SOFTLINE

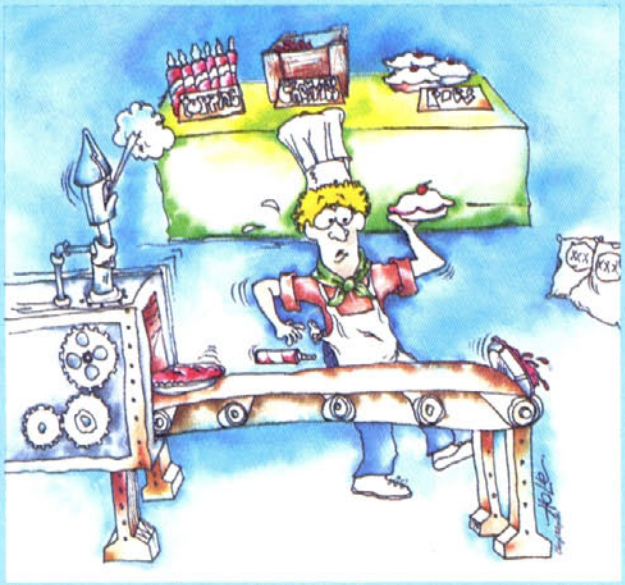
VOLUME 2 NOVEMBER 1982 $2.00

ARCADE GAMING:
Friend or Foe?

SPY'S DEMISE

Arcade Action by Alan Zeldin

Somewhere on each floor of the Soviet diplomatic mission in Pyongyang are the nine parts of an encoded message. Your future is assured if you can just find those pieces and put them together, and then solve the puzzle. But to do so you must avoid the embassy guards who make frequent rounds at unscheduled intervals. They don't ask questions first, either.



PIE-MAN

by Eagle Berns and Michael Kosaka

You got a late start looking for that summer job, and all you could find was a baker apprentice position at the Automated Bakery Company. Simple enough, since the pies are made by machine . . . all you have to do is add topping and put the pies away when they come out on the conveyor belt. Shouldn't be too difficult of a summer, you think to yourself . . .

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Directline

Advice from a Commander

Here are a few tricks I've found useful in achieving a high score on *Star Raiders* for the Atari.

Play the most advanced level (commander); there are more targets. Use the pause feature often. Don't waste time watching the repair shuttle. Position your hyperwarp indicator, switch to forward view, and have your finger ready on "H" when the repair-complete signal sounds.

When entering a hostile sector, I watch only the radar display and range; I begin firing at 130 centrons just as the targets become visible. If the oncoming target is a basestar, I pull up at once to try to catch it along the lower part of the photon paths. This is more effective than the method suggested in the manual. I use a speed of five in these head-on encounters.

Strategy is important at the commander level. By first eliminating most, but not all, of the fast patrol groups you can take the pressure off your starbases. Later in the game you will be fighting larger groups to defend a starbase—they will come to you, thereby saving your energy.

Examine the scoring structure and concentrate on improving one factor with each game. Your ship can do quite well, even with considerable damage. Don't return for repairs more often than necessary. It takes a lot of time, energy, and points. Good luck, fellow raiders!

Jeffrey Carl, Rohnert Park, CA

Stuck by Four

I have some questions about some games that I own.

How do I move between levels on *Horizon V*?

I bought *Track Attack* mail-order and it came without directions. I'd like to find out the object of the game and how to play. What keys do I use? What does the jump command do?

In *Minotaur*, after I kill the minotaur the second time (maze two), I am stuck wandering around in the maze forever with no minotaur to kill. For some reason I am never advanced to maze three.

Last but not least, how can I take the elevator or stairs in *Human Fly*? Is there a way to get inside the building?

Larry Fisher, Miller Place, NY

Nascent Ninja

Does anyone know the qualifications for making a ninja in *Wizardry*? I think there was an article about this in the March *Softline*.

Jimmy Lim, Republic of Singapore

You must create a twelfth or thirteenth level evil character with all attributes around seventeen or eighteen, evenly balanced. The fastest way is to run an evil thief through the dungeon without weapons or armor.

Try an Alarm Clock

I've been playing the adventure game *Adventureland* from Adventure International, which is really excellent, but I can't seem to wake the sleeping dragon in the meadow. Could anyone provide me with a hint that might help?

Also, I'd like to find out the commands I would need in Applesoft to prevent a break in a program when the reset key is hit.

D. Wolfsdorf, Brookline, MA

Ready for the Gallop

In September *Softline* the article on Lionel Raff mentions that he founded Raff-Craft and that their first product is entitled *Derby Downs*. Any information on where I could purchase a copy of this game, or the current address of Raff-Craft, would be appreciated.

Mike Banker, West Orange, NJ

You can write to Raff-Craft at Box 1754, Stillwater, OK 74076. Derby Downs *is available for $30, in DOS 3.2 or 3.3.*

Zzzzzzzzz

I've had the game *Adventure* by Microsoft for nearly four months and I cannot get past one certain part. I have all the treasures except what is in the treasure vault. The cave has closed on me and I am stuck in the immense room with a mirror and hundreds of sleeping dwarfs. I found an inscription on an oyster—but it did me no good. I need a hint! In return, I can only offer hints to *Mission Asteroid*, *The Wizard and the Princess*, *Cranston Manor*, and *Ultima*. Can someone please help? The snoring is killing me!

Brian Service, Exton, PA

SL

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Apple II Graphics:

A High-Speed Triple Play

by KEN WILLIAMS

It's graphics time again! By now you've probably digested what we talked about last time—byte-move animation can get pretty involved. The big reason for using byte-move is speed, but with all the tables required, Basic is hard pressed to process a byte-move shape any faster than it processes a regular shape. It's really only when you use byte-move animation with machine-level routines that the advantages begin to shine through.

This month we'll look at three ways to increase the speed and efficiency of your graphics. Though the ideas may be applied either in Basic or machine code, the examples are presented in Basic for simplicity. The amount of benefit derived from each technique depends on the particular application and may vary from a lot to none at all (or worse). But since a great amount of the time spent programming any game is devoted to cleaning up the graphics, you sometimes have to be satisfied with achieving several small improvements.

We'll start with the idea of partial modification, where instead of redrawing the entire figure each time, you plot only those bytes that have changed from what they were in the previous figure. A scorecard in hi-res is a good illustration of that idea; the digits keep changing in a predictable manner, and you can use that fact to shorten your code.

Enter and run the following program (you may omit the rem statements if you wish):

```
10  REM PARTIAL MOD
20  REM
30  HGR
40  REM
50  REM POKE EIGHT
60  REM
70  POKE 8192,60: POKE 9216,66:
    POKE 10240,66: POKE 11264,60
80  POKE 12288,66: POKE 13312,66:
    POKE 14336,60: POKE 15360,0
90  VTAB 24 : PRINT "PRESS A KEY ":
    GET R$
100 REM
110 REM POKE NINE
120 REM
130 POKE 8192,60: POKE 9216,66:
    POKE 10240,66: POKE 11264,60
140 POKE 12288,64: POKE 13312,64:
    POKE 14336,60: POKE 15360,0
150 VTAB 24 : PRINT "PRESS A KEY ":
    GET R$
160 REM
170 REM POKE ZERO
180 REM
190 POKE 8192,60: POKE 9216,66:
    POKE 10240,66: POKE 11264,66
200 POKE 12288,66: POKE 13312,66:
    POKE 14336,60: POKE 15360,0
210 VTAB 24 : PRINT "PRINT A KEY":
    GET R$
220 GOTO 70
```

When you have everything keyed in correctly, you'll see the digits eight, nine, and zero cycle on the hi-res screen. That was done easily by poking the appropriate dot patterns into screen memory.

The numerals eight and nine are composed of eight rows of dots that correspond to byte values (see table 1).

DOT PATTERN	BIT PATTERN	DECIMAL VALUE	DOT PATTERN	BIT PATTERN	DECIMAL VALUE
--XXXX-	0011 1100	60	--XXXX-	0011 1100	60
-X----X	0100 0010	66	-X----X	0100 0010	66
-X----X	0100 0010	66	-X----X	0100 0010	66
--XXXX-	0011 1100	60	--XXXX-	0011 1100	60
-X----X	0100 0010	66	------X	0100 0010	66
-X----X	0100 0010	66	------X	0100 0010	66
--XXXX-	0011 1100	60	--XXXX-	0011 1100	60
-------	0000 0000	0	-------	0000 0000	0

(- indicates a dot off)
(X indicates a dot on)

Table 1.

For a refresher on how to translate the dot patterns into the values, you might look at *Softline* volume 1, number 3, where we talked about how the hi-res screen is laid out.

Now if you take a minute to compare the values used for eight with those for nine, you should notice that all except two of the values are the same. So the question arises, "Since nine always follows eight, why should I poke all the values for the nine, when six of them are the same as before?" Glad you asked. . . .

That's the idea behind partial modification—alter the existing figure instead of replacing it with a new one. To change the previous listing, type these lines:

```
130  REM
140  POKE 12288,64: POKE 13312,64
190  POKE 11264,66
200  POKE 12288,66: POKE 13312,66
```

Now lines 130 and 140 poke only the changes that are needed to turn the eight into the nine. Similarly, lines 190 and 200 poke the changes required to turn nine into zero. When you run the program you'll see the same results as before, but you'll have the satisfaction of knowing that your code is more efficient now than it used to be.

Granted, the time you save is insignificant in this example, but when you're trying to animate 150 bytes' worth of Zylon spaceship (or what have you), partial modification can potentially save a great deal of time.

The next topic to look at is precalculation. When a figure is moving around the screen, there are a lot of calculations to be made. These include the shape's X and Y coordinates, perhaps the address corresponding to those coordinates, and, if you're using byte-move, which of the seven versions of the shape is to be used at each coordinate. Calculating all of that "on the fly" can cause problems because arithmetic operations tend to require relatively large amounts of time.

Sometimes the figuring can be done after the shape is drawn on the screen and before it is erased, thus increasing the time the object is on the screen. That has the effect of increasing the ratio of the display time to the erase time, which in turn reduces flicker.

It is also possible, however, to compute the path of an object before it starts, and to store each of the coordinates in a table (Basic calls these groupings arrays). It is usually faster to look a number up in the table (especially in machine code) than it is to compute it on the spot.

In the September 1982 article, we used byte-move techniques to move a line across the screen. If you still have that program lying around on a disk somewhere, go get it—we're about to modify it. The complete listing is given below.

```
10  DIM A%(280): REM 280 X COORDINATES
20  REM
30  REM READ THE VALUES FOR
40  REM THE 7 PAIRS OF FRAMES
50  REM
60  FOR I = 0 TO 6
70  READ T%(I),H%(I)
80  NEXT I
90  REM
100 REM
110 REM
120 REM INITIALIZE THE TABLE
130 REM OF ADDRESSES
140 REM
150 J =0
160 FOR I = 14336 TO 14374
170 A%(J) = I:J = J + 1
180 NEXT
190 REM
200 REM PRE CALC
205 REM
210 DIM Q%(280),R%(280)
220 FOR X = 1 TO 280
230 Q%(X) = X / 7:R%(X) = X — Q%(X) * 7
240 NEXT X
250 HGR : REM SET GRAPHICS
254 REM
255 REM HERE GOES!!
256 REM
260 FOR X = 1 TO 280
270 POKE A%(Q%(X)),T%(R%(X)):
    POKE A%(Q%(X) + 1),H%(R%(X))
280 NEXT X
290 END
294 REM
295 REM DATA TABLE
296 REM
300 DATA 126,1,124,3,120,7,112,15
310 DATA 96,31,64,63,0,127
```

Line 100 and lines 200 through 270 contain the only modifications to the listing from last time.

The arrays Q% and R% hold the quotients and remainders for each of the 280 X coordinates. Dividing the X value by seven tells you which byte across the screen to address (0 to 39), and which of the seven versions of the figure should be used. (Remember from last month?)

For example, if you wish to start the figure at the thirty-first coordinate, divide 31 by 7 (4 with remainder 3). This tells you to poke the third version of the figure into byte number 4. Since the starting address for our screen line is 14336, we poke the value into 14340 (14336 + 4).

Lines 160 through 180 fill array A% with the addresses for each of the forty bytes across the screen line, and lines 220 through 240 calculate the 280 quotients and remainders. Finally, line 250 turns on hires and line 270 does the actual poking.

Sorry about the compound indexing—A%(Q%(X))—but it couldn't be helped. X is the coordinate number so Q%(X) is the quotient belonging to that coordinate, and A%(Q%(X)) is the address determined by that quotient.

This new version of the program runs the line across the screen in seven seconds, as opposed to the nine seconds the earlier one required. Now seven seconds is still pretty slow (blame Basic), but precalculating did result in a significant improvement (22 percent, since you asked).

And now, on to what is perhaps the most elegant of the techniques: preshifting. We're going to animate using a shape table, so from Basic type:

```
CALL —151
300:  02 00 06 00 45 00 3F 3F
308:  3F 3F 3F 3F 08 2D 2D 2D
310:  2D 2D 2D 18 3F 3F 3F 3F
318:  3F 3F 08 2D 2D 2D 2D 2D
320:  2D 18 3F 3F 3F 3F 3F 3F
328:  08 2D 2D 2D 2D 2D 2D 18
330:  3F 3F 3F 3F 3F 3F 08 2D
338:  2D 2D 2D 2D 2D 18 3F 3F
340:  3F 3F 3F 3F 00 24 24 24
348:  24 DF DB DB DB 06 36 36
350:  36 36 00 00 00 00 00 00
3D0G
BSAVE SQUARE,A$300,L$53
```

With the table still in memory, let's find out what we have there. Type:

```
POKE 232,0: POKE 233,3
HCOLOR = 3:ROT = 0:SCALE = 1:HGR
DRAW 1 AT 50,50
```

The first line tells Applesoft where the table is stored ($0300) in lo-byte/hi-byte from (00 and 03). The second line sets all the parameters, and the third draws the first shape, a rectangle, at 50,50 on the hi-res screen. For more information on those commands, refer to the Applesoft manual, pages 98 and 99.

The second shape in the table happens to be the horizontal preshift (the what!??) of the original rectangle. Imagine that you are about to shift the rectangle one place to the right. The bulk of the figure is unchanged; there is a single line added to the right side and one deleted from the left side. Preshifting, like partial modification, is a way to process only that portion of the figure that changes, while leaving the rest of it alone.

Now type:

```
DRAW 2 AT 51,60
```

to draw the preshift below the rectangle. Notice that the preshift has a single line to the right of the rectangle and another that lines up with the left side of the rectangle. To effect the modification, we will xdraw the preshift on top of the rectangle.

Let us digress for a moment. When used to superimpose one shape on another, xdraw has the effect of comparing corresponding dots of the two shapes and forming a resultant figure from them. The resultant dot is on if either one of the original dots was on, but not if both were. Table 2 summarizes the results from the four possibilities.

Dot#1	ON	ON	OFF	OFF
#2	ON	OFF	ON	OFF
Result	OFF	ON	ON	OFF

Table 2.

So when the preshift is xdrawn over the rectangle, the dots on the left side of both figures are on. This has the effect of turning off that whole row. But the right side of the preshift is one row beyond the rectangle, and since only the preshift dots are on, the result is that that row of dots will be turned on. But enough of words; let's try it! From Basic type:

```
XDRAW 2 AT 51,50        XDRAW 2 AT 54,50
XDRAW 2 AT 52,50        XDRAW 2 AT 54,50
XDRAW 2 AT 53,50        XDRAW 2 AT 53,50
```

The rectangle will move to the right and then back to the left. You may be surprised at first by the two xdraws at 54, but remember, two consecutive xdraws always cancel each other out. In this instance, the first one moves the rectangle to the right, and then the second cancels out the effect of the first and begins to move the rectangle back to the left. Play with xdrawing this figure until you can move it around comfortably.

The following program uses this idea to move the square across the screen.

```
10  REM PRESHIFT
20  REM
30  D$ = CHR$ (4)
40  PRINT D$"BLOAD SQUARE"
50  POKE 232,0: POKE 233,3
60  HCOLOR= 3: ROT= 0: SCALE= 1
70  HGR
80  DRAW 1 AT 20,100
90  FOR I = 21 TO 275
100 XDRAW 2 AT I,100
110 NEXT I
```

There are two very pleasant surprises with this program. The first is that it is short and simple, and the second is that it moves the figure quickly and with very little flicker. Ta-daa! SL

Basic Entertainment: An Interview With Jerry White

by GARY AND MARCIA ROSE

You've heard the stories of programmers working until all hours, forgetting to eat (at normal times) and such. They're probably true, and herein lies the reason: programmers love their work; work and pleasure combine; life is fun. More so-called (and self-proclaimed) computer widows and widowers might make an effort to understand this—and join the fun.

You don't have to be an advanced mathematician or a machine language wizard to do it either. Jerry White has written twenty-five programs that are currently available for the Atari—and they're all in Basic. As for freedom—those quarter of a hundred programs represent output from ten software publishers. For breaks, White writes magazine articles.

