NO. 58
OCTOBER 1987

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The ROBOX Incident

Castaway

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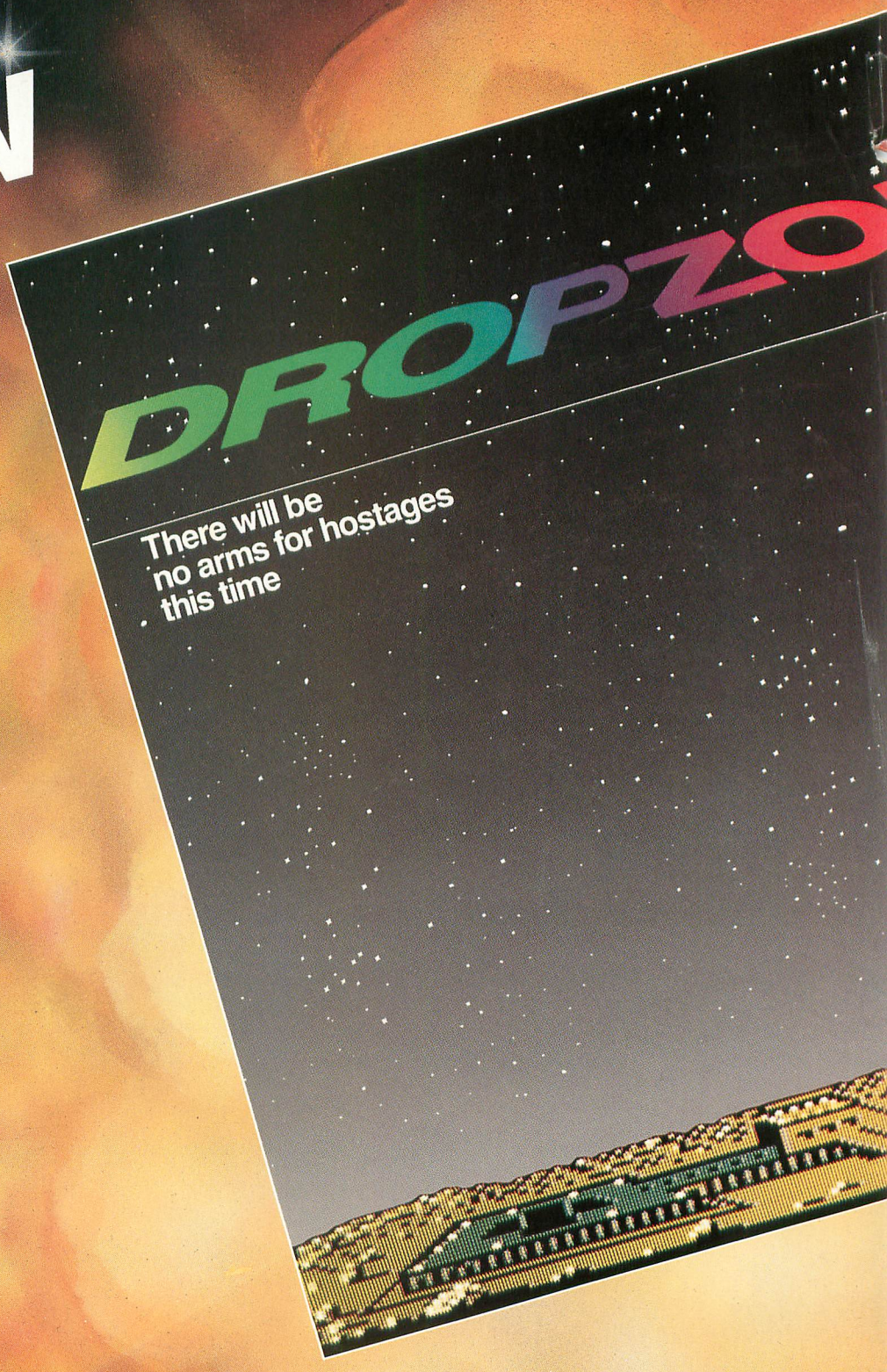

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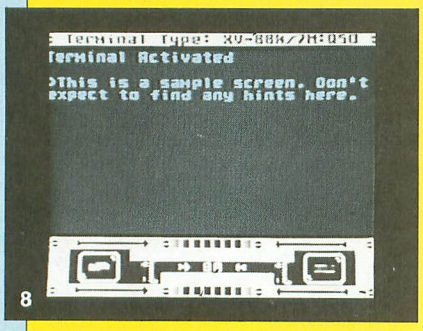
CONTENTS

FEATURES



8

The ROBOX Incident . . and Barry Kolbe and Bryan Schappel 8
At least the alien computer that crashed in your backyard can understand English—but you've still got plenty to figure out.

Castaway . . . . . Rick Graves 19
Washed ashore on a deserted island, you must find a way to be rescued. But first, you're *determined* to discover the secret the island holds.

A look at Computalk . . . . . Andy Eddy 33
This feature-packed BBS from Texas stands out in more ways than one.

The Wizard Part I . . . . . Clayton Walnum 41
You're not a programmer, but you've always wanted to write an adventure game? No problem with this unique system of programs.

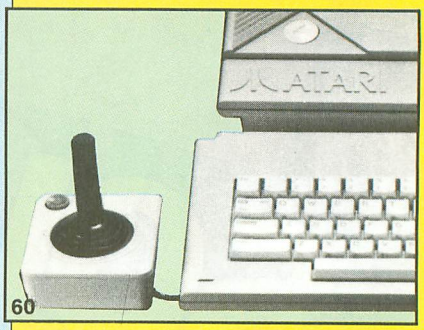
89

Artificial Intelligence . . . . . Dr. Ron Schaefer **ST** 69
Expand your ST's knowledge base—and save the results for its reference in future use.

Troll War II . . . . . Scott Langston 89
The second half of the listing—what you've been anxiously awaiting to begin the game.

REVIEWS

Bureaucracy . . . . . Steve Panak 15
(Infocom)
How's the new adventure from Hitchhiker's author? Dive into the red tape and find out.



60

Forem ST . . . . . Blake Arnold **ST** 39
(Commnet Systems)
Excellent SYSOP control and some powerful commands, are just a few of the advantages this program has over its 8-bit predecessor.

Panak strikes! . . . . . Steve Panak 57
A look at **The Lurking Horror** from Infocom, and **Night Mission Pinball** by subLOGIC, an oldie but goodie.

Video Game Digest . . . . Joyce Worley, Arnie Katz and Bill Kunkel 60
Video Games 60
The basics about systems available.
Slalom (Nintendo) 64
Super Mario Bros (Nintendo) 64
Centipede and Robotron 2084 (Atari Corp.) 64
The Legend of Zelda (Nintendo) 65
Choplifter! (Sega) 66

MaxPak . . . . . Andy Eddy **ST** 67
(Softwerx)
Is this multifunction ST accessory the one you've been looking for?

COLUMNS

Editorial . . . . . Diane L. Gaw 4
Reader comment 6
M/L Editor . . . . . Clayton Walnum 32
Boot Camp . . . . . Karl E. Wiegers 75
ST notes . . . . . D.F. Scott **ST** 87
Scheduled Atari Fairs 88
Index to Advertisers 96

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This does not apply to programs which specifically state that they are *not* public domain and, thus, are not for public distribution.

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Editorial

It seems fitting that, in this adventure issue of **ANALOG Computing**, we begin a new section: the *Video Digest*, devoted to coverage of the "new generation" of video game machines and software. To bring readers the most complete news and reviews possible, our *Digest* will cover all the makes of games and machines now on the market.

The writers of *Video Digest*—Joyce Worley, Arnie Katz and Bill Kunkel—are known to those of you who read **ST-Log**, where they cover news of the entertainment software out for the Atari ST line. Having tried their collective hand at nearly every form of gamesmanship on the market, they are uniquely qualified to bring us all up to date on the current equipment and revived interest in video games.

We hope our readers will enjoy—and profit from—this new section, in continuing on the road of the Atari Adventure.

Also in this issue is the second M/L listing for "Troll Wars II." Now, you can dig in and play to your heart's content.

Worlds of fantasy in our hearts, we're proud to bring you the first installment of Clayton Walnum's "The Wizard." For those of you who've always wanted to write a text adventure—but who've never wanted to learn how to do the actual programming—this is for you! It's an adventure construction set that'll have your ideas on disk in no time, to delight and confuse your friends.

Go out for a midnight stroll in "Castaway," and you'll find yourself stranded on the proverbial island. This text adventure was written by Rick Graves, using tips from Clayton Walnum, too, as presented for programmers in our "Adventurous Programming" series last year.

Games. . .you thought you'd sworn off the things, eh? Well, "The ROBOX Incident" will have you back at your monitor in no time. . .playing on an alien computer that has crash-landed in your backyard. Sworn off? Not yet!

And, for reality's sake, we've included a look at the Texan BBS, Computalk. With its creator's energy and drive, this BBS is one to watch.

As fall gets us back into the swing of things, we're occupied with getting our magazines out on time for you. (No, we haven't disappeared; we've just changed printers and are getting back on schedule. I *hate* it when Murphy's Law strikes—over and over and over.) We're also continuing to work on the Columbus Day weekend's Atari fair planned in our area.

It may seem old hat to those on the West Coast, but this is exciting for us—we've attended fairs and shows all over the country, and this is the first Atari fair that's been held in the Northeast.

We think it's long overdue; the area is, after all, one of the centers of computer expertise in the U.S., as well as a hotbed of college campuses. Atari needs more representation here, and this will be a good chance for Atarians on the East Coast to show themselves, and for dealers to make themselves better known to a whole section of the marketplace.

We're looking forward to playing host to those of you who'll be able to make the trip. With the goings-on in the desktop publishing and MIDI worlds of computing, this fall has many promises to keep. It will be our pleasure to bring you the latest news for the coming holiday season.

See you in October!

Diane L. Gaw
Managing Editor
ANALOG Computing

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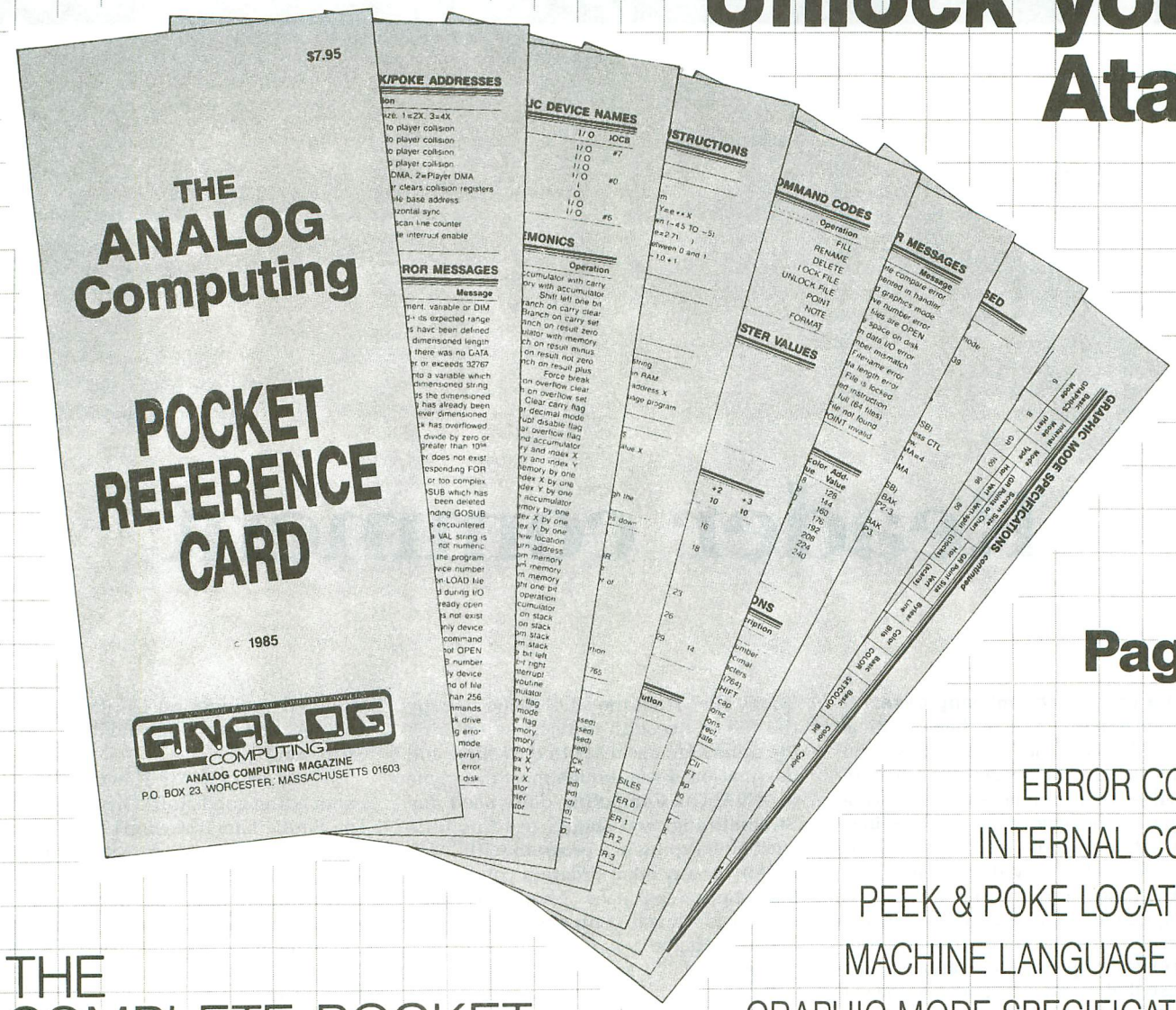

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Reader comment

The case of the missing case.

