar never did have a sense of humor.

### Typing it in.

Before typing anything, look at the listings accompanying this article.

**Listing 1** is the BASIC data and data checking routine. This listing is used to create both cassette and disk versions of **Maze War**. The data statements are listed in hexadecimal (base 16), so the program will fit in 16K cassette systems.

**Listing 2** is the assembly language source code for the game of **Maze War**, created with the OSS MAC/65 assembler. You don't have to type this

listing to play the game! It is included for those readers interested in assembly language.

Follow the instructions below to make either a cassette or disk version of **Maze War**.

### Cassette instructions.

1. Type Listing 1 into your computer using the BASIC cartridge and verify your typing with **Unicheck** (see page 16).

2. Type **RUN** and press **RETURN**. The program will begin and ask:

**MAKE CASSETTE (0) OR DISK (1)?**

Type **0** and press **RETURN**. The program will begin checking the **DATA** statements, printing the line number of each as it goes. It will alert you if it finds any problems. Fix any incorrect lines and re-**RUN** the program, if necessary, until all errors are eliminated.

3. When all of your **DATA** lines are correct, the computer will beep twice and prompt you to **READY CASSETTE AND PRESS RETURN**.

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CIRCLE #113 ON READER SERVICE CARD

Now, insert a blank cassette in your recorder, press the RECORD and PLAY buttons simultaneously and hit RETURN. The message *WRITING FILE* will appear, and the program will create a machine language boot tape version of **Maze War**, printing each DATA line number as it goes. When the *READY* prompt appears, the game is recorded and ready to play. **CSAVE** the BASIC program onto a separate tape before continuing.

4. To play, rewind the tape created by the BASIC program to the beginning. Turn your computer OFF and remove all cartridges. Press the PLAY button on your recorder and turn ON your computer while holding down the START key. If you have a 600 or 800XL computer, you must hold the START and OPTION keys when you turn on the power. The computer will "beep" once. Hit the RETURN key, and **Maze War** will load and run automatically.

#### Disk instructions.

1. Type Listing 1 into your computer, using the BASIC cartridge and verify your typing with **Unicheck** (see page 16).

2. Type **RUN** and press RETURN. The program will ask:

**MAKE CASSETTE (0) OR DISK (1)?**

Type **1** and press RETURN. The program will begin checking the DATA lines, printing the line number of each statement as it goes. It will alert you if it finds any problems. Fix incorrect lines and re-RUN the program, if necessary, until all errors are eliminated.

3. When all the DATA lines are correct, you will be prompted to *INSERT DISK WITH DOS, PRESS RETURN*. Put a disk containing DOS 2.0S into drive #1 and press RETURN. The message *WRITING FILE* will appear, and the program will create an **AUTORUN.SYS** file on the disk, displaying each DATA line number as it goes. When the *READY* prompt appears, the game is ready to play. Be sure the BASIC program is **SAVED** before continuing.

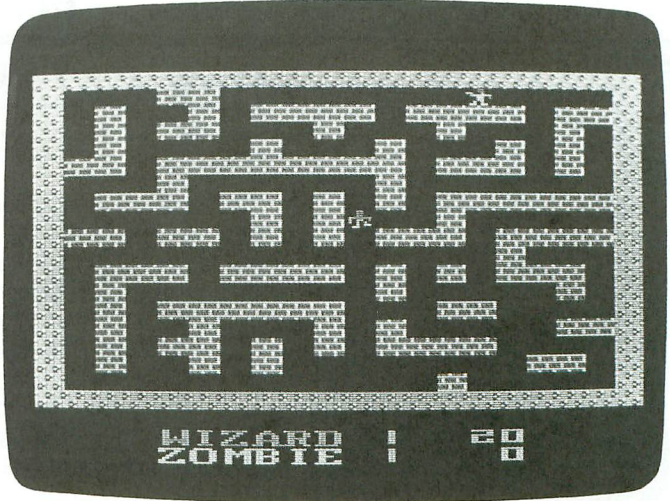
4. To play the game, insert the disk containing the **AUTORUN.SYS** file into drive #1. Turn your computer OFF, remove all cartridges and turn the computer back ON. **Maze War** will load and run automatically.

#### Playing Maze War.

**Maze War** was written using the OSS MAC/65 assembler.

It's a game for one to four players. If played on an

XL computer with more than two players selected, stick 1 will control Wizards 1 and 3, while stick 2 controls Wizards 2 and 4. The number of players is chosen with the SELECT key, and the number of Zombies with the OPTION key. The speed of the Zombies is selected by pressing a key from 1 to 9.



**Maze War.**

You start the game somewhere in Roklar's maze, Havoc Wand in hand. You move about in the maze by pushing your joystick in the desired direction. If the stick is held diagonally, the Wizard will alternate moving between the two directions.

The Wand fires off a magic chain when you hold down the fire button while moving the joystick. The magic chain fired by the Wand is capable of vaporizing man or wall at fifty paces. Once vaporized, a Wizard or Zombie will automatically coalesce back into a whole at a random point somewhere in the maze.

Moving about in the maze will attune you more to its energies, thus making the point value for a hit worth more. In the same fashion, using the Havoc Wand uses up energy, and overuse will bring the point value down. Once a Wizard or Zombie has tapped into 100 points of energy, the spell to return to Earth is cast. Then, the pocket dimension will become unstable and dissolve.

**Maze War** will go into an automatic demo mode with three Zombies going at it after thirty seconds. This can be seen earlier if you press the **D** key. Once the game has started, it can be paused by hitting any key. Unpause by pressing a key again. The game can be aborted at any time by hitting one of the console keys.

All right, face the magic. **A**

(Listing starts on page 43)



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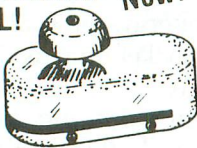
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# Maze War *continued*

Mark Price lives in Los Angeles, where he's studying computer science. A telecommunications enthusiast, he participates in several local BBSs. He likes to program games in cooperation with his living computer, Fred, and has been working with computers since 1979.

Listing 1.  
BASIC listing.

```

10 REM *** MAZE WAR ***
20 TRAP 20:? "MAKE CASSETTE (0), OR DI
5K (1)";:INPUT D5K:IF D5K>1 THEN 20
30 TRAP 40000:DATA 0,1,2,3,4,5,6,7,8,9
,0,0,0,0,0,0,10,11,12,13,14,15
40 DIM DAT$(91),HEX(22):FOR X=0 TO 22:
READ N:HEX(X)=N:NEXT X:LINE=990:RESTOR
E 1000:TRAP 120:? "CHECKING DATA"
50 LINE=LINE+10:? "LINE:";LINE:READ DA
T$:IF LEN(DAT$)<>90 THEN 220
60 DATLIN=PEEK(183)+PEEK(184)*256:IF D
ATLIN<>LINE THEN ? "LINE ";LINE;" MISS
ING!":END
70 FOR X=1 TO 89 STEP 2:D1=A5C(DAT$(X,
X))-48:D2=A5C(DAT$(X+1,X+1))-48:BYTE=H
EX(D1)*16+HEX(D2)
80 IF PA55=2 THEN PUT #1,BYTE:NEXT X:R
EAD CHKSUM:GOTO 50
90 TOTAL=TOTAL+BYTE:IF TOTAL>999 THEN
TOTAL=TOTAL-1000
100 NEXT X:READ CHKSUM:IF TOTAL=CHKSUM
THEN 50
110 GOTO 220
120 IF PEEK(195)<>6 THEN 220
130 IF PA55=0 THEN 170
140 IF NOT D5K THEN 160
150 PUT #1,224:PUT #1,2:PUT #1,225:PUT
#1,2:PUT #1,207:PUT #1,36:CLOSE #1:EN
D
160 FOR X=1 TO 57:PUT #1,0:NEXT X:CLOS
E #1:END
170 IF NOT D5K THEN 200
180 ? "INSERT DISK WITH DOS, PRESS RET
URN";:DIM IN$(1):INPUT IN$:OPEN #1,8,0
,"D:AUTORUN.5Y5"
190 PUT #1,255:PUT #1,255:PUT #1,0:PUT
#1,32:PUT #1,158:PUT #1,53:GOTO 210
200 ? "READY CASSETTE AND PRESS RETURN
";:OPEN #1,8,128,"C":RESTORE 230:FOR
X=1 TO 40:READ N:PUT #1,N:NEXT X
210 ? :? "WRITING FILE":PA55=2:LINE=99
0:RESTORE 1000:TRAP 120:GOTO 50
220 ? "BAD DATA: LINE ";LINE:END
230 DATA 0,44,216,31,255,31,169,0,141,
47,2,169,60,141,2,211,169,0,141,231,2,
133,14,169,56,141,232,2
240 DATA 133,15,169,207,133,10,169,36,
133,11,24,96
1000 DATA 000000000000000000002856140000
0000003CBF28000000000000000208C8C3010
585820208C8C301058582000,797
1010 DATA 0000000303033F3303030FC0C00F
FCC0C0303C00000000000000000000000000
0000000000000000000000,84
1020 DATA 000000000000000000000000000000
000000000000000000000000000000000000
0000000000007E666666667E,744
1030 DATA 00001818181818181800007E067E60
667E00007E061E06667E0000606C6C7E0C0C00
007E607E06667E00007E607E,258
1040 DATA 66667E00007E060C18181800007E
667E66667E00007E667E06667E000000181800
18180080366C492CD2B64B00,59

```

```

1050 DATA 0000002CD2B64B8D366C49000000
00000000020A2BAF3C00028AABEFCC00005E5B
5E55E5B5E55500183C66667E,492
1060 DATA 66E700FC66667C66667C007EC6C0
C0C0C67E00FC6666666666FC00FE6660786066
FE80B0B0B0B2BAAB3F007EC6,573
1070 DATA C0CEC6C67E020A2AAEAFAFC20000
3C181818183C2ACFC0C2CAEBAACF00CED8F0
FCC0CCE00F06060606066FE,600
1080 DATA 0063777F6B63636300C666767E7E
6EE6007CC6C6C6C6C67C00FC66667C6060F0A8
EBAFBEF0C0A8FF00FC66667C,812
1090 DATA 6C6CE6007EC6C07C06C6FC007E5A
181818183C00E766666666663C0A2BAFAAAF28
0A03006363636B7F776300C0,94
1100 DATA 0000C00000C000E7663C1818183C
00FECC183060C6FE80B0B2BAAAAEBE3000020A
EBAFBEFAC3A0BEFAEBAABFF0,824
1110 DATA C088BABABBBB33000080A0BC
A0280F030303153101010AC0C0055C40401028
3C3C30141434102803030315,115
1120 DATA 111010AC0C00C5440401028C0C0
C0544C10280000000303031511040000C0C0C0
544C402800000000000000040,571
1130 DATA A00000000000000000000030303
1500000000C0C0C054111010A000000004C10
2800000000000000000000,598
1140 DATA 0303000000000000C0C003151104
28000000C0544C4040A0000003035035010104
28C0C0C0544C4040A03C3C0C,54

```

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```

1670 DATA D2B59029FE9590B5B095A8D00320
B830B5902910D0034CA82CB5C810034C662C8A
0AA8B5C849030A0A0A0A6910, 253
1680 DATA 9900D2B5C80A0A69029901D2A903
858FB5C858E468E9056202431203F30F032C9
9B9004C99E902AA48FB99631, 312
1690 DATA 490F35BC95BC204730A48FA58438
F96D318584A585F969318585A900A001918488
10FB001CB5C829010A0A058F, 265
1700 DATA 0A69FE8582A93169008583A001B1
8291848810F9C68F10A2F6C8B5C82905D01BA9
03858FB5C858E468E900B20, 748
1710 DATA 2431A900A89184C89184C68F10ED
D6C8D6C8B5C8C9FEF00485BCD00E8A0AA8A900
9901D2B590290F95904CEF2C, 899
1720 DATA B5902920F0418A0AA8F6CCB5CC8D
C602290FF0160A0A493C69209900D2B5CC290F
4A1869209901D2D01DA90099, 664
1730 DATA 01D2A8B5C48584B5C08585989184
C89184200D31B5BC490F95BCCA30034C3C294C
62E4868CA48DB5A4883016C4, 276
1740 DATA 8CF0F9D9A400D0F4B5A0D9A000A9
00901FA902D01BA48DB5A0883021C48CF0F9D9
A000D0F4B5A4D9A400A90190, 763
1750 DATA 02A9039594B59C8584B59885854C
C529A9FF858FA48DB883014C48CF0F920B42D18
658EC58FB0EF858F848A90E9, 985
1760 DATA A48A20B42DC58EB01620942DF027
A48A20A42DF020A48A20942DB5944C322D20A4
2DF011A48A20942DF00AA48A, 4
1770 DATA 20A42DB5944C322D4CB329B5A0D9
A000A9009002A90295944C2630B5A4D9A400A9
019002A90395944C2630B5A0, 718
1780 DATA 38F9A000100549FF186901858EB5
A438F9A400100549FF18690160B49418B59C79
7331959CB5987969319598B5, 695
1790 DATA A01879663195A00B5A41879653195
A49829020A95ACB5942902D004F6ACD002D6AC
B59C8584B5988585B5AC2903, 135
1800 DATA 0A0A75940A0A699E8582A9316900
8583B59420682E20A82EB5AC290395ACD01EB4
94B59C18797131959C9002F6, 935
1810 DATA 98B5A01879643195A00B5A4187963
3195A4B59029B0001380A0A8B5AC2901F00AA9
049901D2A9209900D260858C, 182
1820 DATA A000B1829184C8B1829184A58C29
01F00BA58418692685849002E685C8B1829184
C8B1829184600B59C8584B598, 145
1830 DATA 8585B494B9823118699E8582A931
20002FB5AC2903186A6A15946A6A6A6A8582A9
248583B5A40A0A0A18692085, 577
1840 DATA 84B5942901F008B5AC0A18658485
848A18693C8585A008B18291848810F9B5A00A
0A0A1869308584B5942901D0, 351
1850 DATA 08B5AC0A1865848584A5849D00D0
6069008583A001B18291848810F960AD0AD229
1FC913B0F795A0AD0AD2291F, 495
1860 DATA C912B0EC95A48582A90085848585
8583A9288580A0064680900DA5841865828584
A585658385850682268388D0, 919
1870 DATA E8B5A00A65849002E68518698E85
84A58569358585203F30D0A9A584959CA58595
98A90095948A0A0A0A694085, 159
1880 DATA 8269208580A92085838581A900A0
07918291808810F98A186908A0009184C86904
9184B5A00A0A0A1869309D00, 702
1890 DATA D0B59029FD09019590A90F95ACA9
0795A860B5C485800B5C08581A900A89180C891
80B5C8F010B5BC2901F004A0, 734
1900 DATA 27A900C89180C891808A0AA8A900
9901D260B59C8580B5988581A900A89180C891
80B5ACF010B5942901F004A0, 493
1910 DATA 27A900C89180C891808A18693C85
81A9008580A8918088D0FB60B5C48584B5C085
8584BC4C3030B59C8584B598, 554
1920 DATA 8585B494A58418796D318584A585
7969318585A000B184C8118460868CA689B590
290FD03AB59C8582B5988583, 187

```

```

1930 DATA B5ACF00A209130F00AB494209C30
209130D01F20E42FB59009029590A90995ACE4
8CF00DA68CB5B81875B495B8, 674
1940 DATA A90595B460CA10BDA68C60A584C5
82D004A585C58360A58238F973318582A583F9
69318583A582187971318582, 495
1950 DATA 9002E68360B5902902D00160B5A4
0A0A0A692085848A18693C85858A0AA8D6AC30
29A90A9900D2848CB4ACB986, 417
1960 DATA 31A48C9901D2B5AC290E0A0A699F
8582A9248583A007B18291848810F960A90099
01D2A00791848810FB4C0E2F, 323
1970 DATA B590290F09109590B5BC4902A8B9
963195BCA90395C860B5C84A4901186901858A
B5C48584B5C08585A48FA584, 787
1980 DATA 18796D318584A5857969318585C6
8AD0ED6048A9C88D16D0A9868D17D0A9588D18
D0A9288D19D0684000040000, 940
1990 DATA 00FF0000FFFF0228FED802280000
FED804030104020404040004040206080C0406
08080606040404020202030C, 862
2000 DATA 030C0804020104182C400000C0C1
0000C3C5D2D30000C0DE0000DFC2DFDFC6C7C8
C9DFD4DFDFDCDDC8C9DFC3C4, 638
2010 DATA DFCACBCCDDFD5D6DFCAD9DADBDF
DFC2DFCECFD0D1DFD0D4DFCECFD7D800008182
000084008182000000840000, 604
2020 DATA 0082810083008500008281000083
0085009B9C9C9B009D9D9B009D9D009B9C9C70
70707070422C320202700670, 476

```

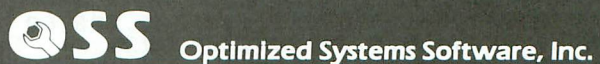
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# Maze War continued

```
2030 DATA 7005707006700404047006067002
410E3200000000000000006061626364656667
606162636869000006A6B6C63,129
2040 DATA 6A6D6E6F00000000000000000000
00000000000070717273707475737071727370
76777870797A73707B7C7300,346
2050 DATA 0000000000000000000000000000
0000000000000000232F2D303534292E270000
000000000000000000000000,752
2060 DATA 000000000000000F0F2E5F3E5EE
F4F380800000000000000000000000000000
00009E9FA6A8AAB1B6B880BB,723
2070 DATA BCBD8EBF00000000000000000000
00000000000022390000D21322B0030322923
250000000000000000000000,954
2080 DATA 0000000000000000000000000000
000000000000000000000000000000000FD
FDFDFDFDFDFDFDFDFDFDFDF,243
2090 DATA FDFDFDFDFDFDFDFDFDFDFDFDFDF
FDFDFDFDFDFDFDFDFDFDFDFDFEFEFEFEFEFE
FEFEFEFEFEFEFEFEFEFEFE,646
2100 DATA FEFEFEFEFEFEFEFEFEFEFEFEFEFE
FEFEFEFEFEFEFEFEFEFEFE80808080F7E9FAE1F2E4
F3DA00510000000000000000,841
2110 DATA 00003A2F2D222925331A00500000
00000000000000000000000000003A2F2D22
29250033302525241A000015,778
2120 DATA 000000000000000000000000007070
70448E350404040404040404040404040404
040404F046863806060641BC,220
2130 DATA 33A0A0A0A0A0A0A0A0A0A0A0A0A0
A0A0A0A0A0A0A0A0A0000000000000000000
000000000000A0A000FE00,711
2140 DATA 00FE00FEFEFEFEFEFEFEFEFEFE
FE0A0000FF00FFF0000000000000FF000000
FF00A0A000FD00000000FD00,181
2150 DATA 0000FD000000FD00FD00A0A0FEFE
00FEFEFEFEFEFEFEFEFEFE00FE00A0A000
0000FF000000000000FF0000,646
2160 DATA 0000000000A0A000FD00FD00FD00
00FD00FD00FD00FD00FD00FD00A00000000000
FE00FE000000FE0000000000,337
2170 DATA A0A0FFF00FFF00FFF00FFF00FFF0
FFF0FFF0FFF0A0A000000000000000000000
000000FD000000A0A000FEFE,373
2180 DATA FE00FEFEFEFEFEFEFEFEFEFEFEFE
00A0A000FF000000000000000000FF00000000
FF00A0A000FD00FD00FD00FD,90
2190 DATA FD000000FD00FD000000A0A000FE
0000FE000000FE00FE0000000000FEFE00A000
FF00FFF00FF00FF00FF00FF00FF,306
2200 DATA FFFF000000A0A000FD0000FD00FD
00FD00000000FD00FD00A0A0000000000000
0000000000FE0000000000,734
2210 DATA A0A0A0A0A0A0A0A0A0A0A0A0A0A0
A0A0A0A0A0A037293A21322477697A617264
B7A9BAA1B2A4F7E9FAE1F2E4,490
2220 DATA 3A2F2D2229257A6F6D626965BAAF
ADA2A9A5FAEFEDE2E9E537292E330000000000
0000000000000000000000,35
2230 REM * 5535 BYTES
```

## CHECKSUM DATA. (see page 16)

```
10 DATA 737,351,496,811,423,729,200,60
3,555,573,694,613,29,205,202,7221
160 DATA 761,198,962,633,491,30,155,10
8,291,931,926,498,357,585,639,7565
1060 DATA 34,308,152,2,154,492,940,669
,164,912,832,779,610,174,497,6719
1210 DATA 262,39,796,815,770,792,961,9
07,761,730,4,839,157,908,866,9607
```

```
1360 DATA 852,854,916,840,33,984,957,1
55,910,85,920,644,746,211,931,10038
1510 DATA 775,875,5,648,813,849,735,90
9,5,826,680,776,624,806,845,10171
1660 DATA 899,699,770,749,847,120,920,
837,55,85,751,698,701,828,842,9801
1810 DATA 715,693,706,501,813,560,753,
526,897,747,784,674,780,669,786,10604
1960 DATA 708,818,754,233,100,457,337,
972,64,511,253,773,375,135,782,7272
2110 DATA 802,815,346,75,87,768,897,28
6,23,341,929,780,640,6789
```

## Listing 2. Assembly listing.

```
*****
* 'MAZE WAR' *
* By *
* Mark Price *
*****
| SYSTEM EQUATES
|-----|
|
| ATTRACT = $4D
| AUDCTL = $D208
| AUDC1 = $D201
| AUDC2 = $D203
| AUDC3 = $D205
| AUDC4 = $D207
| AUDF1 = $D200
| CHBASE = $02F4
| COLOR0 = $02C4
| COLOR1 = $02C5
| COLOR2 = $02C6
| COLOR3 = $02C7
| COLOR4 = $02C8
| COLPF0 = $D016
| COLPF1 = $D017
| COLPF2 = $D018
| COLPF3 = $D019
| CONSOI = $D01F
| DLIST = $0230
| DMACTL = $022F
| GPRIOR = $026F
| GRACLT = $D01D
| HPOS0 = $D000
| KEYCODES = 97
| KEYIN = $02FC
| NMEN = $D40E
| PCOLR0 = $02C0
| PCOLR1 = $02C1
| PCOLR2 = $02C2
| PCOLR3 = $02C3
| PMBASE = $D407
| RANDOM = $D20A
| RTCLOCK = $14
| SIZEP = $D00B
| SKCTL = $020F
| STICK0 = $027B
| STRI0 = $028A
| VDBLST = $0200
| CDTHF5 = $022E
| SETVBY = $E45C
| ITVBY = $E462
|
| IPH GRAPHICS
|
| * = $3800
| PHAREA .DS $0400
| PL0 .DS $0100
| PL1 .DS $0100
| PL2 .DS $0100
| PL3 .DS $0100
|
| | COLORS
| |
| PFCOL0 = $94
| PFCOL1 = $2A
| PFCOL2 = $00
| PFCOL3 = $34
| PLR0COL = $C8
| PLR1COL = $B6
| PLR2COL = $58
| PLR3COL = $28
|
| | ZERO PAGE ALLOCATION
| |
| * = $80
|
| | POINTERS
| |
| POINTR0 .DS 2 | $ENL PURPOSE
| POINTER .DS 2 |
| SCRPTR .DS 2 | $SCREEN POINTER
|
| | VARIABLES
| |
| COUNTER .DS 3 | $AUTO DEMO COUNTER
| ACTIVE .DS 1 | $NUMBER IN USE
| NEAREST | $ZOMBIE MOVE CLOSE MAN'S
| COUNT .DS 1 | $ENL PURPOSE
| DIGITNO | $SCORE KEEPING
| CURLINE .DS 1 | $BOTSCRN LINE NO
```



```

HOLDIT .DS 1 ;GENL PURPOSE
PLYRS .DS 1 ;# OF PLAYERS
DIRSHFT ; BACKLASH DIRECTION REG
DX ; ZOMBIE MOVE X DIST
SAVEIT ; WINNER & SAVE
ZMBYS .DS 1 ;# OF ZOMBIES
DIST ; ZOMBIE MOVE CRNT SHORT DIST
DIREC .DS 1 ;BACKLASH DIRECTION
;
;DATA FOR EACH PLAYER
;
ACTFLAG .DS 4 ;WHAT HE'S DOING
DIR .DS 4 ;DIRECTION POINTING/MOVING
LOCHI .DS 4 ;ABSOLUTE MEM LOC HI
LOCLO .DS 4 ;ABSOLUTE MEM LOC LO
LOCK .DS 4 ;X LOCATION (#-19)
LOCY .DS 4 ;Y LOCATION (#-18)
NOVLOK .DS 4 ;TIME TILL NEXT MOVE
MOVEST .DS 4 ;STATUS IN MOVE
MOVRAE .DS 4 ;MOVEMENT RATE
NXTSCR .DS 4 ;SCORE FOR NEXT KILL
SCRPNL .DS 4 ;SCORE WAITING ADDITION
SHOTDIR .DS 4 ;SHOT MOVE DIRECTION
SHOTHI .DS 4 ;SHOT ABS MEM LOC HI
SHOTLO .DS 4 ;SHOT ABS MEM LOC LO
SHOTMST .DS 4 ;SHOT STATUS IN MOVE
SOUND .DS 4 ;SOUND HOLDING REGISTER
TYPE .DS 4 ;WIZARD=0, ZOMBIE=1
;
** $2000

```

CHARACTER SET DATA

```

CHRSET .BYTE 0,0,0,0,0,0,0,0 ;SPACE
.BYTE 0,40,80,20,0,0,0,0 ;SHOTS
.BYTE 0,60,191,40,0,0,0,0
.BYTE 14,80,0,32,188,188,48
.BYTE 14,80,80,32
.BYTE 32,188,188,48
.BYTE 16,88,88,32,0,0,0,0
MASKL .BYTE 3,3,3,63,51
MASKR .BYTE 3,3,15 ;COALESCE MASKS
PL0CHR .BYTE 192,192,48,60
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,0,0,0,0,0,0,0
.BYTE 0,120,102,102,102,102
.BYTE 102,120,102,0 ;NUMBERS 0
.BYTE 0,24,24,24
.BYTE 24,24,24,0 ;1
.BYTE 0,120,6,126,0 ;2
.BYTE 0,120,6,30,0 ;3
.BYTE 0,102,126,0,13
.BYTE 0,96,108,108,0 ;4
.BYTE 0,126,12,12,0 ;5
.BYTE 0,126,96,126,0 ;6
.BYTE 0,102,126,0,15
.BYTE 0,126,96,126,0 ;7
.BYTE 102,102,126,0,16
.BYTE 0,126,6,12,0 ;8
.BYTE 24,126,24,0,17
.BYTE 0,126,102,126,0 ;9
.BYTE 102,102,126,0,18
.BYTE 0,126,102,126,0 ;10
.BYTE 0,102,126,0,19
.BYTE 0,0,24,24,0 ;COLON
.BYTE 141,54,108,73,4,210
.BYTE 182,73 ;EXPLOSION CHARS
.BYTE 0,0,0,44,210,182,73
.BYTE 141,54,108,73,0,0,0,0
.BYTE 0,0,0,2,10
.BYTE 43,175,60 ;TITLE CHAR
.BYTE 0,2,338,171
.BYTE 239,204,0 ;TITLE CHAR
OUTWALL .BYTE 94,91,94,85,229
.BYTE 181,229,85 ;OUTER WALL
.BYTE 0,24,60,102,102
.BYTE 126,102,231 ;LETTERS A
.BYTE 0,252,102,102
.BYTE 124,102,102,124 ;B
.BYTE 0,126,198,192
.BYTE 192,192,198,126 ;C
.BYTE 0,252,102,102
.BYTE 102,102,102,252 ;D
.BYTE 0,254,102,96
.BYTE 120,96,102,254 ;E
.BYTE 128,176,176,176,178
.BYTE 186,171,63 ;TITLE CHAR
.BYTE 0,126,198,192
.BYTE 206,198,198,126 ;F
.BYTE 2,10,42,174,170
.BYTE 254,194,0 ;TITLE CHAR
.BYTE 0,60,24,24
.BYTE 24,24,24,60 ;I
.BYTE 42,207,192,194,202
.BYTE 235,234,207 ;TITLE CHAR
.BYTE 0,20,216,240
.BYTE 252,204,204,206 ;K
.BYTE 0,240,96,96
.BYTE 96,96,102,254 ;L
.BYTE 0,99,119,127
.BYTE 107,99,99,99 ;M
.BYTE 0,198,102,118
.BYTE 126,126,110,230 ;N
.BYTE 0,124,198,198
.BYTE 198,198,198,124 ;O
.BYTE 0,252,102,102
.BYTE 124,96,96,240 ;P
.BYTE 168,234,173,198,240
.BYTE 192,168,255 ;TITLE CHAR
.BYTE 0,252,102,102
.BYTE 124,108,108,230 ;R
.BYTE 0,126,198,192
.BYTE 124,0,198,252 ;S
.BYTE 0,126,90,24

```