In freelance computer programming for micros, White has found a vocation to encompass the wide range of interests he enjoys, to beat the established system where you work eight hours a day, change gears radically, and enjoy yourself—if you're not too wiped out—for the four or five hours before you need to sleep.

Now thirty-six, New Yorker White began his computer career at age eighteen as a computer operator trainee. Soon he was doing the training, among other tasks.

"Because we did high priority jobs like payrolls, adjustments to data files often had to be made immediately. So I learned to write 'quickjob' programs. When work was slower, I continued writing programs—to do things like control our tape library and keep track of production, forms usage, that kind of thing. That's where I really learned programming. And it's straight from that job that I moved on to devote all my time to writing commercial software."

Following the Muse. White began his new career on a TRS-80. When the Atari 800 came on the scene, its sound and graphics capabilities made the choice of a new computer obvious to him.

The Atari opened to White a world of his own interests. His pleasure in music ("five years of piano when I was young and keyboard stints with rock bands later on") found voice in *Player Piano*, from APX; *Music Box*, Program Design Institute; *Name That Song*, Quality Software; *Tricky Tutorial #6 Sound*, Santa Cruz; and *Music Lessons*, Swifty Software. And the music he produced for APX's *My First Alphabet*, a program by Fernando Herrera, contributed to that package's becoming the first grand prize winner of the Atari Software Acquisition Program competition.

In other moods, White translates his sporting interests to Basic. His two hundred average on the bowling lanes became *Bowling*, from PDI, and *Bowler's Database*, from APX, on the Atari. *Sunday Golf*, from Adventure International, reflects his enjoyment of that sport.

Having provided for the emotions through music and the physique through sports, what naturally followed was something for the mind. Enter White's *Trivia Trek*, from Swifty.

Enter also a new facet of White's personality: a dry wit with a flair for the unexpected. This is what people enjoy first about *Trivia Trek*; its fifty categories and two thousand multiple choice answers are what keeps them at it hour after hour, time after time. What's more, an on-board create and edit option allows users to add their own journeys to the trek.

Programming for the Ages. Jerry White cares about the people he's writing for; it shows in all his programs. They're loaded with on-screen prompts. And his programs always get to know you by name. White believes that ease of use is a crucial ingredient in a good program. Another important quality is the program's useful life.

"If a program you buy today is used often and will be used a year later, it must be a good program," White says.

Perhaps this is the key to why there's a popular Atari area White won't touch: home-arcade games.

"I'm not an arcader," he explains. "I find that, in most cases, arcade games become boring once I catch on to the play of the game. I have boxes of shoot-'em-up games that I'll never play again. I prefer simulations, such as IDSI's *Pool 1.5*."

With such wide-ranging offerings, Jerry White has proven that Basic is much more than a beginners' language. Used with imagination, it can be the foundation for pleasurable games and useful tools.

"I have more tutorial projects in mind as well as a unique spin-off of one of my games," says White. "But I hope to spend at least half my time learning more about this incredible machine. I have to continue learning better programming techniques using assembly language, and I'm considering taking the time to learn Forth.

"Other than that, I'll continue to write magazine articles and, someday, I might try a completely unique concept called a vacation."

Is that some new kind of game? Unless Jerry White changes radically, he'll come back from that vacation with a stock of new program ideas. SL

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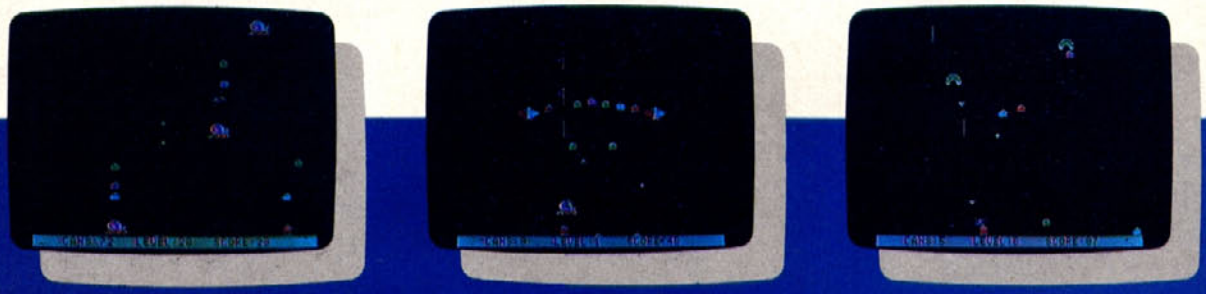


For every pesky insect that's ever bothered you - you owe it to yourself to play PEST PATROL. . . . .

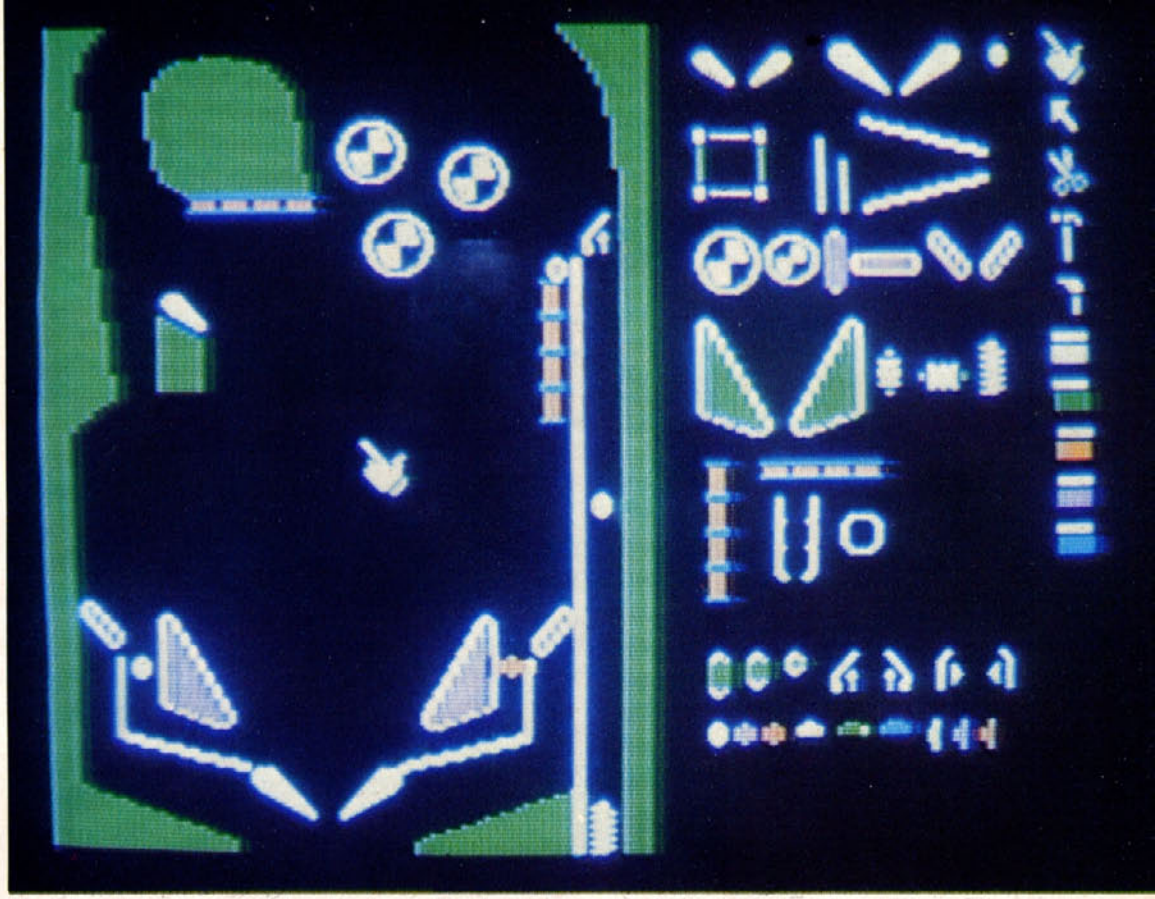
Bomb the bugs (and have them bomb you) as you encounter armored snails, butterfly fighters and a swarm of other "insectivorous" irritation, all brought to life in the quick and beautiful HI-RES graphics that you have come to expect from Sierra On-Line.

PEST PATROL offers never-ending challenge from so many different insects that you better not blink while you play. . . it could be fatal!!! They bite, bounce and bomb their way towards you in wave after wave of insect invasion. Can you survive 29 levels of swarming, stinging, strafing insects, or suffer the injury of infestation?!! Find out as you play PEST PATROL!!!!!

PEST PATROL is another fine HI-RES game by Mark Allen, author of SABOTAGE. Requires 48k Apple II/II + with DOS 3.3. Available at your local computer store for $29.95 or order directly from Sierra On-Line Inc., 36575 Mudge Ranch Rd. Coarsegold, CA 93614.

SIERRAVISION

Sierra ON-LINE INC



Things To Come:

The Pinball Construction Set

The last time you played pinball, either the real thing or the computer kind, there were probably times when you thought, "Drat! If only there were just a few more targets, I could really rack up some points," or, "That darn tunnel is too narrow to shoot the ball through!" No doubt you've figured you could be a pretty good pinball game designer, given the right technical knowledge. Surely it can't be that hard to create your own game.

Forget it. Ever take a look inside a pinball machine? Yeesh! And how about computer pinball games? If you were a good enough programmer to write your own game, you'd be working on it rather than complaining about the one you're playing. It looks as if we're forever forced to appreciate whatever the pinball gods pour into our flipper-table cups. But wait.

The Game That Even You Can Make. We're not gonna take it! No longer shall we be deaf, dumb, and blind to the choice of pinball games given us. The time is ripe for a new revolution, for raising our joysticks in defiance. But first, we need a leader.

BudgeCo, a microcomputer pinball kingpin and father of the bestselling *Raster Blaster*, is that leader.

Raster Blaster creator Bill Budge now makes it possible for us to create our own pinball games from scratch. Welcome, BudgeCo's *Pinball Construction Set*. It's exactly what it sounds like—everything you need to make a customized pinball game for your Apple computer.

Budge got started on the idea early in July 1982 when he was rummaging through pieces of projects he was working on at the time. "I had parts of games, bit map tools, and more games that I was experimenting with, and I didn't want to come up with another game," the pinball whiz explains. "Broken down to their basics, all the current (arcade) games are either maze games or *Pong;* I didn't want any part of that."

In the nascent stages of the *Pinball Construction Set*'s development, Budge visited a local thrift shop, purchased an obsolete Gottlieb *Target Alpha* pinball machine (circa 1977), and took it apart to see what each component looked like in its simplest form. "The reason for that was so that when you look at the construction set on the screen, it will look like you actually have the parts sitting in a box for you to pick up and work with."

It's Party Time. What say we build ourselves a pinball machine?

On screen are an empty pinball table, forty-one different pieces, five tools with which to manipulate the pieces, and five pots of paints for coloring.

Now let's get down to some serious constructing. The first thing you'll want to do is get some of the basics in place. In order to move pieces from the set to the table, a joystick-controlled cursor in the shape of a white-gloved hand with a pointing index finger picks up the piece you want to move and enables you to place it anywhere on the table. Though most pinball games are conventionally designed to have the ball drain out the sides and down the middle, the construction set lets you create as many drainage points as you please—or have none at all. If you prefer the traditional center drain protected by two flippers, it's a free country. And the basics don't end here.

If, for some reason, you don't like the ball launcher shooting the ball out from the lower right corner, BudgeCo's set lets you put the launcher anywhere—right, left, or even at the top.

Moving on, we need some bumpers. The usual round bumpers come in two sizes, and the bank-type bumpers are available in two sizes and four different angles: horizontal, vertical, and left and right diagonals. Line them up or put them in a pyramid. Tradition dictates that they be configured so the ball can bounce off one, rebound off another, on to another, and so on. But this time, you are in control; do what you want.

Bumpers are fine for creating fast action and noise and for racking up a hundred points at a time, but in a day when pinball high scores are reported in the millions, we need bigger points. Bring on

the targets. Targets come in three varieties. You can insert button targets individually, drop-targets one at a time, or four targets at once all on a bank. Banks of targets are either vertical or horizontal; individual ones can be placed at your whim. So far, so good. Now that we have our thousand-point gainers, we need some flippers.

Unlike BudgeCo's *Raster Blaster*, the set gives you two flipper sizes. The nice thing here is even though each size has one right and one left flipper, you don't have to place them as a pair; you can add them to the table one at a time. What this means is that it's possible to have the usual symmetric pair at the bottom (or even two pairs!) and maybe just one flipper at the top to keep the ball in play up there a little longer.

The set also includes the usual extras, allowing you to form lanes with blinking rollover targets, horizontal and vertical kickers to keep the ball in play, and four gates that allow one-way movement, all at different angles.

Then It Gets Magic. One of the most revolutionary features of the set is the way it lets you create shapes. So far, our playing table is a melange of bumpers, flippers, lanes, and targets. A good way to add variety is to introduce shapes that can hold a variety of fixtures, act as obstacles, or simply inject a touch of artistry. The addition of such shapes is an elaborate yet simple procedure; three of the five tools in the set are exclusive to the process.

The original shape you work with is a square. Using hammer, arrow, and scissors-shaped cursors, you can change it from a square to a triangle, rectangle, pentagon, hexagon, or any shape with virtually any number of sides. Once you have the basic shape, you can stretch and shrink each side until you have exactly what you want.

Next, to brighten up the whole thing, the set includes a paint brush cursor and a variety of paints. Coloring in the pieces is as easy as dipping your brush in the bucket and then touching it to the part you want to color.

How do you like it so far? Think it will fly? Push a key and try it out. Okay, the left alley was too tight for the first ball to get through and the second ball would have kept bouncing between the two bumpers in the upper-right-hand corner from here to eternity. Hit another key to go back and fix it.

Bumpers, flippers, targets, and shapes all in place, we finally have ourselves a customized pinball machine. But something is still missing.

If you went into your local bowling alley or billiard hall, looked over all the pinball machines, and saw one with lots of fancy layout but no lights, pictures, or theme, you'd probably pass it over despite any advanced design it might offer. The *Pinball Construction Set* leaves nothing out.

But Wait, There's More! Having customized the layout, you can go on to customize the graphic design of the pieces on the playing table and the artwork of the scoring board. The set includes an electronic magnifying glass that lets you see every part of the screen display in pixel-perfect detail. Using the magnifier and the joystick-controlled cursor, you can create your own designs to go on the pieces on the table, the table itself, or the scoring board. If you're tricky enough, you can even splash your signature across the game.

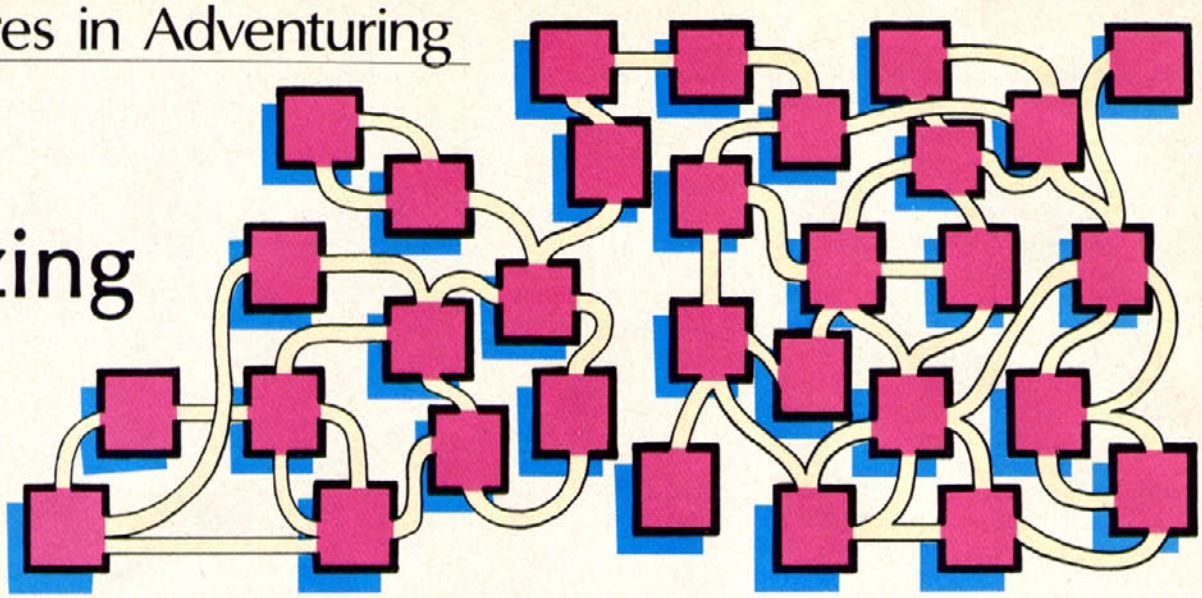
Ah, finished at last! All that needs to be done is to *bsave* the entire creation.

One more nice thing BudgeCo has provided is the opportunity for everyone to become a famous game designer. Aspiring entrepreneurs might note that, should you decide to market your finished product, BudgeCo is not requiring a licensing agreement for you to do so.

Currently, the *Pinball Construction Set* is an Apple product, but BudgeCo's plans include versions for the Atari 800 and Commodore Pet computers as well.