Astute readers have probably noticed that the "Streamliner" article (issue 56) claims there are "three cases in which binary files contain unnecessary information that can be removed by "Streamliner" —but lists only two. Yes, there's a third case, but. . .uh. . . my dog ate it.

Here's case 3: binary files which have been appended to. Basically, the way this works is that, if a binary file which already exists is opened for an append operation (so that data can be added to the end of the file), the new data is put in a new sector, even if the last sector of the file has some room in it.

Suppose you create a file containing 1 byte. Then, you open the file for an append operation, add 1 byte to the end of the file, close the file, and repeat this "append and close" bit 99 times. Believe it or not, you'd end up with a 100-byte file which requires 100 *sectors* on disk! Something similar happens if you type in a machine language program using "M/L Editor" in more than one sitting. (This is not "M/L Editor's" fault; blame it on DOS.)

If "Streamliner" processes a file like this that doesn't contain any extra bytes, via case 1 or 2, then it would determine that the file was in perfect order. (If the file did contain such bytes, the unused disk space would be removed when the file is rewritten.) This is *not* a bug in "Streamliner" because it is designed to look for extraneous *bytes*, not unused space which is not part of a file.

The solution is easy. Just use option C, "Copy file" from the DOS menu to copy the file in question to itself by entering the same filename for both the source and destination. Even though most programs in **ANALOG Computing** don't need any Streamlining, you should use this little trick after typing in a program with "M/L Editor" or any other program you believe to contain "dead space." I hope this hasn't caused too much confusion.

James Hague
Author of "Streamliner"
Richardson, TX

How about it, EA?

I would like to respond to an item in issue 56 of your magazine, concerning Electronic Arts. In the "ST notes" section, EA President Trip Hawkins was quoted as saying that the Atari 8-bit line would probably lose the support of EA, due to poor sales of new products last year. I've looked at those products from EA, and only one, Chessmaster 2000, impressed me to the point where I'd buy it.

However, there is an EA software package that I'd buy immediately—if only they'd port it over to the 8-bit. The package I'm referring to is The Bard's Tale. I feel it has the quality that everyone wants in a software package for their computer and consider it the best EA has to offer.

I wonder why EA is so critical of Atari without showing us *their* best. Software companies should just port their top products to the Atari 8-bit line. If they find that Atari owners won't buy products that Apple and Commodore owners make top sellers, then forget us. Until they try us, and see that we'll buy quality, I guess we're sunk.

So how about it, Mr. Hawkins? Give us a shot at the good stuff. Give us a shot at The Bard's Tale. If we don't buy that one, or other quality "port overs," then we won't buy anything. Maybe you'll find that, while we might not be the place for new products, we'll buy what sells on other systems. This may not give us products the others don't have, but we'll get more than we have now.

Duke T. Matlock
St. Louis, MO

Lightspeed C manual improved.

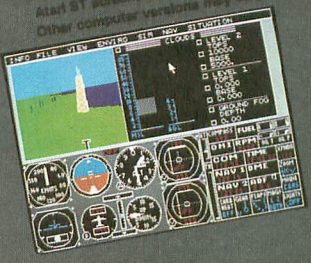
I'm writing to inform you that the manual to our product, Lightspeed C, which was reviewed in the April issue of **ANALOG Computing**, has been revised, per the recommendation of reviewer Kurt Oestreich. The text size is significantly larger and the manual is now a pleasure to read. I would like to take this opportunity to thank Kurt for his honest and fair review of our product.

Also, I would like to introduce a revised, completely new edition of Elite Personal Accountant. Since the program was taken in by our company, it has undergone a major overhaul, including increased speed (nearly two times as fast) and a new manual.

Other new releases include our Brown Baggin It! line of games for the Atari 8-bit. The first of these is Classy Chassy, a full-

(continued on page 86)

THE FLIGHT CHOICE!



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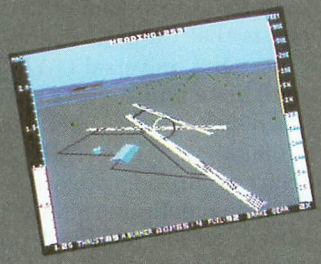

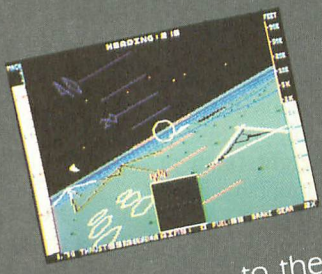

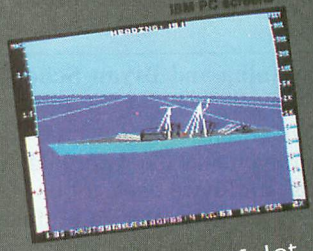

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The ROBOX Incident

Try out the alien computer that just crashed into your life.

by Barry Kolbe and Bryan Schappel

Your bed still likes you, even if you have been gone a long time—and you still like your bed. You hit the sack at about 10:00 p.m. and have been snoozing comfortably for nearly five hours, when. . .there's a crash and a bright flash of white light. Amazing how none of your neighbors have been awakened, isn't it?

You leap from bed, as best you can, don your robe and slippers, step on the dog, trip over your stuffed Komodo dragon doll and stumble down the stairs. The back door opens, even though you wanted it to, and you're outside.

Over in the vegetable garden, right on top of the corn that just started to come in, between the carrots and the peas, is a crater the size of your pumpkin patch. [Hey, where did the pumpkin patch go?]

Against your best judgment, you approach this crater—waiting for a big green thing with scales to jump at your throat, but no such luck. There's just a blackened box, with a panel and a button, sitting there. You're about to re-enter your humble abode and pass this occurrence off as a normal everyday kinda thing, when you notice the words *Press START* on the panel.

Well, you thought that addiction to computer games was cured, didn't you? Not quite. Against your will you press START and. . .

Typing it in.

Listing 1 contains the BASIC data statements used to create the ROBOX.COM file on your disk. Please refer to the "M/L Editor," found elsewhere in this issue for instructions on keying in **ROBOX**.

Once the ROBOX.COM file has been created, simply binary load it from DOS. If you're not sure how to do this, please refer to your DOS manual for instructions.

Playing ROBOX.

You are now the proud owner of a slightly used alien computer, sent to Earth for reasons unknown. One nice thing about these aliens is that they speak the English tongue.

The computer uses the universal QWERTY keyboard as an input device and has a built-in CRT terminal for output. There also must be a disk in drive 1 at *all times* during play.

ROBOX has a total of 42 points. There is a point display at the bottom of the screen; keep a close eye on it, because it tells you if you did something right or wrong. For each new thing you discover, you receive 1 point. If you then do the thing wrong, after having done it right, you will loose 1 point.

Learning how to save/load a game also gives you points, so you may want to figure out how to do these operations first.

Program options.

There are a couple of options available to you, that just make playing more fun. You will notice messages are printed to the screen slowly; to speed things up, press the inverse (Atari logo) key. Pressing it again will toggle it back to slow mode.

The other option is a key-click toggle. There is normally no click, so if you like the click, just press CTRL-CAPS. Press CTRL-CAPS again to turn off the click.

Technical notes.

ROBOX operates in graphics mode 0, on a narrow playfield. The wonderful moving graphs at the bottom of the screen were accomplished by defining a pair of characters with a pattern that would meet at both ends if folded over (like a sine wave). Then, every three vertical blanks, the character definition is shifted to the left with the ROL, LSR instructions, checking to see if the carry was set. If so, bit 7 of the rightmost character is set.

WHAT IS ST-CHECK?

Most ST BASIC program listings in this magazine are followed by a table of numbers appearing as data statements, called "ST CHECKSUM DATA." These numbers are to be used in conjunction with **ST-Check** (which appeared in **ANALOG Computing** issue 41).

ST-Check, written by Clayton Walnum, is designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of the article, you may send for back issue 41 of **ANALOG Computing** for $4.00.

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We used a custom screen print routine (the OS will not do narrow playfields) that accesses screen memory directly—this bugger can fill a screen with straight ATASCII text in the wink of an eye. Try that with CIO someday. (Our print routine also does word wraps, making the text easier to read.) There's a custom input routine used that will allow only sixty-four character inputs, alphanumeric *only*.

All game messages are tokenized to save memory. This also means that you can't look at the disk file for clues. By tokenizing the messages, we probably saved upwards of fifteen sectors. The Scott Adams adventures also used a technique similar to this, so all his adventures could fit into 16K.

We hope **ROBOX** keeps you busy for the next month. You may want to schedule an appointment at the Hair Transplant Salon in the near future [you could be pulling out quite a bit].

ANALOG Computing will not give clues over the phone. If you'd like a copy of the game's solution, send a stamped, self-addressed envelope to: **ROBOX** Solution, c/o **ANALOG Computing**, P.O. Box 23, Worcester, MA 01603.

Barry Kolbe is a mathematics teacher in Madison, WI. He uses the Atari to demonstrate graphing in his classroom. His former student, Bryan Schappel, is studying Computer Science at the University of Wisconsin. This is their fourth team project for **ANALOG Computing**.