```

.BYTE 24,24,24,60 ;T
.BYTE 0,231,102,102
.BYTE 182,182,182,60 ;U
.BYTE 10,43,175,170
.BYTE 175,40,10,3 ;TITLE CHAR
.BYTE 0,99,99,99
.BYTE 107,127,119,99 ;W
.BYTE 0,102,0,0
.BYTE 192,0,0,192 ;TITLE CHAR
.BYTE 0,231,102,60
.BYTE 24,24,24,60 ;Y
.BYTE 0,254,204,24
.BYTE 48,96,198,234 ;Z
.BYTE 128,176,178,186,178
.BYTE 174,190,48 ;TITLE CHAR
.BYTE 0,2,10,235,175
.BYTE 190,250,195 ;TITLE CHAR
.BYTE 160,190,250,235,170
.BYTE 191,240,192 ;TITLE CHAR
.BYTE 136,186,186,187,186
.BYTE 187,187,51 ;TITLE CHAR
.BYTE 0,0,128,160,180
.BYTE 160,40,15 ;TITLE CHAR
STLCHR .BYTE 3,3,3,21,49
STRCHR .BYTE 1,1,10 ;PLAYERS/ZOMBIES
.BYTE 192,192,5,92
.BYTE 44,84,11,40
.BYTE 60,60,48,20,20,32,16,40
.BYTE 3,3,3,21,17,17,1,10
.BYTE 192,192,12,84
.BYTE 64,64,16,40
.BYTE 192,16,40,0
.BYTE 0,0,3,3,3,21,17,4
.BYTE 0,0,192,192
.BYTE 192,84,76,64
.BYTE 60,0,0,0,0,0,0,0
.BYTE 60,160,0,0,0,0,0,0
.BYTE 0,0,0,3,3,21,0,0
.BYTE 0,0,0,0,192,192,192,84
.BYTE 17,17,1,10,0,0,0,0
.BYTE 76,16,40,0,0,0,0,0
.BYTE 0,0,0,0,0,0,3,3
.BYTE 0,0,0,0,0,0,192,192
.BYTE 3,1,17,4,0,0,0,0
.BYTE 192,84,76,64,64,160,0,0
.BYTE 13,80,33,1,1,4,40
.BYTE 192,192,192,84
.BYTE 76,64,64,160
.BYTE 60,60,12,20,20,28,4,40

```

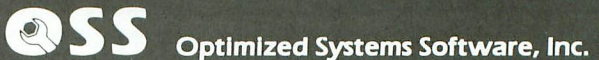
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```

LDA #031      ISET # PLAYERS TO
STA PLAYERS  I AND WAIT FOR
BNE WTCNSL   ICONSOL RELEASED
CKZMBIE      CLC          IIF ZOMBIES PLUS
ADC ZOMBIES  IPLAYERS>5, WAIT
CMP #0A5    ICONSOL RELEASE
BCC WTCNSL  IELSE DEC # OF
DEC ZOMBIES IZOMBIES
WTCNSL      JBR STIMER   I
BELOOP      I8OTO TOP OF LOOP

I STIMER
LDA #5       ISET TIMER 5
LDX # <40   I2/3 SEC DELAY
LDA SETVSV  I
STI #1      ISET FLAG FOR
STA CDMFS   ITIMER #5
RTS

I GAME START SETUP
I START
JBR STIMER  ISET PLYRS
LDA PLAYERS ISET PLYRS
AND #00F
STA PLYRS
LDA ZOMBIES
AND #00F
STA ZMBYS IAND ZMBYS
CLC
ADC PLYRS
CHR #1      IIF TOTAL=1,
BNE SETACT IAND UP TOTAL
LDA ZMBYS  ISET ZOMBIES TO 1
STA #2
STA ACTIVE ISET # OF ACTIVE
DEC ACTIVE IPARTICIPANTS

I
LDX #0      IERASE WALKERS
JBR ERASHAN
INX
JBR ERASHAN

I SETUP GAME SCREEN
LDA # <[HAZEDAT-084]
STA POINTER
LDA # >[HAZEDAT-084] I SOURCE

```

```

STA POINTER+1
LDA # <[08AMESCR-084]
STA SCRPTA
LDA # >[08AMESCR-084] I DEST
STA SCRPTA+1
LDX #1
LDY #004
LDA (POINTER), Y ISET A BYTE
STA (SCRPTA), Y ISAVE IT ONCE
INX IADD 1 TO DEST
BNE STSCRLP
INC SCRPTA+1
BNE STSCP2
STA (SCRPTA), Y ISAVE TWICE +
INX I COPY THE NXT ONE
BNE STSCRLP
INC POINTER+1
INC SCRPTA+1
DEX
BPL STSCRLP

I ERASE SCREEN BOTTOM
LDA # <[0BTSCRN
STA SCRPTA
LDA # >[0BTSCRN
STA SCRPTA+1
LDY #7
LDA (SCRPTA), Y
DEX
BPL ERASBOT

I SET SCREEN BOTTOM
LDA #0 ISET COLOR COUNT
STA COUNT
LDA # <[0BTSCRN+4] I INIT SCRNM
STA SCRPTA
LDA # >[0BTSCRN+4] I PNTR
STA SCRPTA+1
LDY #0 ISET # OF PLAYERS
LDX #1 IIF # (DEMO), SKIP
STA HOLDIT ISAVE IT
LDA # <[PLRTXT ISET PTR TO
STA POINTER I "WIZARD" TEXT
LDY # >[PLRTXT
LDA (POINTER+1)
STA (PTR) IAND SET 'EH

```

```

STZMTXT     LDA ZMBYS   GET # OF ZOMBIES
            BEG PUTHIN  IIF #, SKIP
            STA HOLDIT IELSE, SAVE IT
            LDA # <ZOMTXT ISET PTR TO
            STA POINTER I "ZOMBIE" TEXT
            LDA # >ZOMTXT
            STA POINTER+1
            JSR SETBOTH IAND SET 'EH

I INITIALIZE ACTIVE PARTICIPANTS
I PUTMIN
SETALLP     LDX ACTIVE  ISET ALL ACTIVE
            LDA #0      ITYPE = PLAYER
            STA TYPE, X
            STA SCRPNB, X I# SCORE TO ADD
            STA ACTFLAS, X IACTION TO NONE
            LDA #3      IMOVE RATE =3
            STA MOVRATE, X I(PLR DEFAULT)
            LDA #5      INEXT HIT SCORE=5
            STA NXTSCR, X
            JSR FNDSPOT ISET 'IM ON SCRNM
            CPX PLYRS   IIF THIS IS A
            BCC STNXPLR IPLAYER SKIP
            LDA #01B    ISET MOVE RATE
            SBC ZOMSPD  IBY ZOMBIE SPEED
            STA MOVRATE, X
            LDA #1      ITYPE = ZOMBIE
            STA TYPE, X
STNXPLR     DEX
            BPL SETALLP
I
            LDA PLYRS   IPLAYERS=#? THIS
            BNE PUTINVB IIS A DEMO, SET
            LDA #3      IPLYRS=3 TO FOOT
            STA PLYRS   IZOMBIES

I PUTINVB
JSR STGAMVB IINSTALL GAME VBI
LDA # <GAME IPUT UP GAME SCRNM
STA DLIST
LDA # >GAME
STA DLIST+1
LDA #07
STA NMEN IENABLE DLI

I MAIN PROGRAM LOOP
I STRTCN
LDA CDMFS   ICHECK CONSOL
BNE CHKSCR  IAFTR 2/3 SEC
LDA CONSOL  IIF CONSOL KEY
CMP #007   INOT PRESSED
BEQ CHKSCR  IKEEP PLAYING
JSR VBIOFF  ITURN OFF VBI
LDA CONSOL  IWAIT FOR CONSOL
BNE EXITLP  IKEY AND STRIB #
            LDA STRIB#
            BEQ EXITLP
            JMP RESTART IAND 8OTO TITLES

I
LDX ACTIVE  ISET # TO DO
LDA SCRPNB, X ISET # TO ADD
BEQ DONXSCR IIF #, DO NEXT
LDY SCRINDX, X ISET, BASE INDEX
CLC ITO SCORE AND ADD
ADC SCORE, Y ITO SCORE
STA SCORE, Y
LDA #0     ICLR SCORE TO ADD
LDA #1     IDIBIT # FOR END
STA DIGITNO IGAME DETECTION
LDA SCORE, Y IDONE?
BEQ DONXSCR IYES, DO NEXT
CMP #0DA  ITHIS DIGIT >10?
SBC SCUNDX INC 80 TO RIGHT
SBC #1     IYES, SUBTRACT 10
STA SCORE, Y IFROM THIS DIGIT
DEY IPOINT TO NEXT
DEC DIGITNO
BHI GAMEDVR IOVER 100! END IT
LDA SCORE, Y IGET NEW DIGIT
BNE SCDBTNZ IIF BLANK
LDA #0     ISET TO ZERO
CLC IADD 1 TO IT
ADC #1
STA SCORE, Y ISAVE IT
BNE ADDSCR IAND LOOP
INX IGO RIGHT 1 DIGIT
SCDBTNZ
BNE ADDSCR
INC DIGITNO
BNE ADDSCR ICHECK NEXT ONE
DEX ITRY ADD TO
BPL UDBSCRB INEXT SCORE

I CHECK FOR AND PAUSE GAME
I
LDA KEYIN  ICHECK KBD
CMP #255  IANY PRESSED?
BNE PAUSE IGO TO TOP OF
JMP STRTCN IMAIN LOOP
PAUSE     JSR VBIOFF ITURN OFF VBI
            LDA #255  I
            STA KEYIN

```

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```

LDA #0      ;TURN OFF SOUND
STA AUDC1
STA AUDC2
STA AUDC3
STA AUDC4
HLDPTRN LDA KEYIN ;AND WAIT FOR
          CMP #255 ;A KEY TO BE
          BEQ HLDPTRN ;PRESSED
          JSR STGAMVB ;RE-SET GAME VBI
          LDA #255 ;CLEAR KBD INPUT
          STA KEYIN
          JMP STRTCN ;GOTO TOP OF LOOP
;
;GAME END HANDLING ROUTINES
;-----
;
;GAMEDVR STX SAVEIT
          JSR VBI0FF ;TURN OFF VBI
          LDA #0 ;AND ALL SOUND
          STA AUDC1
          STA AUDC2
          STA AUDC3
          STA AUDC4
;
;SET WINNER MESSAGE
;
LDX SAVEIT
LDY #3 ;INDEX - TEXT SET
LDA SCRINDX,X ;SET POINTER TO
          CLC ;WINNER'S SCORE
          ADC # <SCORE-1
          STA SCRPT
          LDA # >SCORE-1
          STA SCRPT+1
          BCC STENDTX
          INC SCRPT+1
STENDTX LDA ENDTXT,Y ;AND SET IT
          STA (SCRPT),Y ;TO "WINS"
          DEY
          BPL STENDTX
;
;EVAPORATE ALL LOSERS
;
LDA #0 ;CLEAR
STA ACTFLAG,X ;WINNER ACTION
STX SAVEIT ;SAVE WINNER #
LDX ACTIVE ;GET # TO DO
CPX SAVEIT ;IF =WINNER,
          BEQ STNXTEV ;DO NEXT ONE
          JSR ERASHAN ;ELSE ERASE 'IM
          LDA #2 ;ACTION=EVAPORATE
          STA ACTFLAG,X
          LDA #9 ;MOVEST FOR EVAP
          STA MOVEST,X
          BPL STALLEV
          DEY
          BPL STALLEV
;
DOALLEV LDA RTCLK
DOAL2 CMP RTCLK
          BEQ DOAL2
          LDA #0 ;INIT END COUNT=#
          STA COUNT
          LDX ACTIVE ;LOOP FOR ALL
          LDA COUNT ;ADD THIS ACTFLAG
          CLC ;TO COUNT
          ADC ACTFLAG,X ;(FOR END CHK)
          STA COUNT
          JSR EVAPRTE ;AND DO EVAP
          DEY
          BPL EVAPEM ;DO NEXT
          LDA COUNT ;IF COUNT=ACTIVE,
          CMP ACTIVE ;WE'RE DONE,
          BNE DOALLEV ;OTHERWISE LOOP
;
;SET WINNER AS ALL PH
;
LDX SAVEIT ;SET WINNER #
JSR ERASHAN ;ERASE 'IM + SET
LDA PCOLR0,X ;1ST PH COLOR
LDA PCOLR0 ;TO WINNING COLOR
LDA #PFCOL0 ;AND OTHERS TO
          STA PCOLR1 ;NORMAL PF COLORS
          LDA #PFCOL1
          STA PCOLR2
          LDA #PFCOL3
          STA PCOLR3
          LDA # <WINPLYR ;SET POINTER
          STA POINTER ;TO ALL PH IMAGES
          LDA # >WINPLYR
          STA POINTER+1
          LDA LDCY,X ;SET SCRPT
          ASL A ;TO LOC
          ASL A
          CLC
          ADC #20
          STA SCRPT
          LDA # >PL0
          STA SCRPT+1
          LDA #3 ;COUNT THRU
          STA COUNT ;ALL 3 PLYRS
          LDY #7 ;SET ONE COLOR
          SETWINR LDA (POINTER),Y
          SETPRTS

```

```

STA (SCRPT),Y
DEY
BPL SETPRTS
LDA LOCK,X ;SET HORIZ LOC
ASL A ;TO XLOC*8+48
ASL A
ASL A
CLC
          ADC #48
          LDY COUNT
          STA HPOSP,Y
          LDA POINTER ;POINT TO NEXT
          CLC ;COLOR'S IMAGES
          ADC #8
          STA POINTER
          BCC UDMNSCP
          INC POINTER+1
          INC SCRPT+1 ;POINT TO NEXT
          DEC COUNT ;PLAYER
          BPL SETWINR ;AND DO IT
;
;FADE ALL COLORS TO BLACK
          LDA #16 ;SET COLOR LUM
          STA COUNT ;LEVELS TO 16
          LDX #3 ;FADE COLOR=#..3
          LDA COLOR,X ;SET THE COLOR
          AND #0F ;IF LUM <0, CUT
          BNE CUTCOLR,X ;IT DOWN
          STA COLOR,X ;SET TO BLACK
          BEQ FADNXCL
          DEC COLOR,X
          LDY RTCLK ;WAIT FOR A BIT
          INY
          INY
          CPY RTCLK
          BNE FADN2
          DEX
          BPL FADACOL ;FADE NEXT COLOR
          DEC COUNT
          BPL FADEALL ;AND DO NEXT LUM
;
;WAIT A BIT TO SHOW OFF SCORES
;
LDA #7
STA HOLDIT
LDX #0FF
LDY #0FF
LDA CONSOL ;END DELAY EARLY
CMP #7 ;IF A CONSOL KEY
          BNE ENDOBK ;HAS BEEN PRESSED
          BNE WAIT2
          DEX
          BNE WAIT1
          DEC HOLDIT
          BPL WAIT0
          JMP RESTART ;GOTO TITLES
;
;MAIN PROGRAM SUBROUTINES
;-----
;
;SET SCREEN BOTTOM LINES (1 TYPE ONLY)
SETBOTH LDA #0 ;SET TYPE'S LINE
          STA CURLINE ;COUNT TO #
          INC CURLINE ;ADD 1 TO LINE
          LDX #6 ;GET LENGTH INDEX
          LDY COUNT ;GET COLOR INDEX
          SETALIN LDA (POINTER),Y ;SET TYPE
          STA (SCRPT),Y ;TEXT LINE
          INY
          DEX
          BNE SETALIN ;SET TYPE NUMBER
          LDA CURLINE
          ORA #0D
          STA (SCRPT),Y
          INY
          INY
          INY
          LDA #0D
          STA (SCRPT),Y
          LDA COUNT ;ADD 6
          CLC ;TO COLOR INDEX
          ADC #6
          STA COUNT ;POINT TO NEXT
          CLC ;LINE
          ADC #14
          STA SCRPT
          BCC CHKDONL
          INC SCRPT+1
          LDA CURLINE ;IF WE'VE GOT
          CMP HOLDIT ;MORE LINES TO
          BNE SETLNLP ;DO? DO 'EM
          RTS ;RETURN
;
;INSTALL GAME VBI
;
STGAMVB LDY # <VBI
          LDX >VBI
          BNE VBI1

```

```

;TURN OFF VBI
;
VBI0FF LDY # <XITVBV
          LDX # >XITVBV
          LDA #7
          JMP SETVBV
;
;*****
; ** VERTICAL BLANK ROUTINE **
;*****
; (All of the game but scoring)
;
;MOVE OUTER WALL
;-----
;
;VBI LDA RTCLK ;TIME TO MOVE?
          AND #07
          BNE MOVBUYS ;NO MOVE PLAYERS
          LDX OUTWALL ;SAVE FIRST BYTE
          LDY #1 ;OF WALL AND LOOP
          LDA OUTWALL,Y ;CHANGING REST
          ASL A ;GET BYTE + SHIFT
          ROL A ;IT LEFT 1 PIXEL
          STA HOLDIT
          AND #01
          ADC HOLDIT
          DEY ;AND MOVE IT UP
          STA OUTWALL,Y ;1 LINE
          INY
          INY
          CPY #8
          BNE MOVWALL ;LOOP FOR NEXT
          TXA ;GET BACK FIRST
          ASL A ;SHIFT OVER FIRST
          ROL A
          STA HOLDIT
          AND #01
          ADC HOLDIT
          STA OUTWALL+7 ;SAVE AT END
;
;MOVE PLAYERS/ZOMBIES
;-----
; (Includes shot initialization)
;
MOVBUYS LDX ACTIVE ;INIT LOOP COUNT
CKMVLPL LDA ACTFLAG,X ;IF HE IS
          AND #03 ;EVAPORATING OR
          BEQ CKHTIME ;COALESCING SKIP
          JMP CHKSHOT ;MOVE + DO SHOTS
;
;CHECK TIME TO MOVE
;
CKHTIME DEC MOVCLK,X ;TIME TO MOVE?
          BEQ SETIME ;YES, RESET TIME
          LDA ACTFLAG,X ;IF NO SOUND
          BNE CKTIMND ;MAKING THING IS
          TXA ;GOING ON, TURN
          ASL A ;OFF THE SOUND
          TAY ;(THIS FOR BETTER
          LDA #0 ;SOUNDING WALK)
          STA AUDC1,Y
          JMP CHKSHOT ;AND DO SHOTS
;
;RESET MOVE TIMER AND PARSE
;TO MOVE ROUTINES
;
SETIME LDA MOVRATE,X ;RESET MOVE
          STA MOVCLK,X ;TIMER
          LDA MOVEST,X ;NOT MOVING? TRY
          BEQ STRTMOV ;MOVING SOMETHING
          JSR MOVEIM ;ELSE, UPDATE
          JMP CHKSHOT ;AND DO SHOTS
;
STRTMOV LDA TYPE,X ;IF ZOMBIE THEN
          BEQ PLRMOV ;JUMP TO THEIR
          JMP ZHMOVE ;MOVE ROUTINES
;
;READ STICK AND SET DIRECTION IF
;IT HAS BEEN MOVED. ALSO, DO ZIBZAB
;
PLRMOV LDA STICK0,X ;READ THE STICK
          OR #0F ;IF IT IS MOVED,
          BNE TRYDIR ;DO IT
          JMP CHKSHOT ;ELSE, DO SHOTS
;
TRYDIR TAY ;CONVERTED DIR
          LDA CONVERT,Y
          AND #A ;IS IT DIAGONAL?
          BNE SETDIR ;NO, SET IT
          STY HOLDIT ;SAVE IT
          TYA ;GET LAST DIR
          LDY DIR,X ;FOR ZIBZAB MASK
          AND XYMASK,Y ;TRY IT ON NEW
          TAY ;CONVERT TO NORM
          LDA CONVERT,Y
          STA DIR,X ;SAVE IT + CHECK
          JSR BETAHEDM ;IF THERE'S ROOM
          BEQ CHKTRIG ;YES, LOOK TRIG
          LDA HOLDIT ;USE OTHER DIR
          LDY DIR,X
          AND XYMASK,Y
          TAY

```



```

SETDIR LDA CONVERT,Y ;CONVERT IT
STA DIR,X ;AND SET IT
;READ TRIGGER AND PARSE TO INIT
;SHOT OR MOVE ROUTINES
CHKTRIS LDA #0 ;CLR ATTRACT SINCE
STA ATTRACT ;STICK WAS MOVED
LDA STRIG# ,X ;TRIG PRESSED?
BEQ INITSHOT ;YES, START SHOT
JSR BETAHEDM ;LOOK FOR ROOM
BEQ INITHOVE ;FOUND, DO MOVE
JSR SETSTIL ;NONE POINT IM
JMP CHKSHOT ;AND DO SHOTS
;BEGIN A MOVE CYCLE
INITHOVE JSR INITHVE ;DO LOC ADDS AND
LDY NXTSCR,X ;START OFF.
INY ;ADD 1 TO NEXT
CPY #23 ;NEXT KILL VALUE
BCC STNXSC
LDY #22
STNXSC TYA
STA NXTSCR,X
JMP CHKSHOT ;DO SHOTS
;FIRE OFF A SHOT IF WE CAN
INITSHOT LDA ACTFLAG,X ;ARE WE BEING
AND #9F ;PREVENTED FROM
BNE CHKSHOT ;FIRING? YES
JSR SETSTIL ;SET PLYRS DIR
LDY NXTSCR,X ;SUBTRACT 2 FROM
DEY ;NEXT KILL VALUE
DEY
CPY #5
BCS STNSCDM
LDY #5
STNSCDM TYA
STA NXTSCR,X
LDA DIR,X ;SET SHOT DIR
STA SHOTDIR,X
JSR BETAHEDM ;ANYTHING THERE?
BNE FSKILL ;YES, KILL IT
LDA SCRPT# ,X ;SET SHOT'S
STA SHOTLO,X ;LOCATION
LDA SCRPT# +1
STA SHOTHI,X
LDA ACTFLAG,X ;SET ACTION
ORA #80 ;SHOOT FLAG ON
STA ACTFLAG,X
LDA #0 ;INIT SHOT
STA SHOTMST,X ;MOVE STATUS
LDA #0 ;BEGIN SOUND
STA SOUND,X
LDY SHOTDIR,X ;SET SHOT
LDA SHOTOF# ,Y ;ON SCREEN
CLC
ADC # <SHOTSH
STA POINTER
LDA # >SHOTSH
JSR SHRTSET ;EXIT TO SPECIAL
JMP COLESC ;EFFECTS ROUTINES
;SHOT IMMEDIATE HIT
FSKILL CMP #86 ;DID IT HIT
BCS FSKNRM ;ANOTHER SHOT?
LDA SCRPT# ,X ;START OFF
STA SHOTLO,X ;A BACKLASH AND
LDA SCRPT# +1 ;JUMP TO SPFX
STA SHOTHI,X ;ROUTINES
JSR STBKLSH
JMP COLESC
FSKNRM LDA LOCLD,X ;NO, SET SHOT LOC
STA SHOTLO,X ;AND JUMP TO HIT
STA SCRPT# ,X ;CHECK ROUTINES
LDA LOCHI,X
STA SHOTHI,X
STA SCRPT# +1
JMP CHKWALL
;MOVE SHOTS
;-----
CHKSHOT LDA ACTFLAG,X ;IS THERE ONE
BHI CHKHITS ;OUT THERE?
JMP COLESC ;NO, DO SPFX
CHKHITS LDA SHOTMST,X ;IF MOVE STAT=#
BNE MOVSHOT ;THEN LOOK AHEAD
JSR BETAHEDM ;ANYTHING THERE?
BNE SHOTHIT ;BOTH SHOT HITS
DEC SHOTMST,X ;UPDATE SHOT
STA SHOTMST,X ;MOVE STATUS
AND #01
STA SHOTMST,X ;<>#?
BEQ SETSHOT ;YES, WE CROSSED
LDY SHOTDIR,X ;A LOCATION, SO
LDA SHOTLO,X ;UPDATE IT.
CLC
ADC PRVADLO,Y
STA SHOTLO,X

```

```

LDA SHOTHI,X
ADC PRVADHI,Y
STA SHOTHI,X
SETSHOT LDA SHOTLO,X ;SET POINTERS
STA SCRPT# ,X ;TO SHOT ON SCRN
LDA SHOTHI,X ;AND SHOT IMAGES
STA SCRPT# +1
LDA SHOTMST,X
ASL A
ASL A
ADC SHOTDIR,X
ASL A
ASL A
ADC # <SHOTSH
STA POINTER
LDA # >SHOTSH
ADC #0
STA POINTER+1
LDA SHOTDIR,X ;SET THE NEW
JSR SETMOVE ;IMAGE
LDA SHOTMST,X ;IF SHOT MOVE
BNE SHOTSND ;STATUS=#, THEN
LDY SHOTDIR,X ;UPDATE LOC
LDA SHOTLO,X ;(PART 2)
CLC
ADC AFTRADD,Y
STA SHOTLO,X
BCC SHOTSND
INC SHOTHI,X
INC SOUND,X ;UPDATE SOUND
TXA
ASL A
TAY
LDA SOUND,X
STA AUDF1,Y
LDA #0C
STA AUDC1,Y
JMP COLESC ;EXIT TO SPFX
;SHOT HIT CHECKS/HANDLING
;-----
SHOTHIT LDA ACTFLAG,X ;CLEAR SHOOTING
AND #7F ;FLAG.
STA ACTFLAG,X
JSR ERASHOT ;ERASE SHOT
;CHECK HIT ON WALL
CHKWALL LDY SHOTDIR,X ;SET CHR WE
JSR BETAHEDM ;RAN INTO
CMP #FD ;IF NOT WALL,
BCC CHKMSHT ;TRY SHOT
LDY #00 ;CHANGE WALL'S
LDA (SCRPT#),Y ;BRICK COLOR
AND #7F
STA (SCRPT#),Y
INY
LDA (SCRPT#),Y
AND #7F
STA (SCRPT#),Y
LDA ORA #26 ;SET
STA ACTFLAG,X ;EXPLODE FLAG
LDA #36
STA SOUND,X ;INIT FOR SOUND
LDA SCRPT# ,X ;SAVE WALL'S LOC
STA SHOTLO,X ;FOR EXPLOSION
LDA SCRPT# +1
STA SHOTHI,X
JMP COLESC ;EXIT TO SPFX
;CHECK HIT ON ANOTHER SHOT
CHKMSHT CMP #86 ;DID IT HIT SHOT?
BCC STSHBK ;NO CHECK
BCS CHKMAN ;AGAINST A MAN
JSR STBKLSH ;SET FOR BACKLASH
STX HOLDIT ;SAVE LOOP CNTR
LDX ACTIVE ;FIND WHO WE HIT
LDA ACTFLAG,X ;IF NO SHOT
BPL CHKMSHT ;FIRE! TRY NEXT
LDA SHOTLO,X ;SEE IF THEY
STA POINTER ;ARE IN THE SAME
LDA SHOTHI,X ;POSITION
STA POINTER+1 ;(TRY UP/LEFT)
LDA SHOTMST,X
BEQ CKSHT2
JSR SCPCMP
BEQ FNDSHOT ;SAME! KILL IT
LDY SHOTDIR,X ;(TRY DN/RT)
JSR SETPTR
JSR SCPCMP
BNE CKMSHT ;TRY NEXT
JSR ERASHOT ;SAME, ERASE IT
JSR STBKLSH ;SET FOR BACKLASH
DZX
BPL CKMSHLP ;TRY NEXT ONE
LDX HOLDIT ;RESTORE CNTR
JMP COLESC ;EXIT TO SPFX
;CHECK SHOT HIT PLAYER/ZOMBIE

```

```

CHKMAN CMP #0C ;IF CHR HIT IS IT
BCC COLESC ;IN RANGE, CHECK
CMP #E0 ;FOR A HIT
BCS COLESC ;(SUBR BELOW)
;SPECIAL EFFECTS
;-----
;PLAYER/ZOMBIE RE-INTEGRATION
COLESC LDA RTCLOK ;TIME TO DO IT
AND #01 ;YET? NO, THEN DO
BEQ CHKCOLS ;NEXT PLAYER/
JMP DONXTM ;ZOMBIE
CHKCOLS LDA ACTFLAG,X ;IF HE ISN'T
AND #01 ;COALESCING, TRY
BNE SETFUZZ ;FOR EVAPORATION
JMP TRYEVAP
SETFUZZ ASL A ;SET PNTRS TO
ASL A ;EACH OF THE
ASL A ;COALESCING CHARS
ASL A
ADC # <PLCHR
STA POINTER
ADC #32
STA POINTER#
LDA # >PLCHR
STA POINTER+1
LDA MOVCLK,X ;SET FUZZ TOP
STA HOLDIT ;AND SET A CNTR
LDY #0
DOFUZZ DEY ;FUZZ UP TO IT
LDA RANDOM ;MASKED INTO THE
AND MASKL,Y ;CORRECT SHAPE
STA (POINTER),Y
LDA RANDOM,
AND MASKR,Y
STA (POINTER#),Y
CPY HOLDIT
BNE DOFUZZ
LDA MOVEST,X ;NOT YET TIME
AND #08 ;FOR THE NORMAL
BNE UDCPTRS ;PART, SKIP TO
; UPDATE COUNTERS
LDA MOVEST,X ;SET NORM TOP
STA HOLDIT ;AND SET A CNTR
LDY #0
SETNORM DEY ;SET THE NORMAL
LDA STLCR,Y ;IMAGE TO THAT
STA (POINTER),Y ;POINT IN
LDA STRCHR,Y ;CHAR
STA (POINTER#),Y
CPY HOLDIT
BNE SETNORM
LDA LOCY,X
ASL A
ASL A
ASL A
ADC #20
STA SCRPT#
TXA
CLC
ADC # >PL#
STA SCRPT# +1
LDY #0
SETCOAT DEY ;AND IN
LDA SUITS,Y ;PH OVERCOAT
STA (SCRPT#),Y
CPY HOLDIT
BNE SETCOAT
LDA MOVCLK,X ;IF PART 1
BEQ CLSCND ;COUNTER<>#, SUB
DEC MOVCLK,X ;1 FROM IT
TXA ;SET SOUND. (IN
ASL A ;TWO ALTERNATING,
TAY ;INDEPENDENT
LDA MOVEST,X ;RANGES OF
AND #01 ;FREQUENCY...
BEQ CLSTYP2
LDA MOVEST,X
ASL A
ASL A
ASL A
ORA #80
BNE CLSVOLM
CLSTYP2 LDA MOVEST,X
ASL A
ADC #6
CLSVOLM STA AUDF1,Y ;...AND TONE)
LDA MOVEST,X
BPL CLS#1
SEC
ROR A
EOR #27
ADC #1
STA AUDC1,Y
DEC MOVEST,X ;COUNTDOWN CNTR2
BNE BCKLASH ;<>#? EXIT.
JSR SETSTIL ;COLS OVER, SET
TXA ;NORMAL AND

```