Anyone who thought that following up a successful program such as *Raster Blaster* would be difficult was wrong—it was nearly impossible. But if the *Pinball Construction Set* is any indication of trends, future game programming revolutionaries had better get used to doing the impossible. SL

Amazing We Will Go



by KEN ROSE

It's not easy to decide once and for all whether you love mazes or hate them. Just as it can be an exhilarating experience to master a maze, it can be a real frustration to be stuck in one.

Mazes themselves hark back to the dim beginnings of history when our early ancestors constructed elaborate defenses against their enemies. Over the years the purpose of these stoneworks was forgotten, and subsequent generations believed them to be the work of magical beings who constructed them in order to confine and confuse evil spirits.

By the middle of the eighteenth century, the terms *maze* and *labyrinth* seem to have become interchangeable. During this time, hedge mazes were grown and turf mazes were cut on village greens for the amusement of young people.

With the advent of books on mathematics and topological puzzles, written mazes came into vogue. Although none among us dates that far back, many of us can recall some early experiences with mazes, in particular the paper and pencil kind found in our first-grade workbooks.

Several books devoted to complex mazes have been written. These mazes were once quite popular, but by the early seventies, most people's interest in recreational mazes had diminished. At this same time, though, strangely enough, psychologists and communications technologists had begun showing an interest in them as related to the areas of animal behavior and computer design.

Many people's first experience with mazes in an adventure game was with those in the original *Adventure*, *Colossal Cave*. Once you've bumbled into those "twisty little paths," it's hard to believe that you'll ever find your way out again. After many hours of trying, you do manage to escape, but can you recollect how you did it? Probably not.

Ever since *Adventure*, it has been almost a requirement that an adventure game contain a maze. Perhaps the neatest among the current ones is the maze in *Zork I*, because of its complexity and the necessity of exploring it thoroughly.

The best strategy for solving mazes is to map out the territory carefully. Carry objects with you on your journey and drop one of them in each room. Then note on your map where you dropped each object. When you return to a room with a known object, note on your map where you came from. If you're in a maze and you go south from room 1 to room 2, going north from room 2 may not return you to room 1.

The program that follows uses many of the routines outlined in earlier issues of *Softline*. It's called: *The Labyrinth of the Minotaur*.

This program is written in Applesoft Basic to run on the Apple II. As the adventure programs in this column get more complex, they become a bit more difficult to translate into the Basics that run on other computers. The main difference comes in the handling of string variables. With a little fooling around, you should be able to make the conversion.

Lines 10 through 30 set up the variables and clear the screen. Lines 1000 through 1070 contain the trusty old parser. If you're an Atari user, you'll need to use the substring function of your Basic to locate the blank.

Lines 1200 through 2060 contain the verb-handling routines. Only four directions—north, south, east, and west—are used in this game. The other words used are *inventory*, *get*, *drop*, and *quit*.

The variable R, mentioned in lines 1450 through 1510, represents the number of the room you're in. These lines contain special instructions and messages that appear as you move through the various rooms. Many of these routines can be found in last month's object-handling article.

Lines 2100 through 2280 are the noun-handling routines. Since there are only five nouns in the game, this aspect is pretty easy to handle.

Lines 10000 through 10020 are the data lines. Line 10010 is the most important line in the game and must be typed in very carefully. This line is crucial because it specifies which room is connected to which room. In previous articles featuring the moving-around routines, we've used a separate data line for each room. But this time, gentle reader, you're moving into the big leagues.

The remaining lines in the program are the winning and losing messages.

Those of you who have been following this series of articles can probably see how we have been using various routines to build up from very primitive programs to some level of sophistication. If you entered the game late and are feeling a bit bemused by all this, pick up earlier issues of *Softline* and you'll be able to see why these things work as they do.

You can be sure that there is as great a satisfaction (well, almost as great) in writing an adventure program as there is in playing one.

The Labyrinth of the Minotaur

```
10  TEXT : HOME
20  GOSUB 9000
30  DIM N(20),S(20),E(20),W(20),NOUN$(5)
40  FOR A = 1 TO 20
50  READ N(A),S(A),E(A),W(A)
60  NEXT A
70  FOR A = 1 TO 5
80  READ NOUN$(A)
90  NEXT A
100  FOR A = 1 TO 5
110  OB(A) = 22
120  NEXT
130  R = 1:DES$ = "YOU ARE IN A MUSTY DANK
     CORRIDOR.": POKE 34,1: GOTO 1520: REM  STARTING
     ROOM
1000  REM PARSER
1010  V1$ = "":N1$ = "": PRINT "COMMAND? ";: INPUT
     "";A$
1020  FOR A = 1 TO LEN (A$)
1030  IF MID$ (A$,A,1) = " " THEN X = A - 1:A = 0: GOTO
     1060
1040  NEXT A
1050  V1$ = A$: GOTO 1220
1060  V1$ = LEFT$ (A$,X)
1070  N1$ = RIGHT$ (A$, LEN (A$) - (X + 1))
1200  REM VERB HANDLING SECTION
1210  IF V1$ = "GO" THEN V1$ = N1$
1220  IF V1$ = "NORTH" OR V1$ = "SOUTH" OR V1$ =
     "EAST" OR V1$ = "WEST" THEN GOTO 1400
1230  IF V1$ = "INVENTORY" OR V1$ = "INV" THEN GOTO
     1900
1240  IF V1$ = "GET" THEN GOTO 1700
1250  IF V1$ = "DROP" THEN GOTO 2000
1260  IF V1$ = "QUIT" THEN GOTO 10390
1270  PRINT : PRINT "I DON'T KNOW HOW TO ";V1$;".":
     PRINT : GOTO 1010
1400  REM MOVING AROUND ROUTINE
1410  IF V1$ = "NORTH" THEN R = N(R)
1420  IF V1$ = "SOUTH" THEN R = S(R)
1430  IF V1$ = "EAST" THEN R = E(R)
1440  IF V1$ = "WEST" THEN R = W(R)
1450  IF R = 4 THEN DES$ = "A SIGN ON THE WALL SAYS 'GO
     EAST.'"
1460  IF R = 10 THEN DES$ = "A SIGN ON THE WALL SAYS
     'GO NORTH.'"
1470  IF R = 19 THEN DES$ = "A SIGN ON THE WALL SAYS
     'DON'T GO WEST.'"
1480  IF R = 6 THEN DES$ = "A SIGN SAYS 'ABSOLUTELY
     DON'T GO NORTH.' "
1490  IF R = 5 THEN GOTO 10260
1500  IF R = 20 THEN GOTO 10330
1510  IF R = 21 THEN GOTO 10200
1520  HOME : VTAB 1: CALL - 868: PRINT DES$: VTAB 24
1530  DES$ = "YOU ARE IN A MUSTY DARK CORRIDOR."
1540  PRINT : PRINT "OBJECTS HERE ARE:": PRINT
1550  X = R: GOSUB 2200
1560  X = 0
1570  GOTO 1010
1700  REM GET STARTS HERE
1710  GOSUB 2100
1720  IF OB(X) = R OR OB(X) = 22 THEN GOTO 1740
1730  PRINT : PRINT "THAT ISN'T HERE.": PRINT : GOTO 1760
1740  OB(X) = 22
1750  PRINT : PRINT "YOU'VE GOT THE ";NOUN$(X);
     " GEM.": PRINT
1760  X = 0: GOTO 1010
1900  REM INVENTORY ROUTINE
1910  X = 22
1920  PRINT : PRINT "YOU ARE CARRYING: ": PRINT
1930  GOSUB 2200
1940  GOTO 1010
```

```
2000  REM DROP ROUTINE
2010  GOSUB 2100
2020  IF OB(X) = 22 THEN GOTO 2040
2030  PRINT : PRINT "I DON'T HAVE THAT": PRINT : GOTO
      2060
2040  OB(X) = R
2050  PRINT : PRINT "I'VE DROPPED THE ";NOUN$(X)
      " GEM.": PRINT
2060  GOTO 1010
2100  REM ROUTINE FOR CHECKING NOUN
2110  FOR A = 1 TO 5
2120  IF N1$ = NOUN$(A) THEN X = A:A = 0: RETURN
2130  NEXT
2140  PRINT : PRINT "I DON'T SEE ";N1$;"..."
2150  POP : PRINT : GOTO 1010
2200  REM ROUTINE FOR LISTING OUT OBJECTS
2210  IF X = OB(1) THEN PRINT "A RED GEM":Y = 1
2220  IF X = OB(2) THEN PRINT "A GREEN GEM":Y = 1
2230  IF X = OB(3) THEN PRINT "A GOLD GEM":Y = 1
2240  IF X = OB(4) THEN PRINT "A PINK GEM":Y = 1
2250  IF X = OB(5) THEN PRINT "A BLUE GEM":Y = 1
2260  IF Y = 0 THEN PRINT "NOTHING"
2270  PRINT
2280  Y = 0: RETURN
9000  REM GAME INTRODUCTION
9010  HTAB 5: PRINT "THE LABYRINTH OF THE MINOTAUR"
9020  PRINT
9030  PRINT "BECAUSE OF THE SORDID LIFE YOU LIVE,":
      PRINT "YOU HAVE BEEN TRANSPORTED BACK TO":
      PRINT "ANCIENT CRETE AND UNCEREMONIOUSLY
      DUMPED";: PRINT "INTO THE LABYRINTH OF THE
      MINOTAUR."
9040  PRINT : PRINT "HOWEVER, BECAUSE YOU ONCE GAVE
      A SMALL": PRINT "DONATION TO AN OBSCURE
      CHARITY, THE": PRINT "FATES HAVE ORDAINED THAT
      YOU SHALL HAVE": PRINT "A SLIM CHANCE TO
      SURVIVE BEING A MCRIB": PRINT "SANDWICH FOR
      THE MINOTAUR."
9050  PRINT : PRINT "YOU HAVE BEEN PROVIDED WITH A
      BAG OF": PRINT "COLORED (WORTHLESS) GEMS IN
      ORDER TO": PRINT "SOLVE THE RIDDLE OF THE MAZE.
      THE": PRINT "INSTRUCTIONS IN THE BAG SAY:"
9060  PRINT
9070  HTAB 5: PRINT "THE GEMS WITHIN ARE RED AND
      GREEN"
9080  HTAB 5: PRINT "AND GOLD AND PINK AND BLUE"
9090  HTAB 5: PRINT "SAY 'DROP' OR 'GET' AND NAME A
      GEM"
9100  HTAB 5: PRINT "TO HELP YOU MUDDLE THROUGH."
9110  PRINT : PRINT "PRESS ANY KEY TO CONTINUE: ";: GET
      A$
9120  RETURN
10000  REM DATA STARTS HERE
10010  DATA 2,7,1,1,1,7,3,2,3,8,3,3,3,4,5,4,5,5,5,5,21,16,16,16,1,1,
       7,7,4,8,8,9,4,9,10,8,5,15,15,15,7,16,11,11,17,7,12,12,8,13,13,
       12,9,19,14,14,15,15,14,15,11,16,16,6,12,17,17,11,13,18,18,18,
       18,20,20,20,20,20,20,20,20
10020  DATA "RED","GREEN","GOLD","PINK","BLUE"
10200  REM MISCELLANEOUS MESSAGES
10210  TEXT : HOME
10220  PRINT : PRINT "HOORAY...YOU'VE WON....SORT OF."
10230  PRINT : PRINT "AS YOU EXIT THE LABYRINTH
       THROUGH A": PRINT "TURNSTILE, YOU SEE WHAT
       LOOKS LIKE A": PRINT "LARGE SIGN HANGING
       FROM A TREE."
10240  PRINT : PRINT "UPON CLOSER EXAMINATION YOU
       SEE IT IS": PRINT "REALLY A MIRROR.": PRINT : PRINT
       "GAZING INTO THE MIRROR YOU SEE A": PRINT
       "MINOTAUR GAZING BACK AT YOU."
10250  PRINT : PRINT "SUDDENLY YOU FEEL LIKE GOING
       INTO TOWN": PRINT "AND WREAKING HAVOC.":
       END
10260  TEXT : HOME
10270  VTAB 1: PRINT "YOU ARE IN A WINECELLAR.": POKE
       34,1
10280  PRINT : PRINT "THERE ARE RACKS AND RACKS OF
       WINE UPON": PRINT "THE WALL. ON THE FLOOR ARE
       AMPHORAE": PRINT "CONTAINING MORE OF THE
       SAME LIQUID."
10290  PRINT : PRINT "LOOKING AROUND YOU KNOW
       YOU'RE IN": PRINT "TROUBLE AS THE DOOR HAS
       SWUNG SHUT AND": PRINT "BLENDED INTO THE
       WALLS."
10300  PRINT : PRINT "A SIGN ON THE WALL SAYS" : PRINT :
       PRINT TAB(5)"DISREGARD PREVIOUS SIGN."
10310  PRINT
10320  GOTO 1540
10330  TEXT : HOME
10340  FLASH : PRINT "MINOTAUR'S KITCHEN": NORMAL
10350  PRINT : PRINT "YOU HAVE BEEN CLEVERLY LURED
       HERE BY": PRINT "THE SIGN WHICH THE MINOTAUR
       HUNG ON": PRINT "THE KITCHEN DOOR."
10360  PRINT : PRINT "THE MINOTAUR GLANCES UP FROM
       THE CORNER": PRINT "WHERE HE IS READING 'ONE
       THOUSAND AND": PRINT "ONE WAYS TO PREPARE
       ADVENTURERS' BY": PRINT "JULIA CHILD."
10370  PRINT : PRINT "AS HE GETS UP AND MOVES TOWARD
       YOU,": PRINT "SNORTING AND SNUFFLING, WE
       GENTLY CLOSE": PRINT "THE DOOR AND LEAVE
       YOU."
10380  PRINT : PRINT "AU REVOIR, SWEET FRICASEE.": END
10390  TEXT : HOME
10400  END
```

SL

Part 3: Just Like Clockwork

The Atari has very little similarity to the analog monsters we normally think of when we talk of electronic sound generation. When it came to sound, Atari did what you might expect a bunch of computer engineers to do: they did it digitally.

Divide-by-Who? If we think of sound as a series of pulses coming from the television speaker, the frequency, or pitch, of that sound will depend on how fast the pulses come: the *frequency* of their appearance. For this reason, we measure pitch in terms of hertz (abbreviated to Hz). One hertz is equal to one pulse each second. The "pop-pop-pop" of 1 Hz is a very low frequency sound, and we usually deal with much higher pitches. Middle A, for example (in Basic, *sound 0,144,10,4*), is 440 Hz. When the pulses come this fast, we no longer hear them individually, but blended together in a "note" that we can hum. To deal with higher frequencies, the terms kilohertz (1,000 pulses a second) and megahertz (1 million pulses a second) are often used. Kilohertz and megahertz are abbreviated to kHz and MHz, respectively.

To control the frequency of a sound, a counter, or clock, is needed to time out these pulses. Each of the Atari's four channels can be tied to one of three different clock speeds: 1.79 MHz, 64 kHz, and 15 kHz. These master clocks are used to time out the pulses to the television speaker, and in so doing, they control the range of frequencies obtainable from that channel.

A sound generator with a choice of three different pitches is not a great leap forward for mankind. Obviously, something more is needed to extract a greater wealth of frequencies from these three master clocks. This extra something is called a divide-by-N circuit, and though it's simple in concept, it's a really neat trick. This circuit waits until N pulses have entered it, and then it puts out one single pulse. If, for example, N is 7, then the circuit will output one pulse for every seven pulses it receives.

When the divide-by-N circuit is placed in line with one of the selectable clocks, the circuit will mask out some of the pulses coming from the master clock. Changing the size of N will change the number of pulses that are eliminated and hence change the pitch output of the television speaker. Voila! A pitch source.

From this, you can see that there are two variables affecting the final pitch sent out to the real world: the master clocking frequency that is input to the divide-by-N circuit, and the divisor N. The Basic *sound* statement uses only the "normal" clocking frequency of 64 kHz, thus limiting the user to manipulating only the size of N.

There is one other factor affecting the range of frequencies available from Pokey: the size of N. If N is a single-byte number, the lowest note possible will be the master clock divided by 255. If N is a two-byte number, the lowest note possible will be the master clock divided by 65,535. The size of N is called the "frequency resolution" of the channel. In normal operation, each of the four channels has eight-bit frequency resolution. The Atari, however, does permit joining two channels together to get sixteen-bit frequency resolution.

Some Pokables. To play with the hidden sound modes, we have to make a foray into the interior of the Atari. The sound statement won't take us much farther, so we're going to have to poke the hardware registers ourselves. The following memory locations are pertinent to sound generation:

AUDF1=53760	AUDC3=53765
AUDC1=53761	AUDF4=53766
AUDF2=53762	AUDC4=53767
AUDC2=53763	
AUDF3=53764	AUDCTL=53768

AUDF1 through AUDF4 are the frequency registers for each channel. This is where the divisor N is obtained. To find the frequency of the sound selected by AUDF1–4, use the following formula (FIN is the frequency input to the divide-by-N circuit and corresponds to the master clock frequency. FOUT is the frequency output to the real world):

FOUT = FIN/(2*(AUDF+M))

M will have a value of 1, unless FIN = 1.79. In this case, M will equal 4 if AUDF is an eight-bit counter, or 7 if AUDF is a sixteen-bit counter.