Listing 1.
"M/L Editor" Data.

```
1000 DATA 255,255,0,32,251,32,0,0,0,0,
0,0,0,0,0,24,3724
1010 DATA 24,24,24,0,24,0,0,102,102,10
2,0,0,0,0,0,102,5660
1020 DATA 255,102,102,255,102,0,24,126
,96,126,6,126,24,0,0,102,137
1030 DATA 108,24,48,102,70,0,28,54,28,
56,111,102,59,0,0,24,7124
1040 DATA 24,24,0,0,0,0,0,30,28,24,24,
28,30,0,0,120,4754
1050 DATA 56,24,24,56,120,0,0,102,60,2
55,60,102,0,0,0,24,8224
1060 DATA 24,126,24,24,0,0,0,0,0,0,0,2
8,28,56,0,0,2988
1070 DATA 0,126,126,0,0,0,0,0,0,0,0,28
,28,0,0,0,2400
1080 DATA 7,12,24,48,224,0,0,126,102,1
10,118,102,126,0,0,120,1601
1090 DATA 24,24,24,24,126,0,0,126,6,12
6,96,96,126,0,0,126,144
1100 DATA 6,62,6,6,126,0,0,108,108,108
,124,12,12,0,0,126,8498
1110 DATA 96,126,6,6,62,0,0,124,96,126
,102,102,126,0,0,126,926
1120 DATA 6,14,28,56,48,0,0,126,102,60
,102,102,126,0,0,126,228
1130 DATA 102,126,6,6,126,0,0,56,56,0,
56,56,0,0,0,56,5292
1140 DATA 56,0,56,56,56,112,0,30,48,96
,48,30,0,0,0,0,5060
1150 DATA 126,0,0,126,0,0,0,120,12,6,1
2,120,0,0,0,126,6496
1160 DATA 102,12,252,32,247,33,24,0,24
,0,0,126,102,110,110,96,1551
1170 DATA 126,0,0,126,102,102,126,102,
102,0,0,126,102,124,102,102,3274
1180 DATA 126,0,0,126,96,96,96,126,
0,0,124,102,102,102,102,2844
1190 DATA 124,0,0,126,96,124,96,96,126
,0,0,126,96,124,96,96,3088
1200 DATA 96,0,0,126,96,96,110,102,126
,0,0,102,102,126,102,102,3052
1210 DATA 102,0,0,56,56,56,56,56,56,0,
0,6,6,6,6,102,5452
1220 DATA 126,0,0,96,102,108,126,102,1
02,0,0,96,96,96,96,102,2320
1230 DATA 126,0,0,99,119,127,99,99,99,
0,0,124,102,102,102,102,2889
1240 DATA 102,0,0,126,102,102,102,102,
126,0,0,126,102,102,126,96,3324
1250 DATA 96,0,0,126,102,102,102,108,1
18,0,0,126,102,102,124,108,3466
1260 DATA 102,0,0,124,96,126,6,6,62,0,
0,126,24,24,24,24,6646
1270 DATA 24,0,0,102,102,102,102,102,1
26,0,0,102,102,102,102,60,1956
1280 DATA 24,0,0,99,99,99,127,119,99,0
,0,102,102,60,60,102,1443
1290 DATA 102,0,0,102,102,126,24,24,24
,0,0,126,108,24,48,102,9246
1300 DATA 126,0,0,30,24,24,24,24,30,0,
0,0,224,48,24,12,6576
1310 DATA 7,0,0,120,24,24,24,24,120,0,
0,8,28,54,99,99,7786
1320 DATA 0,0,248,33,243,34,0,0,0,0,0,
0,255,255,0,0,500
1330 DATA 60,126,0,126,60,0,0,93,84,93
,0,1,0,1,0,1,4918
1340 DATA 0,17,16,17,0,0,192,192,192,1
92,192,192,192,192,192,192,3570
1350 DATA 192,192,208,204,252,0,0,0,48
,120,204,198,3,0,0,12,1109
1360 DATA 30,51,97,192,128,0,0,0,63,12
7,224,192,192,192,0,0,4980
1370 DATA 255,255,0,0,0,0,0,0,252,254,
7,115,59,27,192,192,5497
1380 DATA 192,192,192,192,192,192,3,3,
3,3,3,3,3,3,192,216,2000
1390 DATA 216,204,224,127,63,0,0,0,0,0
,0,255,255,0,3,3,9977
1400 DATA 3,3,7,254,252,0,255,129,129,
129,129,129,129,255,0,0,7188
1410 DATA 15,8,8,8,248,0,0,0,224,32,32
,32,63,0,0,16,6884
1420 DATA 24,252,252,24,16,0,0,8,24,63
,63,24,8,0,0,0,4875
1430 DATA 0,255,255,0,0,0,0,0,3,3,3,3,
0,0,0,0,2831
1440 DATA 192,192,192,192,0,0,0,0,0,0,
0,0,0,0,0,0,3360
1450 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1450
1460 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,24,1844
1470 DATA 60,126,24,24,24,0,0,24,24,24
,126,60,24,0,0,24,5520
1480 DATA 48,126,244,34,239,35,48,24,0
,0,0,24,12,126,12,24,7353
1490 DATA 0,0,0,24,60,126,126,60,24,0,
0,0,126,6,126,102,9464
1500 DATA 126,0,0,96,96,126,102,102,12
6,0,0,0,124,96,96,96,1842
1510 DATA 124,0,0,6,6,126,102,102,126,
0,0,0,126,102,126,96,1600
1520 DATA 124,0,0,30,24,126,24,24,24,0
,0,0,126,102,102,126,9828
1530 DATA 6,126,0,96,96,126,102,102,10
2,0,0,24,0,56,24,24,7672
1540 DATA 24,0,0,6,0,6,6,6,6,62,0,96,9
6,108,120,108,9828
1550 DATA 102,0,0,56,24,24,24,24,24,0,
0,0,198,238,254,198,5600
1560 DATA 198,0,0,0,126,102,102,102,10
2,0,0,0,126,102,102,102,1676
1570 DATA 126,0,0,0,126,102,102,126,96
,96,0,0,126,102,102,126,3096
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1580 DATA 6,6,0,0,126,102,96,96,96,0,0
,0,126,96,126,6,112
1590 DATA 126,0,0,24,126,24,24,24,30,0
,0,0,102,102,102,102,9132
1600 DATA 126,0,0,0,0,102,102,102,60,24,
0,0,0,99,99,127,62,9828
1610 DATA 54,0,0,0,102,60,24,60,102,0,
0,0,102,102,102,126,400
1620 DATA 14,126,0,0,126,14,24,112,126
,0,0,24,60,126,126,24,9904
1630 DATA 60,0,24,24,24,24,24,24,24,24
,0,126,120,124,110,102,1028
1640 DATA 6,0,240,35,255,35,8,24,56,12
0,56,24,8,0,16,24,7575
1650 DATA 28,30,28,24,16,0,0,40,251,40
,112,112,112,240,66,78,4607
1660 DATA 40,160,66,0,59,2,2,2,2,2,2,2
,2,2,2,2,2755
1670 DATA 2,2,2,2,160,66,110,40,2,2,2,
66,110,40,65,0,7793
1680 DATA 40,112,112,112,112,112,112,1
12,112,112,66,238,40,112,2,65,4508
1690 DATA 39,40,64,0,32,96,32,64,0,96,
4,146,2,10,10,12,6737
1700 DATA 111,115,119,123,127,131,135,
139,192,128,180,229,242,237,233,238,78
71
1710 DATA 225,236,128,180,249,240,229,
154,128,184,182,141,162,162,171,143,49
44
1720 DATA 151,173,154,177,179,175,128,
192,192,128,213,212,212,212,212,212,79
55
1730 DATA 212,210,128,192,79,79,79,79,
79,79,79,192,128,211,212,9731
1740 DATA 212,212,212,212,212,214,128,
192,128,128,0,71,72,72,73,0,4959
1750 DATA 128,128,128,128,128,128,128,
128,128,128,128,128,128,128,128,128,91
58
1760 DATA 0,71,72,72,73,0,128,128,128,
128,0,74,69,70,75,0,1013
1770 DATA 0,65,67,0,85,82,0,16,16,0,83
,86,0,0,65,67,7282
1780 DATA 0,74,80,81,75,0,128,128,128,
128,0,76,77,77,78,0,1380
1790 DATA 0,66,68,128,128,128,128,128,
128,128,128,128,128,128,66,68,6876
1800 DATA 0,76,77,77,78,0,128,128,0,0,
0,0,0,0,0,0,4801
1810 DATA 0,0,0,0,0,112,252,40,247,41,
114,101,115,115,0,0,2770
1820 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1820
1830 DATA 0,0,0,0,0,0,0,0,128,179,180,
161,178,180,128,0,5438
1840 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,255,
254,253,159,5050
1850 DATA 158,157,156,155,127,126,125,
31,30,29,28,27,64,95,129,160,3773
1860 DATA 169,39,141,48,2,169,40,141,4
9,2,169,0,141,198,2,141,4365
1870 DATA 200,2,160,0,140,197,2,32,190
,41,32,190,41,200,192,16,5927
1880 DATA 208,242,169,1,141,111,2,173,
31,208,201,6,208,249,169,0,9219
1890 DATA 141,48,2,169,40,141,49,2,160
,3,169,255,153,13,208,169,8598
1900 DATA 0,153,192,2,169,3,153,8,208,
136,16,238,162,61,160,3,6460
1910 DATA 185,62,41,153,0,208,136,16,2
47,32,190,41,32,190,41,32,4610
1920 DATA 190,41,206,62,41,206,63,41,2
38,64,41,238,65,41,202,16,6062
1930 DATA 221,169,0,162,3,157,0,208,20
2,16,250,96,72,169,0,133,7068
1940 DATA 20,165,20,240,252,104,96,169
,0,168,153,0,36,153,0,37,3783
1950 DATA 153,0,38,153,0,39,200,208,24
1,96,169,125,201,155,208,9,662
1960 DATA 169,0,133,139,230,140,76,109
,42,201,126,208,12,32,48,42,4744
1970 DATA 32,73,42,169,0,168,248,41,24
3,42,145,141,96,201,125,208,1181
1980 DATA 20,160,0,152,153,0,59,153,0,
60,153,0,61,200,208,244,8230
1990 DATA 133,139,133,140,96,32,171,42
,72,32,73,42,160,0,104,145,3800
2000 DATA 141,166,139,232,224,32,144,7
,230,140,32,109,42,162,0,134,6282
2010 DATA 139,96,165,139,170,5,140,240
,17,202,16,12,162,31,164,140,6905
2020 DATA 208,4,162,0,240,2,198,140,13
4,139,96,169,224,133,141,169,1713
2030 DATA 58,133,142,164,140,165,141,2
4,105,32,133,141,144,2,230,142,8347
2040 DATA 136,16,242,165,141,24,101,13
9,133,141,144,2,230,142,96,164,9519
2050 DATA 140,192,13,144,55,169,12,133
,140,169,0,133,141,169,59,133,7384
2060 DATA 142,169,32,133,143,169,59,13
3,144,162,0,160,31,177,143,145,8556
2070 DATA 141,136,16,249,165,144,133,1
42,165,143,133,141,24,105,32,133,7743
2080 DATA 143,165,144,105,0,133,144,23
2,224,13,208,223,96,32,189,42,9380
2090 DATA 29,56,40,166,137,96,32,189,4
2,29,60,40,166,137,96,72,4488
2100 DATA 42,42,42,42,41,3,134,137,170
,104,41,159,96,134,136,32,5382
2110 DATA 222,41,166,136,96,173,252,2,
201,255,240,249,162,255,142,252,8579
2120 DATA 2,133,128,168,192,192,144,2,
160,154,177,121,133,147,201,128,1809
2130 DATA 240,227,201,129,208,9,244,42
,239,43,165,149,73,1,133,149,8607
2140 DATA 76,211,42,201,130,208,9,165,
148,73,64,133,148,76,211,42,8036
2150 DATA 201,131,208,6,169,64,133,148
,208,191,201,132,208,9,165,150,1887
2160 DATA 73,1,133,150,76,211,42,201,1
33,240,174,165,128,201,64,144,2015
2170 DATA 19,165,147,201,97,144,13,201
,123,176,9,165,148,240,5,5,7197
2180 DATA 128,76,225,42,162,15,189,46,
41,197,147,240,5,202,16,246,9799
2190 DATA 165,147,201,32,144,131,164,1
50,240,13,160,127,140,31,208,162,774
2200 DATA 8,202,208,253,136,16,245,96,
32,200,43,169,0,133,129,169,8797
2210 DATA 5,133,130,169,0,133,131,160,
0,177,129,153,0,6,200,201,7867
2220 DATA 155,208,4,230,131,208,17,192
,32,208,238,136,177,129,201,32,1533
2230 DATA 240,5,136,208,247,160,31,200
,132,132,160,0,177,129,132,133,215
2240 DATA 201,155,240,3,32,222,41,165,
149,240,6,32,190,41,32,190,7337
2250 DATA 41,164,133,200,196,132,208,2
28,152,24,101,129,133,129,144,2,8864
2260 DATA 230,130,165,139,240,3,32,226
,41,165,131,240,170,96,133,129,1004
2270 DATA 132,130,162,255,160,255,200,
232,177,129,157,0,5,201,155,208,2896
2280 DATA 1,96,41,127,201,32,176,238,1
77,129,16,5,41,127,24,105,4907
2290 DATA 32,132,133,10,168,185,240,43
,235,44,24,57,141,1,44,185,5969
2300 DATA 25,57,141,2,44,160,255,202,2
00,232,185,255,255,157,0,5,2259
2310 DATA 16,246,41,127,157,0,5,164,13
3,76,208,43,169,62,32,222,7439
2320 DATA 41,162,1,134,135,202,134,134
,134,136,32,211,42,166,136,201,697
2330 DATA 155,240,57,41,127,201,32,144
,239,201,126,208,11,224,0,240,1679
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2340 DATA 231,202,32,203,42,76,30,44,2
01,96,240,220,201,123,176,216,3591
2350 DATA 133,138,201,65,144,7,201,91,
176,3,24,105,32,224,63,240,7994
2360 DATA 199,157,0,6,165,138,32,203,4
2,232,208,188,157,0,6,134,7915
2370 DATA 134,198,135,76,222,41,216,16
9,0,170,157,0,36,232,208,250,2092
2380 DATA 165,135,240,52,165,139,10,10
,24,105,64,141,0,208,165,140,6841
2390 DATA 10,10,10,24,105,58,170,173,4
3,2,240,11,169,240,157,0,7084
2400 DATA 36,133,145,169,60,133,146,16
5,145,198,146,208,8,160,30,132,9546
2410 DATA 146,73,240,133,145,157,0,36,
230,154,165,154,201,2,208,51,9759
2420 DATA 169,0,133,154,162,7,189,48,3
4,10,157,48,34,62,40,34,1326
2430 DATA 144,9,169,1,24,125,48,34,157
,48,34,189,136,34,10,157,4022
2440 DATA 136,34,62,128,34,144,9,169,1
,24,125,136,34,157,136,34,4271
2450 DATA 202,16,211,76,98,228,236,44,
229,45,169,0,133,151,166,155,666
2460 DATA 240,66,230,153,166,153,224,8
,208,58,133,153,164,152,200,192,3597
2470 DATA 8,208,2,160,0,132,152,185,70
,40,141,1,208,152,73,7,5508
2480 DATA 168,185,70,40,141,2,208,160,
12,185,24,34,201,208,240,4,8660
2490 DATA 136,16,246,200,169,192,153,2
4,34,169,208,192,0,208,2,160,9546
2500 DATA 13,153,23,34,76,95,228,72,13
8,72,166,151,189,64,40,141,7955
2510 DATA 24,208,141,10,212,189,67,40,
141,23,208,141,10,212,230,151,839
2520 DATA 104,170,104,64,165,121,5,122
,208,6,169,254,133,121,133,122,303
2530 DATA 32,220,41,133,135,141,200,2,
133,148,133,149,230,149,133,150,1993
2540 DATA 133,151,133,152,133,153,133,
154,133,155,169,32,141,244,2,169,701
2550 DATA 240,133,145,169,30,133,146,1
69,61,141,47,2,169,7,160,108,6412
2560 DATA 162,44,32,92,228,169,6,160,2
36,162,44,32,92,228,169,57,9197
2570 DATA 141,0,2,169,45,141,1,2,169,1
92,141,14,212,32,66,41,4497
2580 DATA 169,32,141,7,212,169,3,141,2
9,208,32,201,41,141,8,208,7547
2590 DATA 141,9,208,141,10,208,169,68,
141,192,2,169,56,141,193,2,7830
2600 DATA 169,168,141,194,2,230,155,16
0,5,169,120,153,183,37,153,215,1582
2610 DATA 38,136,16,247,230,45,225,46,
216,162,0,189,195,51,24,105,8440
2620 DATA 5,157,195,51,232,224,188,208
,242,169,1,141,68,2,169,255,2310
2630 DATA 133,161,169,176,160,51,32,98
,43,32,226,41,32,18,44,162,4015
2640 DATA 255,134,160,173,0,6,201,155,
208,10,169,0,160,6,32,98,5061
2650 DATA 43,76,7,46,162,0,134,159,188
,139,52,185,195,51,16,10,5593
2660 DATA 169,32,160,53,32,98,43,76,7,
46,205,0,6,240,6,232,5260
2670 DATA 208,228,76,7,46,162,0,232,20
0,185,195,51,48,7,221,0,7092
2680 DATA 6,240,244,208,7,41,127,221,0
,6,240,6,32,201,46,76,5576
2690 DATA 7,46,134,158,166,159,189,44,
58,208,6,254,44,58,32,187,7854
2700 DATA 50,166,158,232,189,0,6,201,1
55,208,3,76,8,47,201,32,5788
2710 DATA 240,3,76,90,46,232,134,157,1
62,0,134,160,188,148,52,185,468
2720 DATA 241,51,48,47,166,157,221,0,6
,240,5,166,160,232,208,234,3407
2730 DATA 232,200,185,241,51,48,7,221,
0,6,240,244,208,15,41,127,8430
2740 DATA 221,0,6,208,8,232,189,0,6,20
1,155,240,77,32,201,46,8415
2750 DATA 76,7,46,166,157,32,201,46,76
,7,46,134,156,162,0,189,6582
2760 DATA 0,6,157,112,58,232,228,156,2
08,245,160,0,185,42,53,157,599
2770 DATA 112,58,232,200,226,46,221,47
,192,7,208,244,164,156,185,0,1928
2780 DATA 6,201,155,240,10,9,128,157,1
12,58,200,232,185,0,6,157,8448
2790 DATA 112,58,201,155,208,244,169,1
12,160,58,32,98,43,96,165,159,9294
2800 DATA 10,170,189,86,58,141,25,47,1
89,87,58,141,26,47,32,255,6205
2810 DATA 255,76,7,46,169,49,160,53,32
,98,43,169,60,160,53,32,4201
2820 DATA 98,43,169,68,160,53,32,98,43
,169,71,160,53,32,98,43,3982
2830 DATA 169,74,160,53,32,98,43,169,7
7,160,53,32,98,43,96,166,5472
2840 DATA 160,240,8,169,178,160,53,32,
98,43,96,173,78,58,208,6,6143
2850 DATA 238,78,58,32,187,50,169,115,
160,52,32,98,43,169,127,160,7762
2860 DATA 52,32,98,43,162,3,134,156,16
9,240,160,52,32,98,43,166,7850
2870 DATA 156,202,16,242,169,252,160,5
2,32,98,43,169,8,160,53,32,5759
2880 DATA 98,43,169,20,160,53,32,98,43
,96,166,160,224,1,240,15,7636
2890 DATA 224,3,208,3,76,236,50,169,17
8,160,53,32,98,43,96,32,5251
2900 DATA 128,50,144,1,96,169,190,160,
53,32,98,43,32,18,44,162,3979
2910 DATA 0,134,161,188,189,52,185,153
,52,48,10,205,0,6,240,17,5663
2920 DATA 166,161,232,208,236,169,195,
160,52,32,98,43,169,255,133,161,2495
2930 DATA 96,162,0,232,222,47,217,48,2
00,185,153,52,48,7,221,0,7567
2940 DATA 6,208,225,240,242,41,127,221
,0,6,208,221,166,161,189,52,2189
2950 DATA 58,208,6,254,52,58,32,187,50
,169,213,160,52,32,98,43,6471
2960 DATA 96,169,179,160,56,32,98,43,3
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2970 DATA 42,240,76,169,189,160,56,32,
98,43,32,126,48,169,253,162,9502
2980 DATA 0,32,144,48,142,47,2,142,29,
208,169,64,141,14,212,169,8691
2990 DATA 42,141,200,2,162,228,160,95,
169,6,32,92,228,162,228,160,2229
3000 DATA 98,169,7,32,92,228,169,0,162
,3,157,0,208,202,16,250,9583
3010 DATA 169,255,162,160,32,144,48,16
9,0,141,200,2,76,98,48,169,6945
3020 DATA 23,141,208,56,169,189,160,56
,32,98,43,169,210,160,56,32,7811
3030 DATA 98,43,32,126,48,76,98,48,32,
226,41,169,229,160,56,32,7176
3040 DATA 98,43,169,249,160,56,32,98,4
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3050 DATA 48,252,96,166,160,224,1,240,
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3060 DATA 96,32,128,50,144,1,96,165,16
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3070 DATA 98,43,96,10,170,189,102,58,1
41,200,48,189,103,58,141,201,291
3080 DATA 48,32,255,255,166,161,189,57
,58,208,6,254,57,58,32,187,9293
3090 DATA 50,76,7,46,218,48,213,49,169
,227,160,52,32,98,43,162,7958
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,74,49,169,7,32,85,49,1857
3120 DATA 162,41,189,44,58,29,112,58,1
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3130 DATA 50,96,169,217,160,52,32,98,4
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3140 DATA 169,11,32,85,49,96,72,32,74,
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,3,169,34,157,68,3,169,5411
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3180 DATA 68,3,169,36,157,72,3,169,0,1
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3200 DATA 157,160,56,32,98,43,32,18,44
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,134,156,169,32,32,222,41,169,9063
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5,240,11,189,0,6,209,162,8703
3270 DATA 240,50,201,155,240,55,166,15
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3280 DATA 6,222,62,58,32,187,50,76,19,
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3290 DATA 70,58,76,2,50,166,156,232,22
4,8,208,160,169,150,160,56,1803
3300 DATA 32,98,43,96,196,157,240,237,
232,200,76,226,49,166,156,165,5116
3310 DATA 164,208,14,189,62,58,208,6,2
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3320 DATA 50,189,70,58,208,248,254,70,
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3330 DATA 32,98,43,96,169,90,160,54,32
,98,43,96,169,7,160,55,5476
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,43,96,169,172,160,55,32,6578
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,200,200,189,0,6,217,115,52,1639
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3420 DATA 10,9,16,141,190,40,138,9,16,
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60,53,32,98,43,32,226,41,5388
3480 DATA 169,95,160,53,32,98,43,32,22
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,51,162,2,32,148,51,169,53,5851
3510 DATA 162,161,32,117,51,162,3,32,1
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3520 DATA 0,177,129,48,10,132,157,32,2
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3530 DATA 127,32,222,41,169,32,32,222,
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3560 DATA 99,116,105,118,97,116,101,10
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3570 DATA 95,112,104,235,206,51,201,52
,96,105,98,92,98,224,103,92,9823
3580 DATA 112,105,94,227,107,103,92,24
4,109,96,111,109,100,96,113,224,1234
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3600 DATA 111,92,107,?24,107,109,106,9
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3610 DATA 250,100,105,95,27,52,51,110,
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3620 DATA 105,95,27,45,110,111,95,27,1
09,96,98,93,100,105,95,27,5035
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105,95,27,52,46,110,111,95,6309
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,92,103,111,250,92,27,105,6497
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3690 DATA 32,48,32,49,155,0,7,11,17,23
,27,35,40,45,0,5,7352
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3710 DATA 108,97,110,100,105,110,231,1
08,97,117,110,99,104,105,110,231,1017
3720 DATA 115,116,97,116,117,243,255,0
,6,13,20,29,35,110,111,32,3574
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,32,0,155,0,32,110,111,116,5387
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3770 DATA 55,32,100,32,52,155,98,32,48
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,105,116,99,232,50,49,51,49,6258
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3890 DATA 104,32,0,63,198,53,193,54,15
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,115,32,97,110,100,32,97,32,4812
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,48,32,10,46,32,5,32,9042
4080 DATA 105,115,32,57,56,32,109,105,
108,108,105,111,110,32,10,32,3893
4090 DATA 102,114,111,109,32,103,114,1
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4110 DATA 97,110,100,115,46,32,18,100,
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05,115,32,115,116,111,114,101,6091
4140 DATA 100,32,105,110,155,51,32,114
,101,103,105,115,116,101,114,115,8222
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,8,46,32,12,32,99,9010
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,46,32,21,32,100,105,115,116,5109
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132,57,153,57,158,57,164,57,7832
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211,57,218,57,230,57,242,57,2582
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,116,46,174,114,101,97,100,249,946
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,101,115,243,112,114,111,103,114,1322
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,105,108,101,243,109,101,116,101,1187
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4540 DATA 231,109,117,115,116,32,98,10
1,32,112,117,116,32,105,238,99,9193
4550 DATA 111,117,114,115,229,105,108,
108,101,103,97,236,116,104,101,121,134
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4570 DATA 100,32,105,238,102,105,114,1
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0,0,4610
4620 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4620
4630 DATA 0,0,0,0,0,0,0,0,0,30,47,73,47,
148,47,7,48,192
4640 DATA 153,48,218,48,20,49,117,49,7
4,50,82,50,90,50,105,50,4253
4650 DATA 120,50,226,2,227,2,86,45,0,0
,0,0,0,0,0,0,7665
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Bureaucracy

by Douglas Adams and the Staff of Infocom
INFOCOM
125 CambridgePark Drive
Cambridge, MA 02140
48K Disk $39.95

by Steve Panak

A long, long time ago, on a computer not far enough away, Infocom gave us, the computing public, a game so wild, so off the wall, that it was a preordained best-seller. 'Round about the same time, they also gave us interactive fiction plus and universes so large as to escape the confines of low memory systems. This new product was also greeted warmly and embraced by the public. But now they've gone too far. How can the populace resist a game combining the two? They can't.

Bureaucracy is the latest comedy from Infocom. Written by Douglas Adams, author of the popular Hitchhiker's Guide to the Galaxy series, this new work takes aim at the bureaucracy and bureaucrats we must all deal with in our daily lives. And, with uncanny accuracy, it scores a direct hit. It makes us laugh, while cynically pointing out the frustrations we've created for ourselves in this modern world in which we live.

The story starts innocently enough. Having just gotten a new job and moved to a new home, you seem ready to start your life anew. A fresh start, as it were. In fact, your first assignment is a training session in Paris, France. You feel as though you could just sink into your easy chair and relax your day away. That's if the moving company hadn't lost, misplaced, or otherwise eliminated all your possessions. To make things worse, your bank has turned on you as well, failing to properly process your change of address form and invalidating your charge card. By the time you get all these various problems straightened out and finally get to Paris, you'll have taken an adventure unlike any you've ever taken before —if you survive.

What could be so dangerous in this real-world game? Well, assuming the frustration doesn't force you into suicide, you've got that blood pressure problem to worry about. The status line in this game is unlike any of Infocom's other offerings. In the top right corner of the display is a readout of your blood pressure. Each of life's little annoyances cause this pressure to rise slightly. In this game, even ordering a meal or trying to withdraw money from your bank are tasks that quickly grow to monumental proportions. Taken alone, each frustration is merely an additional throb in your already aching head. But when accumulated, rest assured they're lethal.

The strange status line is only the first unique aspect of this Infocom work. A sample response from the SCORE command typifies the side-splitting prose each new frustration can unleash: *Your blood pressure is 144/88 in thirty-four moves. Your status is livid. Your score is 0 out of a possible 21, making you a victim.*

In another first, this program allows (rather, forces) the player to fill out those most infamous of the bureaucratic roadblocks: forms. At key places in the game, the screen display fills with a form, which must be filled out before you're allowed to proceed onward. In fact, the first form informs (rather, misinforms, in the spirit of true bureaucracy) the program of your name, sex and other vital statistics.

The documentation, likewise, is very distinctive. Containing a form (of course) and a booklet entitled "You're Ready to Move," (published by your very caring bank, the Fillmore Fiduciary Trust Company), the game materials foreshadow the mess you'll have to disentangle yourself from in order to complete the game. Also included is a skinny pencil, a charter membership flyer for "Popular Paranoia Magazine" and a letter from your boss. Even the players' testimonies contained inside the front cover are different; they're complaints from players frustrated with Infocom bureaucracy.

While the game *is* frustrating to play, the program itself is simple to use. My favorite feature is the allowed abbreviation of *EXAMINE* to *X*; it just makes being nosey that much easier.

Even the save game feature is used much differently than in other Infocom games. Usually, you save your position before trying a dangerous task. In **Bureaucracy**, you'll find yourself saving your position after a particularly frustrating ordeal, so that it won't have to be suffered through again. Finally, even the constant responses in Infocom games (such as those elicited by an expletive or a word the program doesn't understand) are humorous and original.

Bureaucracy is quite possibly the most frustrating game Infocom has released. It's not hard to play, but, like the world in which we live, it's often hard to cope with. Like the little annoyances in life it pokes fun at, **Bureaucracy** gets under your skin. And once implanted, it'll tickle your funny bone for days to come.

Steve Panak is a Trust Attorney and a free-lance writer living in northeastern Ohio. He holds a B.S. in B.A. and a J.D. He currently oversees computer operations in his department, where he develops software to teach complex legal concepts. In his spare time, he enjoys computer games.

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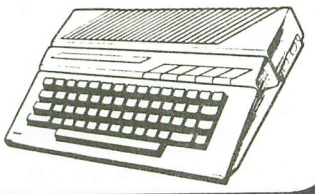

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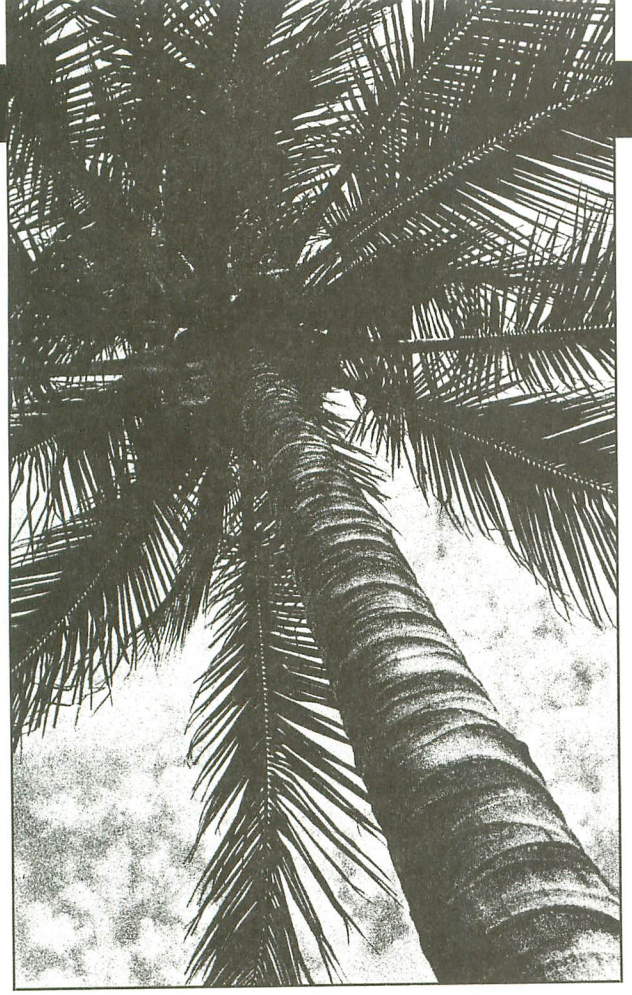


Castaway

The island hides a secret in this text adventure.

by Rick Graves

From the moment I loaded my first Infocom adventure, I wondered what made it tick. I wondered what it would take to produce such a finely structured illusion.

One day last year I sat at my Atari 800, eagerly anticipating my monthly issue of **ANALOG Computing**. When it finally arrived, I opened it and haphazardly scanned the table of contents, trying to decide which program to key in first. Out of the corner of my eye, I spotted an article entitled "Adventurous Programming," by programmer extraordinaire Clayton Walnum. To make a long story short, Mr. Walnum led me step by step through the adventure-creating process. I couldn't believe it; it was easy. Once I understood what was going on inside an adventure, the difficulty was reduced to creating good puzzles. Several months and endless hours of debugging later, **Castaway** was complete.

The plot.

All you remember is a midnight stroll along the deck of a ship, an alarm sounding, a muffled explosion, and warm waters quickly closing over your head.

When you awaken, you discover you've washed ashore on a deserted island. You're alone, with no idea how you'll survive.

You realize you must find a means of rescue as soon as possible, but while gazing upon the island, you sense that it holds some dark secret to discover. With renewed purpose, you rise to your feet.

Typing it in.

Listing 1 is the main program. It handles all player input and the appropriate responses.

Listing 2 prints the room descriptions to disk. For each room in **Castaway**, one or more text files are created, so I suggest you save these programs on a clean disk.

When BASIC has been installed, type Listings 1 and 2 and save them. Be sure to check your typing with the "Basic Editor."

Load and run Listing 2. The message *Creating Room Descriptions* will appear. After a few minutes, the *READY* prompt will reappear on the screen.

Playing *Castaway*.

After the room descriptions have been created, run Listing 1. You'll be asked to wait, while the program initializes itself. After a few seconds, you'll be in the opening room.

In **Castaway**, the video screen is separated into two areas. The top line of the screen displays your current location, your score and the number of actions you've attempted so far. The remainder of the screen is used to display room

descriptions, to accept player input and to print necessary output. The top line of the display will remain intact, while the rest scrolls continuously underneath.

As you enter each new room, its description will be printed (this isn't always the case, as explained later), followed by the phrase *You see:*. Under this heading appears a list of the takeable objects, if any, currently in the room. There are other objects in individual room descriptions. Some can be manipulated with certain verbs, others can't.

Following the list of takeable objects, player input is accepted. Like most text adventures, **Castaway** only understands two-word sentences of the Verb-(space)-Noun form. You'll have to experiment to determine which verbs and nouns **Castaway** understands, but that's all part of the fun. If you enter an invalid sentence, or a nonexistent verb or noun, **Castaway** will inform you immediately.

Commands.

Castaway recognizes certain special commands that are vital to any adventure.

Movement Commands:

N-North	NE-Northeast	U-Up
S-South	SE-Southeast	D-Down
E-East	NW-Northwest	
W-West	SW-Southwest	

Other commands used in **Castaway** are:

Inventory or I	Prints the objects currently in your possession.
Look or L	Reprints the room description and the takeable objects in case you forget the room's details.
Score	Prints your current rank and score.
Quit	Exits *Castaway*.
Restart	Restarts the game from the beginning.
Save	Saves your current game status.
Restore	Restores a game that's been saved.
Verbose	Verbose room descriptions.
Brief	Brief room descriptions.

Saving and restoring games.

Castaway lets you save your current game status and location to disk. This is particularly useful when you're about to attempt something dangerous. To save your game, type *SAVE* and hit RETURN. Be sure the disk you want the game saved on is in the disk drive, because no prompts are given. When the operation is complete, the game is reentered at the point at which it was saved.

To restore a previously saved game, type the command *RESTORE* and hit RETURN. The game will be reentered at the point where you last saved your game status. As with the SAVE command, make sure the desired save disk is in the disk drive.

The BREAK key has been disabled, so if you want to halt the program, simply hit the SYSTEM RESET key.

Room descriptions.

Castaway lets you select between verbose and brief room descriptions. When the program is set to verbose, the entire room description, as well as the takeable objects list, is displayed. If set to brief, the program will only display the takeable objects. This command comes in handy when you're moving through familiar territory and want to speed things up.

For verbose descriptions, enter the command *VERBOSE*, and for brief, type *BRIEF*.

Hints for solving *Castaway*.

(1) Make a map of the island as you go along. Some of the areas can be pretty confusing, so you might get lost.

(2) Save your game frequently—preferably before you attempt something that might be hazardous to your health—or you'll have to start over.

(3) Try anything. You might be suprised to find out what you can do.

(4) Watch your score. It can be used as a measure of your progress.

(5) Examine everything. Clues have been included in certain descriptions to help you along.

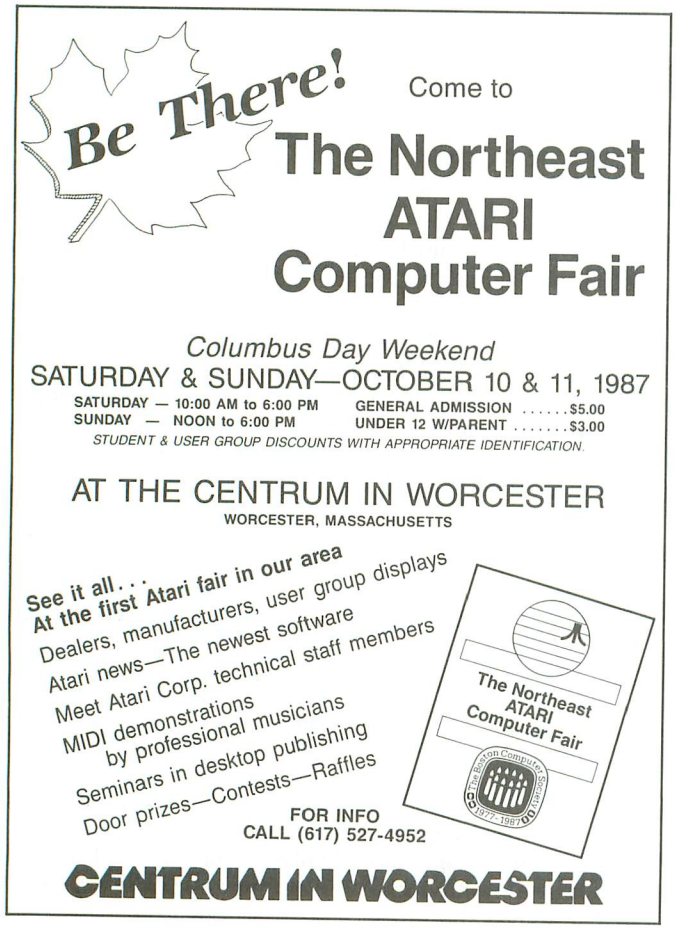
(6) Don't get frustrated. If one verb doesn't work, try to think of a synonym.

Credits.

I'd like to thank Clayton Walnum for getting me started. **Castaway** was developed around the adventure he used as an example in his adventure series. Needless to say, without his help and expertise, this adventure wouldn't have been possible.

Apologies.

For those readers who've already taken a look at the listings, you know what I'm about to apologize for. Some parts of Listing 1 and almost all of Listing 2 has been encrypted.



I know this means hours of tedious typing, but I have a good reason. In adventures that aren't encrypted, it's easy for the reader to go through the listing and pick out clues. Encryption cuts down on this to some degree.

Well, do your best. **Castaway** can be solved. Believe me, I've done it many times.

ANALOG Computing will not give adventure hints over the phone. If you'd like a copy of this game's solution, send a stamped, self-addressed envelope to: **Castaway** Solution, c/o **ANALOG Computing**, P.O. Box 23, Worcester, MA 01603.

Rick Graves is a student at the University of Oklahoma, majoring in Aerospace Engineering. He's been programming on his 800 for about four years. He enjoys puzzle-oriented software immensely and is looking forward to programming on a 520ST.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the "BASIC Editor II," in issue 47.

Listing 1.
BASIC listing.