```

ASL A      ;TURN OFF SOUND
TAY
LDA #0
STA AUDC1,Y
LDA ACTFLAG,X ;CLR COALESCE
AND #FE ;FLAG
STA ACTFLAG,X
LDA MOVRAATE,X ;RESET
STA MOVCLK,X ;MOVE TIMER
BNE BCKLASH ;GOTO SPFX PART 2

;ZOMBIE/PLAYER EVAPORATION
TRYEVAP JSR EVAPRTE
;SHOT BACKLASH + WALL EXPLOSION PART 2
BCKLASH LDA ACTFLAG,X ;IF IT ISN'T
AND #10 ;BACKLASHING,
BNE DOBKLSH ;EXIT TO CHK FOR
JMP WLXPLOD ;WALL EXPLODING
LDA SHOTMST,X ;IF BCKLASH
BPL SKLSND ;OVER, ERASE IT
JMP ERBKLSH ;AND LEAVE
BKLNSD TXA ;SET BACKLASH
ASL A ;SOUND
TAY
LDA SHOTMST,X
EOR #03
ASL A
ASL A
ASL A
ASL A
ADC #16
STA AUDF1,Y
LDA SHOTMST,X

;
ASL A
ASL A
ADC #2
STA AUDC1,Y
LDA #3 ;INIT DIRECT
STA DIREC ;LOOP CNTR
LDA SHOTDIR,X ;AND DIR FLABS
STA DIRSHFT
LSR DIRSHFT ;BACKLASH IN THIS
BCC STBKSLP ;DIR? NO.
JSR ADLOFS ;ADD DIR OFFSET +
JSR BETHRE ;LOOK FOR <EMPTY
BEQ STNRBLL ;IF EMPTY, SET IT
CMP #9B ;ELSE, AS LONG AS
BCC NRBLHT ;IT IS A BCKLASH
CMP #9E ;CHR, SET IT.
BCC STNRBLL
NRBLHT LDY DIREC ;OTHERWISE, CLR
LDA DIRBIT,Y ;THIS DIR BIT
EOR #0F
AND SHOTDIR,X
STA SHOTDIR,X
JSR MNHTCHK ;CHECK FOR HIT
LDY DIREC ;A GUY. ERASE THE
LDA SCRPTX ;BACKLASH IMAGE
SEC
SBC DIRADLO,Y
STA SCRPTX
LDA SCRPTX+1
SBC DIRADHI,Y
STA SCRPTX+1
LDA #0
LDY #1
ERBLHT STA (SCRPTX),Y
DEY
BPL ERBLHT
BNE STBKSLP ;AND DO NEXT DIR
LDA SHOTMST,X ;SET THE
AND #01 ;BACKLASH CHARS
ASL A
ASL A
ORA DIREC
ASL A
ADC #<EXPLSH
STA POINTER
LDA #>EXPLSH
ADC #0
STA POINTER+1
LDY #1
STBKLP LDA (POINTER),Y
STA (SCRPTX),Y
DEY
BPL STBKLP
DEC DIREC ;DO NEXT DIR
BPL STBKSLP
ERBKLSH INC SHOTMST,X
LDA SHOTMST,X ;TIME TO ERASE?
AND #03
BNE UDBKLSB ;NO. UPDATE STAT
LDA #3 ;SET LOOP COUNTER
STA DIREC
LDA SHOTDIR,X ;AND DIR FLABS
STA DIRSHFT
LSR DIRSHFT ;GOING THIS WAY?
BCC ERBKSLP ;NO. DO NEXT
JSR ADLOFS ;YES, ADD OFFSET
LDA #0 ;AND ERASE IT
TAY
STA (SCRPTX),Y
INY
ERBKSLP STA (SCRPTX),Y
DEC DIREC ;DO NEXT DIR
BPL ERBKSLP
UDBKLSB DEC SHOTMST,X ;UPDATE STATUS
DEC SHOTMST,X
LDA SHOTMST,X
CMP #-2 ;IF AT END, OR
BEQ NRBLND
LDA SHOTDIR,X ;NO DIRS LEFT
BNE BKLEXIT
NRBLND TXA ;TURN OFF SOUND,
ASL A
TAY
LDA #000
STA AUDC1,Y
LDA ACTFLAG,X ;AND CLR ACTION
AND #0F ;BACKLASH FLAG
STA ACTFLAG,X
BKLEXIT JMP DONXTMN ;EITHER WAY, EXIT
;WALL EXPLOSION PART 1. BUILD UP
WLXPLOD LDA ACTFLAG,X ;IF WALL IS NOT
AND #20 ;EXPLODING, DO
BEQ DONXTMN ;NEXT PLAYER/
TXA ;ZOMBIE GET
ASL A ;SOUND INDEX
TAY
INC SOUND,X
LDA SOUND,X
STA COLOR2 ;AND UPDATE COLOR
AND #0F
BEQ STFBLEX ;IF NOT AT END,
ASL A ;SET SOUND
ASL A
EOR #3C
ADC #20
STA AUDF1,Y
LDA SOUND,X
AND #0F
LSR A
CLC
ADC #20
STA AUDC1,Y
BNE DONXTMN ;AND EXIT
STFBLEX LDA #0 ;TURN OFF SOUND
STA AUDC1,Y
TAY
LDA SHOTLD,X ;ERASE THE WALL
STA SCRPTX
LDA SHOTHI,X
STA SCRPTX+1
TXA
STA (SCRPTX),Y
INY
STA (SCRPTX),Y
JSR STBKLSH ;INIT BACKLASH
LDA SHOTDIR,X ;{ALL DIRS BUT
EOR #0F ;FROM SHOT}
STA SHOTDIR,X
;DO NEXT PLAYER/ZOMBIE
DONXTMN DEX
BNI EXIT
JMP CKMVLV
EXIT JMP XITVVB
;ZOMBIE MOVEMENT HANDLING
;-----
ZOMOVE STX HOLDIT ;SAVE IDENTITY
;SHOOT AT ANYONE IN A STRAIGHT LINE
;AWAY FROM THE ZOMBIE
LDY PLYRS
LDA LOCY,X
DEY
BNI ZSHDOY ;IS THERE ANYBODY
;IN A STRAIGHT
CPY HOLDIT ;LINE FROM THE
BEQ ZCKYSHL ;ZOMBIE IS THE X
CMP LOCY,Y ;DIRECTION?
BNE ZCKYSHL
LDA LOCK,X ;SHOOT AT HIM
CMP LOCX,Y
LDA #0
BCC ZMSHOOT
LDA #2
BNE ZMSHOOT
ZSHDOY LDY PLYRS ;OTHERWISE, WE'LL
LDA LOCK,X ;TRY UP AND DOWN.
DEY
BNI ZMTRYMV ;IS THERE ANYBODY
;IN A STRAIGHT
CPY HOLDIT ;LINE AWAY IN
BEQ ZCKXSHL ;THE Y DIRECTION?
CMP LOCX,Y
BNE ZCKXSHL ;IF NO, THEN TRY
LDA LOCY,X ;MOVING
CMP LOCY,Y
LDA #1
BCC ZMSHOOT
LDA #3
STA DIR,X ;ELSE, SET UP
LDA LOCL0,X ;AND SHOOT
STA SCRPTX
LDA LOCHI,X
STA SCRPTX+1
JMP INITSHOT
;FIND NEAREST PLAYER
ZMTRYMV LDA #255 ;SET DIST TO MAX
STA DIST
LDY PLYRS
ZCKKNXM BMI ZMFDIR
CPY HOLDIT ;IF ON SELF, SKIP
BEQ ZCKKNXM
JSR BETDXDY ;GET DISTANCE
CLC
ADC DX
CMP DIST ;IF <CURRENT, SET
BCC ZCKKNXM ;AS THE NEW LOW
STA DIST
STY NEAREST
BCC ZCKKNXM ;AND DO NEXT
;AND MOVE TO HIM, IF POSSIBLE
;CLEAR AWAY A WALL IF NOT.
ZMFDIR LDY NEAREST ;FIND LONGER DIR
JSR BETDXDY
CMP DX ;IF Y IS LONG
BCC CKYLONG ;DIR, SKIP TO IT.
JSR CHKXDIR ;IS AREA BLANK?
BEQ ZHMOVE ;IF YES, MOVE
LDY NEAREST ;OTHERWISE, CHECK
JSR CHKYDIR ;Y (SHORT)
BEQ ZHMOVE ;IF BLANK, MOVE
LDY NEAREST ;ELSE, SHOOT OUT
JSR CHKXDIR ;THE X-WALL
LDA DIR,X
JMP ZMSHOOT
CKYLONG JSR CHKYDIR ;IF LONG Y IS
BEQ ZHMOVE ;BLANK, THEN MOVE
LDY NEAREST ;ELSE, CHECK X
JSR CHKXDIR
BEQ ZHMOVE ;IF BLANK, MOVE
LDY NEAREST ;ELSE SHOOT OUT
JSR CHKYDIR ;THE Y-WALL
LDA DIR,X
JMP ZMSHOOT
ZHMOVE JMP INITMOVE
;ZOMBIE MOVE SUBROUTINES
;-----
;IS THERE AN OPENING IN THE X DIR
CHKXDIR LDA LOCK,X ;FIRST, SET LEFT
CMP LOCK,Y ;OR RIGHT
LDA #0
BCC STXDIR
LDA #2
STXDIR STA DIR,X
JMP BETAHEDM ;THEN LOOK
;IS THERE AN OPENING IN THE Y DIR
CHKYDIR LDA LOCY,X ;FIRST, SET DIR
CMP LOCY,Y ;UP OR DOWN
LDA #1
BCC STYDIR
LDA #3
STYDIR STA DIR,X
JMP BETAHEDM ;THEN GO LOOK
;SET X & Y DISPLACEMENTS
BETDXDY LDA LOCK,X ;SUBTRACT TARGET
SEC ;X FROM ZOMBIE X
SBC LOCY,Y
SBC SAVEDX ;AND TAKE
EOR #0FF ;ABSOLUTE VALUE
CLC
ADC #1
STA DX
LDA DX
LDA LOCY,X ;SAVE IT IN DX
;THEN, SUBTRACT
SBC LOCY,Y ;TARGET Y FROM
;ZOMBIE Y
BPL DXDYEND ;AND TAKE THE
EOR #0FF ;ABSOLUTE VALUE
CLC
ADC #1
DXDYEND RTS
*****
** SUBROUTINES **
*****

```



## MOVEMENT RELATED

## BEGIN MOVE

```

INITHVE LDY DIR,X ;ADD ON THE
        CLC ;MOVE PRECEDED
        LDA LOCL0,X ;LOCATION CHANGES
        ADC PRVADLO,Y ;TO THE ACTUAL
        STA LOCL0,X ;ADDRESS,
        LDA LOCHI,X
        ADC PRVADH,Y
        STA LOCHI,X
        LDA LOCX,X ;THE X-LOCATION,
        CLC
        ADC PRVXADD,Y
        STA LOCX,X
        LDA LOCY,X ;THE Y-LOCATION
        CLC
        ADC PRVYADD,Y
        STA LOCY,X
        TYA ;INIT MOVE STATUS
        AND #02
        ASL A
        STA MOVST,X

```

## CYCLE PLAYER/ZOMBIE MOVE

```

MOVEIM LDA DIR,X ;UPDATE MOVE STAT
        AND #02 ;UP FOR RT/DN
        BNE MVR0DN ;DOWN FOR LF/UP)
        INC MOVST,X
        BNE SETPLR
MVR0DN DEC MOVST,X
        LDA LOCL0,X ;SET POINTER TO
        STA SCRPTX ;SCREEN IMAGE
        LDA LOCHI,X
        STA SCRPTX+1
        LDA MOVST,X ;AND ANOTHER TO
        AND #03 ;THE SHAPE TABLE
        ASL A
        ADC DIR,X
        ASL A
        ASL A
        ADC # <SHAPES
        STA POINTER
        LDA # >SHAPES
        ADC #
        STA POINTER+1
        LDA DIR,X
        JSR SETMOVE ;SET NEW IMAGE
        JSR SETSUIT ;(CHAR & PM)
        LDA MOVST,X ;KEEP STATUS IN
        AND #03 ;THE 0-3 RANGE
        STA MOVST,X
        BNE MOV0ND ;<>0, DO SOUND
        LDY DIR,X ;THIS MOVE'S OVER
        LDA LOCL0,X ;DO DO THE POST-
        CLC ;MOVE LOC CHANGES
        ADC AFRADD,Y ;FOR ABS MEM
        STA LOCL0,X ;LOCATIONS
        BCC UDTLOC0
        INC LOCHI,X
        LDA LOCX,X ;X-LOCATION
        CLC
        ADC AFTXADD,Y
        STA LOCX,X
        LDA LOCY,X ;Y-LOCATION
        CLC
        ADC AFTYADD,Y
        STA LOCY,X
        LDA ACTFLAG,X ;IF SOME OTHER
        AND #08 ;SOUND IS ON
        BNE MOVXKIT ;RETURN
        TXA ;SET SHUFFLE
        ASL A ;NOISE ON AN
        TAY ;EVEN MOVE STATUS
        LDA MOVST,X
        AND #01
        BEG NOVXKIT
        LDA #04
        STA AUDC1,Y
        LDA #20
        STA AUDF1,Y
        NOVXKIT RTS

```

## PLACEMENT

```

;SET THE CHR IMAGE FOR PLAYER OR SHOT
SETMOVE STA HOLDIT ;SAVE DIRECTION
        LDY #0 ;SET BYTES 1,2
        LDA (POINTER),Y
        STA (SCRPTX),Y
        INY
        LDA (POINTER),Y
        STA (SCRPTX),Y
        LDA HOLDIT ;IF DIR IS UP OR

```

```

        AND #01 ;DOWN THEN ADD TO
        BEQ SETMOV2 ;SCRN PNTR TO 00
        LDA SCRPTX ;DOWN 1 LINE
        CLC
        ADC #24
        STA SCRPTX
        BCC SETMOV2
        INC SCRPTX+1
        SETMOV2 INY ;SET NEXT 2 BYTES
        LDA (POINTER),Y
        STA (SCRPTX),Y
        INY
        LDA (POINTER),Y
        STA (SCRPTX),Y
        RTS

```

## SET STATIONARY PLAYER/ZOMBIE

```

SETSTIL LDA LOCL0,X ;SET POINTER
        STA SCRPTX ;TO SCREEN FOR
        LDA LOCHI,X ;SUBROUTINE
        STA SCRPTX+1
        LDY DIR,X ;SET POINTER TO
        LDA SHGT0FS,Y ;APPROPRIATE
        CLC ;IMAGE IN THE
        ADC # <SHAPES ;SHAPE TABLE
        STA POINTER
        LDA # >SHAPES
        JSR SHRTSET ;AND SET AWAY...

```

## SET PM PORTION OF PLAYER/ZOMBIE

```

SETSUIT LDA MOVST,X ;FIND WHAT SUIT
        AND #03 ;IMAGE TO USE AND
        CLC ;POINT TO IT
        ROR A
        ROR A
        ADC # <SUITS
        ORA DIR,X
        ROR A
        ROR A
        ROR A
        ROR A
        STA POINTER
        LDA # >SUITS
        STA POINTER+1
        LDA LOCY,X ;CALC PM Y START
        ASL A ;BASE=Y*8+32
        ASL A
        ASL A
        CLC
        ADC #32
        STA SCRPTX
        LDA DIR,X ;IF GOING UP/DN,
        AND #01 ;ADD ON MOVE
        BEQ FNDDHI ;STATUS #2
        LDA MOVST,X
        ASL A
        CLC
        ADC SCRPTX
        STA SCRPTX
        FNDDHI TXA
        CLC
        ADC # >PL0
        STA SCRPTX+1
        LDY #08 ;SET THE IMAGE
        LDA (POINTER),Y ;(DATA HAS
        STA (SCRPTX),Y ;0'S IN IT TO
        DEY ;ERASE OLD IMAGE)
        BPL READPIC
        LDA LOCX,X ;SET HORIZ LOC
        ASL A ;BASE=X*8+48
        ASL A
        ASL A
        CLC
        ADC #48
        STA SCRPTX
        LDA DIR,X ;IF GOING LF/RT,
        AND #01 ;ADD ON MOVE
        BNE STHORZ ;STATUS#2
        LDA MOVST,X
        ASL A
        CLC
        ADC SCRPTX
        STA SCRPTX
        STHORZ LDA SCRPTX
        STA HPOS0,X
        RTS

```

## FNDDHI

```

        TXA
        CLC
        ADC # >PL0
        STA SCRPTX+1
        LDY #08 ;SET THE IMAGE
        LDA (POINTER),Y ;(DATA HAS
        STA (SCRPTX),Y ;0'S IN IT TO
        DEY ;ERASE OLD IMAGE)
        BPL READPIC
        LDA LOCX,X ;SET HORIZ LOC
        ASL A ;BASE=X*8+48
        ASL A
        ASL A
        CLC
        ADC #48
        STA SCRPTX
        LDA DIR,X ;IF GOING LF/RT,
        AND #01 ;ADD ON MOVE
        BNE STHORZ ;STATUS#2
        LDA MOVST,X
        ASL A
        CLC
        ADC SCRPTX
        STA SCRPTX
        STHORZ LDA SCRPTX
        STA HPOS0,X
        RTS

```

## READPIC

```

        TXA
        CLC
        ADC # >PL0
        STA SCRPTX+1
        LDY #08 ;SET THE IMAGE
        LDA (POINTER),Y ;(DATA HAS
        STA (SCRPTX),Y ;0'S IN IT TO
        DEY ;ERASE OLD IMAGE)
        BPL READPIC
        LDA LOCX,X ;SET HORIZ LOC
        ASL A ;BASE=X*8+48
        ASL A
        ASL A
        CLC
        ADC #48
        STA SCRPTX
        LDA DIR,X ;IF GOING LF/RT,
        AND #01 ;ADD ON MOVE
        BNE STHORZ ;STATUS#2
        LDA MOVST,X
        ASL A
        CLC
        ADC SCRPTX
        STA SCRPTX
        STHORZ LDA SCRPTX
        STA HPOS0,X
        RTS

```

## STHORZ

```

        TXA
        CLC
        ADC # >PL0
        STA SCRPTX+1
        LDY #08 ;SET THE IMAGE
        LDA (POINTER),Y ;(DATA HAS
        STA (SCRPTX),Y ;0'S IN IT TO
        DEY ;ERASE OLD IMAGE)
        BPL READPIC
        LDA LOCX,X ;SET HORIZ LOC
        ASL A ;BASE=X*8+48
        ASL A
        ASL A
        CLC
        ADC #48
        STA SCRPTX
        LDA DIR,X ;IF GOING LF/RT,
        AND #01 ;ADD ON MOVE
        BNE STHORZ ;STATUS#2
        LDA MOVST,X
        ASL A
        CLC
        ADC SCRPTX
        STA SCRPTX
        STHORZ LDA SCRPTX
        STA HPOS0,X
        RTS

```

## SET SHOT/PLAYER USING PRESET POINTERS

```

SHRTSET ADC #0 ;FINISH SETTING
        STA POINTER+1 ;SOURCE PNTR
        LDY #1
        SETLP LDA (POINTER),Y ;AND SET IT
        STA (SCRPTX),Y
        DEY
        BPL SETLP
        INY
        RTS

```

```

;FIND A RANDOM PLACE TO PUT A
;PLAYER/ZOMBIE ON THE SCREEN AND

```

## SET FOR COALESCE

```

FNDSPOT LDA RANDOM ;SET A RANDOM X
        AND #1F ;MASK UPPER BITS
        CMP #17 ;IF NOT IN RANGE,
        BCS FNDSPOT ;TRY AGAIN
        STA LOCX,X
        LDA RANDOM ;SET A RANDOM Y
        AND #1F ;MASK UPPER BITS
        CMP #18 ;IF NOT IN RANGE
        BCS FNDSPOT ;TRY AGAIN
        STA LOCY,X
        LDA #0 ;SET Y#40
        STA SCRPTX
        STA SCRPTX+1
        STA POINTER+1
        LDA #28
        STA POINTR0
        LDY #0
        LSR POINTR0
        BCC FNDSP2
        LDA SCRPTX
        CLC
        ADC POINTER
        STA SCRPTX
        LDA SCRPTX+1
        ADC POINTER+1
        STA SCRPTX+1
        ASL POINTER
        ROL POINTER+1
        DEY
        BNE MULTIPLY
        LDA LOCX,X ;ADD X*2
        ASL A
        ADC SCRPTX
        BCC ADDSCRN
        INC SCRPTX+1
        ADDSCRN CLC ;ADD SCREEN ADDR
        ADC # <GAMESCR
        STA SCRPTX
        LDA SCRPTX+1
        ADC # >GAMESCR
        STA SCRPTX+1
        JSR BETHERE ;SEE IF IT IS
        BNE FNDSPOT ;EMPTY? NO, AGAIN
        LDA SCRPTX ;YES, SET LOC
        STA LOCL0,X ;TO IT
        LDA SCRPTX+1
        STA LOCHI,X
        LDA #0
        STA DIR,X ;DIRECTION TO RT
        TXA ;CLR COALESCE
        ASL A ;CHARS FOR THIS
        ASL A ;PLAYER
        ADC # <PL0CHR
        STA POINTER
        ADC #32
        STA POINTR0
        LDA # >PL0CHR
        STA POINTER+1
        STA POINTR0+1
        LDA #0
        LDY #7
        CLRCLCH STA (POINTER),Y
        STA (POINTR0),Y
        DEY
        BPL CLRCLCH ;SET SCRN TO THEM
        TXA
        CLC
        ADC #8
        LDY #0
        STA (SCRPTX),Y
        INY
        ADC #4
        STA (SCRPTX),Y
        LDA LOCX,X ;PLR HORIZ POS
        ASL A
        ASL A
        ASL A
        CLC
        ADC #48
        STA HPOS0,X
        LDA ACTFLAG,X ;COALESCE FLAG
        AND #0F ;TO TRUE
        ORA #01
        STA ACTFLAG,X
        LDA #0F ;SET ITS CNTRS
        STA MOVST,X
        LDA #7
        STA MOVCLK,X
        RTS

```

## ERASURE

```

;-----
;ERASE A SHOT
ERASHOT LDA SHOTLO,X ;SET POINTER TO
        STA POINTR0 ;THE SHOT LOC
        LDA SHOTH1,X
        STA POINTR0+1

```

```

LDA #0          ;ERASE 2 BYTES
TAY
STA (POINTR0),Y
INY
STA (POINTR0),Y
LDA SHOTMST,X ;MOVE STAT=?
BEQ ERSHXIT ;YES, DONE
LDA SHOTDIR,X ;ADD A LINE
AND #001 ;IF UP/DOWN
BEQ ERSHOT2
LDY #27
LDA #27
ERSHOT2
INY
STA (POINTR0),Y
INY
STA (POINTR0),Y
TAY
ASL A
TAY
LDA #0
STA AUDC1,Y
RTS

;ERASE PLAYER/ZOMBIE
ERASHAN LDA LOCL0,X ;SET A POINTER
STA POINTR0 ;TO THE SCREEN
LDA LOCHI,X ;CHR IMAGE
STA POINTR0+1
LDA #0 ;ERASE 2 CHARS
TAY
STA (POINTR0),Y
INY
STA (POINTR0),Y
LDA MOVEST,X ;IF MOVEST=0,
BEQ ERMNXIT ;CHRG DONE,
;ERASE PH
LDA DIR,X ;ADD 1 LINE IF
AND #001 ;GOING UP/DOWN
BEQ ERSHAN2
LDY #27
LDA #0
ERSHAN2
INY
STA (POINTR0),Y
INY
STA (POINTR0),Y
TAY
STA (POINTR0),Y
TAY
LDA #0
STA POINTR0+1
LDA #0
STA POINTR0
TAY
STA (POINTR0),Y
DEY
BNE ERSUTLP
RTS

;COLLISION DETECTION
;-----
;LOOK AHEAD SUBS
;
GETAHEDS LDA SHOTLO,X ;SET WHAT'S IN
STA SCRPTX ;FRONT OF A SHOT.
LDA SHOTHI,X ;SET PNTRS, DIR
STA SCRPTX+1 ;& BOTO GETAHED
LDY SHOTDIR,X
JMP GETAHED

;GETAHEDM LDA LOCL0,X ;SET WHAT'S IN
STA SCRPTX ;FRONT OF PLAYER.
LDA LOCHI,X ;SET PNTRS, DIR
STA SCRPTX+1
LDY DIR,X

;GETAHED LDA SCRPTX ;ADD ON TO PNTR
CLC
ADC DIRADLO,Y ;BY DIR PASSED
STA SCRPTX
LDA SCRPTX+1
ADC DIRADHI,Y
STA SCRPTX+1

GETHERE LDY #0 ;FIND WHAT'S TO
LDA (SCRPTX),Y ;BY THE SCREEN
INY
ORA (SCRPTX),Y
RTS

;CHECK FOR HITS ON PLAYERS/ZOMBIES
MNHCHK BTX HOLDIT ;SAVE WHO WE ARE
LDX ACTIVE ;LOOP TO CHK ALL
LDA ACTFLAG,X ;IF PLAYER NOT
AND #00F ;ON, DO NEXT
BNE CHKHMND
LDA LOCL0,X ;SET POINTER
STA POINTR ;TO COMPARE
LDA LOCHI,X
STA POINTR+1
LDA MOVEST,X ;IF NOT MOVING,
BEQ CKMAN2 ;CHECK IT ONCE
JSR SCPCMP ;TRY ONCE,

```

```

BEQ FNDMAN ;IF FOUND, DO IT!
LDY DIR,X ;MOVE TO OTHER
JSR SETPTR ;POSSIBILITY
JSR SCPCMP ;IS IT THERE?
BNE CKMNMND ;NO, DO NEXT
JSR ERASHAN ;ELSE, ERASE 'IM
LDA ACTFLAG,X ;SET TO
ORA #002 ;EVAPORATE
STA ACTFLAG,X
LDA #9
STA MOVEST,X
CPX HOLDIT ;IF HIT SELF
BEQ CKMNMND ;(LIKE IN BACK-
LASH) NO SCORE
LDX HOLDIT ;SCORE PENDING
LDA SCRPN0,X ;TO NEXT SCORE
CLC
ADC NXTSCR,X
STA SCRPN0,X
LDA #5 ;RESET NEXT SCORE
STA NXTSCR,X ;TO 5
CHKHMND
RTS
CHKMNMND DEX ;CHECK NEXT
BPL CKMNLPL
LDX HOLDIT ;IF NONE FOUND,
RTS ;SET BACK SELF 'ID
;SEE IF POINTER=SCRPTX (USED ABOVE
;AND IN SHOT VS SHOT CHECKS)
;
SCPCMP LDA SCRPTX ;CHECK LO
CMP POINTR
BNE SCPOBK ;IF <, EXIT
LDA SCRPTX+1 ;ELSE, TRY HIGH
CMP POINTR+1
RTS
SCPOBK ;
;CHANGE POINTER TO OTHER POSSIBLE
;LOCATION ON COLLISION (USED ABOVE
;AND IN SHOT VS SHOT CHECKS)
SETPTR LDA POINTR ;SUB PRIOR TO
SEC ;MOVE ADD AMOUNT
SBC PRVADLO,Y
STA POINTR
LDA POINTR+1
SBC PRVADHI,Y
STA POINTR+1
LDA POINTR ;ADD AFTER MOVE
CLC ;ADD AMOUNT
ADC AFTRADD,Y ;WEIRD, BUT...
STA POINTR
BCC STPTRND
INC POINTR+1
STPTRND
RTS
;SPECIAL EFFECTS
;-----
;EVAPORATION OF PLAYER/ZOMBIE
EVAPRTE LDA ACTFLAG,X ;SEE IF HE IS
AND #002 ;EVAPORATING
BNE DOEVAP ;IF NOT, RETURN
RTS
DOEVAP LDA LOCY,X ;ELSE, SET PNTR
ASL A ;INTO 'PLAYER X
ASL A
ASL A
ADC #32
STA SCRPTX
TXA
CLC
ADC # >PL0
STA SCRPTX+1
TXA ;SET SOUND INDEX
ASL A
TAY
DEC MOVEST,X ;UPDATE COUNTER
BHI ENDEVAP ;IF AT END
LDA #10 ;ELSE, SET SOUND
STA AUDF1,Y
STY HOLDIT
LDY MOVEST,X
LDA EXPNVL,Y
LDY HOLDIT
STA AUDC1,Y
LDA MOVEST,X ;FIND WHAT CLOUD
AND #00E ;STATE TO USE
ASL A
ASL A
ASL A
ADC # <SMOKE
STA POINTR
LDA # >SMOKE
STA POINTR+1
LDY #7 ;AND SET IT
LDA (POINTR),Y
STA (SCRPTX),Y
DEY
BPL READSMK
RTS ;AND RETURN

```