The actual values for each of the three master clock frequencies (FIN) are:

1.79 MHz = 1,789,789 Hz
64 kHz = 63,921 Hz
15 kHz = 15,699 Hz

AUDC1 through AUDC4 are the audio control registers for each channel. These registers contain the volume and distortion parameters for each channel packed into one byte. The high nibble contains the distortion parameter and the lower nibble contains the volume.

AUDCTL is the audio mode control register, and is the "master switch" for how all the sound channels will behave. Each bit in AUDCTL has its own meaning, so AUDCTL is really a collection of eight switches. The actions associated with each bit are given below. To use this table with Basic, just select the options you want and add up the corresponding POKE: numbers, then poke the result into AUDCTL.

POKE:128. Changes the seventeen-bit polynomial random counter into a nine-bit counter.

POKE:64. Clocks channel 1 with 1.79 MHz, instead of 64 kHz.

POKE:32. Clocks channel 3 with 1.79 MHz, instead of 64 kHz.

POKE:16. Clocks channel 2 with channel 1, instead of master clock. This ties channels 1 and 2 together to form a sixteen-bit AUDF register. AUDF1 becomes the low-order byte and AUDF2 becomes the high-order byte. The sound that is controlled by these channels "comes out" of channel 2.

POKE:8. Clocks channel 4 with channel 3, instead of the master clock. This ties channels 3 and 4 together into a sixteen-bit AUDF register in the same way POKE:16 ties channels 1 and 2.

POKE:4. Inserts a Hi-Pass filter into channel 1's output. The filter's cutoff frequency is controlled by AUDF3.

POKE:2. Inserts a Hi-Pass filter into channel 2's output. The filter's cutoff frequency is controlled by AUDF4.

POKE:1. Changes the normal 64 kHz clocking frequency into a 15 kHz clock.

How Do I Use All This? First, initialize Pokey. Pokey handles all the I/O stuff, too, so it has to be set up for sound generation after every I/O operation (like, for instance, reading in your program). Executing a *sound 0,0,0,0* at the beginning of your program will take care of this.

Next, select the sound mode options you want and poke the corresponding value into AUDCTL. After that, just poke the distortion and volume parameters into AUDC1–4, and your frequency parameters into AUDF1–4. If you use the sound statement again, however, it will wipe out any special AUDCTL modes you may have selected, so you'll have to repoke in your value after every Basic sound command.

To get you started, sample program 1 shows the procedure for setting up two channels of high frequency resolution sound clocked from 1.79 MHz. The program then plays a short musical sequence from the data statements at the end.

To play musical notes in these special sound modes, of course, you need a chart showing the correct values for each equally tempered note in the Western scale. The note chart included in the Basic manual will no longer work: it's for eight-bit frequency resolution and a 64kHz clocking rate. That's where sample program 2 comes in.

Sample program 2, when run, will print out a list of the musical notes and their corresponding two-byte values for each of the three clocking frequencies. Just look up the note you want and poke the first number into the high-order AUDF byte, the second number into the low-order AUDF byte.

The range of the charts goes beyond anything practical: the lowest C is 8.17 Hz, which hardly sounds musical, and the highest C is 134 kHz, which considerably outdistances your stereo's frequency reponse. You'll also notice that as each chart nears the top of its range, weird things start to happen: the value of 0,1 is listed for every note between G# and D#. This is because decimal numbers are not allowed in the AUDF registers.

This concludes our discussion on clocking. The sharp-eyed may have noticed that the distortion modes were glossed over; because of their nature, it is important to understand Pokey's clocking system first. Next time we'll delve into the topics of noise and waveform cancellation.


```
20 AUDCTL=53768
30 AUDF1=53760:AUDC1=53761
40 AUDF2=AUDF1+2
50 AUDC2=AUDC1+2:AUDC3=
   AUDC2+2:AUDC4=AUDC3+2
60 REM Initialize everything
70 SOUND 0,0,0,0
80 REM Poke POKEY
90 POKE AUDCTL,120
100 REM Shut off unused outputs
110 POKE AUDC1,0:POKE AUDC3,0
120 REM Turn on channels 2 and 4
130 POKE AUDC2,168:POKE AUDC4,168
140 RESTORE
150     FOR TONE=1 TO 12
160         FOR VOICE=0 TO 4 STEP 4
170             READ HIBYTE,LOBYTE
180             POKE AUDF1+VOICE,LOBYTE
190             POKE AUDF2+VOICE,HIBYTE
200         NEXT VOICE
210         FOR WAIT=1 TO 50
220         NEXT WAIT
230     NEXT TONE
240 GOTO 140
400 DATA 0,88,0,120,0,78,0,106,0,94,0,128,0,88,0,120,15,221
420 DATA 47,150,14,33,42,100,13,85,40,3,14,33,42,100,11,224
440 DATA 28,73,10,148,31,192,10,148,127,22,10,148,63,136
```

Sample Program 1.

```
 90 DIM CLOCK(2),M(2),NAME$(5)
110 CLOCK(0)=15699
120 CLOCK(1)=63921
130 CLOCK(2)=1789789
150 M(0)=1
160 M(1)=1
170 M(2)=7
190 FOR FREQ=0 TO 2
200     LPRINT: LPRINT
210     LPRINT "CLOCK: ";CLOCK(FREQ)
220     LPRINT
240     FOUT=8.1759375
260     SKEY=0
280             AUDF=INT((CLOCK(FREQ)
                /FOUT)-M(FREQ)+0.5)
290             REM Break into high and low
300             HIBYTE=INT(AUDF/256)
310             LOBYTE=AUDF-(HIBYTE*256)
330             IF HIBYTE > 255 THEN 370
340                 RESTORE 500+SKEY
350                 READ NAME$
360                 LPRINT NAME$;"= ",
                    HIBYTE;",";LOBYTE,
                    INT(FOUT*100)/100;" Hz."
370             SKEY=SKEY+1
380             IF SKEY=12 THEN SKEY=0
390             FOUT=FOUT*1.059463094
410     IF HIBYTE>0 OR LOBYTE>0 THEN 280
420 NEXT FREQ
430 END
500 DATA C,C#/Db,D,D#/Eb,E,F,F#/Gb
510 DATA G,G#/Ab,A,A#/Bb,B
```

Sample Program 2.

SL

What Is the Routine for One Hand Clapping?

How auditorially inclined are you? Can you make an Atari sing? Can you produce a subtle, yet richly elegant and evocative, tone, using the full potential of your machine's wondrous sound-generating capabilities? Can you do it in 150 lines or less of Atari Basic?

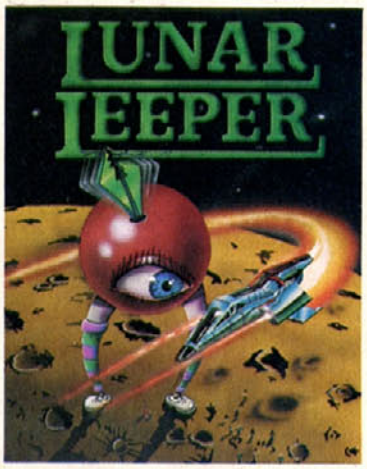
If all your answers are yes (or even maybe), you qualify to enter the *Softline* Sound Effects Contest. Send us your program, with disk and listing, and include a written description (no more than a page) of the background—the milieu, the mise en scene, or the raison d'etre that you imagine as a backdrop for your audible feast. What is that sound supposed to be coming from and why?

Entries will be judged both on creativity of program and description. A great program could win accompanied by a so-so description, and vice versa. The winner will win its author $100 worth of products from any *Softline* advertisers, and we will publish the winning listing in *Softline*.

Entry deadline: January 15, 1983. The winner and runners-up will be published in the March issue. Mail entries to Softline Sound, Box 60, North Hollywood, CA 91603.

JEEPERS CREEPERS!

DON'T KILL THEM LEEPERS!



Them leepers is cute.
Them leepers ain't kind.
Them leepers will jump up
and bite your behind.

Your job is to fly through
them leepers galore
to rescue some men
is the reason what for.

So be a good pilot
be quick and be sly
Don't kill the leepers
but shoot up the eye

Save all the men
and avoid all the leepers
fly through a cave
and shoot the lunar leepers keepers

If you want to know
what this silly poem's for
check out LUNAR LEEPERS
at your local computer store

Lunar Leepers is a funtastic new APPLE arcade game from CHUCKLES, creator of Laff Pak. Lunar Leepers is available for $29.95 at your local computer store or directly from:

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36575 Mudge Ranch Rd.
Coarsegold, CA 93614
Phone (209) 683-6858

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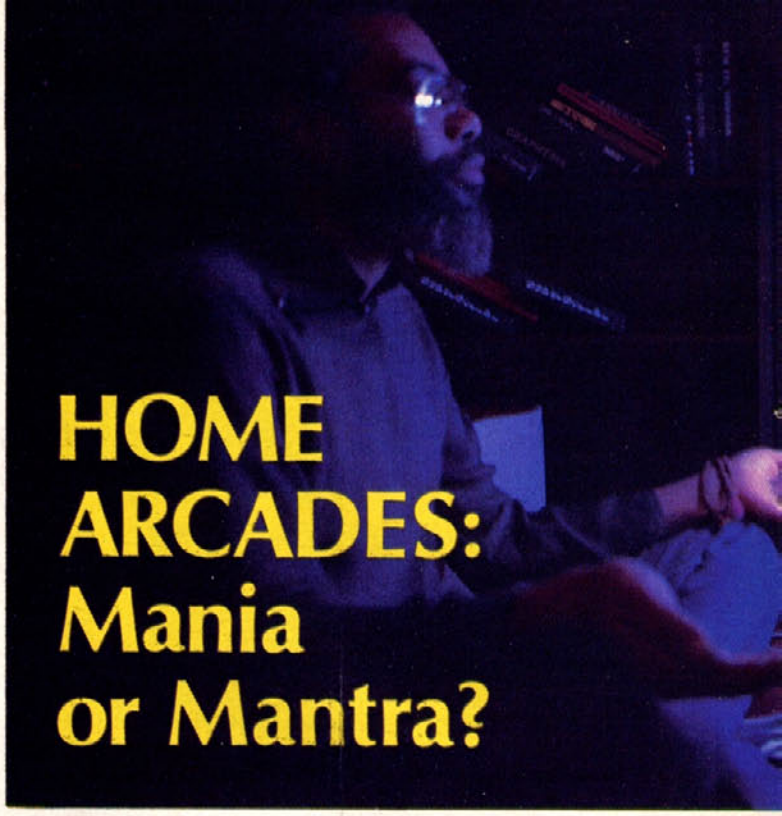
SIERRAVISION

Sierra ON-LINE INC



HOME ARCADES: Mania or Mantra?

by RICH HOFMANN

Historically, people, as if seeking a scapegoat, have always found something to suspect of being unhealthy within our culture, something designed to lead our youth astray. In the present, arcade games are the lurking suspect, and traditional parents worry about their children becoming addicted to arcade games.

When one thinks of addiction, one thinks of the undesirable consequences of being addicted. With arcade games there is really only one obvious bad consequence—loss of money. (This results in more than one kind of problem, to be touched on later.)

Considering home arcade games played on micros as opposed to games played in the arcades, however, it may well be that there are no bad consequences for the people who play microcomputer games other than possible hardship resulting from the initial cash outlay for the game disk.

In fact, considering games in the context of microcomputers, there are many positive consequences, especially for children.

Stress and Microcomputer Games. In the adult world, stress is a common topic of concern these days. Although we do not always know the specific cause of stress, we do know its symptoms: cold palms, cold sweat, a "pain in the neck" just above the shoulders and behind the lower ears, chronic sickness, mental fatigue (which includes a low tolerance for frustration as well as confusion and poor memory), depression, and insomnia, just to mention a few.

In some adults, stress is treated clinically. Other adults learn how to manage their stress from books, television, or other people. A majority of stress sufferers accommodate their stress in rather natural fashions by going for walks, jogging, or engaging in hobbies.

Virtually all methods of treating stress include one common feature: they remove the person mentally from the real world. Given that one of the bases for treating stress is temporary removal from reality, it's easy to understand the value of watching a television show, listening to music, gardening, and jogging. Such behaviors free the mind from the mundane or threatening real-world thought processes. All stress reducers also share the common approach of controlling the environment. Control of the environment results in a tremendous surge of psychological strength and a sense of mental safety.

Two years' in-depth research indicates strongly that one reason for the popularity of microcomputer games is their role in the reduction of stress. Involvement in a microcomputer game can represent a temporary escape from reality. Typically, involvement with a microcomputer game places the player in control—at least partially—of the environment. This logic may also explain why children play with toys. When you watch young children play with their trucks and dolls and other toys, there can be little doubt as to who is in control of the environment. Playing with toy cars, trucks, and dolls is a common activity of five-year-old to seven-year-old children; it may be their natural way of exercising some environmental control in an otherwise adult-dominated world.

Simple Pleasures. The same child who enjoys playing with cars and dolls appears to derive great delight in exercising control over the ship, tank, or animated character involved in the typical arcade game.

Those games with a lot of sound, color, and special movement hold the child's attention for periods of time that far surpass the normal attention span that one ordinarily finds in children of this age in an educational setting. Children seem to show no great concern for winning the game and virtually no remorse when they lose.

The concept of losing as "bad" simply is not a reality. With the press of a key or flick of a switch, the child is back in control of the situation, and in the child's mind, he or she never relinquished control. This gives a child an extremely good feeling and is a major factor in explaining the child's persistence and eagerness in playing with something that is perceived as a no-win experience in the eyes of some adults.

Especially important at this age level are the animation, colors, and sounds that go with these programs. If a program is lacking in any of these commodities, it is usually of little interest to the child. *Space Invaders*, lacking in sound and color, is an example of an arcade program of no great interest to a child this age. Yet this may also be one of the reasons why *Snack Attack*, usually associated with older players, is so popular with young children as well. *Alien Rain*, *Alien Typhoon*, *Apple Panic*, *Pulsar II*, *Ceiling Zero*, *Space Eggs*, and *Night Crawler* have all proved fiercely popular with children in the study.

Because games such as *Raster Blaster*, *Snoggle*, and *Night Mission Pinball* require a great deal of finger coordination, children within this age range can exercise very little control over them; little kids simply do not possess the necessary coordination skills. To be in control of the game is to escape and experience a reduction of stress, but a lack of control of the game causes anxiety and results in stress, so the younger child simply avoids the game.

Of course strategy and role-playing games are of no interest to these young children. Kids this age are just not intellectually sophisticated enough to understand games of this sort.

Why a Duck? One particular type of game, typified by *Russki Duck*, was especially intriguing to children in the middle elementary grades, ages eight to ten, and generally held no interest for younger or older children. Kids aged eight to ten were observed to spend two or three hours at a single sitting with these games. Such attention is somewhat irregular for children within this age range and was initially baffling.

Eight to eleven-year-old children are just intellectually advanced enough to know when they are losing in an arcade game and, typically, are not good competitors (there are exceptions). The mystery of *Russki Duck* is thus solved. It is a simple strategy game, well within the intellectual grasp of the eight to eleven-year-old. Indeed, it is ideal for this age child.

The player in *Russki Duck* risks "destruction" but is allowed five mistakes and can quickly become the master of the game by

avoiding certain situations. Most important, all action on the screen occurs as a function of the player's choice of movement on the screen. In other words, the player is in total control of the game environment. Such control and strategy is beyond the thinking capacity of most five to seven-year-olds and a little too easy for the child past the age of eleven.

Theoretically, an ideal microcomputer game should mentally involve the player to the extent that the player has the feeling of being in control of the game environment. A game that is either too easy or too difficult won't allow the player to escape from reality, and therefore the player won't derive any great satisfaction from playing the game. (An exception to this occurs in the game playing of the adult—read on.)

Older elementary children, from about age ten through twelve, as well as adolescents, preadolescents, and adults, certainly enjoy the thrill of arcade games, but they really get into such adventure and fantasy games as *Wizardry*, *Castle Wolfenstein*, *Crown of Arthain*, *Zork*, *Escape*, and *The Prisoner*.

When provided with several game choices, this age group tends to burn out on arcade games. Of course this burnout does not occur overnight. Rather, it is a slow process that takes about twelve to thirteen months. When this burnout occurs, people in this age range tend to concentrate on the strategy involved in the fantasy and role-playing games. A new arcade game always draws interest but the interest peaks when all the different aspects of the game are understood.

A number of adults in mentally demanding jobs indicated that they were not really into games. In the course of the study, it became apparent that many of these people do play games, but they don't talk much about it. What is truly amazing about all of this is that they tend to play the same games: *Asteroids*, *Snoggle*, and *Sabotage*. These people didn't volunteer this information about their game playing. It seemed to come out in bits and pieces during conversations about games, children, and computers. Several readers may have been surprised when *Softline* published Apple designer and founder Steve Wozniak as the early record holder in *Sabotage*. Yet that game has proved to be an adult favorite that holds no special interest for children, regardless of age group.