```
MO 10 REM ****************************
FJ 20 REM *                          *
ZD 30 REM *     Castaway V1.2        *
LK 40 REM *       12/20/86           *
JR 50 REM *     by Rick Graves       *
HG 60 REM * A.N.A.L.O.G. Computing  *
FO 70 REM *                          *
MV 80 REM ****************************
BG 90 REM
UU 100 CLR :GRAPHICS 0:? "initializing, P
   lease wait...":GOTO 4490
AF 110 A=USR(ADR(CRYPT$),ADR(TEXT$),LEN(T
   EXT$)):RETURN
JS 120 A=USR(ADR(CRYPT$),ADR(TEXT$),LEN(T
   EXT$)):? :? TEXT$:RETURN
WW 130 FOR X=N1 TO 1000:NEXT X:RETURN
KH 140 POKE N16,112:POKE 53774,112:RETURN
IU 150 N=N0:S=N0:E=N0:W=N0:U=N0:D=N0:NE=N
   0:SE=N0:SW=N0:NW=N0:GOSUB (ROOMLOC-N4)
   *N10+150:GOSUB 3960:RETURN
KX 160 TEXT$="Tboez!Tipsf":NE=N12:E=N6:SE
   =N20+N2:RETURN
FJ 170 TEXT$="Gpsftu!Fehf":W=N5:E=N20+N4:
   RETURN
DM 180 TEXT$="Usbdlmftt!Gpsftu":N=N7:NE=N
   7:E=N8:SE=N20+N4:S=N7:SW=N7:W=N6:NW=N7
   :RETURN
NZ 190 TEXT$="Usbdlmftt!Gpsftu":N=N14:NE=
   N8:E=N8:SE=N8:S=N20+N3:SW=N8:W=N7:NW=N
   8:U=N9:RETURN
VQ 200 TEXT$="Vq!b!Usff":D=N8:RETURN
IH 210 TEXT$="Vq!b!Usff":D=N11:RETURN
QS 220 TEXT$="Ofbs!Tqsjoh":S=N20+N5:U=N10
   :NW=N15:RETURN
IA 230 TEXT$="Tboez!Tipsf":NE=N17:SE=N7:S
   W=N5:RETURN
MU 240 TEXT$="Ubs!Qju":N=N17:RETURN
ZV 250 TEXT$="Efdbzjoh!Fbsui":N=37:S=N8:R
   ETURN
SB 260 TEXT$="Cpuupn!pg!Imm":U=N19:SE=N1
   1:RETURN
IT 270 TEXT$="Tboez!Tipsf":N=N20+N1:NW=N2
   0:RETURN
QL 280 TEXT$="Obujwf!Wjmmbhf":E=N18:S=N13
   :SW=N12:RETURN
MW 290 TEXT$="Tusbx!Ivu":W=N17:RETURN
EV 300 TEXT$="Upq!pg!Imm":E=N20:D=N15:RE
   TURN
EX 310 TEXT$="Spdlz!Qbui":E=N20+N1:SE=N16
   :W=N19:RETURN
QP 320 TEXT$="Tboez!Tipsf":S=N16:W=N20:RE
   TURN
OR 330 TEXT$="Tboez!Tipsf":E=N20+N3:S=N20
   +N7:NW=N5:RETURN
JB 340 TEXT$="Usbdlmftt!Gpsftu":N=N7:NE=N
   8:E=N20+N4:SE=N20+N3:S=N20+N3:SW=N20+N
   3:W=N20+N2:NW=N20+N3:RETURN
FI 350 TEXT$="Usbdlmftt!Gpsftu":N=N8:NE=N
   20+N4:E=N6:SE=N20+N4:S=N20+N9:SW=N20+N
   4:W=N20+N3:NW=N7:RETURN
GX 360 TEXT$="Jo!Xbufs":N=N11:D=N20+N11:R
   ETURN
KH 370 TEXT$="Mbshf!Dbwf":S=N20+N13:RETUR
   N
SM 380 TEXT$="Eftfsufe!Dbcjo":N=N20+N2:E=
   N20+N8:RETURN
SF 390 TEXT$="Hbsefo":N=N20+N3:W=N20+N7:R
   ETURN
FN 400 TEXT$="Pvutjef!Dbwf":N=N20+N4:E=N2
   0+N10:RETURN
YK 410 TEXT$="Ebsl!Dbwf":W=N20+N9:RETURN
NA 420 TEXT$="Voefsxbufs":U=N20+N5:D=N20+
   N12:RETURN
GW 430 TEXT$="Voefsxbufs":U=N20+N11:E=N20
   +N13:SE=N20+N16:S=N20+N15:RETURN
QP 440 TEXT$="Voefsxbufs":U=N20+N6:S=N20+
   N16:SW=N20+N15:W=N20+N12:RETURN
GZ 450 TEXT$="Tnbmm!Dbwf":E=N20+N15:RETUR
   N
KA 460 TEXT$="Voefsxbufs":U=N20+N14:N=N20
   +N15:NE=N20+N13:E=N20+N16:RETURN
HI 470 TEXT$="Voefsxbufs":N=N20+N13:W=N20
   +N15:NW=N20+N16:RETURN
DC 480 TEXT$="Dsbti!Tjuf":S=N14:RETURN
EU 490 RESTORE 4590:FOR X=N1 TO NV:READ A
   :V(X)=A:NEXT X
RL 500 FOR X=N1 TO 72:READ A:LOC$(X)=CHR$
   (A):NEXT X
ZI 510 FOR X=N1 TO 35:READ A:SPC$(X)=CHR$
   (A):NEXT X
FQ 520 FOR X=N1 TO 35:READ A:CRYPT$(X)=CH
   R$(A):NEXT X
KF 530 FOR X=N1 TO NN-N1:READ TEXT$,A:Q=5
   Z-LEN(TEXT$):ITEM$(X*5Z-5Z+N1,X*5Z-Q)=
   TEXT$:ITEMLOC(X)=A:NEXT X
TF 540 FOR X=N1 TO N10:SCFLG(X)=N0:NEXT X
GM 550 FOR X=N1 TO N6:INV(X)=N0:NEXT X:IN
   V(N1)=N1
DC 560 RESTORE 4720:FOR X=N1 TO 35:READ A
   :POKE 1742+X,0:DL$(X)=CHR$(A):NEXT X
WN 570 DL$(N5,N5)=CHR$(206):DL$(N6,N6)=CH
   R$(N6)
QC 580 DL$(N9,N9)=CHR$(SCRL+40):DL$(N10,N
   10)=CHR$(SCRH)
OV 590 GRAPHICS N0:GOSUB 140:DLH=INT(ADR(
   DL$)/256):DLL=ADR(DL$)-DLH*256
AT 600 DL$(34)=CHR$(DLL):DL$(35)=CHR$(DLH
   ):POKE 559,N0:POKE 560,DLL:POKE 561,DL
   H:POKE 559,34
YS 610 TURN=TURN+N1
XU 620 GOSUB 3670
NO 630 IF KILLFLG THEN 4000
IP 640 ? :? "You see:":IT=N0:FOR X=N1 TO
   NN-N1:IF ITEMLOC(X)<>ROOMLOC THEN NEXT
    X:GOTO 660
IQ 650 TEXT$=ITEM$(X*5Z-5Z+N1,X*5Z):GOSUB
    110:? " ";TEXT$:IT=N1:NEXT X
HM 660 IF  NOT IT THEN ? "Nothing."
FZ 670 IF INS AND SWCH THEN 685
OU 680 GOTO 710
IO 685 IF (ROOMLOC=5 OR ROOMLOC=12 OR ROO
```