```

ENDEVAP LDA #0 ;EVAP DONE, TURN
STA AUDC1,Y ;OFF SOUND,
LDY #7 ;ERASE CLOUD
CLRSMOK STA (SCRPTX),Y
DEY
JMP CLRSMOK
BPL FNDSPOT ;FIND SPOT TO
;PUT HIM BACK IN
;
;SETUP A SHOT FOR BACKLASH
STBKLSH LDA ACTFLAG,X ;SET FLAG =TRUE
AND #00F
ORA #010
STA ACTFLAG,X
LDA SHOTDIR,X ;TURN SHOT DIR
EOR #002 ;THE OTHER WAY
TAY
LDA DIRBIT,Y ;SET IN BACKLASH
STA SHOTDIR,X ;FASHION
LDA #3 ;SET SHRAPNEL
STA SHOTMST,X ;DISTANCE TO 3
RTS
;SET POINTER OFFSET FROM BACKLASH BASE
ADDBLOFS LDA SHOTMST,X ;FIGURE OUT HOW
LSR A ;MANY LOCATIONS
EOR #001 ;AWAY IT IS
CLC
ADC #1
STA COUNT ;AND SAVE IT
LDA SHOTLO,X ;SET BASE
STA SCRPTX
LDA SHOTHI,X
STA SCRPTX+1
LDY DIR0 ;ADD DIRECTION
LDA SCRPTX ;OFFSET AS MANY
CLC ;PLACES AWAY AS
ADC DIRADLO,Y ;WE HAD TO GO
STA SCRPTX
LDA SCRPTX+1
ADC DIRADHI,Y
STA SCRPTX+1
DEC COUNT
BNE AD0FSLP
RTS
;
;*****
;DLI ROUTINE **
;*****
DLI PMA ;SET COLORS FOR
LDA #PLR0COL ;BOTTOM OF SCREEN
STA COLPF0
LDA #PLR1COL ;TO THOSE OF
STA COLPF1 ;PLAYER/ZOMBIE
LDA #PLR2COL ;SUIT COLORS
STA COLPF2
LDA #PLR3COL
STA COLPF3
PLA
RTI
;
;*****
;PROGRAM DATABASE **
;*****
;NUMERICAL DATA
;-----
;LOCATION ADDITIONS TO SET NEW
;LOCATIONS (SEPARATED BY DIR)
;
AFTYADD .BYTE # 11,0,0
AFTXADD .BYTE 1 10,0,0
PRVYADD .BYTE # 10,0,-1
PRVADD .BYTE # 0,0,-1
DIRADHI .BYTE # 0,-1,-1
DIRADLO .BYTE 2,40,-2,-40
AFTRADD .BYTE 2,40 10,0
PRVADHI = DIRADHI
PRVADLO .BYTE # 0,-2,-40
;
;JOYSTICK TO INTERNAL DIR CONVERSION
;
CONVERT .BYTE 4,3,1,4,2,4,4,0,4,4
;
;OFFSET FOR STILL IMAGE INTO SHAPES
SHSTOFS .BYTE 2,0,8,12
;
;EVAPORATION VOLUMES
EXPNVLP .BYTE 4,0,8,8,0,6,4,4,4,2,2,2
;
;ZIGZAG DIRECTION MASKS
;
XYMASK .BYTE #03,#0C,#03,#0C
;
;BACKLASH DIRECTION BITS
;

```





```

DIRBIT .BYTE 8,4,2,1
ISCREEN INDEX TO SCORES
ISCRINDX .BYTE 4,24,44,64
ISHAPE TABLES
IPLAYER/ZOMBIES
ISHAPES
.BYTE 000,000,0C9,0C1,1R4
.BYTE 000,000,0C0,0C0,1U0
.BYTE 000,000,0D2,0D2,1U0
.BYTE 000,000,0DF,0DF,1R1
.BYTE 000,000,0C7,0C7,0C9,0C9,1D1
.BYTE 000,000,0D4,0D4,0C8,0C8,1L1
.BYTE 000,000,0C3,0C3,0C4,0C4,1U1
.BYTE 000,000,0D5,0D5,0D0,0D0,1U0
.BYTE 000,000,0C4,0C4,0D9,0D9,1U0
.BYTE 000,000,0DF,0DF,0D1,0D1,1R3
.BYTE 000,000,0C6,0C6,0C7,0C7,0D8
.BYTE 000,000,0C5,0C5,0D7,0D7,0D8

IPLAYERS
.BYTE 000,000,081,082,1R2
.BYTE 000,000,082,082,1R2
.BYTE 000,000,084,084,1R1
.BYTE 000,000,082,081,000,1R1
.BYTE 000,000,083,083,000,1L1
.BYTE 000,000,083,080,085,1U1

IBACKLASH SHAPNEL
.BYTE 000,000,09B,09C,1R4D0
.BYTE 000,000,09D,09D,1L4U0
.BYTE 000,000,09D,09D,1R2D1
.BYTE 000,000,09D,09C,1L4U1

ITITLE SCREEN
I-----
IDISPLAY LIST
ITITDISP .BYTE 070,070,070,070,042
.WORD 222,066,070,070,05,070
.BYTE 070,070,070,070,070,070
.WORD 111,011
ITITLE SCREEN DISPLAY DATA
ITITLES .BYTE 000,000,0A,00,0,96
.BYTE 000,000,000,000,000,000
.BYTE 00 "abc1 jk1cJmo"
.BYTE 00 "pqrsTuvwxyz"
.BYTE 00 "1234567890"
.BYTE 00,00,00,00,00,00,00,00

```

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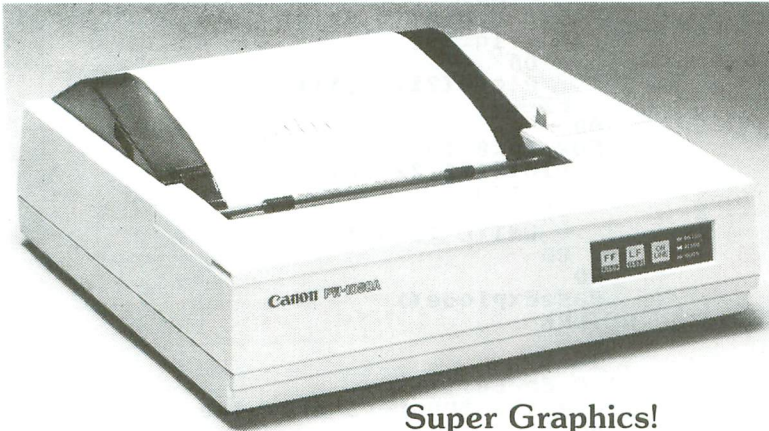
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#### Printing Characters

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Character size: 2 x 2.42 mm (standard)  
Character set: Full ASCII character set (96),  
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### SPECIFICATIONS (Apple - Atari - Etc.)

#### Down Loading

11 x 9 dot matrix; NLQ 23 x 18 dot matrix  
optional

#### Print Buffer

2K-byte utility buffer

#### Image Printing

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#### Ink Ribbon Cartridge

Ribbon Life: 3 million characters/cartridge

#### Maximum Number of Characters

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Elite:	12 cpi	96 cpl
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NLQ pica:	10 cpi	80 cpl
NLQ pica enlarged:	5 cpi	40 cpl

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# Sneak Attack

continued from page 37

```

PROC MoveShots()
;move the fired bullets
BYTE lp
FOR lp=0 TO 29 DO ;for each shot
IF Mis5status(lp)=1 THEN
Plot0(Misx(lp), Misy(lp), 0)
IF 5tick=11 THEN
Misx(lp)=-1
ELSEIF 5tick=7 THEN
Misx(lp)=+1
ELSE
Misy(lp)=-1
FI
IF (Misx(lp) <> 39 AND
Misy(lp) <> 255 AND
Misx(lp) <> 0) THEN
MissileHit(lp)
ELSE
Mis5status(lp)=0
FI
FI
OD
RETURN

```

```

PROC MoveExplosions()
;move the explosions
BYTE lp
FOR lp=0 TO 59 STEP 2 DO
IF Exp5status(lp)=1 THEN
Plot0(ExpX(lp), Expy(lp), 0)
Plot0(ExpX(lp+1), Expy(lp+1), 0)
Expy(lp)=+1
Expy(lp+1)=+1
ExpX(lp)=-1
ExpX(lp+1)=+1
IF Expy(lp) <> 22 AND ExpX(lp) <> 0
AND ExpX(lp+1) <> 39 THEN
Plot0(ExpX(lp), Expy(lp), 6)
Plot0(ExpX(lp+1), Expy(lp+1), 6)
ELSE
Exp5status(lp)=0
Exp5status(lp+1)=0
FI
FI
OD
RETURN

```

```

PROC BaseExplode()
;explode the base
BYTE ARRAY endx(0)=[16 24 17 23 20],
endy(0)=[22 22 19 19 17]
BYTE lp, time=20
color=38
FOR lp=0 TO 4 DO
Plot(20, 22)
DrawTo(endx(lp), endy(lp))
OD
FOR lp=0 TO 16 DO
Sound(0, Fate, 8, 16-lp)
Sound(1, Fate, 8, 16-lp)
time=0
DO
UNTIL time=15
OD
OD
SndRst()
color=32
FOR lp=0 TO 4 DO
Plot(20, 22)
DrawTo(endx(lp), endy(lp))
OD
RETURN

```

```

PROC EndRight()
;move the troopers from the right

```

```

;to the base
BYTE lp, lq, nn, time=20
FOR lp=0 TO 19 DO
IF Rr(lp)=1 THEN
lq=21+lp
WHILE lq > 20 DO
IF nn=12 THEN
nn=13
ELSE
nn=12
FI
Plot0(lq, 22, nn)
time=0
DO
UNTIL time=10
OD
Plot0(lq, 22, 0)
lq=-1
OD
Plot0(21, 22, 11)
FI
OD
FOR lp=0 TO 3 DO
Plot0(21, 22-lp, 11)
time=0
DO
UNTIL time=10
OD
OD
BaseExplode()
RETURN

```

```

PROC EndLeft()
;Move the troopers from the left to
;the base
BYTE lp, lq, lc, nn, time=20
FOR lp=0 TO 19 DO
lq=19-lp
IF Ll(lq)=1 THEN
FOR lc=lq TO 19 DO
IF nn=12 THEN
nn=13
ELSE
nn=12
FI
Plot0(lc, 22, nn)
time=0
DO
UNTIL time=10
OD
Plot0(lc, 22, 0)
OD
Plot0(19, 22, 11)
FI
OD
FOR lp=0 TO 3 DO
Plot0(19, 22-lp, 11)
time=0
DO
UNTIL time=10
OD
OD
BaseExplode()
RETURN

```

```

PROC EndPrint()
;print the end of game message and
;test for new game
BYTE trig=644, lp
Position(10, 7)
Print("Game Over...Final Score:")
Position(15, 8)
PrintC(Score)
Position(15, 9)
Print("FINAL LEVEL :")
PrintB(Level)

```

```

Position(10,20)
Print("Press FIRE to play again")
DO
  UNTIL trig=0
OD
DownL=0
DownR=0
Put(125)
FOR lp=0 TO 19 DO
  Ll(lp)=0
  Rr(lp)=0
OD
Score=0
Level=1
DrawBase()
Update()
Hard=15
RETURN

PROC GameOverTwo()
;game over when four troopers down
BYTE lp
  SndRst()
  ClearScreen()
  Loud=0
  Loud1=0
  Freq=169
  FOR lp=0 TO 19 DO
    IF Ll(lp)=1 THEN
      Plot0(lp,22,11)
    FI
    IF Rr(lp)=1 THEN
      Plot0(lp+21,22,11)
    FI
  OD
  IF DownL=4 THEN
    EndLeft()
  ELSE
    EndRight()
  FI
  EndPrint()
RETURN

PROC GameOverOne()
;game over when trooper lands on base
BYTE lp
  SndRst()
  ClearScreen()
  Loud=0
  Loud1=0
  Freq=169
  FOR lp=0 TO 19 DO
    IF Ll(lp)=1 THEN
      Plot0(lp,22,11)
    FI
    IF Rr(lp)=1 THEN
      Plot0(lp+21,22,11)
    FI
  OD
  BaseExplode()
  EndPrint()
RETURN

PROC TrooperDown(BYTE wh)
;redraw trooper wh at bottom of screen
BYTE cc
  TrStatus(wh)=0
  cc=Trx(wh)
  Plot0(Trx(wh),Try(wh),0) ;erase chute
  Plot0(Trx(wh),Try(wh)+1,11) ;replace
  IF Trx(wh)<20 AND Ll(cc)=0 THEN
    Ll(cc)=1
    DownL==+1
  ELSEIF Trx(wh)>20 AND
    Rr(cc-21)=0 THEN

```

```

    Rr(cc-21)=1
    DownR==+1
  ELSEIF Trx(wh)=20 THEN
    GameOverOne()
  FI
  IF DownL=4 OR DownR=4 THEN
    GameOverTwo()
  FI
RETURN

PROC TrooperFall()
;make trooper fall when chute hit
BYTE lp,qq,cc
  FOR lp=0 TO 29 DO
    IF TrStatus(lp)=2 THEN
      Plot0(Trx(lp),Try(lp)+1,0)
      Try(lp)==+1
      IF Try(lp)=21 THEN
        cc=Trx(lp)
        IF Trx(lp)<20 AND Ll(cc)=1 THEN
          DownL==+1
          Ll(cc)=0
        ELSEIF Trx(lp)>20 AND
          Rr(cc-21)=1 THEN
          Rr(cc-21)=0
          DownR==+1
        FI
      FI
      IF (Try(lp)<22 AND Trx(lp)<>20)
        OR (Try(lp)<20 AND
          Trx(lp)=20) THEN
        Plot0(Trx(lp),Try(lp)+1,10)
      ELSE
        TrStatus(lp)=0
      FI
    FI
  OD
RETURN

PROC MoveTroopers()
;move paratroopers down screen
BYTE lp,qq
  BYTE ARRAY Trooper(0)=
    [60 126 255 255 195 66 36 24
     60 36 24 255 60 24 36 102
     0 0 0 0 0 0 0 0]
  FOR lp=0 TO Indx DO
    Charset(56+lp)=0
  OD
  MoveBlock(Charset+56+Indx+1,
    Trooper,16)
  Indx==+1
  IF Indx<8 THEN
    RETURN
  FI
  Indx=0
  FOR lp=0 TO 29 DO
    IF TrStatus(lp)=1 THEN
      Plot0(Trx(lp),Try(lp),0)
      Try(lp)==+1
      IF Try(lp)=21 THEN
        TrooperDown(lp)
      FI
    FI
    IF TrStatus(lp)=3 THEN
      TrStatus(lp)=0
      Plot0(Trx(lp),Try(lp)+1,0)
    FI
  OD
  MoveBlock(Charset+56,Trooper,24)
  FOR lp=0 TO 29 DO
    IF TrStatus(lp)=1 THEN
      Plot0(Trx(lp),Try(lp),7)
      Plot0(Trx(lp),Try(lp)+1,8)
      Plot0(Trx(lp),Try(lp)+2,9)
    FI
  OD

```



# Sneak Attack *continued*

```
OD
RETURN
```

```


PROC NewLevel()
;go to higher level
BYTE lp,time=20
  Level==+1
  IF Level>100 THEN
    Level=100
  FI
  SndRst()
  Loud=0
  Loud1=0
  Freq=169
  Comp==+300
  FOR lp=10 TO 150 STEP 10 DO
    Sound(0,lp,10,4)
    Sound(1,lp+10,10,4)
    time=0
  DO
    UNTIL time=2
  OD
  OD
  Position(25,23)
  PrintB(Level)
  IF Level>8 THEN
    Hard=19
  FI
  SndRst()
RETURN

```

```

PROC Main()
BYTE time=20,lp,ch=764
  Title()
  Gr0Init()
  Snd1=0
  Snd2=3
  Download()
  Modify()
  DrawBase()
  ScoreLine()
DO
  LaunchChopper()
  MoveChopper()
  MoveExplosions()
  Noise()
  TrooperFall()
  MoveTroopers()
  Position(8,23)
  PrintC(Score)
  IF Score>Comp THEN
    NewLevel()
  FI
  time=0
  FOR lp=2 TO 6 STEP 2 DO
    AimGun()
    Shoot()
    MoveShots()
  DO
    UNTIL time=lp
  OD
  OD
  OD
RETURN

```



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by Patrick J. Kelley

It must be getting pretty tough to be a computer game designer these days. After all these years of variation upon variation, and looking at the countless products of other designers, it seems to me that it would be next to impossible to come up with an original game.

Now the trend seems to be to take the old favorite board games, revamp them and add a touch of shoot-'em-up, then market them and hope they sell. One of these games is Avalon Hill's **Combat Chess**, its derivative nature self-evident in the very title.

Taking the strategic elements of chess, **Combat Chess** evolves into a classic war-game, complete with hit points, terrain difficulties and tactical objectives.

The goal of this game is simple: eliminate your enemy through attrition or by destroying the opposing side's nerve center, the battle cruiser. A computer imposed time limit ticks away as you do battle, racing the clock to avoid a stalemate and defeat your enemy.

#### Disposition of forces.

The actual playfield of **Combat Chess** divides the opposing armies by a wide river and two mountain ranges. To cross the river and reach your enemy, you must traverse three small bridges. These bridges are important to the outcome of the conflict, as their status will define the nature of the combat—either a set-piece moving battle or an across-the-river artillery duel.

The opening moves of any game begin with you winding your way through heavy woods to face off with the opposing forces. The armies depicted are designated by their color as Red or Black armies. Each side has pieces of varying movement and armament capabilities, which can be computer selected.



The armies are made up of tanks, armored cars and the all-important battle cruiser. Each of these pieces can withstand a certain number of hits before it vaporizes and ceases to be. Proportionally, they also have range limitations and movement limits within a given "turn." By using the joystick, you can select the unit's function, be it move, fire or hold position.

At this phase, **Combat Chess** becomes something akin to the Muhammed Ali vs. Joe Foreman boxing match: "Bop till you drop." Once you've contacted your enemy, all finesse and skill goes south, and the only sound that can be heard is the boom of cannon fire.

#### Peace through fire superiority.

As the game progresses, you'll get a better sense of your unit's strengths and weaknesses. Armored cars are usually the first to go, their weak armor a major drawback. The tanks are slow and use

*mucho* fuel, but are the most versatile of all the pieces. Their range is great, and their firepower is impressive against the smaller armored cars, while they use only a modicum of fuel.

The real slugger of both sides is the battle cruiser, a gas-guzzling titan that moves like a slug. The battle cruiser is most effective in delivering a *coup de grace* to a wounded unit, or in long-range bombardment.

Options provide you with a choice of terrain, heavy or light to your tastes. More esoteric players might prefer the option that puts you on a real chess-board. This option gives the game a more surreal flavor, reminiscent of Electronic Arts' **Archon**.

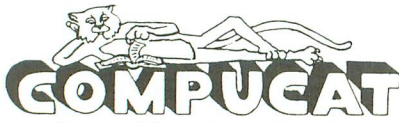
Also, you may select the number of tanks and armored cars to each side, and whether you wish to take on a human opponent or the computer. As is the case in many games with this option, I do not recommend that novices tangle with the computer until they have their moves down.

The computer is a decent adversary and tries a lightning blitz in the opening moves of the game. A good strategy at this point would be to blow up the bridges, to prevent the assaults on your battle cruiser that a setpiece battle will bring. Instead, upon eliminating the bridges, align your heavy guns on the shoreline and pummel the tar out of the enemy.

Blowing up the bridges also sends the computer into a momentary tizzy, since its programming sets up an assault as a priority to win the game. The enemy forces will mill about for a few moves, giving you ample time to "get some" off of the computer.

However, don't assume that you'll prevail every time with this strategy. The

(continued on next page)



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computer is *always* a better shot than you are, and a better all-around tactician.

Placement for optimum firepower is also a strong suit of your computer opponent. Notice how the computer tries to get you to use as much fuel as possible. Finally, the computer has an advantage of quicker "decision" time, finding rapidly which of your pieces to victimize. The most important strategy to use is your human unpredictability—and a strong desire to get even.


### Summary.

In closing, I'd say that **Combat Chess** is an adequately entertaining game. Its blend of themes is interesting and well suited to my tastes. The tactical side of me appreciates the chess aspects, while the bloodthirsty side derives gobs of glee from watching the other side's hapless tanks blow up.



The game is well detailed in the right places. It does a good job of letting you know the particulars of each piece (fuel, ammo, etc.) via a text window that activates when you place the cursor over it.

On the down side, **Combat Chess** has, in my opinion, below average graphics and a woefully paltry information manual. Another recommendation would be to increase the ammunition quotient given to each vehicle and step down the excessive fuel expenditures. A "return to base to reload" feature would be most welcome—it would make the job easier for us "armchair generals."

**Combat Chess** is certainly not a great game, but it grows on you and will do until something better comes along. 

Patrick J. Kelley, *ANALOG Computing's* Circulation Manager, is a car nut, film buff and amateur military historian, with an interest in the Third Reich. Besides his reviews for us, Pat has written *Free-Fire*, an unpublished Vietnam war novel.

**HEX**  
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by Monte Bank

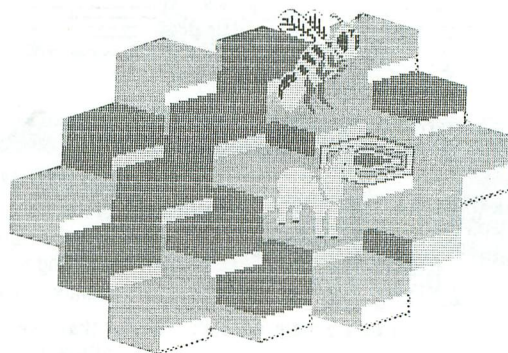
There is no doubt in my mind that, if God had not created the unicorn, man would have invented it. So singular is the unicorn that it seems appropriate for it to assume one's persona in this special game. It's difficult to be totally objective in reviewing the first game to come to life on the new Atari 520ST, but we'll give it our best shot.

**Hex** is a game played on a field of nineteen hexagonal pillars in a magical arena. Landing on the tops of these pillars changes their color. The hues vary in sequence from green to red to purple to blue, and back to green. The object of **Hex** is to turn the entire field green. A group of mystical opponents try to turn it purple.

The game has a number of features that make it quite a challenge. If hexes of like color are adjacent to each other, they're considered "locked." All the hexes in a locked group must be jumped on before they all flip to the next color. As the game progresses, larger and larger groups are formed until the entire complex is one color, and the round ends.

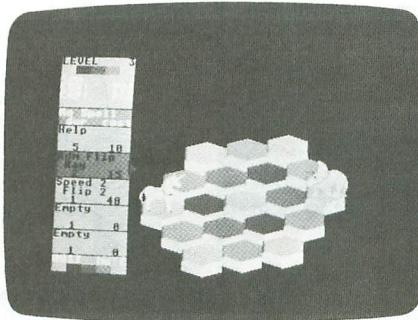
A green or purple arena results in a victory for the one of the two main combatants, as mentioned above. A complete field of red or blue, or failure to turn the entire field a single color by one hundred moves, results in a tie.

Quite a diverse crew of adversaries confront your best laid plans at every turn. Whether facing a centaur, jaguar, wasp, animated mushroom or Portuguese man-of-war, you have to stay alert. There is even a Claude Raines look-alike invisible man (or is it, therefore, a "look-unlike"?).



You face twelve different opponents, one at a time initially, then in pairs as the game progresses. To win the game, you have to advance through 120 levels of combat.

The principal feature of this game is magic. The magic, though an enigma most of the time, is what makes winning possible. With each victory, you're offered a new magical spell. A total of five of these spells may be kept in your arsenal at any on time. More than a hundred spells are available for use by you and your opponents.



Hex.

Simple spells enable you to flip a hex multiple times, jump several hexes, or move several hexes in one turn. The spells can take on much greater complexity, allowing you to alter the actual color of a hex by putting a "fake" on it, or even making a group of hexes entirely disappear. Need help? Just summon up a Phantom Partner or create an exact clone to team up with against that dastardly lot of miscreants.

These spells are great when you get to use them, but when your rival starts dealing out a few of his own, it's a different matter. Just as you're about to flip

the last group of hexes green and win, your opponent casts a random flip spell and changes the color of several to purple or red. I *hate* when that happens!

Winning a round and creating green hexes generates an energy store. The energy is needed to move and to use the magical spells. A victory sends you to the next level; a loss sends you back to face the previous opponent.

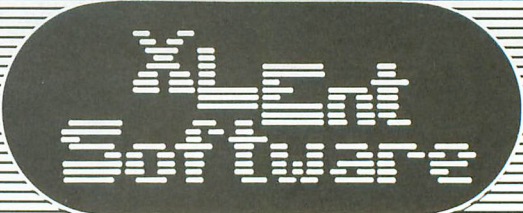
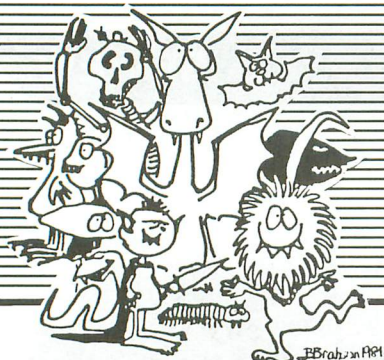
**Hex** ends if you complete the 120 levels, or if you run out of energy. I made it to level 61, but only by using every possible spell I could—and eventually depleting all of my energy stores. It's going to be tough to get to the final level.

With such a long session necessary for success, a save option has been provided. You can stop play and continue from that point later.

The documentation could be clearer in explaining the different spells. Also, I'd like the different characters identified, just for fun. If the programmers are planning a "Son of Hex" or "Hex II," an option allowing two people to compete against each other would be great.

In summary, I think this game is just super. It's as challenging a game as I've seen since **Archon**. The graphics, as viewed on Atari's SC1224 color monitor, are fantastic. Oh yes, I also got to use a mouse for the first time, and loved it. Outmaneuvering a puckish leprechaun with a mouse-controlled unicorn... the future is here. **A**

*Monte Bank is a rock group backup singer and a game freak. In fact, he's always been a freak. He does not have a cute name for his computer, and his favorite game is **Pong**. (He usually writes in the guise of a Kindly Pediatrician.)*



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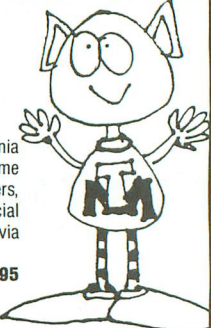


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# LOGO Demos

## for the 520ST

---

by Sol Guber

---

*Ah, sweet mystery of life, at last I've found you . . .* Atari has brought out a monster of a computer, and I've fallen in love with it.

How's that for a beginning of an article on the new 520ST? Yes, the machine is very nice. Yes, it's very effective. But there's not much available for it, except a cute little mouse and a language called LOGO that comes with it.

Isn't LOGO a "kids" language? Why is Tramiel packaging this fine high-tech machine with a kids language? Well, because LOGO is more than that. This LOGO is one with a Ph.D. It's a good subset of LISP and has many fine touches in it.

This LOGO just cries out for demos, and the best demos are graphic—the ones that show off the capabilities of the machine. I've written two little demos, mainly because I was waiting for my C package to arrive, to show off for all my friends who wanted to know: *why* did I have to buy another computer?

The first is a simple little demo. All that's done is fifteen circles of random radii, drawn on the screen at random locations. They are then filled in with colors.

Big deal, you might say, with sixteen colors available it might be nice, but all good systems could do this now. However, this LOGO has more than sixteen colors to fill in. There are thirty different patterns that can be used to fill in, and each of these thirty

patterns can have one of the sixteen colors. You can even have overlays of patterns.

Okay, you might say, so it would be nice, but it has to be slow, doesn't it? No, it doesn't! This is not a Macintosh; this is a Jackintosh. It's *quick*. To fill the whole screen with a pattern takes three seconds. To put fifty different patterns on the screen takes about a minute. Right, you think, so it's quick, but is it easy? This program has to be complicated and hard to understand. No. That's part of the genius of the system. Listing 1 shows the whole program.

Before I start to explain **Logo Demo**, let me give you a little information about LOGO. It's not like BASIC; it's very modular and much simpler to use.

There are three kinds of words: those that start with a blank, those that start with a double quotation ("), and those that start with a colon (:).

The ones that start with nothing are things that need to be done, known as procedures. Those that start with a double quotation are variables; things are stored under that name. Those that start with a colon are the values found under the variable's name.

Thus, things look more realistic, and you're not confused with algebraic statements that don't make sense. In BASIC, you can have the statement  $X = X + 1$ . This means that it takes the value stored at X, adds 1 to it, then stores the result back at the spot X. In LOGO, this is simply: `MAKE "X :X + 1`. Make the variable name X ("X) equal the value at X (:X) plus 1. A great deal easier to explain to children, and it also makes sense to unsophisticated adults.

# ST LOGO Demos *continued*

Now that a little of the theory of how things look in LOGO is known, some explanations of the program are needed. First, four new procedures or words are defined. These are RCIRCLE, COIN, PLAID and FILLIT. After these words are defined, they can be used anywhere in the program to do something. But what are they doing?

Well, let me explain the shortest and easiest one, COIN. It simply flips a coin and gets a 1 or a 0. When a procedure is to be defined, it must start with a *TO*, then the name is written and, at the end, *END* is typed. The middle is always different.

The middle, in this case, is merely *MAKE "C RANDOM 2*. This almost makes sense just the way it is: find a random number less than 2 and make C equal to it. The only random numbers less than 2 are 0 and 1. Thus, it's as if we're flipping a coin, with heads being 1 and tails being 0. It is just that easy to write procedures.

Now that the easiest one has been described, let me tell you about the other three procedures. The first is RCIRCLE, which makes random circles on the screen.

There are three new words to this procedure. The first is the easiest. There is a "circle" function that will make a circle if given a list of three components: the X-position of the center, the Y-position of the center and the radius.


Again, this sounds much more complicated than it really is. LOGO has a little pointer called a "turtle," which has a pen in its mouth. When the turtle walks, it draws a line with the pen. It starts out at HOME, a spot called X = 0 and Y = 0. If it walks one step to the right, then the new position is X = 1 and Y = 0. If it takes a step from here, the new position is X = 1 and Y = 1. If it's at HOME and takes a step to the left, the new position is X = - 1 and Y = 0. Thus, to tell the turtle to make a circle, you can tell it how far to the right or left, up or down from HOME to put the center.

Now we go on to a "list," which is just some items grouped together. In LOGO, a list always has brackets around its contents, like [REBECCA JASON LAUREN DANIEL]. The list has a first member (REBECCA), a last member (DANIEL), and contains four members. All these things can be determined by special operators in LOGO. Lists can be made up by putting words together with the *SENTENCE* command.

One last item is the IF test in RCIRCLE. It looks similar to any other IF test, but there's no THEN, just statements surrounded by brackets. Yes, that's right. The IF test in LOGO is much simpler than in BASIC. First, there's the test. If it's true, then do whatever is in the first set of brackets. If it's false, then do whatever is in the second set of brackets. Very easy and very neat!

Now we can explain both the procedures RCIRCLE and FILLIT. First, for RCIRCLE, flip the coin. If the answer is 0, then make "X a random number between 0 and 80; otherwise, make "X a random number between - 80 and 0. Flip the coin again and make "Y a random number between 0 and 150 or - 150 and 0. Make "R a random number less than 150. Make "FC a *SENTENCE* with the values of :X and :Y. Then make a circle with the list makeup of the sentence of :FC and the random radius.

FILLIT is very similar to RCIRCLE. There are two new commands: SETPOS and SETFILL. SETPOS moves the turtle to any spot on the screen. Two random points are picked for this location. SETFILL tells the system which of the many patterns are to be used




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CIRCLE #126 ON READER SERVICE CARD

for the fill operation. It's also possible to pick any of the sixteen colors for the pattern.

FILL just tells the system to fill in with the pattern determined from the SETFILL parameters, and it fills until it reaches a boundary. It's very similar to the Atari BASIC fill command. So, this procedure picks a random point on the screen, then picks a random pattern with which to fill up a portion of the screen.

One procedure to go. This is PLAID, the calling procedure for the whole operation. It contains several new words. The first is "GFILL, an internal variable in the system. If it's true, then all circles are filled in as they're drawn. If it's false, then they're not. This is used to control parts of the fill operations.

The next two commands are common LOGO commands, "clear screen" (CS) and "pen up" (PU). These are, respectively, to start over and to have the turtle move without drawing.

The next command is REPEAT. It does just what it says it will. It needs a number and a list of operations. Thus, it will perform RCIRCLE thirteen times.

"GFILL is made "TRUE. Then FILLIT is done fifty times. Finally, there's a strange command before the END. This is PLAID—the same command that was used to start the program. The program will then go into an endless loop and keep showing off all the colors and patterns that the 520ST is capable of.

Okay, okay, you might say, you make it look a great deal easier than it probably is, and the first demo used lots of the built-in functions of the ST LOGO. I don't think that you could do another demo relying so heavily on the built-in functions.

But that's just the point of the built-in functions: they let you do other things easily. Figure 2 shows another demo called FLAKE, which is made up of many of the same functions that PLAID had. Let's go through it in detail, so you can see how nice LOGO is. First, though, I'd like to thank Tom Hudson for this little program, which he wrote in BASIC several years ago.

All right, let's START. This just initializes several variables and makes "X and "Y empty lists. Then it repeats ten times the word INITIAL. INITIAL picks two random numbers and puts them into a list under the names "X and "Y. It uses the sentence command to make the list.

SEGMENT performs PUT1 ten times and increments a counter, "DUM. In PUT1, there is a new idea. It's that of a variable passing. The value of :D is put into :A spot, and it's used interchangeably. Thus, a procedure can be used in various parts of a program

without having to remember the names of all the variables used.

PUT1 is a little more complicated. First, it uses a new command: ITEM. ITEM expects a number and a list. It then returns the member of that list at that number. So, if the list were [REBECCA JASON LAUREN DANIEL], then ITEM 3 would be LAUREN.

Thus, what the procedure does is take two numbers in each list and, using SIN and COS functions, calculates a point. A constant corresponding to the HOME value is added to each number. The turtle is made to move to that point with the SETPOSITION command. SEGMENT1 and PUT2 correspond closely to SEGMENT and PUT1.

FLAKY simply REPEATs SEGMENT six times, incrementing :ANGLE by 60 degrees. SEGMENT1 is also REPEATed six times, but it does the mirror image. This is what gives the nice snowflake effect.

FLAKE is the controlling procedure. It's the one that makes the snowflake on the screen and uses some of the joys of LOGO. What's drawn on-screen is a random snowflake. The turtle is then moved slightly, and another snowflake is drawn in a different color. Finally, the turtle is moved in between the two starting points, and a third color is used. This gives the picture a three-dimensional effect. It's all done easily and quickly with the LOGO system.

Now that you've seen these two demos and understand how nice the LOGO system can be, why wait? Go out and buy your 520ST now! Soon, you too will be singing the praises of this fine computer, even if you don't notice the sweet mysteries of life. **A**

---

*Sol Guber discovered computers, music and girls in college. Not having time for all three, he had to give up computers. After five years of marriage, he's given up girls and is back to programming an Atari.*

---

#### Listing 1.