Mind Over Missile Defense. It should now be clear why older children "burn out" (with exceptions, of course) on arcade games. Perhaps they develop a mastery of the logic of the game. Mastery of the game itself may be only a relative accomplishment. The intrigue and interest in new games may, in most cases, be a result of the novelty of the game as opposed to any redeeming features that it alone may possess. The strategy and role-playing games such as *Wizardry*, *Dragon's Eye*, and *Adventure* approach the level of intellectual involvement demanded by adult thinking. In order to be engrossed mentally in a game, the adult must be challenged and, most important, must actually be required to assume a role in the game. Such games should effectively remove the player from reality, from the humdrum business of everyday life, from the stress that wears so many people out mentally, children as well as adults.

You Are Getting Sleepy. . . . Contrary to all this discussion is the case of the adult who has been involved in heavy mental activity. The games that seem to appeal to this particular type of adult are games that require no real thought at all! It's as though the attraction is that one can turn the mind off when playing the game.

Transcendental meditation, a very effective method for coping with stress, involves the use of a mantra—usually a simple phrase that the meditator concentrates on in order to purge or cleanse the mind of other thoughts and to slow down the thinking process until only one thought—the mantra—occupies the mind.

It is said by those who follow such a procedure that great mental peacefulness and tranquility results from successful concentration on the mantra. The adult who is involved in heavy mental activity during the workday tends to select a fairly simple game that requires concentration with no thought, such as *Sabotage*. Such game involvement is similar to the mantra concentration that occurs in transcendental meditation. Games that fall into this category are *Asteroid Field*, *Phantoms Five*, *Space Eggs*, and maybe *Snack Attack*.

It seems quite reasonable to speculate that a computer game, when properly designed and aimed at the right player, will function as a stress reducer. That is, microcomputer games may indeed assume a very important role in the reduction of stress in our society. It is reasonable to assume that microcomputer games have some redeeming values similar to those that we associate with a hobby. It's quite obvious that some individuals have simply adopted microcomputer games as hobbies. This may strike some people as a rather strange hobby, but many middle-aged adults can probably recall their surprised reactions when they first saw a jogger. Now joggers and jogging are an accepted part of our society.

It might be argued that a computer adventure game has as much redeeming social value as a chess game. We already have *Zork* clubs, and soon we will probably have certified *Zork* masters. Psychologically, it can be just as beneficial for a young child to escape from reality by exercising control over a spaceship within the context of a microcomputer game as it is for the same child to escape from reality by exercising control over a die-cast metal dump truck. Psychologically, it may be just as beneficial for an adult to play *Sabotage* as it is for the adult to concentrate on a mantra.

One of the problems associated with arcade parlor video games is now quite easy to explain. Every time you play a game you lose a quarter. In this sense one always loses when playing an arcade game; a continual loss that is stressful for most people. There is, furthermore, a necessary break in players' concentration while they "feed" the machine again. Thus, not only do pay-for-play arcade games fail to remove the player from reality, they actually have a high potential for creating stress.

There are several possible outcomes that may result from re-

search into the use of games as stress reducers in children and adults. One result may be a method for systematically evaluating computer games with respect to their potential as stress reducers. It would be extremely valuable to parents and others to know which commercially produced microcomputer games have some value as stress reducers, and to know the types of individuals with whom they might be most effectively used.

Rich Hofmann is a professor of educational psychology at Miami University in Oxford, Ohio. He has conducted research in the areas of applied statistics, the development of thought processes in children, and computer programming. He has been programming for approximately twenty years and is presently completing a programming project in applied statistics for the Apple Education Foundation.

For the past two and a half years he has been systematically studying the interaction between children and microcomputers. SL

Hot Town Bans Bug

When you're a few points away from a new high score and your last ship blows up, it's hard not to take video games seriously. Some city governments take them seriously enough to ban video game machines from the city limits for fear that they encourage youngsters to engage in antisocial behavior.

So far, there's no hard evidence linking one to the other. But the city council of Kentwood, Michigan, fears the worst—that a certain game will lead its players to become felons. They have passed a resolution asking dealers not to carry the game in their stores.

The game is Silas Warner's *Firebug*, and it's from Muse Software of Baltimore, Maryland.

The object of *Firebug* is to burn walls by dropping gasoline cans in strategic locations. The game is not incredibly realistic; it's done entirely in lo-res graphics, the player is represented by a square, and the gasoline cans are blue dots.

"We received a letter from the fire chief saying that the game might encourage arson," says Beverly Bacon, city clerk of the Grand Rapids suburb. "We [the city council] haven't seen the game, but the title alone has a connotation of arson."

Muse representative Rhonda Miller explains that *Firebug* "was just a diversion for Silas while he was working on another project. It gave him a chance to experiment with screen graphics and sound effects."

When *Firebug* first came out, the instructions put the player in a building and challenged him to burn down the five-story structure and escape alive. "The game sold a lot of copies for the first few weeks before sales dropped off," says Miller.

Then Muse began receiving letters from fire officials, mostly in the Grand Rapids area, expressing concern about the game. Miller says that the company understood the concern and changed the game's instructions to make it "a 'test of fire' in which the player 'guides a mechanical firebug through a maze.' "

But that didn't seem to make any difference to Kentwood officials. "We still don't want the game being sold here," Bacon says.

Mike Flint of Computerland, Kentwood, says that he can't imagine people being encouraged to go out and set buildings on fire just from playing *Firebug*. "It's like saying that a game where you jump off a building will make you want to jump off buildings—it just doesn't happen."

Flint adds that, to his knowledge, *Firebug* "has not been a real hot mover" in his store. Maybe he should try a fire sale? SL

Gameline

Frogger
By John Harris.

The translations of coin-op arcade games to the home computer continue with the release of *Frogger*.

When a software company pays for the rights to market a copyrighted coin-op, the computer owner expects a true-to-form game. They will be amply satisfied with *Frogger* as programmed by John Harris for the Atari.

Frogger has earned the ominous distinction of being "the arcade game with the most ways to die," and its rep is preserved here. The object of the game is to maneuver a frog safely to his home within an allotted time interval. This not-so-casual journey presents you with a plethora of obstacles. First you must traverse a four-lane highway, crowded with casual Sunday drivers and crazed speed demons. If you get hit, you die.

Make it to the river bank and you will be provided with a modicum of safety, at least on the first few levels. Then you must cross the river by using the logs, turtles, and crocodiles that float by as stepping stones. If you jump into the water, you die. If you jump into a crocodile's open mouth, you die. If you are riding on the back of a turtle who decides to take a dive, you die. If you sail off the end of the screen, you die. As you approach the safety of your home, you must jump into it exactly, or you die! Periodically, a crocodile will invade your home, and if you jump in while he's there, you die. By the way, you must make it home before you run out of time, or guess what? *You die!*

The successful completion of one level only makes the next crossing more difficult. The speed of everything increases, the vehicles on the road become more numerous, and the objects in the river become fewer and farther apart. By the third level, deadly snakes and otters make their appearance, infesting the logs, the water, and your once safe haven, the river bank. Their mission in life is to further increase the ways that you can die. If this is not enough of a challenge for you, you can select from two starting speeds, slow or fast.

The multicolored playing field, flawless animation, and fast response are truly state of the art. The music is outstanding, with an entire medley of songs serenading you throughout the game, although you do have the option to turn it off without turning off the other game sounds.

Sierra On-Line has billed this as "the original *Frogger*" in reference to the several variations of this game currently available. None of the others gives you the feeling that you are playing the coin-op. *This* game does. GR/MR

Atari 400 or 800; 32K, disk; 16K, cassette. $34.95 from Sierra On-Line, 36575 Mudge Ranch Road, Coarsegold, CA 93614; (209) 683-6858.

Seafox
By Ed Hobbs.

Nothing succeeds like success. And one of Broderbund's recent successes has been a program by Tony Suzuki called *Star Blazer*. Their latest release, *Seafox*, is strongly reminiscent of its predecessor, with three primary differences: speed, setting, and graphics.

In *Seafox*, you control a submarine on a convoy hunt. The bottom three-quarters of the screen represents your watery domain, while above a variety of ships cruise by in three tiers. Your mission is to sink the top tier of ships: tankers, freighters, and liners. Between you and your prey is a steady parade of hospital ships which are inviolate according to international law. Should you be so foolish as to ignore world opinion, you will find your torpedoes speeding right back at you after a hit on one of these floating palaces of mercy. At the second level of difficulty, and all the following ones (there are five altogether), there appears a third tier of ships below the hospital ships and the merchanters. These are destroyers with a nasty habit of tossing innumerable depth charges overboard. The depth charges will blow up when they are level with your sub, or when they encounter one of their own subs.

One of their own subs? Yes, there are quite a few enemy boats patrolling the depths, bent on a collision with you. These inimical types come from any direction, and after the first level, they begin firing fishlike torpedoes at you. By the time you get to the fourth level—if you get to the fourth level—there are also magnetic mines to deal with. These cute little fuzzballs home in on you relentlessly, no matter where you turn or however desperately you may try to avoid them. Who knows what terrors lurk at the fifth level? You should live so long!

In the interest of a challenging game, the folks at Broderbund have also provided all erstwhile sub skippers with a limited amount of fuel, some 1,200 units, and a mere thirty torpedoes. In order to refuel, you must await the passage of the supply sub along the bottom of the screen. Supply sub economics are such that you only have two chances to refuel before trickling down to the bottom, out of fuel and doomed. Refueling is accomplished by means of a trained dolphin released from the supply sub. You must maneuver your sub into a position to intercept the dolphin's backpack. There is also a giant clam around who just loves fuel and torpedoes. He will try to beat you to the dolphin and scarf down all the goodies. One word of caution: don't shoot the dolphin. He is your friend and it is wise to treat him as such. Torpedo him and you'll meet some of his big friends.

By the time you reach the third level in *Seafox*, the action slows down noticeably. This is not too surprising in light of the fact that there is, by then, an average of twenty animated objects on screen. Yet the relationship of movement between all the objects is preserved. You may be moving more slowly, but so is everything else. The challenge is still there.

The graphics, while not breathtaking as in *Star Blazer*, are nevertheless colorful and enjoyable. All in all, *Seafox* is quite entertaining. It has definite addictive potential. While it is not the tour de force that its airborne inspiration was, it still promises many hours of

joystick-bending diversion for all. Broderbund's golden touch is once again in evidence. DA

Apple II, Apple II Plus; 48K, disk. $29.95 from Broderbund, 1938 Fourth Street, San Rafael, CA 94901; (415) 456-6424.

Starcross

By David Lebling.

You are humanity's newest brand of pioneer, the space prospector. Unlike your counterpart in the Old West, you are equipped with highly sophisticated instruments to help you find that one big strike that will make you rich for life—not gold, but a black hole. Until then, you put up with what little you have: your one-person ship, which needs repairs badly, and a terribly irritable computer that is your only distraction from the long hours and the vast loneliness of space.

Suddenly, the alarm bell on the mass detector starts clanging. Your first puzzle, as your computer prompts you impatiently, is to turn off the alarm. After that, you must find the object that triggered the alarm, give your computer the navigation data necessary to get to it (one of those things you can't yet afford is an interface for your mass detector), and turn on the drives. When you arrive at your destination, you will find not a black hole, but something altogether more intriguing and potentially profitable: an immense alien spaceship, apparently derelict. Now how do you get on board?

So opens *Starcross*, Infocom's first science-fiction entry into the text adventure market. Written by David Lebling, *Starcross* evokes more with text than many hi-res adventures do with the most advanced graphics.

Based on the conventions of science fiction rather than fantasy, *Starcross*'s puzzles will appeal to the scientifically minded. You must get into the alien mind and determine the meaning of cryptic machine labels. Fortunately, the labels are done in symbols rather than in an alien language. This makes the puzzles reasonable, but still challenging.

Starcross requires you to be a scientist, an engineer, an astronaut, an explorer, and a diplomat. It expects you to have the judgment to know when to shoot a gun and the wisdom to know when not to. You must instinctively be able to know what actions are productive and what can get you killed. You will experience the farthest reaches not only of space, but of your own imagination as well. For the ultimate mystery is the origin of the giant spaceship; before you understand its purpose, how can you know what to do with it?

What *Starcross* doesn't do is give you pointless puzzles to solve, like which synonym for ray gun it understands. Of course, it won't know every word you throw at it, but with a vocabulary of more than six hundred words and error messages that indicate precisely which word it doesn't grok, you'll find the program more of a help in playing the game than a hindrance.

With *Starcross*, Infocom continues its new flamboyant merchandising technique that started with *Deadline*. Each disk is packaged, appropriately enough, in a reusable flying saucer. You also get a manual and a deluxe, multicolored map of your area of the solar system, which is an integral part of the game.

Starcross was obviously a labor of love for Lebling. It is a sheer pleasure to play. DD/RRA

Apple II, Apple II Plus; 48K. Atari 400 or 800; 32K. TRS-80. Commodore. IBM pc. CP/M 8-inch. Osborne. DEC. NEC. $39.95 from Infocom, 55 Wheeler Street, Cambridge, MA 02139; (617) 492-1031.

Salmon Run

By Bill Williams.

Those who've grown tired of destroying things in arcade-type games, take heart: Bill Williams's delightful *Salmon Run* requires that you *save* things . . . in this case, ol' Sam the salmon, who's desperately moving upstream to spawn.

Naturally, life is not simply a swiftly moving stream. Fish have

many enemies, natural or otherwise, and all will appear as the player gains proficiency. Most common is Bertha, the large black bear whose idea of the perfect lunch is fillet of Sam. Eventually her white-furred cousin, Bert the polar bear, also appears; he moves faster and is harder to avoid. Both bears can be fooled by pulling back on the joystick in mid-jump, which causes Sam to disappear into deeper water. Once the bear has moved off-screen, pushing forward will make Sam reappear to continue his journey.

Seagulls are beneficial adversaries. Although they frighten the bears, the birds also crave fish and are not above swooping down for a quick snack. Finally, impetuous little boys eventually gather and spread nets in the hopes of bringing Mom a fresh fish dinner. Sam's life is indeed tough.

The spry little swimmer no doubt considers the struggle worthwhile, however, since Samantha waits upstream. Surviving the hazards results in a successful spawning (signified by one of the cutest visual surprises seen in a while) and produces another life for Sam. This reward system is but one of the clever touches in *Salmon Run*: rather than beginning with, say, three lives and using them up one by one, Sam starts with only one and receives another after each successful run.

By far the best feature of *Salmon Run* is its outstanding sound effects. The bubbling stream and Sam's rippling progress are remarkably lifelike. Waterfalls seem particularly authentic, as do the cries of the seagulls (the latter, in fact, sound like they've flown in from an outtake of *The Birds*).

The trickiest skill to learn is that of jumping a waterfall successfully. It's a coordinated effort, not unlike shifting gears with a manual transmission: trigger and joystick must be manipulated at precise moments.

Salmon Run is a charming game that gives the player a genuine sense of ecological accomplishment; it's also quick to learn and quite contagious. DB

Atari 400 or 800; 16K, cassette; 24K, disk. $22.95 from Atari Program Exchange (APX), Box 427, 155 Moffet Park Drive, B-1, Sunnyvale, CA 94086; (408) 745-5535.

Galactic Gladiators

By Tom Reamy.

By the twenty-eighth century highly advanced weapon technology has spread through the seven intelligent species of the known portion of the galaxy. In *Galactic Gladiators*, you simulate twenty-eighth century combat between two teams of one to ten gladiators each. There are several standard teams and scenarios—which lets you start playing quickly—and you can also create your own in almost endless variety. Teams and maps can be saved on disk when they are created and used in later games. The winning team in each game can also be saved; the surviving gladiators gain skill with their weapons and experience points that will help them in their next battle. Unfinished games can also be saved and continued later.

This strategy game comes with a twenty-eight page rulebook that seems very complete. There are rules, reference tables, historical notes, and blank maps and charts to help you design your own games. There's so much that it's confusing at first, but then you shouldn't start with the rulebook. *Galactic Gladiators* also has a player's aid card that can have you playing in less than five minutes.

The only thing SSI could have done better is to put a warning in the front of the rulebook to tell first-timers to read the card first. The logical assumption is that a player's aid card is a reference that won't make much sense until after you learn the game. In this case, it is essential to read the card first since this is the *only* place where the basic mechanics are explained.

The instructions on the card will explain how to get started and lead you into the simplest of the standard games: *The Brawl in Cosmic Mike's Place*. This is a nice little donnybrook between two mixed-species teams with three members each. Mike's Place is an example of a small battlefield, eight squares by fourteen squares. Your education about the relative capabilities of weapons and characters begins immediately.

Each gladiator is rated for strength, dexterity, endurance, speed, and skill with weapons. Strength will dictate which weapons and armor you can carry and how much damage you can take. Dexterity determines the order in which attacks occur. Endurance is reduced by hand-to-hand (or claw or tentacle or whatever) combat and by damage. When endurance reaches zero, the character must rest. Speed determines how far each character can move in one turn and the order of movement. Weapon skill and dexterity determine the probability of scoring a hit when an attack occurs. Gladiators with high strength and endurance do well in close combat; those with mobility and skill with long-range weapons do well if they have room to keep away from the big brutes.