```
   MLOC=N16 OR ROOMLOC=N20+N1 OR ROOMLOC=
   N20+N2) AND ITEMLOC(19)=-N1 THEN 4210
UD 690 IF ITEMLOC(N19)=-N1 OR ITEMLOC(N19
   )=ROOMLOC OR (ITEMLOC(N19)=-N3 AND ROO
   MLOC=N19) THEN 700
PL 695 GOTO 710
CO 700 TEXT$="Uif!usbotnjuufs!jt!ivnnjoh-
   !cvu!!!!!!!tpnfujoh!jt!cmpdljoh!jut!t
   jhobm/":GOSUB 120
NL 710 GOSUB 150:SOUND N0,N20,N10,N8:FOR
   X=N1 TO N10:NEXT X:SOUND N0,N0,N0,N0:I
   TEMLOC(32)=ROOMLOC
UN 720 TRAP 4420:? :? "What now";:INPUT I
   NP$:IF ROOMLOC>30 AND ROOMLOC<>34 AND
   ROOMLOC<>37 THEN BRTH=BRTH+N1
SG 730 IF BRTH>N4 THEN BRTH=N0:GOTO 4080
PF 740 IF INP$="" THEN TEXT$="Xibu@":GOSU
   B 120:GOTO 670
NO 750 IF ROOMLOC=N8 OR ROOMLOC=N9 OR ROO
   MLOC=N10 OR ROOMLOC=N11 OR ROOMLOC=28
   THEN ITEMLOC(N8)=-ROOMLOC
GW 760 IF LIT THEN CNTR=CNTR+N1:IF CNTR>N
   3 THEN CNTR=N0:LIT=N0:TEXT$="B!hvtu!pg
   !xjoe!cmpxt!pvu!zpvs!nbudi/":GOSUB 120
BI 770 IF ROOMLOC>30 AND ROOMLOC<>34 AND
   ROOMLOC<>37 THEN GOSUB 4130
FW 780 IF INP$="LOOK" OR INP$="L" THEN 61
   0
RJ 790 IF INP$="QUIT" THEN 4480
WH 800 IF INP$="YELL" THEN TEXT$="Bbssshh
   hhiiiiiiii=":GOSUB 120:TURN=TURN+N1:GO
   TO 670
XX 810 IF INP$="RESTART" THEN 100
CP 820 IF INP$="INVENTORY" OR INP$="I" TH
   EN 3560
AZ 830 IF INP$="SCORE" THEN GOSUB 3820:GO
   TO 670
LT 840 IF LEN(INP$)=N1 OR LEN(INP$)=N2 TH
   EN GOSUB 4170:VB$=INP$:GOTO 980
HI 850 IF INP$="BRIEF" THEN BRIEF=N1:TEXT
   $="Csjfg!Eftdsjqujpot/":GOSUB 120:GOTO
    670
PE 860 IF INP$="VERBOSE" THEN BRIEF=N0:TE
   XT$="Wfscptf!Eftdsjqujpot/":GOSUB 120:
   GOTO 670
AX 870 IF INP$="SAVE" THEN 4260
OE 880 IF INP$="RESTORE" THEN 4350
VZ 890 A=USR(ADR(SPC$),LEN(INP$),ADR(INP$
   ))
DX 900 VB$=INP$(N1,A):NN$=INP$(A+N2)
VD 910 IF LEN(VB$)=N2 THEN VB$(N3)=" "
PV 920 Z=USR(ADR(LOC$),ADR(VB$),ADR(VERB$
   ),LEN(VERB$))
XR 930 Y=USR(ADR(LOC$),ADR(NN$),ADR(NOUN$
   ),LEN(NOUN$))
PH 940 IF  NOT Z THEN ? :? "I don't under
   stand that verb.":GOTO 670
XO 950 IF  NOT Y THEN ? :? "I don't under
   stand that noun.":GOTO 670
AP 960 Z=V(Z)
LU 970 ON Z GOTO 1200,1310,1410,1470,1560
   ,1630,1710,1850,1990,2100,2560,2670,28
   20,2920,3110,3220,3290,3340,3440,3520
LN 980 IF VB$="D" AND ROOMLOC=25 THEN BRT
   H=N0:GOSUB 4100:GOSUB 4130
UF 990 IF VB$="S" AND ROOMLOC=26 THEN BRT
   H=N0:GOSUB 4100:GOSUB 4130
HP 1000 IF VB$="E" AND ROOMLOC=34 THEN BR
   TH=N0:GOSUB 4100:GOSUB 4130
PM 1010 IF VB$="NE" AND ROOMLOC=N12 AND I
   TEMLOC(N5)=-N2 AND SCFLG(N1)<>N1 THEN
   GOSUB 3630
SP 1020 IF VB$="D" AND ROOMLOC=31 AND  NO
   T SCFLG(N4) THEN TEXT$="Uif!spdl!jt!jo
   !uif!xbz/":GOTO 1040
PK 1030 GOTO 1050
EA 1040 GOSUB 120:TURN=TURN+N1:GOTO 670
IC 1050 IF VB$="E" AND ROOMLOC=27 AND  NO
   T OP1 THEN TEXT$="Uif!epps!jt!dmptfe/"
   :GOSUB 120:GOTO 670
KB 1060 IF VB$="N" AND  NOT SCFLG(N3) AND
    ROOMLOC=N14 THEN 1080
RW 1070 GOTO 1090
ND 1080 TEXT$="Zpv!dbo(u!gpsdf!zpvs!xbz!u
   ispvhi!uif!!ubohmf!pg!wjoft/":GOTO 104
   0
VW 1090 IF VB$="N" AND N THEN ROOMLOC=N:G
   OTO 610
IO 1100 IF VB$="S" AND S THEN ROOMLOC=S:G
   OTO 610
WL 1110 IF VB$="E" AND E THEN ROOMLOC=E:G
   OTO 610
TS 1120 IF VB$="W" AND W THEN ROOMLOC=W:G
   OTO 610
OJ 1130 IF VB$="U" AND U THEN ROOMLOC=U:G
   OTO 610
UB 1140 IF VB$="D" AND D THEN ROOMLOC=D:G
   OTO 610
VA 1150 IF VB$="NE" AND NE THEN ROOMLOC=N
   E:GOTO 610
WL 1160 IF VB$="NW" AND NW THEN ROOMLOC=N
   W:GOTO 610
JM 1170 IF VB$="SE" AND SE THEN ROOMLOC=S
   E:GOTO 610
KX 1180 IF VB$="SW" AND SW THEN ROOMLOC=S
   W:GOTO 610
UN 1190 ? :? "You can't go that way!":TUR
   N=TURN+N1:GOTO 670
CE 1200 TEXT$="Zpv!dbo(u!pqfo!uibu="
NQ 1210 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
JO 1220 IF ROOMLOC=27 AND Y=N4 AND OP1 TH
   EN TEXT$="Uif!cbdl!epps!jt!bmsfbez!pqf
   o/"
JT 1230 IF ROOMLOC=27 AND Y=N4 AND  NOT O
   P1 AND UNL1 THEN OP1=N1:TEXT$="Uif!cbd
   l!epps!jt!opx!pqfo/"
TZ 1240 IF ROOMLOC=27 AND Y=N4 AND  NOT O
   P1 AND  NOT UNL1 THEN TEXT$="Uif!cbdl!
   epps!jt!tfdvsfmz!mpdlfe/"
OQ 1250 IF Y=27 AND OP3 AND (ITEMLOC(N19)
   =-N1 OR ITEMLOC(N19)=ROOMLOC) THEN TEX
   T$="Uif!qbofm!jt!bmsfbez!pqfo/"
IS 1260 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND OP2 THEN TEXT$="
   Uif!ejbsz!jt!bmsfbez!pqfo/"
SS 1270 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND  NOT OP2 THEN OP
   2=N1:TEXT$="Zpv!pqfo!uif!npmez!ejbsz/"
JN 1280 IF Y=27 AND  NOT OP3 AND (ITEMLOC
   (N19)=-N1 OR ITEMLOC(N19)=ROOMLOC) THE
   N OP3=N1:GOTO 1300
ET 1290 GOSUB 120:TURN=TURN+N1:GOTO 670
FO 1300 TEXT$="Uif!qbofm!jt!opx!pqfo/":GO
   TO 1290
AI 1310 TEXT$="Zpv!dbo(u!dmptf!uibu="
NV 1320 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
RH 1330 IF ROOMLOC=27 AND Y=N4 AND  NOT O
   P1 THEN TEXT$="Uif!cbdl!epps!jt!bmsfbe
   z!dmptfe/"
CT 1340 IF ROOMLOC=27 AND Y=N4 AND OP1 TH
   EN OP1=N0:TEXT$="Uif!cbdl!epps!jt!opx!
   dmptfe/"
YS 1350 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND  NOT OP2 THEN TE
   XT$="Uif!ejbsz!jt!bmsfbez!dmptfe/"
RA 1360 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND OP2 THEN OP2=N0:
   TEXT$="Zpv!dmptf!uif!npmez!ejbsz/"
BA 1370 IF Y=27 AND  NOT OP3 AND (ITEMLOC
   (N19)=-N1 OR ITEMLOC(N19)=ROOMLOC) THE
   N 1400
DB 1380 IF Y=27 AND OP3 AND (ITEMLOC(N19)
```