```
TO START
MAKE "D []
MAKE "X []
MAKE "Y []
MAKE "HM [0 0]
REPEAT 10 [INITIAL]
END

TO INITIAL
MAKE "P RANDOM 60
MAKE "X SE :X :P
MAKE "P :P * 2.5
MAKE "Y SE :Y RANDOM :P
END

TO SEGMENT
MAKE "DUM 1
REPEAT 10 [PUT1 :DUM MAKE "DUM :DUM +!
  1]
END
```

# ST LOGO Demos *continued*

```

TO PUT1 :A
MAKE "P1 ITEM :A :X
MAKE "P2 ITEM :A :Y
MAKE "P3 :P1 * COS :ANGLE
MAKE "P3 :P3 + (:P2 * SIN :ANGLE)
MAKE "P4 :P2 * COS :ANGLE
MAKE "P4 :P4 - (:P1 * SIN :ANGLE)
MAKE "P3 :P3 + ITEM 1 :HM
MAKE "P4 :P4 + ITEM 2 :HM
SETPOS SE :P3 :P4
END

TO FLAKE
SETBG 1
SETPC 4
CS MAKE "ANGLE 0
START FLAKY
PU HOME FD 1 MAKE "HM [0 5]
SETPC 12 PD
FLAKY
PU HOME MAKE "HM [0 3]
SETPC 10 PD
FLAKY
END

TO SEGMENT1
MAKE "DUM 1
REPEAT 10 [PUT2 :DUM MAKE "DUM :DUM +!
  1]
END

TO PUT2 :A
MAKE "P1 ITEM :A :X
MAKE "P2 ITEM :A :Y
MAKE "P3 :P1 * COS :ANGLE
MAKE "P3 :P3 - :P2 * SIN :ANGLE
MAKE "P4 :P2 * COS :ANGLE
MAKE "P4 :P4 + :P1 * SIN :ANGLE
MAKE "P4 :P4 * -1
MAKE "P3 :P3 + ITEM 1 :HM
MAKE "P4 :P4 + ITEM 2 :HM
SETPOS SE :P3 :P4
END

TO FLAKY
REPEAT 6 [SEGMENT MAKE "ANGLE :ANGLE !
+ 60 SETPOS :HM]
MAKE "ANGLE 0
REPEAT 6 [SEGMENT1 MAKE "ANGLE :ANGLE !
+ 60 SETPOS :HM]
END

MAKE "GFILL "TRUE
MAKE "ANGLE 360
MAKE "DUM 11
MAKE "Y [3 86 6 1 1 0 35 24 80 18]
MAKE "X [3 56 41 41 26 36 57 22 51 33]
]
MAKE "P 82.5
MAKE "K [5 5]
MAKE "D [ ]
MAKE "HM [0 3]
MAKE "P4 22.578835
MAKE "P3 32.088451
MAKE "P2 18
MAKE "P1 33

```

Listing 2.

```

TO RCIRCLE
COIN
IF :C = 0 [MAKE "X RANDOM 80] [MAKE "X
RANDOM -80]
COIN
IF :C = 0 [MAKE "Y RANDOM 150] [MAKE "Y
RANDOM -150]

```

```

CIRCLE SE :FC :R
END

```

```

TO COIN
MAKE "C RANDOM 2
END

```

```

TO PLAID
MAKE "GFILL "FALSE
CS PU
REPEAT 13 [RCIRCLE]
MAKE "GFILL "TRUE
REPEAT 50 [FILLIT]
PLAID
END

```

```

TO FILLIT
COIN
IF :C = 0 [MAKE "X RANDOM 80] [MAKE "X
RANDOM -80]
COIN
IF :C = 0 [MAKE "Y RANDOM 150] [MAKE "Y
RANDOM -150]
SETPOS SE :X :Y
MAKE "X RANDOM 2
MAKE "X :X + 2
MAKE "Y RANDOM 13
MAKE "R RANDOM 16
MAKE "FC SE :X :Y
SETFILL SE :FC :R
FILL
END

```

```

MAKE "GFILL "FALSE
MAKE "Y 58
MAKE "X -51
MAKE "R 125
MAKE "C 0
MAKE "FC [-51 58]

```

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by Chuck Rosko

Top o' the mornin' to you. Welcome to the annual St. Patrick's Day two-man **Rafferty Run**. This year's finalists are: in the blue, Paddy O'Brien (player 0), and in the pink, Lanny McErly (player 1).

The object in this traditional Irish sport, played at the famed Rafferty Downs, is to be the first player to fill his pot with ten gold coins. The winner is awarded with a case of Irish Cream and becomes a full-fledged Leprechaun.

#### Game play.

Use your joystick (player 0 - port 0; player 1 - port 1) to move your man along the path in your quest for gold. To pick up a coin, simply touch it, and it will disappear. A bar then appears under your bucket, indicating you're carrying a coin.

You can carry only one coin at a time, and you must deposit it in your pot in order to receive credit for it. Each player's total number of coins is located at the bottom of the screen. After depositing a coin, you'll be placed on the path where you started the game. This prevents either player from quickly grabbing up all the coins.

If you go to your pot without a coin, one will be deducted from your total, and you'll again return to your original starting position. Your total can never go below zero.

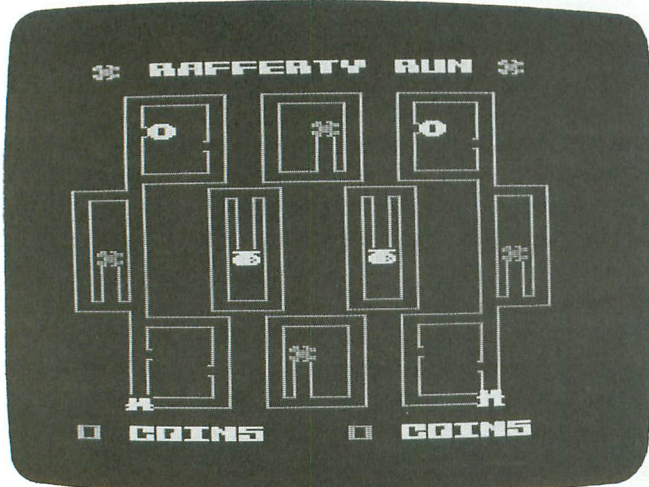
Whoever is carrying a coin will lose it if they run into their opponent. So, if your opponent starts getting too many coins, you can try to bump into him and cause him to lose the coin he's carrying. But, remember, this will make you lose your coin, also, if you're carrying one.



# Rafferty Run *continued*

## The challenge.

The challenge in **Rafferty Run** lies in the crossroads. Initially, you can't run freely along the paths, because not all of them are connected. If a crossroad is blocked or doesn't connect to another section, you cannot go through.



**Rafferty Run.**

The only way to open or close these crossroads is by touching a shamrock. There are four different types, each controlling four different crossroads. With practice, you'll soon learn which crossroads each shamrock governs.

When you touch a shamrock, your fate lies in the hands of Lady Luck, because all four crossroads change. You never know which way they'll turn. If the Luck of the Irish is with you, the crossroads could open up a path to a coin or to your pot. If not, you could block your own path or open one up for your opponent.

Once a shamrock is used, it becomes inactive and can't be used again for about two seconds. Occasionally, after you've touched a shamrock, the paths will disappear for a few seconds. You can still get around when this happens, if you know where to go.

If you happen to be on one of the crossroads when your opponent touches the corresponding shamrock, you'll disappear. Just move your joystick in any direction, and you'll reappear.

## Program description.

**Lines 250-710** — This checks which direction you want to move and whether it's a legal move, then sees what's located there and, finally, moves your man accordingly.

**Lines 300-330** — Check to the right for your opponent and coins.

**Lines 400-430** — Check to the left for your opponent and for coins.

**Lines 500-530** — Check up for your opponent and for shamrocks.

**Lines 600-710** — Check down for your opponent and for the pot, check if it's the correct pot and whether or not you're carrying a coin. Check if your total equals max.

**Lines 800-835** — Routine which changes the crossroads.

**Lines 845-860** — Make path disappear.

**Lines 900-910** — Randomly plot coins.

**Line 975** — Randomly pick which section of crossroad to plot when a shamrock's touched.

**Lines 1000-1200** — Winning routine.

**Lines 24995-25070** — Draw main screen.

**Lines 27995-28120** — Draw title screen, initialize variables and set up the game to begin.

**Lines 28995-29030** — Set up the display list interrupt.

**Lines 31995-32231** — Redefine the character set.

## List of variables.

- COIN(G) ... Holds total number of coins deposited.
- CTEMP(G) ... Equal to 1 if you're carrying a coin, 0 if you're not.
- DARK ... If dark equals 1, the path disappears.
- G ... Determines which player is moving (player 0 or 1) and in which variables the resulting information is to be stored. G is always switching back and forth between 0 and 1.
- K ... Depending on the direction you want to move and what's located there, K holds the line number where the program transfers to.
- MAN(G) ... Holds the number of the redefined character used to represent each player.
- MAX ... The number of coins you must deposit to win.
- PATH ... Determines what type of path section will be plotted at the crossroads when a shamrock is touched.
- POT(G) ... Holds the number of the redefined character used to represent each pot.
- X(G), Y(G) ... Holds the X and Y position of each player.
- XC(G), YC(G) ... Holds the X and Y position of each of the eight possible places a coin can appear.
- XD(J) ... Holds what direction the joystick is moved.
- Z ... The computer looks in the direction that you intend to move, finds out what is located there (i.e., pot, coin, etc.) and stores this information in the variable Z.

ZT(G) . . . . Holds which section of the path you're on. This determines which direction you can move.

Well, that's about it. Good luck to the both of you, and, as the saying goes, "May the roads rise to meet you, and may the wind be at your back." **A**

Chuck Rosko is a Medical Technologist from Pittsburgh who's been programming for three years. His *Note Master* appeared in issue 33 of *ANALOG Computing*, and he is the author of two educational programs available through T.H.E.S.I.S., *Number Blunder* and *Smart Shopper*.

Listing 1.  
BASIC listing.

```

1 REM *****
2 REM ***** RAFFERTY RUN *****
3 REM ***** BY CHUCK ROSKO *****
4 REM ***** FOR ANALOG *****
5 REM *****
6 REM
8 K1=1:K2=2:K3=3:K4=4:K5=5:K6=6:K7=7:K
8=8:K10=10:K11=11:K12=12:K13=13:K14=14
:K15=15:K16=16:K32=32
10 DIM ZZ$(K32),XD(K15),XC(K8),YC(K8),
COIN(K2),ZT(K2),X(K2),Y(K2),CTEMP(K2),
MAN(K2),POT(K2)
20 POKE 559,K0:GOSUB 32000:POKE 559,34
:GOTO 28000
250 REM READ JOYSTICKS
260 L=L+K1:IF INT(L/K2)=L/K2 THEN M=K1
-M:L=K0
263 MAN(G)=M+254*(G=K0)+126*(G=K1):M=K
1-M
265 G=K1-G:J=STICK(G):ON XD(J) GOTO 30
0,400,500,600,700
300 LOCATE X(G)+K1,Y(G),Z:K=(ZT(G)=36)
+(ZT(G)=38)+(ZT(G)=39)+(ZT(G)=45):IF K
=K1 THEN 260
310 K=260*(Z=K32 OR Z=43)+320*(Z=216)+
995*(Z=254 OR Z=255 OR Z=126 OR Z=127)
:IF K=K0 THEN 330
315 GOTO K
320 IF CTEMP(G)=K1 THEN 260
325 COLOR K32:PLOT X(G)+K1,Y(G):COLOR
251-G*128:PLOT K12-G*K5,K13:GOSUB 985:
GOSUB 910:CTEMP(G)=K1:GOTO 260
330 COLOR ZT(G):PLOT X(G),Y(G):X(G)=X(
G)+K1:COLOR MAN(G):PLOT X(G),Y(G):ZT(G
)=Z:GOTO 260
400 LOCATE X(G)-K1,Y(G),Z:K=(ZT(G)=35)
+(ZT(G)=36)+(ZT(G)=37)+(ZT(G)=43):IF K
=K1 THEN 260
410 K=260*(Z=K32 OR Z=45)+420*(Z=216)+
995*(Z=254 OR Z=255 OR Z=126 OR Z=127)
:IF K=K0 THEN 430
415 GOTO K
420 IF CTEMP(G)=K1 THEN 260
425 COLOR K32:PLOT X(G)-K1,Y(G):COLOR
251-G*128:PLOT K12-G*K5,K13:GOSUB 985:
GOSUB 910:CTEMP(G)=K1:GOTO 260
430 COLOR ZT(G):PLOT X(G),Y(G):X(G)=X(
G)-K1:COLOR MAN(G):PLOT X(G),Y(G):ZT(G
)=Z:GOTO 260
500 LOCATE X(G),Y(G)-K1,Z:K=(ZT(G)=35)
+(ZT(G)=38)+(ZT(G)=40)+(ZT(G)=44):IF K
=K1 THEN 260
510 K=260*(Z=K32 OR Z=42)+520*(Z=81)+9
95*(Z=254 OR Z=255 OR Z=126 OR Z=127):
IF K=K0 THEN 530
515 GOTO K

```

```

520 IF PEEK(540)=K0 THEN ZZ=(X(G)*K2)+
800:GOTO ZZ
525 GOTO 260
530 COLOR ZT(G):PLOT X(G),Y(G):Y(G)=Y(
G)-K1:COLOR MAN(G):PLOT X(G),Y(G):ZT(G
)=Z:GOTO 260
600 LOCATE X(G),Y(G)+K1,Z:K=(ZT(G)=37)
+(ZT(G)=39)+(ZT(G)=40)+(ZT(G)=42):IF K
=K1 THEN 260
610 K=260*(Z=K32 OR Z=44 OR Z=POT(K1-G
))+995*(Z=254 OR Z=255 OR Z=126 OR Z=1
27)+635*(Z=POT(G)):IF K=K0 THEN 630
620 GOTO K
630 COLOR ZT(G):PLOT X(G),Y(G):Y(G)=Y(
G)+K1:COLOR MAN(G):PLOT X(G),Y(G):ZT(G
)=Z:GOTO 260
635 IF CTEMP(G)=K0 THEN 640
637 GOTO 650
640 COIN(G)=COIN(G)-K1:IF COIN(G)<K0 T
HEN COIN(G)=K0
645 POSITION K11-G*K10,23: ? #K6:COIN(G
):GOSUB 990:GOTO 660
650 FOR C=K15 TO K0 STEP -.25:SOUND K
2,C+C,K10,C:SOUND K2,K0,K0,K0:POKE 711
-G-G,(127-G*K32)-C:NEXT C
651 POKE 711-G-G,127-G*K32
652 IF BW=K1 THEN POKE 711,134:POKE 70
9,127
653 COIN(G)=COIN(G)+K1:GOSUB 985:POSIT
ION K11-G*K10,23: ? #K6:COIN(G):GOSUB 9
10
654 S=5+K2:POKE 1547,70-S:POKE 1551,90
-S:POKE 1600,90-S
660 COLOR K32:PLOT K12-G*K5,K13:CTEMP(
G)=K0:GOTO 670+G*K10
670 COLOR 36:PLOT K12,K11:X(K0)=K3:Y(K
0)=21:ZT(K0)=37:COLOR MAN(K0):PLOT X(K
0),Y(K0):GOTO 690
680 COLOR 36:PLOT K7,K11:X(K1)=K16:Y(K
1)=21:ZT(K1)=39:COLOR MAN(K1):PLOT X(K
1),Y(K1):GOTO 690
690 IF COIN(G)=MAX THEN 1000
695 GOTO 260
700 IF PEEK(540)=K0 THEN POKE 708,200
710 COLOR MAN(G):PLOT X(G),Y(G):GOTO 2
60
800 REM CHANGE CROSSROADS
804 GOSUB 975:PLOT K6,K7:GOSUB 980:GOS
UB 975:PLOT K8,K7:GOSUB 980
805 GOSUB 975:PLOT K6,K8:GOSUB 980:GOS
UB 975:PLOT K8,K8:GOSUB 980:GOTO 850
818 GOSUB 975:PLOT K6,K15:GOSUB 980:GO
SUB 975:PLOT K8,K15:GOSUB 980
819 GOSUB 975:PLOT K6,K16:GOSUB 980:GO
SUB 975:PLOT K8,K16:GOSUB 980:GOTO 850
820 GOSUB 975:PLOT K11,K7:GOSUB 980:GO
SUB 975:PLOT K13,K7:GOSUB 980
821 GOSUB 975:PLOT K11,K8:GOSUB 980:GO
SUB 975:PLOT K13,K8:GOSUB 980:GOTO 850
834 GOSUB 975:PLOT K11,K15:GOSUB 980:G
OSUB 975:PLOT K13,K15:GOSUB 980
835 GOSUB 975:PLOT K11,K16:GOSUB 980:G
OSUB 975:PLOT K13,K16:GOSUB 980:GOTO 8
50
845 REM PATHS DISAPPEAR
850 DARK=INT(RND(K0)*K7)+K1:IF DARK=K1
THEN POKE 708,K0
860 POKE 540,120:GOTO 260
900 REM PLOT COINS
910 CN=INT(RND(K0)*K7)+K1:COLOR 216:PL
OT XC(CN),YC(CN):GOTO 985
970 REM CHANGE CROSSROADS
975 COLOR 209:PLOT X(G),Y(G)-K1:PATH=I
NT(RND(K0)*K5)+41:COLOR PATH:RETURN
977 REM SOUND SUBROUTINES
980 FOR C=K14 TO K0 STEP -K2:SOUND K2,
K10*C,K10,C:NEXT C:COLOR 81:PLOT X(G),
Y(G)-K1:RETURN

```



# Rafferty Run *continued*

```

985 SOUND K2,K6,K10,K14:SOUND K3,K8,K1
0,K14:SOUND K2,K0,K0,K0:SOUND K3,K0,K0
K0:RETURN
990 FOR C=K15 TO K0 STEP -.4:SOUND K2
,80,K0,C:NEXT C:RETURN
995 FOR C=K10 TO K0 STEP -.K1:SOUND K2,
150,K0,C:POKE 708,200-C:NEXT C:POKE 70
8,200:CTEMP(K0)=K0:CTEMP(K1)=K0
997 COLOR K32:PLOT K7,K13:PLOT K12,K13
:GOTO 260
1000 POKE 54286,64:FOR C=50 TO K0 STEP
-K1:FOR J=K0 TO K3:SOUND J,C+J,K10,K8
:NEXT J:NEXT C:FOR C=K1 TO K3
1005 SOUND C,K0,K0,K0:NEXT C:FOR C=K1
TO 22:COLOR K32:PLOT K0,C:DRAWTO 19,C:
NEXT C
1010 POSITION K3,K3:? #K6;"THE WINNER
IS":IF COIN(K0)=MAX THEN POSITION K3,
K5:? #K6;"Paddy O Brian":GOTO 1020
1015 POSITION K3,K5:? #K6;"lanny mc e
rly"
1020 POSITION K0,K7:? #K6;"          QQQ
Q          Q          Q          Q
          Q"
1030 POSITION K0,K10:? #K6;"          Q Q
          Q Q          Q Q          Q Q
          QQ          Q"
1040 POSITION K0,K13:? #K6;"          Q Q
          Q Q          Q Q          Q Q
          QQ          Q"
1050 POSITION K0,K16:? #K6;"          Q Q Q
          Q Q          Q Q          Q Q
          QQ" :C=K5:FOR CC=K1 TO 100
1060 C=C+K15:IF C>245 THEN C=K5
1070 POKE 708,C:SOUND K3,C,K10,K6:NEXT
CC:POKE 708,200:SOUND K3,K0,K0,K0
1200 FOR C=K1 TO 1000:NEXT C:POSITION
K0,K0:? #K6;CHR$(125):GOTO 28000
24995 REM DRAW SCREEN
25000 POKE 559,K0:POSITION K0,K2:? #K6
;" #((& #((& #((&
$ $ $ $
$ $ $ $ $ $ $ $ $ $ $
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
25010 POSITION K0,K5:? #K6;" $ - $
$ $ $ - $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
%(*' %((- "
25020 POSITION K0,K8:? #K6;" #(- #,&
#,& +(& $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
$ $ $ $ $ $ "
25030 POSITION K0,K11:? #K6;" $ $ $$$
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
$ $ $ $ $$$ "
25040 POSITION K0,K14:? #K6;" $$$ $ $
$ $ $$$ %*- %(' %(' +% ' "
25050 POSITION K0,K16:? #K6;" +((& #
((& #((- $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
$0 $ + $ "
25060 POSITION K0,19:? #K6;" $ - $$
$ $ - $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
%*( ' %((- "
25070 POSITION K2,K0:? #K6;"Q RAFFERTY
RUN" Q":POKE 559,34:RETURN
27995 REM TITLE & INPUT
28000 POKE 708,200:POKE 709,95:POKE 71
0,46:POKE 711,143:C=K5
28010 POSITION K0,K3:? #K6;" Q RAFFER
TY RUN Q " :POSITION K3,K5:? #K6;"by c
huck rosko":POSITION K2,K12
28015 ? #K6;"PRESS":POSITION K2,K14:?
#K6;"ENTER for color tv":POSITION K2,K
16:? #K6;"SPACE for bw tv"
28020 IF PEEK(53279)=K6 THEN POKE 711,
143:POKE 709,95:BM=K0:GOTO 28050
28025 IF PEEK(53279)=K5 THEN POKE 711,
134:POKE 709,127:BM=K1:GOTO 28050
28030 C=C+K15:IF C>245 THEN C=K5
28035 POKE 711,C:GOTO 28020
28050 POSITION K0,K0:? #K6;CHR$(125):F
OR X=K5 TO K15:X0(X)=K5:NEXT X:X0(K7)=
K1:X0(K11)=K2:X0(K14)=K3:X0(K13)=K4

```

```

28060 RESTORE 28070:FOR C=K1 TO K8:REA
D X,Y:XC(C)=X:YC(C)=Y:NEXT C:GOTO 2808
0
28070 DATA 4,4,14,4,5,5,15,5,4,18,14,1
8,5,19,15,19
28080 COIN(K0)=K0:COIN(K1)=K0:ZT(K0)=3
7:ZT(K1)=39:CTEMP(K0)=K0:CTEMP(K1)=K0:
X(K0)=K3:Y(K0)=21
28090 X(K1)=K16:Y(K1)=21:MAN(K0)=254:MA
AN(K1)=126:Z=K0:MAX=K10:POT(K0)=250:PO
T(K1)=122
28100 GOSUB 25000:POSITION K0,23:? #K6
;" 0 coins 0 COINS"
28120 COLOR MAN(K0):PLOT X(K0),Y(K0):C
OLOR MAN(K1):PLOT X(K1),Y(K1):GOSUB 29
000:GOTO 260
28995 REM SOUND DLT
29000 DL=PEEK(560)+256*PEEK(561):POKE
53768,K0:POKE 53775,K3:POKE 53761,162:
POKE 1600,90:RESTORE 29030
29010 POKE DL+K6,134:FOR I=K0 TO 20:RE
AD A:POKE 1536+I,A:NEXT I:POKE 512,K0:
POKE 513,K6:POKE 54286,192
29020 RETURN
29030 DATA 72,206,64,6,173,64,6,141,0,
210,201,70,208,5,169,90,141,64,6,104,6
4
31995 REM REDEFINE CHAR SET
32000 RESTORE 32010:FOR I=K1 TO K32:RE
AD A:ZZ$(I)=CHR$(A):NEXT I
32010 DATA 104,104,133,204,104,133,203
,104,133,206,104,133,205,162,4,160,0
32020 DATA 177,203,145,205,136,208,249
,230,204,230,206,202,208,240,96
32030 POKE 106,PEEK(106)-K5:GRAPHICS 1
8:START=(PEEK(106)+K1)*256:POKE 752,K1
32031 POSITION K5,K3:? #K6;"COINING UP
":POSITION 4,K6:? #K6;"rafferty run"
32040 A=USR(ADR(ZZ$),57344,START):REST
ORE 32200
32050 READ X:IF X=-K1 THEN RESTORE :GR
APHICS 17:POKE 756,PEEK(106)+K1:RETURN
32060 FOR Y=K0 TO K7:READ Z:POKE X+Y+5
TART,Z:NEXT Y:GOTO 32050
32200 DATA 24,0,127,64,64,64,64,67,66
32201 DATA 32,66,66,66,66,66,66,66,66
32202 DATA 40,66,67,64,64,64,64,127,0
32203 DATA 48,0,254,2,2,2,2,194,66
32204 DATA 56,66,194,2,2,2,2,254,0
32205 DATA 64,0,255,0,0,0,0,255,0
32206 DATA 72,66,195,0,0,0,0,195,66
32207 DATA 80,66,195,0,0,0,0,255,0
32208 DATA 88,66,67,64,64,64,64,67,66
32209 DATA 96,0,255,0,0,0,0,195,66
32210 DATA 104,66,194,2,2,2,2,194,66
32211 DATA 392,108,231,255,60,60,255,2
31,108
32212 DATA 448,60,126,231,231,231,231,
126,60
32213 DATA 464,0,255,60,126,251,253,25
1,126
32214 DATA 472,0,0,255,255,255,255,0,0
32215 DATA 496,0,0,110,110,126,255,102
,231
32216 DATA 504,110,110,126,255,102,102
,102,231
32220 DATA 128,127,99,99,99,99,99,127,
0,136,56,24,24,24,62,62,62,0,144,127,3
,3,127,96,96,127,0
32221 DATA 152,126,6,6,127,7,7,127,0,1
60,112,112,112,112,119,127,7,0,168,127
,96,96,127,3,3,127,0
32222 DATA 176,124,108,96,127,99,99,12
7,0,184,127,3,3,31,24,24,24,0,192,62,5
4,54,127,119,119,127,0
32223 DATA 200,127,99,99,127,7,7,7,0
32224 DATA 264,63,51,51,127,115,115,11
5,0,272,126,102,102,127,103,103,127,0,
280,127,103,103,96,99,99,127,0

```