Each character can choose from among six options each turn. They can attack immediately, move, move half the normal distance and attack (after all others have moved), rest, load a phaser, or change weapons (each gladiator carries two). The result of an attack can be a miss, a partial hit, or a full hit. When strength falls to zero, a gladiator is dead and is removed from the game. A wounded gladiator is also removed, but if its team wins it will be saved (fully recovered) along with the survivors. A stun deprives the target of any moves or actions for the remainder of the turn. Heavy stun does the same and extends to the following turn as well.

Most of the weapons can only be used when adjacent to a target. There are two exceptions: phasers and guided weapons. There are two kinds of phasers, a light one and a heavier, more powerful rifle. Both have unlimited range. Their disadvantage is that they must be reloaded after every shot. Guided weapons have a range of up to six squares and are the game's version of hand grenades. They are the only offensive weapons that may be used against someone other than the designated target—friend or foe alike, they aren't that smart. They also come in two varieties—the Gaper and the Gemstone—and can be used only once.

After you tire of Mike's Place, you can try the other standard

games. *In the Arena* introduces medium (ten by seventeen) and large (sixteen by twenty-eight) battlefields. In *Hijack!*, you graduate to five-member teams and can choose a game in which one of the teams defends a square instead of just trying to destroy the enemy. *Home World Combats* gives you a chance to test your experienced teams against an experienced single-species team of seven. (This is the big leagues; don't show up here with beginners!) *Strange Places* introduces some of the scarier, less-intelligent lifeforms that inhabit the galaxy.

And then, of course, you can roll your own. You can custom-build teams, combining all types of creatures in any combination. You can design your own species by creating what the game calls a monster, which lets you choose all characteristics freely. By building a monster team and merging it with your own, you can combine Big Bird, elves, Darth Vader, and Godzilla.

After a few games, you begin to get attached to your characters just as you would in *Wizardry*. You can send them on quests, where the survivors of each round move on to face new challenges. *Galactic Gladiator* tournaments should be a natural; the game is going to be around for a while. BP

Apple II, Apple II Plus; 48K, disk. $39.95 from Strategic Simulations, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043; (415) 964-1353.

Escape from Rungistan

By Bob Blauschild.

You soon realize that your vacation to Rungistan was a mistake when you find that the Rungistanians' idea of welcoming you is to throw you in a small, cold jail cell. Before you can ask the meaning of this outrage, you hear that you are to be shot at sunrise. What a vacation this turned out to be!

When, or if, you succeed in taking leave of your cell, don't pat yourself on the back. This is *Escape from Rungistan*, remember? Escaping from your jail cell is just the beginning of your long, perilous journey.

On your way, you must acquire skiing, sailing, and flying skills that will be tested later in the game.

Keep in mind that Rungistan is deep in the Asian subcontinent: the caves are inhabited by vicious bears; the dry, desolate deserts have snakes crawling about; and deep in the jungles live natives who would like to have you for dinner, literally. It would also be fair to mention that guerilla warriors are terrorizing Rungistan, and they don't like foreigners.

Although *Rungistan* has precise, colorful graphics and cartoon-style music, the best is yet to come. Unlike most other adventure games, *Rungistan* has animation. *Creature Venture* was one of the first to use animation in adventuring, but *Rungistan* is the first adventure that lets you take part in the animated events, arcade-style.

Rungistan does not have a very involved plot, but it does have enough off-the-wall situations to make the plot matter less.

Unlike *Kabul Spy*, Sirius's debut adventure, *Rungistan* does not call for you to flip the disk and then doze while it loads the next section. *Rungistan* loads in the next part without any flipping or switching. It even gives you the option to start over at the beginning of the section you get killed in.

Rungistan, like *Kabul Spy*, provides the invaluable aid of hints. *Rungistan*, however, insists that you use proper manners. You must respond with "Hint, please." With these hints, *Rungistan* is easy enough for the beginner. The puzzles are otherwise challenging enough for the average adventurer. AM

Apple II, Apple II Plus; 48K. $29.95 from Sirius Software, 10364 Rockingham Drive, Sacramento, CA 95827; (916) 366-1195.

Guest reviewers in November were Roe Adams, Dave Albert, Derrick Bang, Alan Mankovitz, Bob Proctor, and Gary and Marcia Rose. SL

Hockey, from Gamma Software (Box 25625, Los Angeles, CA 90025; 213-473-7441), reviewed in September Gameline, is available for the Atari on cassette as well as disk.

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The Amazing Maze, Part II

by BRIAN FITZGERALD

After dispatching the water snake with a kick to the head, you make it to the island. Pulling yourself up onto the rocky beach, you make your way to a small gray building set under the one tree on the island. You enter through the only door and take a few steps, only to become lost in a baffling, surrealistic world of shifting outlines. Confused and disoriented by the shift, you wander aimlessly.

Yes, it's time once again to sneak past Gadanya and extract information from the crypt of ultimate knowledge of Good and Oreo cookies.

Now, if you'll remember from last time, we were working on a 3-D maze plotter. Let's flesh out the picture with a question: How many of you live in framework houses without any solid walls or doors?

How unrealistic. But wait a second: We can color the walls in! Run the program; then get some crayons and . . . no? Oh, very well, then; we'll do it the hard way. Take a deep breath and dig in.

Still Life with Pictures. Look at figure 1 (and feel free to use any of the pictures from last time). We have a left panel wall and we want to color it in. One way to do it (the way *we'll* do it) is to draw parallel vertical lines between the boundaries of the shape, like this:

```
FOR I = 0 TO (width of panel)
HPLOT (top) TO (bottom)
NEXT I
```

Simple, right? So do it. The left top of the left panel is X1,Y1; and the left bottom is X4,Y4. The edges slope up and down, respectively, so we have to keep track of that when drawing the lines. They're 45-degree lines, so that makes it easy; for every step across, we take one up or down.

```
FOR I = 0 TO (X5 - X1)
HPLOT X1+I,Y1+I TO X4+I,Y4 - I
NEXT I
```

This little routine draws lines parallel to the vertical line (X1,Y1), (X4,Y4), keeping inside the boundaries of the panel.

Now that works, but it makes solid white panels—not too pretty. To make it a color, we just draw every other line, and Apple graphics take care of the rest. Also, the previous bit of code makes each panel blend into the next; we need to shorten each one if we want to maintain the distinction. So, the for loop becomes

```
FOR I = 2 TO (X5 - X1 - 2) STEP 2
```

and everyone's happy. But what about the doors? Look to the diagram, and read on.

The wall we just made is green, a nice color. So let's make the doors white. In the Apple world, white = green + violet, and the panel has already been painted a solid green. Yes, if we make a purple door on the green wall, it will turn white and be all nice. So, using the general formula from above, we get

```
FOR I = 1 TO (X5 - X1 - 2*XV - 1) STEP 2
HPLOT X1+XV+I,Y1+XV+YV+I TO X1+XV+I,Y4-XV-I
NEXT I
```

Explain that? Sure thing. The for loop starts on 1 to make the lines violet instead of green. There's a boundary of XV between each side of the door and the wall, so there's an extra 2*XV off of the length of the panel. And it ends at one less because the last line's violet, or should be. And, it steps by 2 to make all the lines violet. The hplot is ugly looking, but it works on the principles we just outlined. The left-hand line is X1+XV,Y1+XV+YV TO X1+XV, Y4−XV, and we just add or subtract I in the right places, according

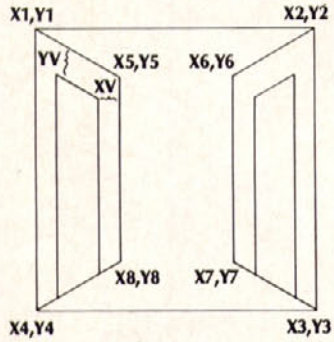

Figure 1.

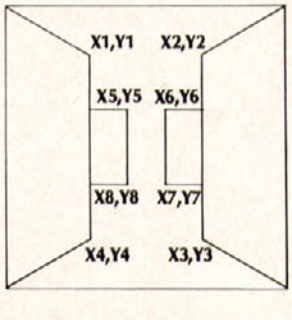

Figure 2.

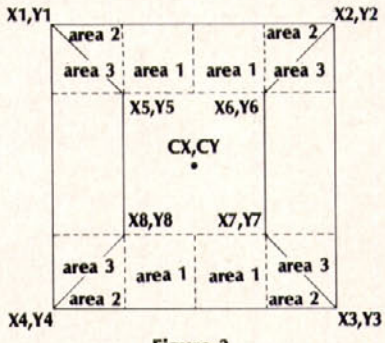

Figure 3.

to the geometry of the situation.

Side by Side by Side. Whew. Your deep breath is probably used up by now, so go get a new one and keep your eyes open.

That was the left side panel. What will become of a left facing panel? Trivial, very trivial. Look at figure 2, and write this:

```
FOR I = 2 TO (X5 - X1 - 2) STEP 2
HPLOT X1+I,Y5 TO X1+I,Y8
NEXT I
```

That's the solid wall. Now the door:

```
FOR I = 0 TO (X5 - X1 - XV - 3) STEP 2
HPLOT X1+I,Y5+XV TO X1+I,Y8
NEXT I
```

Remember, there's only a half door on the panel (we can only see half, that's why), and so there's only one XV to subtract. Otherwise, it flows the same. The left-hand line is X1,Y5+XV TO X1,Y8; and the Is are added straight across because all the lines are the same length for a rectangular panel.

No problem, right?

Now that we've done the left side, let us proceed to the right. It goes like this:

Right Side Panel

Wall
```
FOR I =  2 TO (X2 - X6 - 2) STEP 2
HPLOT X6+I,Y6-I TO X7+I,Y7+I
NEXT I
```

Door
```
FOR I = 1 TO (X2 - X6 - 2*XV - 1) STEP 2
HPLOT X6+XV+I,Y5+YV-XV-I TO X7+XV+I,Y7+XV+I
NEXT I
```

Right Face Panel

Wall
```
FOR I = 2 TO (X2 - X6 - 2) STEP 2
HPLOT X6+I,Y6 TO X6+I,Y7
NEXT I
```

Door
```
FOR I = 3 TO (X2 - X6 - XV - 1) STEP 2
HPLOT X6+XV+I,Y6+XV TO X6+XV+I,Y8
NEXT I
```

```
1180  HPLOT 30,22 TO 30,154: HPLOT 28,20 TO 28,156: GOTO 1200
1190  FOR I = 1 TO (X5 - X1 - 2 * XV - 1) STEP 2
1195  HPLOT X1 + XV + I,Y1, + XV + YV + I TO X4 + XV + I,Y4
      - XV - I
1196  NEXT I
1200  FOR I = 2 TO (X5 - X1 - 2) STEP 2
1210  HPLOT X1 + I,Y1 + I TO X4 + I,Y4 - I
1211  NEXT I
1242  HPLOT 30,31 TO 30,143: HPLOT 28,31 TO 28,143
1250  FOR I = 1 TO (X5 - X1 - XV - 3) STEP 2
1251  HPLOT X1 + I,Y5 + XV TO X1 + I,Y8
1252  NEXT I
1260  FOR I = 2 TO (X5 - X1 - 2) STEP 2
1261  HPLOT X1 + I,Y5 TO X1 + I,Y8
1262  NEXT I
1310  HPLOT 180,22 TO 180,154: HPLOT 182,20 TO 182,156: GOTO 1330
1320  FOR I = 1 TO (X2 - X6 - 2 * XV - 1) STEP 2
1325  HPLOT X6 + XV + I,Y5 + YV - XV - I TO X7 + XV + I,Y7
      + XV + I
1326  NEXT I
1330  FOR I = 2 TO (X2 - X6 - 2) STEP 2
1340  HPLOT X6 + I,Y6 - I TO X7 + I,Y7 + I
1345  NEXT I
1372  HPLOT 180,31 TO 180,143: HPLOT 182,31 TO 182,143
1373  GOTO 1390
1380  FOR I = 3 TO (X2 - X6 - XV - 1) STEP 2
1381  HPLOT X6 + XV + I,Y6 + XV TO X6 + XV + I,Y8
1382  NEXT I
1390  FOR I = 2 TO (X2 - X6 - 2) STEP 2
1391  HPLOT X6 + I,Y6 TO X6 + I,Y8
1392  NEXT I
1500  FOR I = 2 TO (X6 - X5 - 2) STEP 2
1501  HPLOT X5 + I,Y5 TO X5 + I,Y8
1502  NEXT I
1530  FOR I = 1 TO (X6 - X5 - 2 * XV - 1) STEP 2
1531  HPLOT X5 + XV + I,Y5 + YV TO X5 + XV + I,Y8
1532  NEXT I
```

Listing 1.

Load the program in from last time and type in listing 1. It looks great, especially in color. Now let's make it better.

What should we do this time? Color the floor and ceiling in purple. Ready? Note: If you're using black and white, don't add the floor-ceiling fill-in lines; it will make it impossible to distinguish anything.

Look at figure 3. We have three types of areas to fill in on both left and right sides. There's a square that always gets filled in, toward the center (area 1). Then there's a triangle to fill if there's a side panel by it (area 2). And finally, if there's no side panel, there's a rectangle to cover the missing area (area 3). The top and bottom segments are the same, save for Y-axis translation; symmetry is nice, isn't it? Yeah. Pick a place and start in. The four squares that always get drawn look like this:

Left Top
```
FOR I = 1 TO (CX - X8 - 1) STEP 2
HPLOT X5+I,Y1 TO X5+I,Y5
NEXT I
```

Left Bottom
```
FOR I = 1 TO (CX - X8 - 1) STEP 2
HPLOT X8+I,Y8 TO X8+I,Y4
NEXT I
```

Right Top
```
FOR I = 1 TO (X7 - CX - 1) STEP 2
HPLOT CX+XI,Y2 TO CX+I,Y6
NEXT I
```

Right Bottom
```
FOR I = 1 TO (X7 - CX - 1) STEP 2
HPLOT CX+I,Y7 TO CX+I,Y3
NEXT I
```

The floor and ceiling are going to be violet; whence the starting on 1 and the step by 2 business. Also, upon noticing that the for loops for tops and bottoms are the same, a loud voice seems to cry out: "Simplify!" Shall we?

Left
```
FOR I = 1 TO (CX - X8 - 1) STEP 2
HPLOT X8+I,Y8 TO X8+I,Y4
```

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```
        HPLOT X5+I,Y1 TO X5+I,Y5
        NEXT I
Right   FOR I = 1 TO (X7 - CX - 1) STEP 2
        HPLOT CX+I,Y7 TO CX+I,Y3
        HPLOT CX+I,Y2 TO CX+I,Y6
        NEXT I
```

Open Another Case. There's a face-forward panel for which we need to fill in floor. That looks like this:

```
Left    FOR I = 1 TO (X5 - X1 - 1) STEP 2
        HPLOT X4+I,Y4-I TO X4+I,Y4
        HPLOT X1+I,Y1 TO X1+I,Y1+I
        NEXT I
Right   FOR I = 1 TO (X3 - X7 - 1) STEP 2
        HPLOT X7+I,Y7+I TO X7+I,Y3
        HPLOT X6+I,Y2 TO X6+I,Y6-I
        NEXT I
```

Don't worry, we're getting there. Oh, another note: in the pairs of hplots, the first hplot is for the bottom area; the second hplot is for the top area. We're all advocates of bottoms-up programming.

Now, the only thing left is the third case: no panel. We fill in the entire rectangle like this:

```
Left    FOR I = 1 TO (X5 - X1 - 1) STEP 2
        HPLOT X4+I,Y8 TO X4+I,Y4
        HPLOT X1+I,Y1 TO X1+I,Y5
        NEXT I
```

and thus

```
Right   FOR I = 1 TO (X3 - X7 - 1) STEP 2
        HPLOT X7+I,Y7 TO X7+I,Y3
        HPLOT X6+I,Y2 TO X6+I,Y6
        NEXT I
```

Pure, unadulterated fun. Take some more deep breaths, calm your pounding heart, and then look at listing 2. Those are the extra changes to the program you can add to color the floor and ceiling.