```
   =-N1 OR ITEMLOC(N19)=ROOMLOC) THEN OP3
   =N0:TEXT$="Uif!qbofm!jt!opx!dmptfe/"
EV 1390 GOSUB 120:TURN=TURN+N1:GOTO 670
BD 1400 TEXT$="Uif!qbofm!jt!bmsfbez!dmptf
   e/":GOTO 1390
TY 1410 TEXT$="Zpv!dbo(u!mpdl!uibu="
NX 1420 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
EQ 1430 IF ROOMLOC=27 AND Y=N4 AND  NOT U
   NL1 AND ITEMLOC(N12)=-N1 THEN TEXT$="U
   if!cbdl!epps!jt!bmsfbez!mpdlfe/"
WZ 1440 IF ROOMLOC=27 AND Y=N4 AND UNL1 A
   ND ITEMLOC(N12)=-N1 THEN UNL1=N0:TEXT$
   ="Uif!cbdl!epps!jt!opx!mpdlfe/"
ZA 1450 IF ROOMLOC=27 AND Y=N4 AND ITEMLO
   C(N12)<>-N1 THEN TEXT$="Zpv!epo(u!ibwf
   !boz!lfzt/"
EO 1460 GOSUB 120:TURN=TURN+N1:GOTO 670
RY 1470 TEXT$="Zpv!dbo(u!vompdl!uibu="
OP 1480 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
JU 1490 IF ROOMLOC=27 AND Y=N4 AND UNL1 A
   ND ITEMLOC(N12)=-N1 THEN TEXT$="Uif!cb
   dl!epps!jt!bmsfbez!vompdlfe/"
RL 1500 IF ROOMLOC=27 AND Y=N4 AND  NOT U
   NL1 AND ITEMLOC(N12)=-N1 THEN UNL1=N1:
   GOTO 1530
YQ 1510 IF ROOMLOC=27 AND Y=N4 AND ITEMLO
   C(N12)<>-N1 THEN TEXT$="Zpv!epo(u!ibwf
   !boz!lfzt/"
EE 1520 GOSUB 120:TURN=TURN+N1:GOTO 670
VM 1530 TEXT$="Uif!cbdl!epps!jt!opx!vompd
   lfe/"
LZ 1540 IF SCFLG(N2)<>N1 THEN SCFLG(N2)=N
   1:SCORE=SCORE+N10:GOTO 1520
QV 1550 GOTO 1520
AE 1560 TEXT$="Zpv!dbo(u!xfbs!uibu="
LJ 1570 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 THEN TEXT$="Zpv!dbo(u!t
   ff!uibu!ifsf="
IZ 1580 IF ITEMLOC(Y)=-N2 THEN TEXT$="Zpv
   !bsf!bmsfbez!xfbsjoh!uibu/"
IM 1590 IF Y=N5 AND ITEMLOC(Y)=-N1 THEN I
   TEMLOC(Y)=-N2:TEXT$="Zpv!opx!dmptfmz!s
   ftfncmf!b!hiptu/"
LE 1600 IF Y=N16 AND ITEMLOC(Y)=-N1 THEN
   ITEMLOC(Y)=-N2:TEXT$="Zpv!bsf!opx!xfbs
   joh!uif!hphhmft/"
TT 1610 IF ITEMLOC(Y)<>-N1 AND ITEMLOC(Y)
   <>-N2 THEN TEXT$="Zpv!epo(u!ibwf!uibu=
   "
EG 1620 GOSUB 120:TURN=TURN+N1:GOTO 670
UX 1630 TEXT$="Zpv!dbo(u!sfnpwf!uibu="
OH 1640 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
RO 1650 IF Y=N5 AND ITEMLOC(Y)=-N1 THEN T
   EXT$="Zpv!bsfo(u!xfbsjoh!uif!cfe!tiffu
   /"
MV 1660 IF Y=N5 AND ITEMLOC(Y)=-N2 THEN I
   TEMLOC(Y)=-N1:TEXT$="Zpv!sfnpwf!uif!cf
   e!tiffu/"
BJ 1670 IF Y=N16 AND ITEMLOC(Y)=-N1 THEN
   TEXT$="Zpv!bsfo(u!xfbsjoh!uif!hphhmft/
   "
FL 1680 IF Y=N16 AND ITEMLOC(Y)=-N2 THEN
   ITEMLOC(Y)=-N1:TEXT$="Zpv!sfnpwf!uif!h
   phhmft!gspn!zpvs!!!!!!ifbe/"
UR 1690 IF ITEMLOC(Y)<>-N1 AND ITEMLOC(Y)
   <>-N2 THEN TEXT$="Zpv!epo(u!ibwf!uibu=
   "
EC 1700 GOSUB 120:TURN=TURN+N1:GOTO 670
KB 1710 IF ITEMLOC(Y)=-N1 OR ITEMLOC(Y)=-
   N2 THEN TEXT$="Zpv!bmsfbez!ibwf!uibu="
   :GOTO 1840
AF 1720 IF (Y=17 OR Y=18 OR Y=19) AND ROO
   MLOC=N19 AND  NOT SCFLG(N5) THEN TEXT$
   ="Uif!cjse!esjwft!zpv!bxbz=":GOTO 1840
RK 1740 IF Y=N3 AND ROOMLOC=27 THEN TEXT$
   ="Zpv!dbo(u!ejtuvsc!uif!efbe/":GOTO 18
   40
FU 1750 IF Y=N15 AND (ITEMLOC(N19)=-N1 OR
    ITEMLOC(N19)=ROOMLOC) AND INS THEN IN
   S=N0:GOTO 1810
VC 1760 IF ROOMLOC=N19 AND SCFLG(N5) AND
   ITEMLOC(Y)=-N3 THEN 1810
EY 1770 IF Y=28 AND ITEMLOC(Y)=-ROOMLOC T
   HEN TEXT$="Uif!gjsf!cvsot!zpvs!gjohfst
   =":GOTO 1840
GG 1780 IF Y=32 THEN TEXT$="Zpv!dbo(u!ep!
   uibu=":GOTO 1840
JT 1790 IF ABS(ITEMLOC(Y))<>ROOMLOC THEN
   TEXT$="Zpv!dbo(u!tff!uibu!ifsf=":GOTO
   1840
FQ 1800 IF ITEMLOC(Y)=-ROOMLOC THEN TEXT$
   ="Zpv!dbo(u!ublf!uibu=":GOTO 1840
RC 1810 L=N0:FOR X=N1 TO N6:IF INV(X)=N0
   THEN L=X:GOTO 1835
FT 1820 NEXT X:IF  NOT L THEN TEXT$="Zpv!
   dbo(u!dbssz!boznpsf="
MI 1825 IF Y=N15 AND (ITEMLOC(N19)=-N1 OR
    ITEMLOC(N19)=ROOMLOC) AND  NOT INS TH
   EN INS=N1
TF 1830 GOTO 1840
QA 1835 ITEMLOC(Y)=-N1:INV(L)=Y:TEXT$="Pl
   bz/"
EQ 1840 GOSUB 120:TURN=TURN+N1:GOTO 670
YU 1850 TEXT$="Uijt!bddpnqmjtift!opuijoh/
   "
HI 1860 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N 1880
WE 1870 GOTO 1890
AF 1880 TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
YY 1890 IF ROOMLOC=31 AND Y=24 AND SCFLG(
   N4) AND ITEMLOC(N16)=-N2 THEN TEXT$="Z
   pv!ibwf!bmsfbez!epof!uibu="
GR 1900 IF ROOMLOC=31 AND Y=24 AND ITEMLO
   C(N16)=-N2 AND  NOT SCFLG(N4) THEN SCF
   LG(N4)=N1:SCORE=SCORE+N10:GOTO 1960
HW 1910 IF Y=26 AND (ITEMLOC(N19)=-N1 OR
   ITEMLOC(N19)=ROOMLOC) AND INS AND SWCH
    THEN SWCH=N0:GOTO 1970
ND 1920 IF Y=26 AND (ITEMLOC(N19)=-N1 OR
   ITEMLOC(N19)=ROOMLOC) AND  NOT INS AND
    SWCH THEN SWCH=N0:GOTO 1970
MN 1930 IF Y=26 AND (ITEMLOC(N19)=-1 OR I
   TEMLOC(N19)=ROOMLOC) AND INS AND  NOT
   SWCH THEN SWCH=N1:TURN=TURN+1:GOTO 670
DC 1940 IF Y=26 AND (ITEMLOC(N19)=-N1 OR
   ITEMLOC(N19)=ROOMLOC) AND  NOT INS AND
     NOT SWCH THEN SWCH=N1:GOTO 1980
EV 1950 GOSUB 120:TURN=TURN+N1:GOTO 670
UB 1960 TEXT$="Xjui!bo!joivnbo!fggpsu-!zp
   v!npwf!uif!!spdl-!dmfbsjoh!uif!qbttbhf
   /":GOSUB 120:GOTO 610
HZ 1970 TEXT$="Zpv!uvso!uif!usbotnjuups!p
   gg/":GOTO 1950
NZ 1980 TEXT$="Uifsf!jt!op!sfbdujpo!gspn!
   uif!!!!!!!!usbotnjuups/":GOTO 1950
BK 1990 TEXT$="Zpv!epo(u!ibwf!uibu="
FR 2000 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC<>-N2 THEN T
   EXT$="Zpv!dbo(u!tff!uibu!ifsf="
EF 2010 IF Y=29 AND ITEMLOC(Y)=-N1 THEN I
   TEMLOC(Y)=N0:ITEMLOC(21)=ROOMLOC:GOTO
   2030
PT 2020 GOTO 2050
OS 2030 FOR X=N1 TO N6:IF INV(X)=Y THEN I
   NV(X)=N0:TEXT$="Zpvs!upsdi!ibt!cffo!fy
   ujohvjtife/":GOSUB 120:GOTO 610
EU 2040 NEXT X:GOSUB 120:GOTO 610
WR 2050 IF ITEMLOC(Y)=ROOMLOC AND (ITEMLO
   C(Y)<>-N1 OR ITEMLOC(Y)<>-N2) THEN TEX
   T$="Zpv!epo(u!ibwf!uibu="
```