```

32225 DATA 288,126,102,102,119,119,119
,127,0,296,127,96,96,127,112,112,127,0
,304,127,96,96,127,112,112,112,0
32226 DATA 312,127,99,96,111,103,103,1
27,0,320,115,115,115,127,115,115,115,0
,328,127,28,28,28,28,28,127,0
32227 DATA 336,12,12,12,14,14,110,126,
0,344,102,102,108,127,103,103,0,35
2,48,48,48,112,112,112,126,0
32228 DATA 360,103,127,127,119,103,103
,103,0,368,103,119,127,111,103,103,103
,0,376,127,99,99,103,103,103,127,0
32229 DATA 384,127,99,99,127,112,112,1
12,0,400,126,102,102,127,119,119,119,0
32230 DATA 408,127,96,127,3,115,115,12
7,0,416,127,28,28,28,28,28,0,424,10
3,103,103,103,103,103,127,0
32231 DATA 432,103,103,103,103,111,62,
28,0,440,103,103,103,111,127,127,103,0
,456,103,103,103,127,28,28,28,0,-1

```

#### CHECKSUM DATA.

(see page 16)

```

1 DATA 255,929,972,756,263,997,633,214
,196,381,657,761,872,561,859,9306
315 DATA 710,593,293,427,553,866,712,5
95,297,435,518,842,714,252,722,8529
530 DATA 442,519,363,714,438,608,734,7
99,490,838,125,555,942,836,480,8883
670 DATA 793,915,850,745,715,327,584,2
84,369,955,74,896,15,915,86,8523
845 DATA 902,189,348,709,39,607,484,77
8,482,883,842,759,985,143,638,8788
1010 DATA 636,187,725,646,313,746,67,1
92,649,423,160,792,809,886,894,8125
25050 DATA 144,746,652,750,293,255,816
,643,548,825,401,851,739,250,695,8608
28090 DATA 507,816,247,641,168,566,73,
890,664,226,499,222,398,429,119,6465
32050 DATA 989,196,159,186,170,864,890
,584,751,880,212,873,978,646,634,9012
32213 DATA 811,25,509,54,827,772,67,97
6,957,51,702,502,108,66,623,7050
32231 DATA 942,942

```

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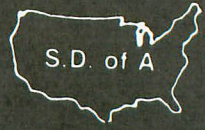
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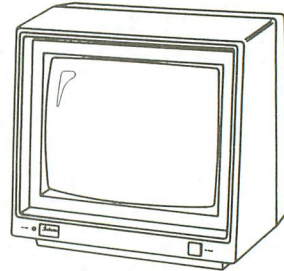
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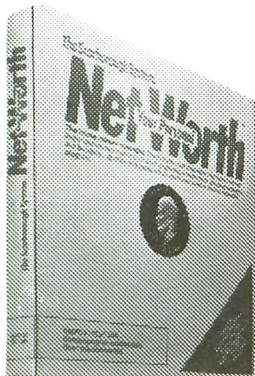


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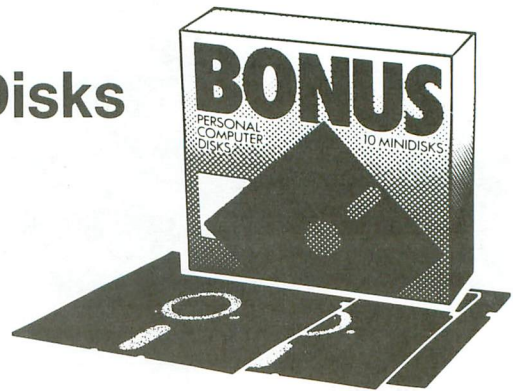
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by Clayton Walnum

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There's a land that exists in the unconscious flickers passing through a mind embraced by sleep. It hides in the shadows of dreams and shuns the bright light of reality. It is a land called **Nightshade**.

Ten-year-old Denny Wayne first found **Nightshade** not in the dark realm of sleep, but in a book discovered tucked back on a dusty library shelf. Each night, he perches on his bed and reads, turning the pages with trembling fingers, eyes as round as full October moons. Periodically, he frowns and shakes his head.

It seems that the Troll King has decided that all of **Nightshade** should be under his sole rule. His armies are even now preparing to march on the Elf capital of Gandolèse. The city will remain under siege until the Elves pledge fealty to the Troll King.

Denny closes the book reluctantly, crawls beneath

his blankets and settles back. Soon, he's asleep. In his mind's eye, he relives each moment of the story as if he were there. It is he who must overthrow the Troll King. And, in his dreams, **Nightshade** comes into being, begins to act out the script that has been laid down so carefully by some long-forgotten author.

The book rests on the bed. Each of Denny's movements nudge it closer to the edge. What secrets lay hidden in its final passages? The Troll King's plans are doomed to failure. On the very last page, the Elf armies banish him from **Nightshade** forever.

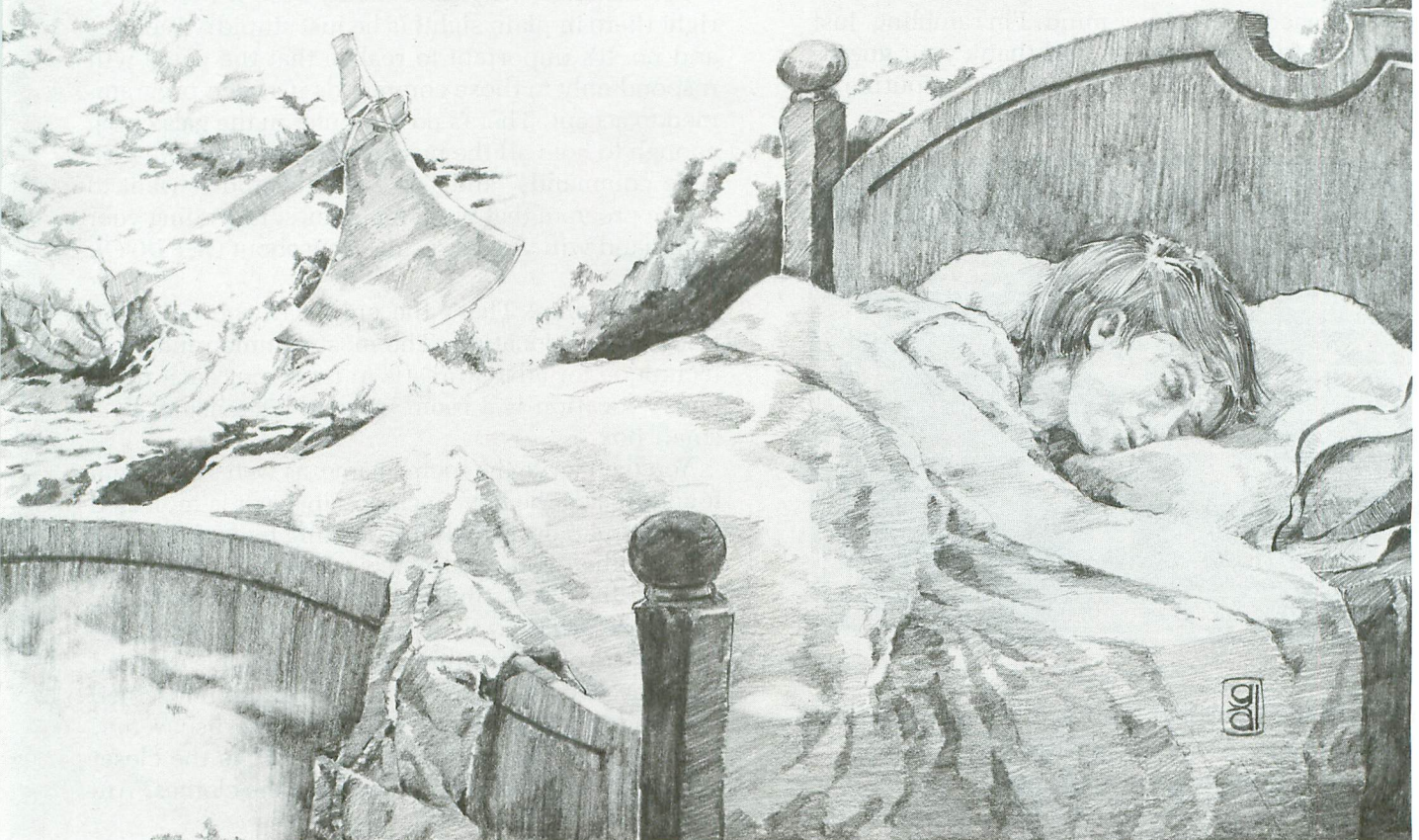
Denny sleeps. Denny dreams. The book falls from the bed to the floor. The pages flutter, opening to the final paragraphs before coming to rest.

Suddenly, a face looms from Denny's dream, the face of the Troll King. The King sees the book, reads the words that spell his downfall, and bellows in fury. He will not be defeated! An idea begins to form. . .





# Nightshade



Yes! That should work! He will send one of his henchmen from *Nightshade* into Denny's world and steal the last page. If Denny can't read it, his dreams will take another path.

Denny wakes with a start. He scrambles up, looks wildly about.

Nothing there.

Only a dream.

His breath whispers past his lips in a quiet sigh as he eases back. Eyelids creep shut. He remembers seeing the book lying on the floor. Wasn't there something different? Something missing, perhaps? Sleep enfolds Denny in its dark arms, and, in his last moment of wakefulness, his mind focuses on the book. The last page has been torn out! It's up to him to recover the missing page and place it back in the book. Only then will the Troll King's defeat be assured.

Denny sleeps. *Nightshade* wakes.

## The game.

*Nightshade* is a nonviolent fantasy text adventure suitable for the entire family. There's no fighting or dying. If you make a "fatal" mistake during play, Denny will simply wake from his dream. Your job is to guide Denny through the realm of *Nightshade*, recover the missing page and replace it in the book. Do you have what it takes? Well, let's find out!

## Hey! What's all this?

Type in the program exactly as it appears here. See all that strange gobbledygook? You know, the stuff that looks like a letter from E.T.? No, the typesetter didn't fall asleep at the keyboard. That's just a sneaky way to keep you from learning all the game's secrets as you're typing it in.

I know it makes the typing a bit difficult. Okay, a byte difficult (that's eight times a bit, get it?), but you can't very well play the game if you know all the



# Nightshade *continued*

answers before you even start! If it will make you feel better, you may send me nasty letters complaining about the knots in your fingers and comparing my IQ to that of an overripe tomato. I won't mind, and, in the return post, I'll send you a copy of my new book, *A Master's Guide to Finger Untying*, soon to be published by. . . Never mind; I'm rambling. Just type as carefully as you can, and thank your guardian angel that I remembered to include a routine to translate that stuff for you as you play.



**Nightshade.**

When you've finished typing, SAVE a copy of the program to tape or disk, then RUN it.

### Playing Nightshade.

Like most text adventures, **Nightshade** is open to your communication via two-word commands. These commands should be in a verb/noun format (i.e., *GET BOOK*, *GO DOOR*). There are a few exceptions.

All directions should be abbreviated to a single letter (N, S, E, W, U, D). There are also several single-word commands you should be aware of. These are *SAVE*, *LOAD* and *HELP*. Use the *SAVE* command to store your progress on tape or disk. The *LOAD* command will restore the last position saved. Type *HELP* any time you wish to have one of the encrypted hints translated.

**Nightshade** will not understand everything you type. To help you find the right commands, the program will give you short messages. The message *No such verb* or *No such noun* indicates that the verb or noun you used isn't in the program's vocabulary. When you see *Denny can't do that!*, it means that you haven't met the conditions required for the requested action, or that the command is beyond the scope of the game.

### Novice's corner.

If you've never played a text adventure before, you may find **Nightshade** a bit (byte?) confusing at first. You will see the message *Denny can't do that!* at times when it seems completely illogical.

For instance, why can't Denny *MOVE BOOK*? It's right there in plain sight! Is he just stupid? Well, yes and no. It's important to realize that the game will respond only to those commands it's been programmed to accept. There's no computer in the galaxy big enough to hold all the possible replies to all the possible commands (and you surely wouldn't want to type a program that big). Sometimes, rewording your command will yield a result. How about *GET BOOK* instead?

Draw a map! That's the only way you can keep track of your location. The most common mapping technique for adventures is to represent each room (every location is a room, even if it's outside) by a small box.

You then write the room's name, as well as any item found, inside the box. Each possible exit is indicated on your map by a small line leading toward the next room. When you enter a new room, be sure to take note of all exits. It's imperative that you try each one, otherwise you're likely to miss something important.

To start your adventure, try each available exit and note any items found. When you can go no farther, stop and think about everything you've discovered. What should Denny do with the bed? Is the closet significant in some way? How about the clothes? Are they important?

When you solve a puzzle, repeat the process, moving from room to room, gathering items and information until you get stuck again. Eventually, you'll find your way to the game's solution.

### Nightshade hints.

To use the following hints, type the *HELP* command any time during play. Find the question that relates to your problem, then type in the first encrypted hint beneath it. Each line is a separate hint. Some questions have several hints. After you decode the first, try to solve the puzzle on your own. If you're still stuck, then decode the next hint.

How can Denny get out of his room?

IF!NVTU!TMFFQ/  
MPPL!JO!UIF!DMPTFU/  
NPWF!UIF!DMPUIFT/

What are the trees for?

FYBNJOF!UIFN/  
POF!DBO!CF!DMJNCFE/  
POF!IBT!B!EPPS/

How can Denny cross the swamp?

**WJTJU!UIF!FMWFT/  
UBML!UP!UIF!FMWFT/**

How can Denny cross the pond?

**EJE!IF!HFU!JO!UIF!CPBUE  
MPPL!BU!UIF!NVTJD/  
EFOOZ!JT!B!H5FBU!TJOHF5=**

Where's the page from the book?

**JO!B!TUPOF!5PPN/  
VTF!UIF!NJ55PS/  
FYBNJOF!GBJOUFE!U5PMM/**

What about the dwarf?

**UBML!UP!IJN/**

Troll won't let Denny leave?

**SFGMFDU!PO!UIBU/  
IF(T!BXGVM!VHMZ/  
HJWF!IJN!UIF!NJ55PS/**

How can Denny "survive" the silver door?

**IF!DBO(U/**

How can Denny open the fancy box?

**IBWF!UIF!CMVF!TD5PMM6  
TFF!XIBU!JU!TBZT/  
TBZ!QSFTUP/**

What about the giant?

**UBML!UP!IJN/**

How can Denny get the hammer?

**IF!NVTU!CF!TUSPOHFS/  
EPFT!IF!IBWF!UIF!QPUJPO6  
FYBNJOF!JU/  
ESJOL!UIF!QPUJPO/**

What about the stream?

**FYBNJOF!JU/  
HFU!UIF!BMHBF/**

What about the old hag?

**UBML!UP!IFS/  
CBE!JEFB-!IVIC  
TIF!IBT!OPUIJOH!PG!VTF/**

What about the boulders?

**EFOOZ!OFFET!DSZTUBMT/  
CSFBL!UIFO!PQFO/  
XJUI!UIF!IBNMF5/**

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CIRCLE #131 ON READER SERVICE CARD



# Nightshade *continued*

How can Denny make the glue?

```
SFBE!UIF!SFDJRF/  
UTF!UIF!KVH/  
QVU!FBDI!JUFN!JO!UIF!KVH/
```

How can Denny get back to his room?

```
UTF!UIF!CSBTT!EPPS/  
SFBE!UIF!TJHO/  
UTF!UIF!SFE!TDSPMM/  
TBZ!TFYBNF/
```

How can Denny fix the book?

```
HFU!CDBL!UP!IJT!SPPN/  
OFFE!HMVF!QBHF!CPPL/  
HMVF!QBHF!PS!HMVF!CPPL/
```

All set? Denny's patiently awaiting your instructions. Good luck! **A**

Clayton Walnum is an industrial X-ray technician by day and a computer science major by night. He played guitar in a rock band for twelve years before turning his creative energies to programming. His greatest regret is that he wasn't one of The Beatles.

Listing 1.  
BASIC listing.

```
0 REM REVISED 2/16/85  
1 READ N1,N2,N3,N4,N5,N6,N7,N8,N9,N10,  
  NV,NN,5Z,N950,N11,N12,N13,N14,N15,N16,  
  N17,N18,N19,N20,N6760:GOTO 5000  
2 DATA 1,2,3,4,5,6,7,8,9,10,19,39,13,9  
  50,11,12,13,14,15,16,17,18,19,20,6760  
3 A=USR(ADR(D$),ADR(A$),LEN(A$)):A$:  
  A$="":RETURN  
4 POSITION N6,N10:"Okay":RETURN  
5 POKE N16,112:POKE 53774,112:RETURN  
45 N=N0:S=N0:E=N0:W=N0:U=N0:D=N0:GOSUB  
  R*N10:POSITION N11,N5:GOSUB N3:A$:A  
  $="":RETURN  
50 A$="Jo!Efooz(!c!fesppn":N=N6:RETURN  
60 A$="Jo!Efooz(!dmp!tfu":S=N5:RETURN  
70 A$="Jo!Efooz(!c!fe":U=N5:RETURN  
80 A$=FA$:N=N11:W=N9:I(N6)=-R:RETURN  
90 A$=FA$:N=N10:E=N8:I(N6)=-R:RETURN  
100 A$=FA$:E=N11:S=N9:I(N6)=-R:RETURN  
110 A$=FA$:S=N8:W=N10:I(N6)=-R:I(36)=-  
  R:RETURN  
120 A$="Cz!b!qpo":N=N15:RETURN  
130 A$="Jo!b!tnbmm!sppn":S=N10:RETURN  
140 A$="Jo!b!txbnq":E=N15:S=N11:RETURN  
150 A$="Po!b!spbe":S=N12:I(36)=-R:RETU  
  RN  
160 A$="Jo!b!ivu":S=N15:RETURN  
170 A$="Cz!uif!npvoub!ot!jef":RETURN  
180 A$="Jo!b!dbwf":W=N17:RETURN  
190 A$=SA$:E=N20+N2:W=N18:RETURN  
210 A$=SA$:W=N18:RETURN  
220 A$="Cz!uif!npvoub!ot!jef":N=N20+N4:  
  5=N20+N5:W=N19:D=N20+N3:RETURN  
230 A$=VA$:N=N20+N6:S=N20+N7:U=N20+N2:  
  RETURN  
240 A$=TA$:S=N20+N2:D=N20+N6:RETURN  
250 A$=TA$:N=N20+N2:S=N20+N10:D=N20+N7:  
  RETURN  
260 A$=VA$:S=N20+N3:U=N20+N4:RETURN  
270 A$=VA$:N=N20+N3:U=N20+N5:RETURN  
280 A$="Jo!b!usff":D=N11:RETURN  
290 A$="Jo!b!cpbu":U=R1:RETURN  
300 A$=TA$:N=N20+N5:RETURN  
900 RESTORE 5821:FOR X=N1 TO 72:READ A  
  :CC$(X)=CHR$(A):NEXT X
```

```
901 FOR X=N1 TO 35:READ A:D$(X)=CHR$(A  
  ):NEXT X  
902 FOR X=N1 TO 77:READ A:E$(X)=CHR$(A  
  ):NEXT X  
903 FOR X=N1 TO 35:READ A:L$(X)=CHR$(A  
  ):NEXT X  
904 FOR X=N1 TO NV:READ A:V(X)=A:NEXT  
  X  
905 FOR X=N1 TO NN:READ A$:A:Q=5Z-LEN(  
  A$):I$(X*5Z-5Z+N1,X*5Z-Q)=A$:I(X)=A:NE  
  XT X:GOTO 9000  
950 IF LEN(A$) THEN GOSUB N3  
951 IF R=N20+N9 THEN U=R1  
952 IF R=N14 AND I(N10)<>-N1 THEN 4819  
953 IF NOT UL THEN 1100  
955 A=USR(ADR(E$),N11,N5,N20+N3):GOSUB  
  45  
960 A=USR(ADR(E$),N11,N7,N20+N3):POSIT  
  ION N11,N7:IF NOT (N OR 5 OR E OR W O  
  R U OR D) THEN ? "None":GOTO 970  
962 IF N THEN ? "N "  
963 IF S THEN ? "S "  
964 IF E THEN ? "E "  
965 IF W THEN ? "W "  
966 IF U THEN ? "U "  
967 IF D THEN ? "D "  
970 A=USR(ADR(E$),N6,N14,N13):A=USR(AD  
  R(E$),N6,N15,N13):A=USR(ADR(E$),N6,N16  
  ,N13):A=USR(ADR(E$),N6,N17,N13)  
972 ROW=N14:FOR X=N1 TO NN:IF ABS(I(X)  
  )<>R THEN NEXT X:GOTO 974  
973 A$=I$(X*5Z-5Z+N1,X*5Z):POSITION N6  
  ,ROW:GOSUB N3:IT=N1:ROW=ROW+N1:NEXT X  
974 IF NOT IT THEN POSITION N6,ROW:?  
  "Nothing"  
980 A=USR(ADR(E$),N20+N1,N14,N13):A=US  
  R(ADR(E$),N20+N1,N15,N13)  
981 A=USR(ADR(E$),N20+N1,N16,N13):A=US  
  R(ADR(E$),N20+N1,N17,N13)  
982 ROW=N14:FOR X=N1 TO NN:IF I(X)<>-N  
  1 THEN NEXT X:GOTO 984  
983 A$=I$(X*5Z-5Z+N1,X*5Z):POSITION 21  
  ,ROW:GOSUB N3:ROW=ROW+N1:INV=N1:NEXT X  
984 IF NOT INV THEN POSITION N20+N1,N  
  14:?"Nothing"  
1100 IT=N0:INV=N0:UL=N0  
1260 POSITION N5,N11:SOUND N0,N20,N10,  
  N8:FOR X=N1 TO N10:NEXT X:SOUND N0,N0,  
  N0,N0  
1265 TRAP 1260:INPUT IN$  
1280 A=USR(ADR(E$),N6,N10,N20+N8):A=US  
  R(ADR(E$),N5,N11,N20+N9):POSITION N6,N  
  9:?"IN$:POSITION N6,N10  
1480 A=USR(ADR(L$),LEN(IN$),ADR(IN$)):  
  IF A=N0 THEN ? "What?":H=N0:GOTO N950  
1485 IF H THEN H=N0:A$=IN$(N1,A):GOTO  
  N950  
1490 IF A=N1 THEN V$=IN$(N1,N1):GOTO 1  
  820  
1500 V$=IN$(N1,A):N$=IN$(A+N2)  
1501 IF N$(N1,N3)="D00" THEN A$="Xi!jdi  
  !epps0":GOTO N950  
1502 IF N$(N1,N3)="5CR" THEN A$="5fgfs  
  !up!ju!cz!dmpms/":GOTO N950  
1510 IF R=N6 AND I(25)=-R AND N$(N1,N3  
  )="TRO" THEN I(N20+N5)=-N19:A$="If!svo  
  t!c!fi!joe!uif!dmpuift":UL=N1:GOTO N950  
1520 IF V$="SAVE" THEN 7060  
1540 IF V$="LOAD" THEN 6820  
1550 IF V$="HELP" THEN 4921  
1580 IF LEN(V$)=N2 THEN V$(N3)=" "  
1620 Y=USR(ADR(CC$),ADR(N$),ADR(NN$),L  
  EN(NN$))  
1640 Z=USR(ADR(CC$),ADR(V$),ADR(VB$),L  
  EN(VB$))  
1641 IF Z=N15 THEN 1760  
1642 IF Y=N16 AND I(N13) THEN Y=N13  
1720 IF NOT Y THEN ? "No such noun."  
  :GOTO N950
```

```

1730 IF NOT Z THEN ? "No such verb.":
GOTO N950
1760 Z=V(Z)
1780 ON Z GOTO 2001,2540,2740,4201,456
1,4601,4721,4761,4810,4832,4872,4892
1820 IF R<>N19 OR (IN$(N1,N1)<>"E" AND
IN$(N1,N1)<>"W") OR I(25)<>-R THEN 18
23
1822 A$="Uspmm!xpo!u!mfu!Efooz!mfbwf="
:GOTO N950
1823 IF R=N7 AND IN$(N1,N1)="U" THEN A
$="Uif!cpl!t!c!ffo!e!j!tuv!sc!fe=":GOSUB N
3:F=N1
1830 IF V$="N" AND N THEN R=N:GOTO 196
0
1840 IF V$="S" AND S THEN R=S:GOTO 196
0
1860 IF V$="E" AND E THEN R=E:GOTO 196
0
1880 IF V$="W" AND W THEN R=W:GOTO 196
0
1900 IF V$="U" AND U THEN R=U:GOTO 196
0
1920 IF V$="D" AND D THEN R=D:GOTO 196
0
1940 ? "No such direction!":GOTO N950
1960 IF NOT F THEN GOSUB N4
1970 F=N0:UL=N1:GOTO N950
2001 IF Y=N1 AND I(Y)=-N1 AND NOT 5L
THEN A$="Uif!ujumf!jt!0JHIUTIBEF/":GOT
O N950
2003 IF I(Y)=-N1 AND Y=N1 THEN A$="Uif
!mbtu!qbhf!jt!njttjoh/":GOTO N950
2005 IF Y=N6 AND R=N10 AND I(N7)=N0 TH
EN A$="Uifsf!t!b!epps!jo!ju=":UL=N1:I(
N7)=-R:GOTO N950
2010 IF R=N11 AND Y=N6 THEN A$="Bo!bss
px!qpjout!vq/":GOTO N950
2015 IF R=23 AND Y=26 AND NOT I(35) T
HEN A$="Efooz!tfft!tpnfuijoh=":I(35)=R
:UL=N1:GOTO N950
2017 IF R=21 AND Y=23 AND I(Y)=-R THEN
A$="Ju!t!Efooz!t!sppn=":GOTO N950
2019 IF R=N19 AND Y=25 AND I(N14)=-R A
ND I(24)=N0 THEN A$="If!ibt!b!cpl!qbh
f/":I(24)=R:UL=N1:GOTO N950
2021 IF I(Y)=-N1 AND Y=32 THEN A$="Ju!
tbzt;!VTF!CMVF!TD5PMM":GOTO N950
2022 IF I(Y)=-N1 AND Y=N8 THEN A$="Ju!
tbzt;!BTZ!SOTFPU":GOTO N950
2023 IF Y=37 AND I(Y)=-N1 THEN A$="Ju(
t!b!wfsz!npwjoh!qjfdf/":GOTO N950
2024 IF Y=34 AND I(Y)=-N1 THEN A$="HMV
F;!nve!bmhb!f!dsztubm/":GOTO N950
2025 IF I(Y)=-N1 AND Y=N5 THEN A$="Ju!
tbzt;!BTZ!NTFFTB":GOTO N950
2026 IF R=21 AND Y=N12 THEN A$="Ju!tbz
t;!BMJ!CBCB!XBT!IF5F":GOTO N950
2027 IF R=N19 AND Y=25 AND I(Y)=-R THE
N A$="If!t!gs!hiufo!johmz!vhmz=":GOTO N
950
2028 IF Y=24 AND I(Y)=-N1 THEN A$="Ju(
t!gsn!uif!cpl/":GOTO N950
2030 IF Y=33 AND I(33)=-N1 THEN A$="Ju
!tbzt;!GP5!TU5FOHUI":GOTO N950
2500 ? "Denny sees nothing of value.":
GOTO N950
2540 IF R=26 AND Y=30 AND I(33)<>-N4 T
HEN A$="Upp!ifbwz/":GOTO N950
2560 IF I(Y)=-N1 THEN ? "Denny already
has it!":GOTO N950
2580 IF I(Y)<N0 THEN ? "Denny can't ge
t that!":GOTO N950
2600 IF ABS(I(Y))<R THEN ? "It's not
here.":GOTO N950
2620 LOCATE 21,N17,A:COLOR A:PLOT 21,N
17
2630 IF A<>32 THEN POSITION N6,N10: ? "
Denny can't carry anymore!":GOTO N950

```