```
1000  HGR: HCOLOR= 3
1141  FOR I = 1 TO (CX - X8 - 1) STEP 2
1142  HPLOT X8 + I,Y8 TO X8 + I,Y4
1143  HPLOT X5 + I,Y1 TO X5 + I,Y5
1144  NEXT I
1212  FOR I = 1 TO (X5 - X1 - 1) STEP 2
1213  HPLOT X4 + I,Y4 - I TO X4 + I,Y4
1214  HPLOT X1 + I,Y1 TO X1 + I,Y1 + I
1215  NEXT I
1230  FOR I = 1 TO (X5 - X1 - 1) STEP 2
1231  HPLOT X4 + I,Y8 TO X4 + I,Y4
1232  HPLOT X1 + I,Y1 TO X1 + I,Y5
1233  NEXT I
1235  GOSUB 1800:XX = XE:YY = YE: GOSUB 1600:
      IF T(D) = 1 THEN 1270
1271  FOR I = 1 TO (X7 - CX - 1) STEP 2
1272  HPLOT CX + I,Y7 TO CX + I,Y3
1273  HPLOT CX + I,Y2 TO CX + I,Y6
1274  NEXT I
1346  FOR I = 1 TO (X3 - X7 - 1) STEP 2
1347  HPLOT X7 + I,Y7 + I TO X7 + I,Y3
1348  HPLOT X6 + I,Y2 TO X6 + I,Y6 - I
1349  NEXT I
1360  FOR I = 1 TO (X3 - X7 - 1) STEP 2
1361  HPLOT X7 + I,Y7 TO X7 + I,Y3
1362  HPLOT X6 + I,Y2 TO X6 + I,Y6
1363  NEXT I
1365  GOSUB 1800:XX = XE:YY = YE: GOSUB 1600: IF T(D) = 1 THEN
      1400
```

Listing 2.

The programs are getting to be a length that is awkward to type in. So here's something nice. If you mail in a disk with a self-addressed return mailer, you'll get a copy of all the programs generated so far—specify Apple or Atari. Plus little extras that won't fit here, like a maze maker program and—oops, that one's a secret.

Anyway, the mailing address is: The Amazing Maze, *Softline* Magazine, Box 60, North Hollywood, CA 91603. SL

What Price Arcades?

by SHERWIN STEFFIN

Item—*The Los Angeles Times*: Salesman kills boss over *Pac-Man*. . . .

Item—*The National Enquirer*: Teen-ager has a heart attack while playing an arcade game, and subsequently dies. . . .

Item—A psychiatrist in private practice reports that one of his patients is so totally immersed in arcade games that he is unable to carry out the responsibilities of normal life. . . .

Having thus disposed of some of the flakier manifestations of human frailty, let's consider some problems that may (and we emphasize the word *may*) arise for people who spend a lot of time playing arcade games.

To the committed arcade aficionado, raising such a specter is much akin to attacking mother, the tooth fairy, and the American flag. Even more so when what is being presented is speculation—taking findings from many disciplines, applying them to some observed phenomena, and seeking explanations.

Simply stated, the hypothesis under consideration is this: the nature of the arcade game, with its interaction with the player's perceptual/motor information processing systems, has potential for instigating long-term psychophysiological effects that may be damaging to the player. These effects may range from distractability when presented with unchanging stimuli (for example, books and other printed materials) to the breakdown of body immune defenses, resulting from stress. If this hypothesis is credible, then there's a need for research to determine its validity or lack of validity.

The *Human Factors Design Handbook,* by Wesley E. Woodson (McGraw-Hill, 1980), identifies various factors as being among those that contribute to mental fatigue and thereby contribute to the creation of stress. These factors include such things as visual display formats that require extrapolation rather than provide directly usable information; the presence of simultaneous and/or excessive background noise; and situations in which overly precise control adjustments are required. These are precise descriptions of arcade game attributes.

Needless to say, the designers of the most effective and attractive arcade games have carefully built these and many other perceptual/motor overload features into their products. Layered on top of this display/response structure is a highly captivating risk/benefit structure. A limited, prespecified number of response failures results in termination of the event (the game), while success leads to increasing difficulty (and an increase in the excitement level). Paradoxically, the best games are perceived as those that can never be completely mastered. Ultimately, the player will always be defeated.

Thus, if the model outlined here is accurate, there's a one-to-one correspondence between the perceived entertainment value of a game and the difficulty of play, the level of excitement aroused, and the level of stress imposed.

Another attribute of computer-driven arcade games can also impose stress on the arcade game player. This is the factor of photo-optic irritability.

In recent months, computer trade journals (such as *InfoWorld*) have reported complaints of fatigue from workers who are assigned throughout the day to video display terminals (VDTs). These complaints have specified symptoms such as headache, eyestrain, nausea, back pain, dizziness, and the tendency to respond to otherwise innocuous situations with irritation and anger. While there could be many plausible explanations for the discomfort these employees have reported, a screen flicker rate of sixty frames per second is as good a suspect as any.

Most people's response to rhythmically flickering visual stimuli is some level of distress. For a few individuals, the effects can be profound—even to the extreme of convulsive seizures. For most people, there's an experience of diffused, mild discomfort, perhaps accompanied by dizziness or a little nausea.

Researchers have linked the phenomenon of highway hypnosis to this response of the human neural system. Sunlight and shadow, repetitive center divider lines, and other light/dark alterations produced by driving at given rates of speed are well-known causative factors in single-car accidents that occur under otherwise optimum driving conditions.

Given the complex nature of the moving visuals that are displayed during arcade games, it seems not unlikely that reactions in players' sensory nervous systems will be triggered by some aspects of critical flicker frequencies.

What we've said thus far can be summarized: arcade games make complex perceptual stimulus/motor response demands upon players. The effects this kind of environment has are as yet unmeasured and unknown but are possibly deleterious. While many of the known effects are clearly pleasurable and positive, other subtler effects could well be damaging.

Much of what has gone before and all that follows should be regarded as speculation—thoughtful and inductive perhaps, yet still just speculation.

Now that this caveat has been established, our suppositions of harmful effects can be broken down into two components—possibilities over the short-term and the long-term. Here are some questions worth pondering.

If psychological fatigue is one result of participation in the arcade game experience, then what will be the effect on the student who spends his lunch period in the arcade or plays these games on the computer at school? Will his learning performance be adversely affected later in the school day or will playing arcade games be refreshing and help him learn more effectively?

Suppose that a player drives a car after an extended period of playing a game. Will her driving performance be better or worse? And what happens when workers are operating machinery that requires close attention—will there be increases or decreases in the rate of industrial accidents?

In considering the long-term effects—if there are any—can we expect to find an increase in arthritic and connective tissue disease? Does the incidence of "arcade wrist" have any long-term implications? And what about eyestrain?

The pervasive presence of the arcade game as part of our recreational technology suggests that there may be hidden costs to be considered. The thinking person will want to assess these potential costs and weigh them against the benefits that result from using the technology. SL

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Game/Publisher	Score	Player
Action Quest, JV Software	20/82	Steve Halberstadt, Newark, DE
Alien Ambush, Peter Fokos	84,600	Derin Basden, Fresno, CA
Alien Defense, Soft Sector Marketing	175,350	Chris Athanas, Topsham, ME
Alien Descent (TRS-80)	164,350	Chris Athanas, Topsham, ME
Alien Rain, Broderbund	1,103,000	Ron Bunch, Collegedale, TN
Alien Swarm, In-Home	71,460	Chris Conway, Winnetka, CA
Alien Typhoon, Broderbund	*886,480	Clark Alyea, Bloomington, IN
Andromeda, Gebelli	118,000	Joey Grisaffi, Houston, TX
Apple Panic (Apple), Broderbund	*546,320	James Baker, Alexandria, VA
Apple Panic (Atari), Broderbund	*285,310	Gayle Hoskin, Hollywood, FL
Asteroid Field, Cavalier	623,000	Jeff Feldman, Miami Beach, FL
Asteroids, Atari	*2,579,840	Michael O'Shaughnessy, El Segundo, CA
Attack Force, Big Five	34,740	Chris Athanas, Topsham, ME
Autobahn, Sirius	*2,183 Miles	Patrick Moran, Amherst, NY
Avalanche, Atari	*1,812	Brian Hall, Milford, MI
Bandits, Sirius	*414,330	Michael Cranford, Corona Del Mar, CA
Beer Run, Sirius	*12,152	Robert L. Skell, East Wenatchee, WA
Bezman, Bez	*227,873	Harry Ilg, Chesterfield, MO
Bez-Off, Bez	27,156	Norman Humbert, Fountain Valley, CA
Blister Ball, Creative Computing	(1 player) *975	Bruce Mah, Fresno, CA
Borg, Sirius	*18,960	Matt Sesow, Lincoln, NE
Bug Attack (Atari), Cavalier	*42,926	Chris Conway, Winnetka, CA
Cannonball Blitz, Sierra On-Line	*1,000,000	Ron Bunch, Collegedale, TN
Canyon Climber (Atari), Datasoft	*32,520	Fran Hoskin, Hollywood, CA
Caverns of Mars, Atari	*796,900	Tak Szeto, Boston, MA
Ceiling Zero, Turnkey	*71,490	Denise Achram, Canton, MI
Centipede, Atari	*2,000,210	Eric Lauritzen, Chatsworth, CA
Chicken, Synapse	*24,810	David Rogers, Chagrin Falls, OH
Chipout, California Pacific	*21,630	Jason Meggs, Bethesda, MD
Chomper, MMG	*29,100	Ed Mixon, Ypsilanti, MI
Clowns and Balloons (Atari), Datasoft	*281,820	Dave Albert, Aurora, IL
Congo, Sentient	*27,154	Mark McKeown, San Jose, CA
Cosmo Mission, Astar Int'l	*7,890	Matt Skinner, Foster City, CA
County Fair, DataMost	*2,369	Derin Basden, Fresno, CA
Crazy Mazey, DataMost	*35,200	Jill Woodward, Laguna Hills, CA
Crossfire (Apple), Sierra On-Line	*1,120,310	Brian Condon, Marietta, GA
Crossfire (Atari), Sierra On-Line	*2,000,770	John A. Shaw, Fresno, CA
Crush, Crumble, and Chomp, Epyx	9,540	Wade Hoelter, Piedmont, CA
Cyclod (Apple), Sirius	28,470	Buell Hollister IV, Shelburne, VT
Cyclod (Atari), Sirius	275,715	Chris Conway, Winnetka, CA
Dark Forest, Sirius	*16,364	Allen Holland, Downey, CA
Datestones of Ryn, Epyx	*5,530	Eric Vesper, Saint Louis, MO
David's Midnight Magic, Broderbund	*1,983,540	Brian Whitworth, Meriden, CT
Defense Command, Big Five	28,330	Chris Athanas, Topsham, ME
Deluxe Invaders, Roklan	12,810	Joey Grisaffi, Houston, TX
Dodge Racer, Synapse	*5,350	Ed Mixon, Ypsilanti, MI
Dogfight, Micro Lab	3,390	Hugh Godfrey, Phoenix, AZ
Dragon's Eye, Epyx	2,905	Adam Newman, Teaneck, NJ
Eliminator, Adventure Int'l	283,375	Derin Basden, Fresno, CA
Epoch, Sirius	*999,999	Bill Fletcher, Thousand Oaks, CA
Escape, Muse	*41,200	Dick Nitto, Binghamton, NY
Escape from Arcturus, Synergistic	*5,735	Steve Rothenberg, Mayfield Hts., OH
Firebird, Gebelli	555,550	Andrew MacKenzie, San Francisco, CA
Firebug, Muse	*9,400	David Hussong, Palmdale, CA
Flight Simulator, SubLogic	*60	King Barnes, Houston, TX
Fly Wars, Sirius	3,670	David Lee, Bloomington, MN
Frogger, Sierra On-Line	*32,420	Billy Horwitz, Roslyn, NY
Galactic Chase, Prism	34,660	David Kitaguchi, Wheaton, MD
Galactic Quest, Crystalware	*10,090	Jim Kelton, Huntington Beach, CA
Galaxy Gates, Magnasoft	11,530	Joey Grisaffi, Houston, TX
Galaxy Invasion, Big Five	225,420	Chris Athanas, Topsham, ME
Galaxy Travel, Tokumo	*51,320	Randy Hayes, Yuba City, CA
Galaxy Wars, Broderbund	*53,700	Brian Donnelly, Ipswich, MA
Gamma Goblins, Sirius	*18,160	Bob Farr, Trenton, NJ
Genetic Drift, Broderbund	*1,020,000	Tom Bredehoft, Columbus, OH
Ghost Encounter, JV Software	20/83	Joey Grisaffi, Houston, TX
Ghost Hunter, Arcades Plus	*98,000	Jomo Starke, Pasadena, CA
Goblins, Highlands	315	Linda Stix, Seattle, WA
Gold Rush, Sentient	*2,136,000	Lee Stafford, Phoenix, AZ
Golden Mountain, Broderbund	2,202,400	Scott Sanchez, San Juan Capistrano, CA
Gorgon, Sirius	*68,920	Clark Alyea, Bloomington, IN
Guardian, Continental	*16,660	Al Tommervik, North Hollywood, CA
Hadron, Sirius	*604,765	Greg Bartlett, Phoenix, AZ
High Orbit, Gebelli	5,570	David Durkee, Burbank, CA
Horizon V, Gebelli	*58,405	Jim Stockla, Shelton, CT
Human Fly, CPU	*150	Buell Hollister IV, Shelburne, VT
Hungry Boy, California Pacific	*39,040	Dale Monson, Denver, CO
Int'l Gran Prix, Riverbank	*33	Brent Shaw, Yorktown, NY
Intruder Alert, Dynacomp	3,633	Randy Dellinger, Fort Belvoir, VA
Invasion Force, Computhings	15,820	Jon Hickey, Narragausett, RI
Jawbreaker (Apple), Sierra On-Line	280,615	Horace Gower, Freeport, ME
Jawbreaker (Atari), Sierra On-Line	*113,250	Jon Mellott, Fort Wayne, IN
Jellyfish, Sirius	*290,000	Eric Vesper, Saint Louis, MO
Juggler, IDSI	*446,600	Marc Shulman, Great Neck, NY
Kamikaze, Hayden	*4,560	Jason Meggs, Bethesda, MD
Kayos, Computer Magic	*23,460	Ed Mixon, Ypsilanti, MI
K-Razy Shoot-Out, K-Byte	*33,650	Barry Landgarten, Douglaston, NY
Labyrinth, Broderbund	*89,470	Elson Valle, San Carlos, CA
Laf Pak: Apple Zap, Sierra On-Line	*32,945	Larry Fisher, Miller Place, NY
Laf Pak: Creepy Corridors, Sierra On-Line	*5,110	Larry Fisher, Miller Place, NY
Laf Pak: Mine Sweep, Sierra On-Line	6,081	Sharron Keck, La Palma, CA
Lazer Maze, Avant-Garde	*9,899	Roe R. Adams III, Hyde Park, MA
Lazer Silk, Gebelli	*45,700	Rob Berkowitz, Goldens Bridge, NY

*Verified score

HIGH SCORES

Next high-score deadline: 7:00 p.m., December 8.

Highlines

Came the revolution.

What insidious effect do arcade games really have on the delinquency of America's youth, and what can we, as a concerned magazine, do about it? Well, we've already done it. Evil will always meet with ultimate defeat, and the cause of righteousness will ever be victorious. Now it shall be revealed unto you why we do not require verification. If you know that your high score is real and you achieved it in an upright and straightforward fashion, you can be confident in your position. If, however, you are tempted to break into these pages in some other clever manner, you will always inevitably fail . . . and something like this will happen:

Not long ago, we received an anonymous letter on one of all our correspondents' favorite subjects: **Norman Fong**. It was accompanied by a disk, suggesting that "Norman has been playing more with 6502 code," and proceeded to give a "slide show" demo of about a dozen famous game screens (you'd know their names in an instant) with deliriously doctored final scores. They "were done real quickly in under two hours and not meant to be serious. But, of course, they can be photographed!"

This, then, is the last word on verifications: we like pictures and screen dumps and admire the artistry lavished upon them, but the only evidence accepted as verification, from this day hence, is the signature of a reputable witness.

In the matter of Norman Fong: Our offer to him to provide us with detailed descriptions of the techniques he used on the many different games on which he achieved his many amazing and controversial scores met with a long and vast silence. And in this case, circumstantial evidence and instinct are sufficient. Goodbye, Norman.

Let us now turn to the matter of **Shane Rolin** and his baker's dozen of verified/unverified scores: **Gary LaPointe**, employed with the research and development division at K-Byte, has this to say about Shane's 91,200 in *K-Razy Shoot-Out:*

1) The game only goes to eight levels.

2) In "cheat" mode, you can achieve an eighth-level score—maybe—of about 55,000.

3) The highest score achieved by anyone at K-Byte is about 33,000.

Concerning Shane's 934,783 on *Pac-Man*, **Alex Leavens,** programmer of that game for the home computer, points out that the final digit of any legitimate score must always be a zero; that a score of more than 900,000 would mean acquiring seventy-eight keys; that at the speed of play after the acquisition of fifty keys it is virtually impossible to outrun the ghosts; and that the game blows up at 750,000.

And then there's just about everyone and their second cousin who all have something to say about Shane and *Caverns of Mars*, none of it nice. Sayonara, Shane.

All the games on which these two gentlemen held the record as of September are now up for grabs, having reverted to the previous record holders or disappeared entirely (*Megalegs* and *Russki Duck*), not having had a previous holder. There are some real bargains here for those of you able to move fast. If you ever submitted a high score on any of them, resubmit it.

Speaking of *Caverns of Mars*, no one can seem to agree on what is legit in that game. Though **Eric Blumthal** agrees with **A. J. Benway** that **Tak Szeto** could not possibly have scored more than 700,000 points unless he has a new, higher scoring version of *Caverns*, he begs to differ with A. J.'s assertion that the game has a ceiling of 260,000. "After setting the fusion bomb at the bottom, you receive more points as you move upward. If you die at the bottom of a sector, you begin again at the beginning of that sector, thus you get all the points from that sector once again. On commander mission, I completed all five caverns and ended up with a score of 325,500. I shot all the obstacles (except in sector 2 of each cavern, which is impossible)." **Michael O'Shaughnessy** informs us that some fancy shift-control work can take you to the next quadrant but not the next cavern, allowing infinite scoring. Thanks a bunch, Mike. And finally Tak Szeto, the veritable eye of the hurricane, coolly joins the legions of those wishing to inform us of the late Mr. Rolin's fatal *Pac-Man* anomaly and has nothing else to say. Look to thine own house, friend.

But now, let us turn to the more pleasant matter of honorable discharges—those of you who have now held your highs so long and so well that there's just no point in holding open competition any longer, and final supremacy must be acknowledged (and we can make room for new blood).

Hereby retired with honors are **Peter Sivo** (Saratoga,

HIGH SCORES

Next high-score deadline: 7:00 p.m., December 8.

Highlines

CA), long-time High Scores lead-off man with *ABM*; **Kerry Shetline** and **Neil Radick** (Morristown, NJ), the unbeatable two-player *Blister Ball* combo; **David Porter** (Hillsdale, IN), the Apple *Bug Attack* master; **Rod Nelsen,** author of *Cricketeer;* **Jeff Parrish** (Overland Park, KS), ruler of *Galactic Empire;* **Steve Cloutier** (East Greenwich, RI), *Head-On* ace; **Robert Pettit** (Pittsburgh, PA), steel-nerved navigator of *Meteoroids in Space;* **Steve Allen** (Des Moines, IA), title holder for *Mission Escape;* **Yung-Chi Chu** (Flint, MI), final *Outpost* defender; **Steve Rothenberg** (Mayfield Heights, OH), *Phantoms Five* phreak extraordinaire; **Jason Meggs** (Rochester, NY), *Planetoids* plenipotentiary; **Michael Yang** (Tarma, OH), staunch sounder of *Red Alert;* **Steve Cloutier** (again), *Sabotage* star; **Dave Ness** (Saratoga, CA), dark lord of *Space Album's Death Star;* **Charles Campbell** (San Jose, CA), tireless *Tail Gunner* from the same package; **William Tung** (Towson, MO), consummate *Space Warrior;* deadly **Dale Archibald** (Minneapolis, MN), *Torax* all-pro; **Buell Hollister IV** (Shelburne, VT), distinguished *Track Attack* train robber; **Kerry Shetline** (by himself), *Tsunami* whiz; and **Dick Nitto** (Binghamton, NY), savior of the *Twerps.* Hail and farewell to these fine programs and classic scores. A job well played, all.

Those of you reporting scores over 64 on *Choplifter:* you have an early version that allows you to lure the deposited hostages away from the post office and back into your chopper—as you well know. (How many times did you vote in the election?) The corrected version of the game does not permit this. Nice try.

Labyrinth, regrettably, must also now be excluded from these rolls, the easy cheat mode for that game having become general knowledge.

Dave Foster, like **Joey Grisaffi** last issue, would like to know how **Jim David** got 223,048 on *Falcons,* as the game scores in increments of ten; but, since Dave beat the score, "that's behind me now." Nevertheless, **Michael Neuman,** evidently a real good friend of Jim's, will tell you anyway: "Jim David . . . has a copy that, when the question '1 or 2 players?' appears, you can hit escape and get a menu asking how many ships do you want, can the falcons shoot, can they collide with you, and so on." Bye-bye, Jim. Bye-bye, Dave. Bye-bye, *Falcons.* Sorry, boys. **Danny Holstein** complains that *Super Invaders* cheats, dropping "invisible bombs" on him at the higher levels, leaving him no recourse but to cheat back. What can we say, Dan?

David Tory, you will have to resubmit your verified *Fly Wars* score so it doesn't look like you went back and changed it after your brother signed it. Paranoia strikes deep at the heartland. All *Serpentine* scores submitted must report highest level attained, along with score. Thanks to **Michael Crawford** for pointing out that game's penchant for allowing one to rack up infinite scores while permanently parked at one level.

Hey! **Arthur Patryk** of Del Mar, California, got a high score of 790,250, verified! Um . . . what was that game again, Art? (Fault *Softline*'s, two points.) Hey, hey! **Adam Mizok, Jordan Firfer,** and **Jeff Stern** all ganged up on poor **Roe Adams** and amassed $29.15 billion in *Taipan!* Give us your address, guys, and we can make it official. (Point, *Softline.*) **James Tsuyuki:** what computer did you play *Cyclod* on? Kindly resubmit score with all necessary info.

Business programmer **Terry Toolin** chastises **Warner Young** for the wish he expressed last issue to turn off the sound in his Atari *Crossfire.* ("While I can appreciate the desire to eliminate the often annoying noise that some of these games generate, it would change the timing of most games if these routines were tampered with or removed. . . . It would be best to treat games which have an option to the sound generation routine as an entirely different game.") Ominous pause as editors turn deathly pale. See what you've started, Warner?

And once more, this time for the benefit of **Steve Dikkers:** *Galaxian* is otherwise known as *Alien Rain,* and vice versa. Your 17,240 doesn't quite make it, Steve, but feel free to subscribe anyway. But in the case of your 72,135, **David Wasserman:** *Nightcrawler* also happens to be known as *Photar,* and that high score was last held by . . . Norman Fong.

Welcome to the rolls, David.

Disputed: *Snake Byte:* J. Crawford challenging L. Kislan over *time of play* and *level.*

Invited: rebuttals from S. Rolin and N. Fong.

Next ish: How to make and maintain a high-score database for the whole family and print out certificates of merit in recognition of your achievements.

SL

Game/Publisher	Score	Player *verified score
Lemmings, Sirius	*58,638	Donald Brown, Des Moines, IA
Marauder, Sierra On-Line	*192,500	Derek Brusko, Diamond Bar, CA
Mars Cars, DataMost	*42,940	Roe R. Adams III, Hyde Park, MA
Mar Tesoro, Synchro	149,561,409	Michael Prater, Glendale, CA
Match Racers, Gebelli	4,692.3 Miles	Bill Hoscheit, Saint Charles, IL
Meteor Mission Two, Big Five	35,180	Chris Athanas, Topsham, ME
Microwave, Cavalier	*15,861	Doug Harmon, Waseca, MN
Minotaur, Sirius	*398,285	Christian Juhring, Carmel, CA
Missile Attack, Adventure Int'l	32,580	Chris Athanas, Topsham, ME
Missile Command, Atari	2,235,000	Jon Mellott, Fort Wayne, IN
Missile Defense, Sierra On-Line	278,900	Marc Vlasak, Tacoma, WA
Morloc's Tower, Epyx	*29,253	John Coffee, Grand Rapids, MI
Mouskattack (Apple), Sierra On-Line	*89,100	Mark Zeitler, Boca Raton, FL
Mouskattack (Atari), Sierra On-Line	*72,440	A. J. Benway, Westport, CT
Nautilus, Synapse	(2 player) 221,440	Sean Kelly and Jeff Chu, Westminster, CO
Nautilus, Synapse	(1 player) 73,400	Joey Grisaffi, Houston, TX
Neptune, Gebelli	*13,040	Buell Hollister IV, Shelburne, VT
Night Mission Pinball, SubLogic	*481,669,040	George De La Mater, Traverse City, MI
Nightmare Gallery, Synergistic	*202,325	Clark Alyea, Bloomington, IN
Norad, Southwestern Data	*28,240	Jeff Baker, Alexandria, VA
Odyssey, Synergistic	*451,950	Matt and Aric Rosenbaum, Montville, NJ
Orbitron, Sirius	*153,000	Dennis McEntire, San Jose, CA
Pac-Man, Atari	*93,320	Terry Rora, Roanoke, IL
Pathfinder, Gebelli	*25,254,326	Brian Hall, Milford, MI
Peeping Tom, Micro Lab	*12,360	Jason Meggs, Bethesda, MD
Pegasus II, Sierra On-Line	*238,460	Brandon Stone, Webster, NY
Penetrator, Beam	10,370	Chris Athanas, Topsham, ME
Photar, Softape	72,135	David Wasserman, Stamford, CT
Pie Man, Penguin	*53	Brad Schultz, Alexandria, MN
Pig Pen, DataMost	*344,640	Buell Hollister IV, Shelburne, VT
Procyon Warrior, Synergistic	*195,000	Keith Goldberg, Bellevue, WA
Protector, Synapse	*58,000	Jon Mellott, Fort Wayne, IN
Pulsar II, Sirius	*61,968	Eric Vesper, Saint Louis, MO
Quadrant 6112, Sensible	*71,990	Chuck Hartley, Natick, MA
Raiders of the Lost Ring, Cavalier	*128,030	Francis Wong, Ellicott City, MD
Raster Blaster (Apple), BudgeCo	7,025,500	Eric Morson, Stamford, CT
Raster Blaster (Atari), BudgeCo	*1,285,900	David T. A. Taylor, Chandler, AZ
Rear Guard (Apple), Adventure Int'l	*267,850	Matt Yuen, Van Nuys, CA
Rear Guard (Atari), Adventure Int'l	77,530	Joey Grisaffi, Houston, TX
Ribbit, Piccadilly	*231,980	Andrew Mellin, Fort Lauderdale, FL
Roach Hotel, Micro Lab	*12,350	Mike Post, Huntington Beach, CA
Robot Attack, Big Five	9,010	Chris Athanas, Topsham, ME
Rocket Command, Norell	*778,070	Paul MacQuiddy, Sunnyvale, CA
Sea Fox, Broderbund	*11,500	Buell Hollister IV, Shelburne, VT
Serpentine, Broderbund	*Level 41/3,278,650	Donald Brown, Des Moines, IA
Shamus, Synapse	*98,035	Jonathan Hopwood, Glastonbury, CT
Sheila, H.A.L. Labs	91,500	Manuel Veloso, Lido Beach, NY
Shooting Arcade, Datasoft	32,000	Ginger Freibrun, Los Angeles, CA
Shooting Gallery (Apple), Western Microdata	*3,495	Steve Rothenberg, Mayfield Hts., OH
Snack Attack, DataMost	*22,984	Chris Wysocki, Brookfield Hts., CT
Snake Byte (Apple), Sirius	2,698,800	Lisa Kislan, North Palm Beach, FL
Snake Byte (Atari), Sirius	21,330	Chris Conway, Winnetka, CA
Sneakers, Sirius	*1,035,982	Marc Brodsky, Woodbridge, CT
Space Ace, London Software	5,300	Joey Grisaffi, Houston, TX
Space Adventure, Sierra On-Line	70	Brian Welch, Saint Louis, MO
Space Album: Asterisk, California Pacific	*6,242	Jason Meggs, Bethesda, MD
Space Eggs, Sirius	53,000	Fred Nisewanger, Fremont, CA
Space Invaders, Atari	55,625	Darryl Terry, Trinity, AL
Space Quarks, Broderbund	*31,870	Clark Alyea, Bloomington, IN
Space Raiders, USA	Galaxy Commander: 196	Brett Kappeman, Renton, WA
Spy's Demise, Penguin	*17,315	Rick Kimmel, Saint Paul, MN
Star Blaster, Piccadilly	*105,874	Kevin Kauffman, Gillette, WY
Star Dance, USA	*3,453	Gary Miller, Monroeville, PA
Star Raiders, Atari	*Star Commander Class 1	John Broas, Reedsburg, CA
Star Thief, Cavalier	(1 player) *30,110	Clark Alyea, Bloomington, IN
Star Thief, Cavalier	(2 player) *23,660	Rob Berkowitz, Kenny Weinstock, Goldens Bridge, NY
Star Warrior, Epyx	*1,872	Ron Felder, Sunnyvale, CA
Stellar Invaders, Apple	*119,000	Patrick Carle, Dunstable, MA
Suicide, Piccadilly	97,030	Joey Grisaffi, Houston, TX
Super Breakout, Atari	2,870	Randy Dellinger, Fort Belvoir, VA
Super Invader, several publishers	*99,840	Chris Wysocki, Brookfield Center, CT
Super Nova, Big Five	101,110	Chris Athanas, Topsham, ME
Super Stellar Trek, Rainbow	7,262	Paul Creager, Sunnyvale, CA
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Taipan, Avalanche	$25.1 Billion	Roe R. Adams III, Hyde Park, MA
Tanktics, Avalon Hill	*495	David Melendez, Rancho Palos Verdes, CA
Taxman, H.A.L. Labs	*999,980	Eggy Paul, Orange, CA
Tharolian Tunnels, Software Farm	108,100	Rod Nelsen, program author
Thief, DataMost	*23,760	Scott Wedel, Saratoga, CA
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Threshold (Atari), Sierra On-Line	*309,500	Ron Felder, Sunnyvale, CA
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Tranquility Base, California Pacific	1,800	Brian Donnelly, Ipswich, MA
Tumblebugs (Apple), Datasoft	*7,205	Sharron Keck, Huntington Beach, CA
Tumblebugs (Atari), Datasoft	*7,035	Robert Goebelbecker, Willowick, OH
Tunnel Terror, Adventure Int'l	53,770	Joey Grisaffi, Houston, TX
Viper, RDA Systems	2,997	Mike Keck, La Palma, CA
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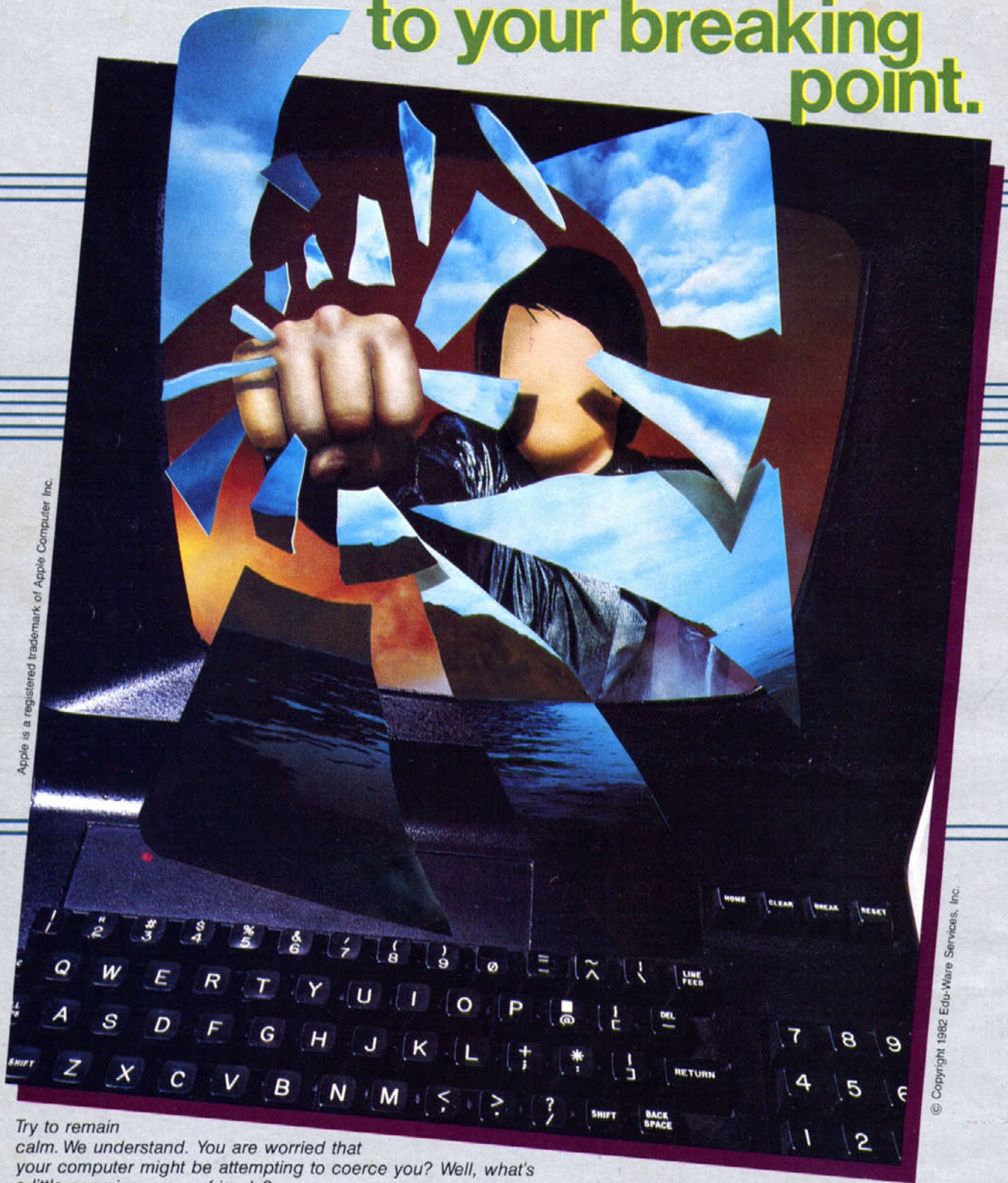

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