```
IX 2060 IF ITEMLOC(Y)=-N1 OR ITEMLOC(Y)=-
   N2 THEN ITEMLOC(Y)=ROOMLOC:TEXT$="P1bz
   /":GOTO 2080
EK 2070 GOSUB 120:TURN=TURN+N1:GOTO 670
DR 2080 FOR X=N1 TO N6:IF INV(X)=Y THEN I
   NV(X)=N0:GOTO 2070
VP 2090 NEXT X:GOTO 2070
SQ 2100 TEXT$="Tffnt!psejobsz/"
NP 2110 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
XS 2120 IF Y=N1 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND WET THEN TEXT$="
   Uif!nbudift!bsf!ebnq!up!uif!upvdi/"
CF 2130 IF Y=N2 AND ROOMLOC=27 THEN TEXT$
   ="Mzjoh!po!uif!cfe!jt!b!npmez!tlfmfupo
   /"
NI 2140 IF Y=N3 AND ROOMLOC=27 THEN TEXT$
   ="Uif!tlfmfupo!jt!dpwfsfe!gspn!ifbe!up
   !!upf!xjui!uif!evtu!pg!nboz!zfbst/"
HB 2150 IF Y=N9 AND ITEMLOC(Y)=-N1 THEN T
   EXT$="Uif!qjfdf!pg!gsvju!gffmt!hppe!jo
   !zpvs!iboe/"
BC 2160 IF Y=N4 AND ROOMLOC=27 AND  NOT O
   P1 THEN TEXT$="Uif!epps!jt!dmptfe/"
BO 2170 IF Y=N4 AND ROOMLOC=27 AND OP1 TH
   EN TEXT$="Uif!epps!jt!tuboejoh!xjef!pq
   fo/"
SF 2180 IF Y=28 AND ROOMLOC=17 THEN TEXT$
   ="Zpv!gffm!uif!fyusfnf!ifbu!pg!uif!gjs
   f!fwfo!gspn!xifsf!zpv!bsf!tuboejoh/"
PV 2190 IF Y=N5 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) THEN TEXT$="Uif!tiff
   u!jt!mpoh!boe!xijuf/"
JE 2200 IF Y=21 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) THEN 2220
RF 2210 GOTO 2260
TI 2220 TEXT$="B!qjfdf!pg!dmpui!ibt!cffo!
   ujfe!bspvoe!uif!xppefo!tubl f/!Uif!upq!
   pg!uif!tublfjt!cmbdl-!bt!"
YU 2230 TEXT$(90)="jg!uif!tublf!ibt!cffo!
   !!!cvsofe!cfgpsf/":GOSUB 120
SL 2240 IF COVRD THEN TEXT$="Uif!xppefo!t
   ublf!ibt!cffo!tnpuifsfe!!!xjui!ubs/":G
   OSUB 120
OO 2250 TURN=TURN+N1:GOTO 670
UJ 2260 IF Y=N5 AND ITEMLOC(Y)=-N2 THEN T
   EXT$="Zpv!dbo(u!ep!uibu-!bt!zpv!bsf!xf
   bsjoh!uif!tiffu/"
LJ 2270 IF Y=N16 AND (ITEMLOC(Y)=-N1 OR I
   TEMLOC(Y)=ROOMLOC) THEN TEXT$="Xbufs!i
   bt!gpsnfe!po!uif!hphhmft/"
XD 2280 IF Y=30 AND (ROOMLOC=11 OR ROOMLO
   C=25) THEN TEXT$="Ju!tffnt!up!tqbslmf/
   "
TG 2290 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND  NOT OP2 THEN TE
   XT$="Uif!npmez!ejbsz!jt!dmptfe/"
XA 2300 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND OP2 THEN TEXT$="
   Uif!ejbsz!jt!pqfo/"
ZW 2310 IF Y=N6 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) THEN 2500
CX 2320 IF Y=N7 AND (ITEMLOC(Y)=-N1 OR IT
```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CIRCLE #107 ON READER SERVICE CARD