```

2660 GOSUB N4:I(Y)=-N1:UL=N1:GOTO N950
2740 IF I(Y)<>-N1 THEN ? "Denny doesn'
t have it!": ? :GOTO N950
2745 IF I(N16)<>-N1 OR (Y<>27 AND Y<>2
8 AND Y<>35) THEN 2750
2747 A$="Jo!uif!kvh//":I(Y)=-N4:UL=N1
:GL=GL+N1:IF GL=N3 THEN I(N13)=-N1:I(N
16)=N0
2748 GOTO N950
2750 LOCATE N6,N16,A:COLOR A:PLOT N6,N
16
2755 POSITION N6,N10:IF A<>32 THEN ? "
There's no more room here!":GOTO N950
2761 IF R<>N19 OR I(Y)<>-N1 OR Y<>N15
OR FT THEN 2840
2762 A$="If!tbx!ijntfmg!boe!gbjoufe=":
I(Y)=R:I(N14)=-R:I(25)=N0:UL=N1:FT=N1:
GOTO N950
2840 GOSUB N4
2842 I(Y)=R:UL=N1:GOTO N950
4201 IF R=N13 AND Y=N9 AND NOT I(N10)
THEN A$="Uifz!tipx!Efooz!tpnfuijoh/":
I(N10)=R:UL=N1:GOTO N950
4202 IF R=N13 AND Y=N9 THEN A$="Uifz!u
ijol!if!tipvme!mfbwf/":GOTO N950
4203 IF R=26 AND Y=29 AND NOT I(30) T
HEN A$="If!pggfst!Efooz!tpnfuijoh/":I(
30)=R:UL=N1:GOTO N950
4204 IF R=N17 AND Y=N18 AND NOT I(N19
) THEN A$="If!qpjout!up!tpnfuijoh/":I(
N19)=-R:UL=N1:GOTO N950
4205 IF (R=26 AND Y=29) OR (R=N17 AND
Y=N18) THEN A$="If!ibt!opuijoh!npsf!up
!tbz/":GOTO N950
4220 IF R=30 AND Y=39 THEN A$="Tif!qjo
dife!Efooz=":COL=N10:GOTO 15000
4500 GOTO N6760
4561 IF I(Y)=-N1 AND Y=33 THEN A$="Efo
oz!gffmt!tuspoh=":I(33)=-N4:UL=N1:GOTO
N950
4580 GOTO N6760
4601 IF R=N6 AND Y=N3 AND I(25)=-N19 A
ND NOT I(N4) THEN A$="Uifsf!t!b!tusbo
hf!eppsx!bz=":I(N4)=-R:UL=N1:GOTO N950
4602 IF R=N6 AND Y=N3 AND I(N4)<>-R TH
EN A$="Efooz!tfft!uif!dmptfu!xbmm/":GO
TO N950
4620 GOTO N6760
4721 IF R=N11 AND Y=N6 THEN R=28:GOSUB
N4:UL=N1:GOTO N950
4759 GOTO N6760
4761 IF R=29 AND I(37)=-N1 THEN R1=N12
*(R1=N17)+N17*(R1=N12):A$="Zpv!dsptt!u
if!qpoe=":I(N17)=-R1:GOTO N950
4800 GOTO N6760
4810 IF R=N5 AND Y=N2 AND NOT 5L THEN
R=N7:I(25)=-N6:A$="I!!!!!!!!!!!!!!!!!!!!
":5L=N1:UL=N1:GOTO N950
4811 IF R=N15 AND Y=N11 THEN GOSUB N4:
R=N16:UL=N1:GOTO N950
4812 IF R=N6 AND Y=N4 AND I(N4)=-R THE
N R=N8:UL=N1:I(N4)=N0:GOSUB N4:GOTO N9
50
4813 IF R=N17 AND Y=N19 AND I(Y)=-R TH
EN R=N18:UL=N1:GOSUB N4:GOTO N950
4814 IF Y=N17 AND I(Y)=-R THEN R=29:UL
=N1:GOSUB N4:GOTO N950
4815 IF R=N5 AND Y=N2 THEN A$="Efooz!t
!opu!tmffqz=":GOTO N950
4817 IF R=N10 AND Y=N7 AND I(N7)=-R TH
EN R=N13:GOSUB N4:UL=N1:GOTO N950
4818 IF (R<>N11 AND R<>N15) OR Y<>36 T
HEN 4824
4819 IF I(N10)<>-N1 THEN A$="Efooz!t!t
joljoh=":COL=N11:GOTO 15000
4821 GOSUB N4:R=N14:UL=N1:GOTO N950
4824 IF R<>N18 THEN 4827
4825 IF Y=21 THEN A$="Efooz!t!gbmmjoh=
":COL=N11:GOTO 15000

```



```

4826 R=Y-N1:UL=N1:GOSUB N4:GOTO N950
4827 IF R<>21 OR Y<>23 OR I(23)<>-R TH
EN 4830
4828 IF (I(N1)=-N1 OR I(N1)=N5 OR I(N1
)=N6) AND I(N13)=-N1 AND I(24)=-N1 THE
N R=N5:UL=N1:GOSUB N4:GOTO N950
4829 A$="Efooz!ib!gbjmf!i!jt!n!jtt!jpo=
=" :COL=N4:GOTO 15000
4830 GOTO N6760
4832 IF I(32)=-N1 AND I(33)=N0 AND I(N
8)=-N1 AND N$(N1,N4)="PRES" THEN A$="U
if!c!py!p!q!fot=" :UL=N1:I(33)=R:GOTO N950
4834 IF R=21 AND I(N5)=-N1 AND I(23)=N
0 AND N$(N1,N4)="SESA" THEN I(23)=-R:U
L=N1:A$="B!epps!b!qq!fbst=" :GOTO N950
4840 A=USR(ADR(L$),LEN(N$),ADR(N$)):N$
=N$(N1,A):? CHR$(34);N$;CHR$(34):GOTO
N950
4872 IF R<>24 OR Y<>31 OR I(27)<>N0 OR
I(30)<>-N1 THEN 4890
4874 A$="Uif!c!p!ym!fst!c!s!fb!l!p!q!fo=" :I(2
7)=R:I(38)=R:I(31)=N0:UL=N1:GOTO N950
4890 GOTO N6760
4892 IF I(N13)<>-N1 OR I(N1)<>-N1 OR I
(24)<>-N1 OR (Y<>24 AND Y<>N1) THEN GO
TO N6760
4893 IF R<>N5 AND R<>N6 THEN A$="Dbo(u
!e!u!ibu!i!f!s!f=" :GOTO N950
4894 GOTO 16000
4921 A$="Uzqf!j!o!u!i!f!f!ods!z!qu!fe!i!j!ou!/"
H=N1:GOTO N950

```

```

5000 GRAPHICS N17:GOSUB N5:POSITION N5
,N5: ? HN6;"NIGHTSHADE":POSITION N9,N10
: ? HN6;"B"
5010 POSITION N3,N12: ? HN6;"CLAYTON WA
N10"
5780 DIM VB$(NV*N3),I$(NN*5Z),A$(160),
IN$(26),V$(N10),N$(N10),CC$(77),D$(37)
,Z$(N1)
5800 DIM NN$(NN*N3),I(NN),E$(79),V(NV)
,L$(35),FA$(N19),SA$(N15),VA$(N11),TA$(
N10)
5821 DATA 104,104,133,204,104,133,203,
104,133,206,104,133,205,104,104,133,20
7,162,0,142,255,6,134,213,232
5822 DATA 160,0,177,203,209,205,208,8,
200,192,3,208,245,134,212,96,173,255,6
,24,105,3,197,207,240
5823 DATA 16,141,255,6,165,205,24,105,
3,133,205,144,217,230,206,176,213,169,
0,133,212,96
5841 DATA 216,104,104,133,204,104,133,
203,104,104,133,205,160,0,177,203,201,
61,240,11,56,233,1,145,203
5842 DATA 200,196,205,208,240,96,169,3
3,208,244
5861 DATA 104,104,104,141,253,6,104,10
4,141,254,6,104,104,141,255,6,165,88,1
33,203,165,89,133,204,174
5862 DATA 254,6,240,14,165,203,24,105,
40,133,203,144,2,230,204,202,208,242,1
65,203,24,109,253,6,133
5863 DATA 203,144,2,230,204,56,165,203
,233,1,133,203,176,2,198,204,172,255,6
,169,0,145,203,136,208
5864 DATA 251,96
5881 DATA 104,104,104,141,255,6,104,13
3,204,104,133,203,160,0,177,203,201,32
,240,8,200,204,255,6,208
5882 DATA 244,160,0,132,212,169,0,133,
213,96
5890 FA$="Jo!b!nbh!jdbm!gps!ftu":SA$="Jo
!b!tupof!sppn":VA$="Jo!b!wbmmfz":TA$="
Po!b!usb!jm"
5960 VB$="EXALOOTAKGETDROGIUPTTALDRIM
OVCLISINGO ENTSAYHITSMAGLUHEL"
6000 NN$(N1,93)="BOOBEDRUGLOEDTREWOO
BLUFAMSHOHUTSIGGLUFAMIRJUGBOADWATUNGO
LSILBRAGLAPAGTRO5TRCRYMUDGIAHAMBOU"
6010 NN$(94,117)="BOXPOTCARALGSHAMUSRO
CHAG"
6060 I$=" ":I$(NN*5Z)=" ":I$(N2)=I$
6080 GOSUB 32000:GOTO 900
6100 DATA 1,1,2,2,3,3,3,4,5,6,7,8,9,9,
10,11,11,12,13
6120 DATA CPPL,5,CFE,-5,DMPUIFT,-6,HMP
XJH!EPPS,0,SFE!TD5PMM,25,USFFT,0,XPPE
FO!EPPS,0,CMVF!TD5PMM,28
6125 DATA FMG!GBN!JMZ,-13,TXBNQ!TIPFT,0
,IUU,-15,TJHO,-21
6130 DATA KVH!XJUI!HMVF,0,GBJOUFE!USPM
M,0,NJSSPS,16,KVH,16,CPBU,-12,EXB5G,-1
7,UVOOFM,0
6140 DATA HPME!EPPS,-18,TJMWFS!EPPS,-1
8,CSBTT!EPPS,-18,HMBTT!EPPS,0,CPPL!QBH
F,0,USPMM,0,TU5FBN,-23
6150 DATA D5ZTUBMT,0,NVE,14,HJBOU,-26,
IVHF!IBNNF5,0,CPUMEF5T,-24,GBODZ!CPY,2
7,OPUJPO,0,5FDJQF!DB5E,16,BMHBF,0
6155 DATA TXBNQ,0,TIFFU!NVTJD,29,CJUT!
PG!SPDL,0,PME!IBH,-30
6760 ? "Denny can't do that!":GOTO 110
0
6820 TRAP 7040
6840 POSITION N6,N10: ? "LOAD FROM TAPE
OR DISK":INPUT Z$:IF Z$="D" THEN 690
0
6860 IF Z$<>"T" THEN ? :GOTO 6820

```

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```

6880 POSITION N6,N10:? "CUE, PRESS RET
URN TWICE.":OPEN #N1,N4,N0,"K":GET #N
1,A:CLOSE #N1
6885 OPEN #N1,N4,N0,"C":GOTO 6920
6900 OPEN #N1,N4,N0,"D:NIGHTSHA.DAT":A
$=""
6920 INPUT #N1,R,R1,GL,FT,5L
6980 FOR X=N1 TO NN:INPUT #N1,A:I(X)=A
:NEXT X
7020 CLOSE #N1:UL=N1:? :? :TRAP 1260:G
OTO N950
7040 POSITION N6,N10:? "NO GAME DATA S
AVED!":CLOSE #N1:GOTO 1100
7060 POSITION N6,N10:? "SAVE TO TAPE O
R DISK":INPUT Z$:IF Z$="D" THEN Z$=","
:GOTO 7120
7080 IF Z$("<" THEN 7060
7100 POSITION N6,N10:? "CUE, PRESS RET
URN TWICE.":OPEN #N1,N4,N0,"K":GET #N
1,A:CLOSE #N1:Z$=","
7110 OPEN #N1,N8,N0,"C":GOTO 7140
7120 OPEN #N1,N8,N0,"D:NIGHTSHA.DAT"
7140 PRINT #N1;R;Z$;R1;Z$;GL;Z$;FT;Z$;
5L
7200 FOR X=N1 TO NN:PRINT #N1;I(X):NEX
T X
7220 CLOSE #N1:? :? :A$="":GOTO 1100
9000 GRAPHICS N0:GOSUB N5:POKE 756,CH5
ET:POKE 559,N0:DL=PEEK(560)+256*PEEK(5
61)+N4:POKE DL-N1,71:POKE DL+N2,N6
10001 POKE DL+24,65:POKE DL+25,PEEK(56
0):POKE DL+26,PEEK(561)
10005 POKE 82,N0:POKE 708,136:POKE 709
,N8:POKE 710,N0:POKE 712,N0:POKE 752,N
1
10010 POSITION N5,N0:? "NIGHTSHADE"
10020 POSITION N1,N1:? "
|+*****+
|*****+
|*****+
10030 POSITION N1,N3:? " *
|*****+
|*****+
10040 POSITION N1,N5:? " * |PLACE
|*****+
|*****+
10050 POSITION N1,N7:? " * |EXITS
|*****+
|*****+
10060 POSITION N1,N9:? " *
|*****+
|*****+
10070 POSITION N1,N11:? " *
|*****+
|*****+
10080 POSITION N1,N13:? " * |DENNY SEE
|*****+
|*****+
10090 POSITION N1,N15:? " *
|*****+
|*****+
10095 POSITION N1,N17:? " *
|*****+
|*****+
10100 POSITION N1,N18:? " *
|*****+
|*****+
10110 POSITION N1,N20:? " |*****+
|*****+
10111 POKE 559,34
10113 R=N5:GL=N0:R1=N12:UL=N1:FT=N0:5L
=N0
10120 A$="":GOTO N950
15000 GRAPHICS N0:POKE 752,N1:POKE 710
,N0:POSITION COL,N7:GOSUB N3:POSITION
N8,N9:? "DENNY WAKES UP IN BED."
15010 POSITION N6,N15:? "Do you want t
o play again?"

```

```

15020 OPEN #N1,N4,N0,"K":GET #N1,A:CL
OSE #N1:IF A=A5C("Y") THEN POSITION N1
7,N20:? "OKAY":RESTORE 6100:GOTO 904
15030 IF A=A5C("N") THEN END
15040 GOTO 15020
16000 GRAPHICS N0:POKE 710,N0:POKE 752
,N1:POSITION N9,N11:? "You saved Night
shade!"
16010 GOTO 16010
32000 DIM MV$(N20):RESTORE 32001:FOR X
=N1 TO N20:READ A:MV$(X)=CHR$(A):NEXT
X
32001 DATA 104,162,4,160,0,177,205,145
,203,200,208,249,230,206,230,204,202,2
08,242,96
32010 CHSET=PEEK(106)-N8:CHBASE=CHSET*
256
32015 IF PEEK(CHBASE+80)=255 THEN RETU
RN
32020 POKE 204,CHSET:POKE 206,224:D=US
R(ADR(MV$))
32030 READ A:IF A=-N1 THEN RETURN
32040 FOR BYTE=N0 TO N7:READ B:POKE CH
BASE+A*N8+BYTE,B:NEXT BYTE:GOTO 32030
32100 DATA 10,255,170,170,170,170,170,
170,255
32110 DATA 11,255,85,85,85,85,85,85,25
5,-1

```

CHECKSUM DATA.

(see page 16)

```

0 DATA 798,699,671,155,886,826,658,154
,868,183,52,996,886,950,509,9291
130 DATA 698,540,520,433,68,507,421,34
7,25,797,706,981,733,733,480,7989
290 DATA 666,638,672,121,137,131,255,3
87,744,567,430,141,47,685,556,6177
963 DATA 577,522,595,588,307,783,480,5
50,611,606,615,59,936,529,77,7835
1260 DATA 348,238,410,448,141,47,589,4
89,269,267,278,288,287,280,808,5187
1640 DATA 795,698,245,443,419,477,839,
951,773,644,846,887,777,923,902,10619
1920 DATA 768,784,782,628,213,60,335,6
83,446,527,271,243,400,875,666,7681
2025 DATA 378,694,443,719,820,566,603,
93,226,50,350,711,813,939,993,8398
2747 DATA 853,845,513,572,319,689,950,
649,106,409,484,518,700,272,45,7924
4561 DATA 949,53,290,920,50,291,74,35,
54,940,397,696,918,603,61,6331
4817 DATA 785,757,735,518,979,267,881,
216,765,328,57,559,951,347,567,8712
4874 DATA 731,63,958,796,952,517,441,3
99,28,127,675,118,198,320,989,7312
5861 DATA 275,91,969,170,322,637,740,8
31,149,961,821,308,559,415,239,7487
6130 DATA 17,788,440,607,527,721,293,5
2,937,266,149,754,860,925,649,7985
7060 DATA 47,230,706,218,532,272,242,1
24,580,607,132,639,423,598,931,6281
10050 DATA 999,798,745,279,185,510,790
,756,61,321,520,316,375,212,519,7386
15040 DATA 212,653,210,696,905,308,201
,323,679,13,824,638,5662

```



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**POWERSTAR**  
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by Charles Bachand

Being one of the few people at **ANALOG Computing** who can stay seated long enough to play a text adventure game, the job of reviewing **Powerstar** fell to me. (In other words, "Charlie, you play games *all day long*; guess what you're going to do?") Well, here I am, with a copy of what has to be the fastest playing, most technically interesting graphics adventure cartridge ever to come along!

That's right, folks—it is, indeed, a cartridge. A 16K cartridge, to be exact, that's so crammed with data and so heavily optimized that I sometimes wonder why it works at all! Just plug it in and turn it on. A cassette or disk drive isn't necessary.

When I first heard that this adventure was on a cartridge, I immediately said to myself, "Probably just another piece of junk that will end up in the trash bin." I couldn't have been further from the truth.

**Powerstar** is a 63-room graphics adventure that will amaze you with its speed. I should really be calling it a 252-room adventure, because, once in a room, you can look at it from four different directions (North, South, East and West), which all give you a different view of the room.

Graphic data for the 252 screens (254, if you count the extras for inventory and getting blown up) has been tokenized

into graphic elements, such as chairs, windows, tables, etc. These are inserted into a picture as required.

Display list interrupts have also been incorporated, to increase the number of colors on the screen, and sound effects at key locations add greatly to the game.

Text, like graphics, has been compacted by replacing common words with 1-byte tokens. Common phrases, like "you can see a" (which can contain work tokens) are also tokenized, so that a sentence like this: "Through the front door you can see a spaceship," might only take up about half a dozen bytes.

Now, a little bit about the scenario, so the rest of you don't fall asleep. . . In the 21st century, all electrical power in the United States is generated by one huge nuclear fission reactor, placed within a geo-synchronous orbiting space station known as **Powerstar**. Power from the station is beamed, via microwave, down to the local communities.

Things have been going well with the **Powerstar**, until the authorities have you summoned. It seems that the sole human operator aboard the station (**Powerstar** is run mostly by robots) is not responding to any messages. As second engineer, you've been ordered to investigate. You are deposited on the front lawn of a government field station, a spaceship parked directly before you. From here, the adventure begins.

Your movements through the game can be controlled via the keyboard, using the arrow keys for moving forward

and turning left or right. Optionally, you can use the four keys *N, S, E* and *W* to face you in a compass direction. But the fastest (and laziest) method is to plug in a joystick, sit back and let your fingers do the walking through **Powerstar**.

This adventure has some interesting puzzles to solve and traps to watch out for. Since I usually plan on being killed at least once while playing a new adventure, I make sure that I have a formatted disk inserted in my drive and that I save the game out periodically. **Powerstar** allows you to save up to ten different versions of the game onto a disk.

The only complaint that anyone could have with Pandora's first release would be with the blockiness of the graphics, which are produced using a multicolor GTIA chip mode. Since the use of graphics in a fast-paced game like this is mainly as a visual aid, this fault quickly disappears.

One word of warning, though. If your machine is an early 400 or 800, you may want to check to see if it contains the required GTIA chip before you purchase **Powerstar**. The older CTIA chips will produce a very strange display. ☐

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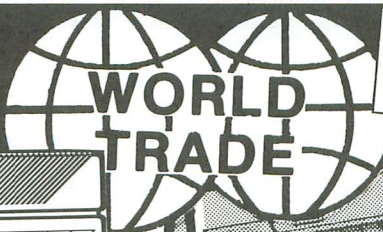
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# The Solid Gold Input Routine

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by Jim Dunion

---

Remember that old cliché, GIGO—garbage in, garbage out? Well, when I write a program, I know pretty much what it expects for input and I don't try to screw it up. However, when somebody else sits down to use it, you can bet they're going to do everything in the world but what I'd intended. So I'd better plan for the program to deal with all sorts of wild and crazy input.

There are a lot of things that people can do wrong when it comes to input. I know this from long, painful experience. I used to work at the American Museum of Science and Energy in Oak Ridge, Tennessee, where we used microcomputers in energy education exhibits.

For the first several months that I was there, we had a running battle with local kids who would come in and try to crash our programs. Then, they could write their own little programs for all the nice visitors to see. I'll leave it to your imagination what sorts of things these little darlings would have popping up on the screen.

Anyway, out of this battle, we evolved an input routine that they couldn't fold, staple or mutilate. Matthew Broderick and the Whiz Kids together couldn't break into this routine! Ladies and Gentlemen, I'd like to introduce to you the **Solid Gold Input Routine**.

## Breakout.

Actually, before I begin talking about input, let me mention a couple of problem areas that aren't exclusively input problems. The first of these is the BREAK key.

Any time a BASIC program is running, merely pressing this key will halt it. Obviously, we can't have that. A simple solution is to define POKMSK = 16, and have a subroutine:

```
I=PEEK(POKMSK):IF I>127 THEN I=I-128:P  
OKE POKMSK,I:POKE 53774,I
```

What this does is check to see if the BREAK key is enabled and, if so, it disables the BREAK key interrupt on the POKEY chip and in the RAM shadow, POKMSK. This statement should be set up as a subroutine, because it must be re-executed after every graphics command (e.g., GR.0).

The other main problem is the SYSTEM RESET key. It's possible to trap this vector to do things like forcing the disk to reboot. It's even possible to rerun the BASIC program in memory. But I was never able to find a way to make it continue executing the program at the spot where the RESET key was pressed. The OS just does too many things before we can get hold of the vector.

What to do? I almost hate to tell you. We opted for the brute strength approach and rewired the SYSTEM RESET key out of the computer. Not elegant, but it worked.



### The trouble with the INPUT statement.

Okay, we need some input for our program. Let's build an input routine for our programming skeleton. *What?* You didn't read my article on programming skeletons in *ANALOG Computing's* issue 32? Quick, rush out and buy a copy before it's gone forever! Now then, we'll put this routine at Line 150.

```
150 REM THIS IS THE GENERAL KEYBOARD I
INPUT ROUTINE.
151 REM WE WILL BUILD UP THIS ROUTINE
152 STARTING AT LINE 155
153 REM
154 REM
```

A quick scan down the list of BASIC statements shows that we do, indeed, have an INPUT statement. No problem, right? Seems pretty obvious what comes next.

*Dunion's 2nd Law of Programming — Beware of the obvious.*

Let's say we'll define a general system variable, ZR, which will be our general arithmetic input variable. We start out with:

```
155 INPUT ZR
156 RETURN
```

Somewhere in our program (which we want to be absolutely crashproof) we put a statement like:

```
GOSUB 155:VALUE1=ZR
```

The first problem with the INPUT statement is that it *always* prints a ? when input is desired. Frankly,

sometimes I don't want a ? to show up. But the real problem with the INPUT statement happens when along comes *Wise Guy #1*, who doesn't enter a value, just presses RETURN. Bingo! Broken routine.

```
ERROR- 8 AT LINE 155
(INPUT STATEMENT ERROR)
```

You see, that's the fatal flaw with the INPUT statement. Even a simple null entry will kill it. Now, we could use the TRAP statement and build up an elaborate error checking procedure, but, instead, let me argue for a different approach: don't let them make errors in the first place.

Let's try to build an input routine that deals reasonably with reasonable input and ignores unreasonable input—RIRO. So, no INPUT statement. That makes things a little more tricky, doesn't it? Well, one of the most primitive ideas in problem solving is: when you can't solve a large problem, try to break it down into a series of smaller problems you *can* solve. Let's see where this approach gets us.

### GETting one character at a time.

Whenever we go out to GET input, whether it's numeric or text string, it still comes in one character at a time. So, let's go at it that way. We'll use the GET statement.

I don't know about you, but the first time I ran into the GET and OPEN statements and IOCBs, internally I said, "Uh-oh, I'm in trouble." Then one day, a great thing happened to me. Chris Crawford, whom

# Solid Gold Input *continued*

I worked for at Atari, said, "Jim, we're going to write a great saga about the Atari 800, called *De Re Atari*, and guess who's going to write the chapter about the operating system?"

So I had to learn about GET, OPEN and IOCBs. GET is a command of the general form:

GET #aexp1,aexp2                      where,

aexp is short for an arithmetic expression  
aexp1 designates which of 8 input/output control blocks (IOCBs) to use  
aexp2 is the arithmetic variable assigned the value of the 1 byte that the GET command gets.

The IOCB mechanism is the general way that the Atari's OS handles input and output. In brief, an OPEN command is used to assign any one of eight (0-7) IOCBs to a physical input or output device. The general form of the OPEN command is:

OPEN #aexp1,aexp2,aexp3,filespec    where,  
aexp1 is the IOCB number we want to use

aexp2 is a code number that determines input or output

aexp3 is a device-dependent auxiliary code  
filespec is the file specification for the physical device we want to use.

To use the keyboard for input, I use:

**OPEN #4,4,8,"K:"**

Then, a statement like GET #4,ZR will get us one byte from the keyboard. Later, when we're through using the keyboard, CLOSE #4 will release the IOCB, so that it could be used at other places in the program.

Meanwhile, back at the input ranch, we're going to GET input one character at a time, until we see the RETURN character. We'll use a string variable, ZR\$, for this. By the way, I name all my system skeleton variables with a Z as the first letter. The R just stands for response string.

We will dimension this string at 40 bytes. It's unlikely that we'll want to input a value greater than 40 characters long. Now, we can look at the general form of the input routine.

```

155 OPEN #4,4,0,"K:":REM ...OPEN THE IOCB
160 ZR$="":REM ...CLEAR THE RESPONSE STRING
165 GET #4,ZR:REM ...GET ONE BYTE INTO ZR
170 IF ZR=155 THEN 199:REM ...CHECK IF RETURN CHARACTER
175 ZC$=CHR$(ZR):REM ...CONVERT NUMERIC VALUE TO A STRING CHARACTER
180 ZR$(LEN(ZR$)+1)=ZC$:REM ...ADD CHARACTER TO RESPONSE STRING
185 PRINT ZC$;:REM ...PRINT THE CHARACTER JUST ADDED
190 GOTO 165:REM ...AND GO GET SOME MORE INPUT
199 PRINT:CLOSE #4:RETURN

```

There are a few things you should notice about this routine as written. First, Line 180 is where we actually add the character just received from the keyboard to the response string. It is an interesting example of what's known as a "self referential" statement.

What we're telling BASIC is, "At the character position of ZR\$ that is one greater than the current size of ZR\$, place the character we just picked up." Also, since GET only inputs the character, we have to explicitly print it ourselves, hence line number 185.

Note that this statement ends in a semicolon, so that BASIC doesn't print the next character on the next line. The PRINT statement on Line 199 closes out one line of print and sets BASIC up to begin printing on the next line.

A few other remarks about style... I hate "magic numbers" like the 155 in Line 170 (155 is the value

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ANALOG COMPUTING



# Solid Gold Input *continued*

ing. Suppose we're looking for numbers again, and Wise Guy #3 starts banging in letters, punctuation marks, etc.

If they happen to type in a numeric character first, a VAL statement will just convert the numeric part of the input string, up to where the first non-numeric character occurs. If, however, the first thing typed is not a number:

```
ERROR- 18 AT LINE --
(INVALID STRING CHARACTER)
```

No problem. We simply pass our little routine two more parameters, ZLO and ZUP, a lower and upper limit for characters we will accept. Change Line 178 to read:

```
178 IF (ZCC=ZF5 OR ZR<ZLO OR ZR>ZUP) T
HEN ZCC=ZCC-Z1:GOTO 165
```

We can set these limits up at program initialization time if we want, then only change them as necessary. For upper case letters, ZLO = 65 and ZUP = 96. For numbers only, ZLO = 48 and ZUP = 57. Things get a little trickier if you want a SPACE ( = 32) or a PERI-

OD ( = 46) or a COMMA ( , = 44). In allowing these values, everything else in between is also allowed.

## You take me up, up, up, up.

We're getting close now, folks. Can you think of any other things that might come screaming out of the night at us? I couldn't, either, until one day somebody goofed around and left the CAPS unshifted when I was expecting upper case letters. Hmmm!

Actually, we might like to filter out upper and lower case, control CAPS LOWR, inverse characters—and just make everything upper case. We need to define location 702 as SHFLOK (shift lock flag) and location 694 as INVFLG (inverse character flag). Then we change Line 165 a little, to read:

```
165 GOSUB 185:IF ZR=CARRET THEN PRINT:
CLOSE #Z4:RETURN
```

and add:

```
185 GET #Z4,ZR:IF ZR=CARRET THEN 195
188 IF ZR>=Z128 THEN ZR=ZR-Z128
190 IF PEEK(SHFLOK)=Z0 AND ZR>=Z96 THE
N ZR=ZR-Z32
195 POKE SHFLOK,Z64:POKE INVFLG,Z0:RET
URN
```

Line 188 would convert an inverse character back to normal display, while 190 changes a lower case character to upper case. Line 195 is a precautionary line. It automatically turns off shift lock or the inverse flag if they've accidentally(?) been turned on. Just in case, you understand.

## A little lace around the windows, please.

We're down to the lace and frills now. Long, long ago, it was noticed that we often want to not only get some input, but to also first print a message. So why not...? You guessed it. I passed three more parameters to the routine, ZXCUR, ZYCUR and ZQ\$.

These determine where I want a message printed and what I want it to say. The input field will be set up right after the last character of ZQ\$. We change our current Line 155 to 160 and add:


```
155 POKE ZTXTR0W,ZYCUR:POKE ZTXTCOL,ZX
CUR:PRINT ZQ$;
```

ZTXTR0W and ZTXTCOL are the locations in the OS database where the cursor row and column are stored. If the routine is used for a mode 0 text screen, these values are 84 and 85, respectively. If you want to use this routine with a split screen, they are 656 and 657.

Any more enhancements you need? How about turning the cursor off when there's no input desired and on again when some is wanted? Simple: define ZCURSOR = 752. During initialization, POKE ZCURSOR with a Z1. *Et voila!* Our final routine, complete

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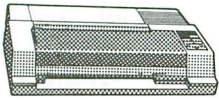




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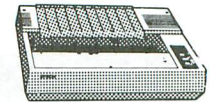
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# Solid Gold Input *continued*

with initializations and a routine to test it out looks like this:

```

1 REM THIS IS A PROGRAM TO TEST OUT
2 REM THE GENERAL INPUT ROUTINE
3 REM
4 REM THE INPUT ROUTINE ITSELF IS
5 REM LINES 150 - 195
6 REM THE MAIN BODY OF THE PROGRAM
7 REM STARTS AT 1000
8 REM INITIALIZATION BEGINS AT 32000
9 REM
10 GOTO 32005
150 REM THIS IS THE GENERAL INPUT ROUTINE
155 POKE ZTXTRW,ZYCUR:POKE ZTXXCOL,ZX
CUR:POKE ZCURSOR,Z0:PRINT ZQ$;
158 OPEN #Z4,Z4,Z0,"K":ZCC=Z0
160 ZR$=""
165 GOSUB 185:IF ZR=CARRET THEN POKE A
CURSOR,Z1:PRINT :CLOSE #Z4:RETURN
170 IF ZR<>DEL THEN 175
172 IF ZCC=Z0 THEN 165
173 PRINT "+ +";ZCC=ZCC-Z1:IF ZCC=Z0
THEN 160
174 ZR$=ZR$(Z1,ZCC):GOTO 165
175 ZC$=CHR$(ZR):ZCC=ZCC+Z1
178 IF (ZCC=ZF5+Z1 OR ZR<ZLO OR ZR>ZUP
) THEN ZCC=ZCC-Z1:GOTO 165
180 ZR$(ZCC)=ZC$:PRINT ZC$;:GOTO 165
185 GET #Z4,ZR:IF ZR=CARRET THEN 195
188 IF ZR>Z128 THEN ZR=ZR-Z128
190 IF PEEK(SHFLOK)=Z0 AND ZR>Z96 THEN
ZR=ZR-Z32
195 POKE SHFLOK,Z64:POKE INVFLG,Z0:RET
URN
200 REM THIS IS THE BREAK KEY DISABLE
ROUTINE
201 REM
202 REM CALL THIS ROUTINE AFTER
203 REM EVERY GRAPHICS STATEMENT
204 REM
205 I=PEEK(POKMSK):IF I>127 THEN I=I-Z
128:POKE POKMSK,I:POKE 53774,I
210 RETURN
1000 REM THIS IS THE MAIN PROGRAM BOD
Y
1001 REM
1002 REM AFTER INITIALIZATION, CONTROL
WILL RETURN HERE
1003 REM
1004 REM
1005 PRINT "KWELCOME TO THE SOLID GOLD
BULLET"
1010 PRINT "PROOF INPUT ROUTINE TEST P
ROGRAM."
1015 PRINT :PRINT "LET'S START OFF SIM
PLE."
1017 REM .....FIRST JUST GET A TEXT
STRING.....
1018 DIM NAME$(10)
1020 ZXCUR=5:ZYCUR=7:ZQ$="ENTER YOUR N
AME: ":ZF5=10:GOSUB 155
1025 IF ZCC=Z0 THEN 1020
1030 NAME$=ZR$:PRINT :PRINT "THANKS FO
R YOUR COOPERATION, ";NAME$
1032 REM .....NOW GET A NUMBER.....
..
1035 ZYCUR=12:ZQ$="HOW OLD ARE YOU? :
":ZF5=2:ZLO=48:ZUP=57:GOSUB 155
1040 IF ZCC=Z0 THEN 1035
1045 AGE=VAL(ZR$)
1047 REM .....NOW BACK TO TEXT
INPUT .....
1050 ZXCUR=2:ZYCUR=15:ZQ$="DO YOU LIKE
THE INPUT ROUTINE? ":ZF5=3:ZLO=65:Z
UP=96:GOSUB 155

```


```

1055 IF ZCC=Z0 THEN 1050
1060 IF ZR$(1,1)="Y" THEN 1070
1065 PRINT :PRINT "I'LL BET YOU COULDN
'T BREAK IT THOUGH. BYE, BYE.":GOTO 10
75
1070 PRINT :PRINT "YOU KNOW, ";NAME$;"
, YOU'RE PRETTY"
1072 PRINT "SMART FOR ";AGE;" YEARS."
1075 STOP
32000 REM THIS IS THE INITIALIZATION
SECTION
32005 READ Z0,Z1,Z4,Z32,Z64,Z96,Z128
32010 DIM ZC$(1),ZR$(40),ZQ$(40)
32015 READ CARRET,DEL,SHFLOK,INVFLG,ZT
XTROW,ZTXXCOL,ZCURSOR,POKMSK
32020 ZLO=65:ZUP=96:GOSUB 205:POKE ZCU
R50R,Z1
32599 GOTO 1005
32600 DATA 0,1,4,32,64,96,128
32605 DATA 155,126,702,694,84,85,752,1
6

```

There are obviously even more refinements that could be added to this routine. We found that, sometimes, people walked off right in the middle of entering a value. Thus, when a new visitor came up, they had no idea what was going on. So, we added a time-out counter to the routine at 185.

Instead of GETting the character right away, we would first check to make sure that a character had been typed. If a certain amount of time went by without an entry, we recycled the program.

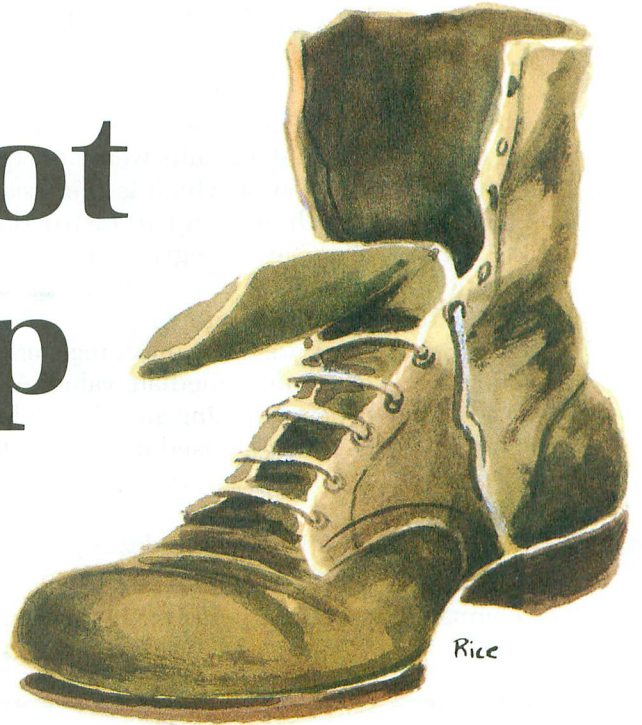
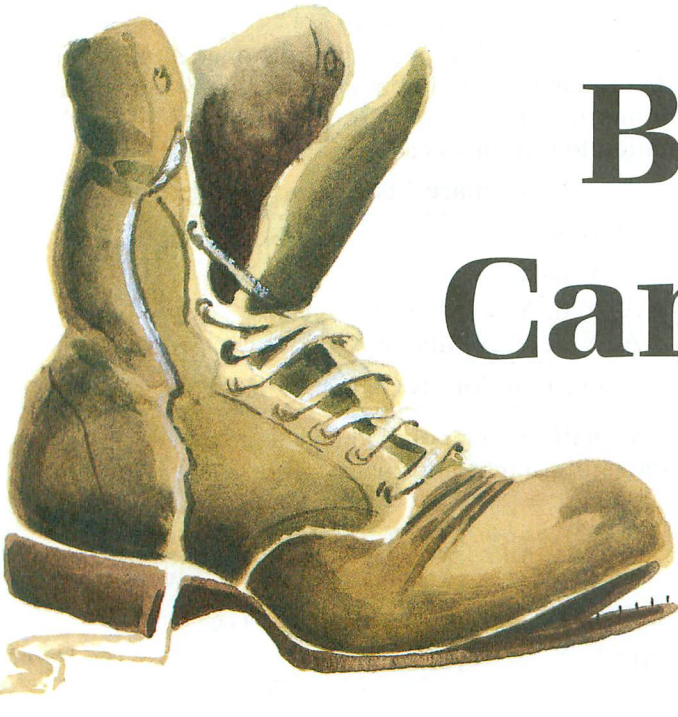
Be creative; add in your own enhancements. I guarantee that the **Solid Gold Input Routine** will make your input life easier. Down with GIGO—Up with RIRO! 

---

*Jim Dunion has worked with computers in a variety of ways: retailing, writing, using micros in energy education exhibits, lecturing on the 800, researching at Atari in Alan Kay's group, and spending nearly a year at Esalen Institute. He's now employed with the System Works in Redmond, Washington.*

---

# Boot Camp



by **Matthew J.W. Ratcliff**

From time to time, the *ANALOG Computing* technical staff has their hands full with various tasks around the office, preventing them from writing their monthly magazine columns. This is one of those times. Rather than miss an installment of *Boot Camp*, we decided to have Matt Ratcliff, an accomplished assembly language programmer and frequent contributor to *ANALOG Computing*, sit in for Tom Hudson. Matt's topic this month is the use of the 6502 compare instruction and how to get the most out of it.

Every time I sit down to write an assembly language program, I have to get out a reference manual when it comes to coding IF statements. It's very simple in BASIC, as you can see below.

However, in assembly language on the Atari computer, there are no IF statements. These "conditional" instructions must be coded with compare and branch command sequences. Instead of having greater than and less than conditional branches (which are self explanatory), the 6502 microprocessor of the Atari requires that you interpret the state of the three flags: Carry, Zero and Sign.

It's not always clear how to determine an IF THEN sequence in assembly by testing these flags. After

studying some assembly manuals, I've compiled the following guide for creating IF THEN statements at the assembly level.

## How it works.

Compare instructions are most often used in conditional branch functions. We use them all the time in BASIC, like this:

```
100 IF A<=35 THEN GOTO 200
110 X=X+1
120 Y=Y-1
130 GOTO 300
```

```
200 X=X+2
210 Y=Y+1
```

```
300 REM CONTINUE HERE
```

The code above is simple enough to follow. If the value of A is less than or equal to 35, then continue execution at Line 200. If A is greater than 35, then continue execution at the next statement.

In assembly language, it isn't quite so simple. . . not on the 6502, anyway. Some microprocessors, such as the 6809, have instructions like BLE—Branch on Less than or Equal (just like the BASIC instruction above). But the 6502 has no "less than or equal" instructions. It has three flags that you may test and branch on:

```
BCC . . . . .Branch on Carry Clear
BCS . . . . .Branch on Carry Set
```

# Boot Camp *continued*

BEQ ..... Branch if EQUAL  
 BNE ..... Branch if Not Equal  
 BPL ..... Branch if PLUS  
 BMI ..... Branch if MINus

Now, the BEQ and BNE are easy enough to follow. But BNE only tells you if the results were not equal; it gives you no indication of which is the greater.

The 6502 gives you three compare instructions:

**CMP MEM.** . . Compare A register to a memory location or immediate value. All the usual indexed addressing modes are supported.

**CPX MEM.** . . Compare the X-index register to a memory location or an immediate value. Absolute and immediate addressing are allowed for index registers. This will be used most often to test loop counters (what index registers are ideally suited for).

**CPY MEM.** . . Compare the Y-index register to a memory location or an immediate value.

The compare instructions perform an "imaginary subtraction." The value you're comparing TO is sub-

tracted FROM the specified register. The 6502 microprocessor doesn't keep the result, but does set the flags Carry, Sign and Zero.

With these flags set, a conditional branch, like BNE, may be used to decide what the results mean. Sometimes it may require two branches in combination to test for a certain condition. To summarize:

### Compare instruction results.

FLAGS	N	Z	C
A, X or Y < Memory	1*	0	0
A, X or Y = Memory	0	1	1
A, X or Y > Memory	0*	0	1

\*Valid only for "two's complement" compare.

A small segment of assembly code for conditional branching might appear as follows:

```

CMP $600 ;IS A < VALUE AT $600 ?
BCC TRUE ;YES IF THE CARRY FLAG
          ;IS CLEAR. IF A < VALUE
          ;IN $600 THEN GOTO 'TRUE'
FALSE.   ;OTHERWISE, GOTO 'FALSE'
TRUE     ;EXECUTE THIS IF
          ;CONDITION MET
  
```

The table below shows how to test for common conditions. If the conditions are met, the program will branch to TRUE. Otherwise, execution will continue at FALSE.

### Use of branch instructions with compare.

To BRANCH if	Follow compare instruction with:	
	For Unsigned #s	For Signed #s
Register is LESS THAN data	BCC TRUE	BMI TRUE
Register is EQUAL TO data	BEQ TRUE	BEQ TRUE
Register is GREATER THAN data	BEQ FALSE BCS TRUE	BEQ FALSE BPL TRUE
Register is LESS THAN or EQUAL TO data	BCC TRUE BEQ TRUE	BMI TRUE BEQ TRUE
Register is NOT EQUAL to data	BNE TRUE	BNE TRUE

I suggest that you keep the above table handy any time you're doing assembly programming. It will prove to be a very useful reference. The BASIC example above might be coded into assembly as follows:

```

L100  CMP #35 ;Is A-REG <= 35?
      BCC L200 ;... LESS THAN 35?
      BEQ L200 ;... or EQUAL TO 35?
L110  INX    ;No, then A > 35.
L120  DEY
L130  JMP L300
L200  INX    ;Acc was <= 35
      INX
  
```



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```
L210 INY
L300 ... ;continue program here.
```

A few examples are given below for unsigned numbers. The comments and labels should be self explanatory.

```
      CMP DATA ;Acc < Value in 'DATA'?
      BCC LT
LT     ...
```

```
      CPX DATA ;X = value in 'DATA'?
      BEQ EQ
EQ     ...
```

```
      CPY #43 ;Is Y > the number 43?
      BEQ NGT ;Not if they're equal!
      BCS GT
NGT   ...
GT    ...
```

```
      CMP DATA ;A <= Value in 'DATA'?
      BCC LE ;Less than?
      BEQ LE ;or EQUAL to?
LE     ...
```

```
      CPX #$9A ;X >= hex number $9A?
      BCS GE
GE     ...
```

```
      CPY #32 ;Y <> number 32?
      BNE NE
NE     ...
```

To summarize the above, it might be best to explain the meaning of each of the flags after a compare instruction has been completed.

If the Zero flag is set, then the register had the same value as the data (either immediate or in a memory location). If the Zero flag is clear, then the two were not equal.

The Carry flag indicates a borrow (remember grade school subtraction). If the register had to borrow a one to complete the subtraction, the Carry flag will be clear. This means that the register was less than the data it was being compared to. If the Carry is set, it means that the register didn't have to borrow for the "imaginary subtraction." This indicates that the register was either equal to or greater than the data (the Zero flag must be used to differentiate).

The Sign flag is used with signed numbers. This flag will be equal to the most significant bit of the result of the subtraction. A byte may represent an un-

signed number from 0 to 255, or a signed number from -128 to +127. When the most significant bit is set, the number is negative. When clear, it is positive.

Note that I did not cover BVC (Branch if overflow Clear) or BVS (Branch if overflow Set). These instructions are seldom used, except in multi-precision (multi-byte) signed math routines.

Armed with this information, you should be ready to tackle the toughest 6502 assembly language comparison situation. Once you master the use of comparison operations, you'll find 6502 assembly language isn't that hard, after all. **A**

---

*Matthew J.W. Ratcliff is an Electrical Engineer in St. Louis, Missouri. He has been programming in BASIC and assembly language on the Atari since 1982. He's also active in telecommunications and is a remote Sysop on the Gateway BBS, (314) 647-3290.*

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**THIS MONTH:**

## **Close encounters with the 520ST — how it really feels and works**

---

*Arthur Leyenberger is a human factors psychologist and free-lance writer living in New Jersey. He has been an Atari enthusiast for four years. When not computing, he enjoys playing with robotic toys.*

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**by Arthur Leyenberger**

---

*The Atari 520ST computers are here!* Yes, that's right. In just about a year from the time Jack Tramiel and company took over the comatose Atari, a powerful, state-of-the-art, inexpensive computer has been delivered to the masses. "Power Without the Price," indeed.

Whew! Now that we've all caught our breath, let's talk shop about the new ST computer, its strengths and weaknesses, competition and what Atari needs to do to make things really happen.

Praises are definitely in order for the 520ST, but, amidst kudos, a few adverse comments must be made. Of course, any negative remarks are made in the spirit of wanting Atari Corp. to succeed, so that our Atari adventure may endure.

As a user, my first experience with the 520ST was when my local retailer received a shipment of six monochrome systems within a week of the highly publicized official ST release date of July 8, 1985. Of the six systems that were received, four of the systems were dead on arrival and had to be returned. These machines exhibited a variety of symptoms, such as TOS not loading and the display disappearing after a few minutes. As it turned out, the keyboards were the problem.

About the same time, a dozen or so similar reports were posted on CompuServe and Delphi from across the country. It seems that two particular chips on

the motherboard had a tendency to become loose during shipping. Several people actually opened up their computers, reseated the chips and reported that the problems disappeared.

Atari became aware of the problem and will have already instituted a fix by the time you read this. Now, should Atari be slandered because some chips came loose? Should we immediately jump to the conclusion that Atari's quality control is nonexistent?

The answer is an obvious *no!* A few problems like this are bound to crop up in the very first production units of any new item. Look at General Motors, Ford or Chrysler automobiles. They've been making cars for decades and *they* still manage to have some problems.

The bottom line here is that Atari had a problem with their first units; they realized the snafu and took corrective action. I say, "Bravo, Atari." Let's hope they continue to be as responsive. I want to mention that my ST system has been working flawlessly since it arrived.

### **ST is a good design.**

The Atari 520ST uses basically good hardware and software design principles. On the hardware side of things, Atari wisely chose to use unique jacks on the back of the computer, so that the user could not incorrectly attach the peripherals. For example, you cannot plug the power supply plug into the disk drive or monitor jacks, and unknowingly fry the computer.



The two-button mouse fits nicely in the hand and is very responsive. Compared to a mouse I've been using with an IBM PC, the ST mouse feels and acts much better.

Other examples of the ST's good design are the addition of cursor control keys on the keyboard, an 18-key numeric keypad, and the use of a Selectric-style keyboard layout, rather than some new and different arrangement.

The 600x400 screen resolution of the monochrome monitor is fantastic. Characters are crystal clear—black text on a white background. The 12-inch screen is large enough to see from typical viewing distances. I've spent hours in front of that screen and have yet to experience any eye strain or fatigue.

The only criticism I have of the 520ST hardware design is the shape of the ten special function keys across the top of the keyboard. The ST is an attractive design, and the function keys definitely add to the aesthetic appeal of the computer, but their angular shape continually causes me to press two keys when I'm trying to press only one.

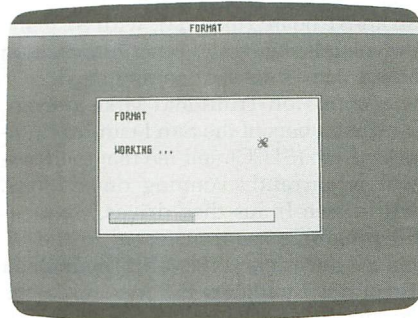
If you have the same problem, I've found a technique that helps a little. When you start to press one of the keys, don't aim for the middle of the key. Instead, aim for the key label itself (on the top left of the function key). By doing this, I generally press the key I was aiming for and avoid hitting two at once. Try it; you'll like it.

With respect to software—really GEM

—I've come to the conclusion that Atari has done an excellent job here, as well. I used to be anti-mouse, thinking that a command-style DOS is faster and simpler to use.

Well, I confess that, the more I use the ST and its mouse, the more I like it. In fact, I got that little rodent zipping all over the screen. I've been pointing and clicking and having a wonderful time.

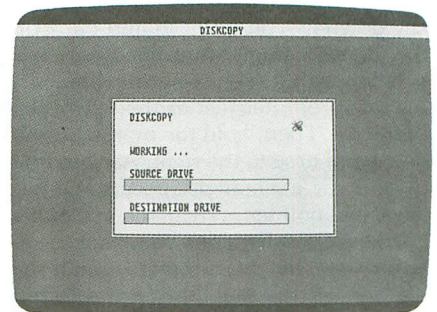
Seriously, there are two particular features of the GEM that are very useful to both a novice and experienced user.



**Screen display —  
Formatting a disk.**

When you format a disk, in addition to the usual (and worthwhile) messages about destroying the existing contents of the disk, GEM also shows you a horizontal bar graph on the screen. This bar graph fills from left to right as the disk is formatted, so that you have a visual indication of the formatting operation's progress. You also see the word *Work-*

*ing* and the "busy bee" icon, to reinforce the fact that the computer is doing something (see photo).



**Screen display —  
Copying a disk.**

In a similar way, GEM shows you two bar graphs when you're copying an entire disk. The top bar graph is labeled *Source Drive*, and the bottom bar graph is labeled *Destination Drive*. As with the formatting command, the partially filled bar graphs are a useful visual indication of the progress of your disk-copying operation (see above photo).

#### **ST GEM secrets.**

Okay, I'll admit it. These really aren't secrets. It's just that, when I read the ST owner's manual (three times), I couldn't figure out how to select multiple icons. It wasn't until I happened to be reading the IBM GEM manual that I discovered how to do it. Why? For one thing, the ST manual doesn't have an index. And, though the manual contains the infor-

## ST Quick Reference Guide.

Keys Pressed	Function
ALT + Cursor	Moves pointer 8 pixels.
ALT + SHIFT + Cursor	Moves pointer 1 pixel.
ALT + INSERT	Left mouse button.
ALT + CLR HOME	Right mouse button.
ALT + INSERT + Cursor	Drag an icon.
ALT + HELP	Print screen.
SHIFT + Left Button	Select multiple icons (noncontiguous).
Left Button and drag through icons	Select multiple icons (contiguous).
Click on Scroll Arrow	Directory moves one column of icons.
Click on Scroll Bar	Directory moves number of columns that are visible in window.
Drag Slider	Move quickly from one end of the directory to the other.
Click on Disk Icon, then select and click on Show Info	Display number of bytes used and number of bytes available.
Click on a file or folder, then select and click on Show Info	Display size (number of bytes in file or folder).
Install Application, choose document type to Automatically run application	Example: Install the Logo language, type <i>LOG</i> as document type. Whenever a file with <i>.LOG</i> is selected, ST Logo will run automatically.

mation, it's not presented prominently.

So if you haven't found out, here's the method. To select multiple icons for copying or trashing, point to and click on the first one. Then, hold the SHIFT key down as you point to and click on the others. Simple? You bet.

If you want to select a group of icons, move the pointer just to the left of the first icon. Then, hold the mouse button down and drag to the right. As you drag the pointer, a rectangle appears and follows the pointer. When the rectangle touches all of the icons you want to select, release the mouse button. You'll see that the entire group has been selected (the icons turn black). Easy as can be.

Table 1 lists several GEM functions and the associated keystrokes for executing them. Although all of the information is available in the manual, I find it easier just to keep this list handy for when I need to look up "mougestrokes" for a particular function. Hope it helps you, too.

### Loneliness is an ST computer.

One of the drawbacks of being one of the first on the block to own an Atari 520ST is the fact that there's virtually no software available for it yet. As this is written, the only software available is **4xForth**, a FORTH language from the Dragon Group.

ST BASIC is not yet finished; Haba hasn't yet released their first programs; and the **Professional Spreadsheet** from VIP is due out any day. What to do? Run demos and talk with other ST owners.

By the time you read this, of course, there should be several programs available for the 520STs.

One you'll want to get is **DEGAS**, a drawing program written by Tom Hudson and distributed by Batteries Included. **DEGAS** works in all three ST graphics modes, includes a font designer and provides screen dumps to commonly used printers. It should be available soon after you read this.

If you're looking for ST demos or the latest information about the ST, call the Sixteen-Thirty-Two Atari Network (or S.T.A.N.) at (415) 552-8924. This BBS is an all-ST board (the first), with ST demo downloads, news and other information about Atari's newest computer.

Sysops Don Truitt and Mike Warren, both members of the San Leandro Computer Club (SLCC), tell me that their system is currently running on a 130XE with three Indus disk drives. Sixteen-bit programs are transferred to the ST via ST **Kermit** and the 8-bit **Chameleon Terminal Emulator**. S.T.A.N. uses the public domain FoReM software, modified to take advantage of the XE's ram-disk capability.

Of course, **ANALOG Computing's** very own TCS contains news, information and over 3 megabytes of downloadable files. The TCS download section has recently been rearranged to better help you find that particular file you're seeking.

### The ST future.

I think the future of the Atari 520ST

computer is very promising. Aside from the lack of software at the beginning, this 16-bit computer is going to put powerful, yet easy to use software in the hands of users.

Look at the Apple Mac. It, too, suffered from lack of software when it first appeared, but it was heralded as a revolutionary computer. I believe the Atari ST is every bit as revolutionary as the Mac... even more so, because it is more affordable and will be purchased by potentially more people.

Allow me a brief word on the Commodore Amiga. Much has already been written about how the Amiga has a chip set designed by the original Atari 800 chip designer, Jay Miner. Some folks have even gone as far as to suggest that the Amiga is the next generation Atari.

I'm not sure I buy that, for two reasons. First, the latest Atari (the 520ST) is from a new Atari, which has little but its name in common with the previous company. Second, because of the price difference between the Amiga and the ST, they're two totally different products, aimed at two totally different markets.

For an equivalent system with 512K RAM, one 3½-inch floppy drive and color monitor, the ST is a \$1000 system; the Amiga is a \$2000 system; and (might as well mention Apple) the Macintosh is a \$2500 system, with no color.

Personally, I hope that all three computers become successful and that the parent companies remain healthy. Only in this way can we be assured of hav-



ing the most to choose from in terms of software and hardware. With more to choose from, we're all bound to benefit.

### Keep in touch.

I enjoy writing **The End User** for **ANALOG Computing**. I like it because it allows me to share information with you, and it lets us all participate in what I call the "Atari adventure."

If you have any comments on the topics that have been discussed, violently disagree with something I've said, or simply want to suggest some improvements, please let me know. A letter or postcard is okay, but I frequently visit various bulletin boards and information services. I can always be reached at CompuServe (71266,46) or on Delphi (NJANALOG). I'd love to hear from you, so don't be shy.

### Oops Dept.

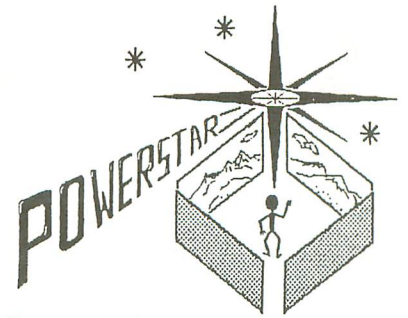
In the September **End User**, I talked about the excellent new Atari 130XE computer. I mistakenly said that the XE

power supply was identical to that of the 800XL.

It looks the same, but, as Matt Ratcliff points out, the XL power supply is good for only 1/2 amp at 5 volts. The XE supply pumps out a full amp, in order to supply enough power for the extra memory and such peripherals as the XM301 modem, which takes its power from the XE computer.

The XE power supply is also a better design, providing better heat sinking (for cooling), which will result in longer life.

Thanks, Matt, for clearing that one up. **The End User** always strives for accurate information. ☐



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# INDEX TO ADVERTISERS



READER SERVICE #	ADVERTISER	PAGE #	READER SERVICE #	ADVERTISER	PAGE #
113	Allen Macroware	40	117	Hal Systems	55
120	American TV	62	103	Happy Computers/San Jose Computers	12
—	ANALOG Publishing	IFC, 2	148	HSU Software	9
112	Astra Systems	38	144	ICD/Spartan	IBC
102	Atari Corp.	8, 9	123	InSoft	64
111	Athena Software	32	122	Integrated Computer Equipment	64
—	Batteries Included	OBC	147	Intra-Tech	9
145	CAL COM	70	119	Kyan Software	62
140	C.A.P. Software	103	136	Lycu Computers	95
108	CDY Consulting	26	101	Microprose	7
141	Centurian Enterprises	104	126	Mirage Concepts	68
121	Compucat	64	129	Misty Mountain Software	81
106	Computability	17	131	New Horizons Software	81
133	Computer Creations	86	115	O.S.S.	43, 45, 47, 49
130	Computer Games Plus	81	139	Pandora Software, Inc.	103
110	Computer Mail Order	30	118	Protecto	56, 57, 58, 59
114	Computer Palace/Royal Software	42	116	Puget Sound	55
142	Consumer Electronics Store	104	—	Senecom	27
127	COVOX	75	124	Softview Concepts	64
132	D.M.I. Services	84	128	Software Discounters	76, 77
137	Eastern House	98	143	Southern Software	104
134	Electronic One	92	135	Wedgwood Rentals	94
105	ESP	17	107	White House Computers	22
138	Gizzmoz	99	125	Xlent Software	66
104	G.T. Enterprises	15			

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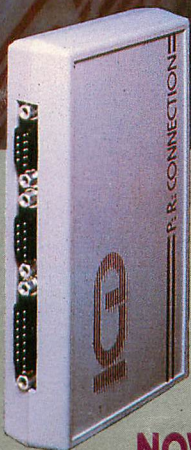
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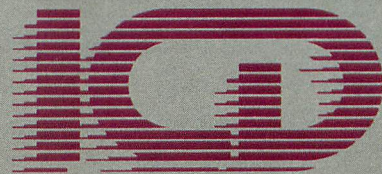
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