```
   EMLOC(Y)=ROOMLOC) THEN 2510
GP 2330 IF Y=20 AND ITEMLOC(Y)=-ROOMLOC T
   HEN TEXT$="Mpplt!mjlf!tpnfuijoh!UBS[BO
   !njhiu!!!!!vtf/"
EG 2340 IF ROOMLOC=14 AND Y=N13 AND  NOT
   SCFLG(N3) THEN TEXT$="Uif!ubohmf!tffnt
   !up!cf!cmpdljoh!bo!!!!pqfojoh/"
EZ 2350 IF Y=N14 AND ROOMLOC=37 THEN TEXT
   $="Uif!qmbof!ibt!uif!mphp!V/T/!OBWZ!po
   !!!jut!tjef/"
DY 2360 IF Y=17 AND ROOMLOC=N19 AND  NOT
   SCFLG(N5) THEN TEXT$="Uif!cjse-!qspufd
   ujoh!jut!oftu-!esjwft!zpv!bxbz/"
LZ 2370 IF Y=18 AND ROOMLOC=N19 AND  NOT
   SCFLG(N5) THEN TEXT$="Uif!cjse-!qspufd
   ujoh!jutfmg-!esjwft!!!zpv!bxbz/"
OW 2380 IF Y=N17 AND ROOMLOC=N19 AND SCFL
   G(N5) THEN 2520
ZS 2390 IF Y=N19 AND (ITEMLOC(Y)=-N1 OR I
   TEMLOC(Y)=ROOMLOC OR ITEMLOC(Y)=-N3) A
   ND SCFLG(N5) THEN 2490
DM 2400 IF Y=26 AND (ITEMLOC(N19)=-N1 OR
   ITEMLOC(N19)=ROOMLOC) AND SWCH THEN 24
   80
YK 2410 IF Y=23 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) THEN TEXT$="Uif!qmbo
   t!tffn!up!jowpmwf!b!spdlfu/"
UJ 2420 IF Y=26 AND (ITEMLOC(N19)=-N1 OR
   ITEMLOC(N19)=ROOMLOC) AND  NOT SWCH TH
   EN 2470
HW 2430 IF Y=27 AND (ITEMLOC(N19)=-N1 OR
   ITEMLOC(N19)=ROOMLOC) AND OP3 THEN 445
   0
FP 2440 IF Y=27 AND (ITEMLOC(N19)=-N1 OR
   ITEMLOC(N19)=ROOMLOC) AND  NOT OP3 THE
   N 2460
EM 2450 GOSUB 120:TURN=TURN+N1:GOTO 670
PG 2460 TEXT$="Uif!qbofm!jt!dmptfe/":GOTO
    2450
DE 2470 TEXT$="Uif!txjudi!jt!jo!uif!pgg!q
   ptjujpo/":GOTO 2450
RK 2480 TEXT$="Uif!txjudi!jt!jo!uif!po!qp
   tjujpo/":GOTO 2450
QM 2490 TEXT$="Po!uif!usbotnjuufs-!zpv!tf
   f!bo!pcmpoh!txjudi!boe!b!tnbmm!qbofm/"
   :GOTO 2450
FM 2500 TEXT$="Uif!lojgf!jt!fyusfnfmz!tib
   sq!boe!!!!!!dpwfsfe!xjui!esjfe!cmppetu
   bjot/":GOTO 2450
QL 2510 TEXT$="Uif!ofxtqbqfs!jt!wfsz!pme!
   boe!cbsfmz!!sfbebcmf/":GOTO 2450
BK 2520 ? :? "In the nest, you see:":IT=N
   0:FOR X=N1 TO NN-N1:IF ITEMLOC(X)<>-N3
    THEN NEXT X:GOTO 2540
SC 2530 TEXT$=ITEM$(X*5Z-5Z+N1,X*5Z):GOSU
   B 110:? " ";TEXT$:IT=N1:NEXT X
MY 2540 IF  NOT IT THEN ? "Nothing."
OU 2550 TURN=TURN+N1:GOTO 670
EA 2560 TEXT$="Zpv!dbo(u!uispx!uibu="
OP 2570 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
JZ 2580 IF Y=N9 AND ITEMLOC(Y)=-N1 AND RO
   OMLOC=N19 AND  NOT SCFLG(N5) THEN SCFL
   G(N5)=N1:SCORE=SCORE+N10:GOTO 2630
NE 2590 IF ITEMLOC(Y)=-N1 OR ITEMLOC(Y)=-
   N2 THEN TEXT$="Uispxo/":GOTO 2610
EB 2600 GOSUB 120:TURN=TURN+N1:GOTO 670
HF 2610 FOR X=N1 TO N6:IF INV(X)=Y THEN I
   NV(X)=N0:ITEMLOC(Y)=ROOMLOC:GOTO 2600
UG 2620 NEXT X:GOTO 2600
IG 2630 ITEMLOC(N19)=-N3:TEXT$="Zpv!iju!u
   if!cjse!trvbsfmz!xjui!uif!!!!qjfdf!pg!
   gsvju-!esjwjoh!ju!pgg="
YQ 2640 FOR X=N1 TO N6:IF INV(X)=Y THEN I
   NV(X)=N0:ITEMLOC(Y)=ROOMLOC:GOTO 2660
MA 2650 NEXT X
DS 2660 GOSUB 120:GOTO 610
AD 2670 TEXT$="Zpv!dbo(u!ep!uibu="
OU 2680 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
ED 2690 IF Y=N1 AND ITEMLOC(Y)=-N1 AND LI
   T THEN TEXT$="Zpv!ibwf!bmsfbez!epof!ui
   bu="
FO 2700 IF Y=21 AND ITEMLOC(Y)=-N1 AND CO
   VRD AND LIT THEN ITEMLOC(Y)=N0:ITEMLOC
   (29)=-N1:GOTO 2770
CN 2710 IF Y=21 AND ITEMLOC(Y)=-N1 AND LI
   T AND  NOT COVRD THEN 2800
HA 2720 IF Y=21 AND ITEMLOC(Y)=-1 AND ROO
   MLOC<>34 AND ROOMLOC>30 AND ROOMLOC<>3
   7 THEN TEXT$="Zpv!dbo(u!ep!uibu!ifsf/"
MX 2730 IF Y=1 AND ITEMLOC(Y)=-1 AND ROOM
   LOC<>34 AND ROOMLOC>30 AND ROOMLOC<>37
    THEN TEXT$="Zpv!dbo(u!ep!uibu!ifsf/"
JH 2740 IF Y=N1 AND ITEMLOC(Y)=-N1 AND  N
   OT WET THEN LIT=1:CNTR=N0:TEXT$="Uif!n
   budi!cvstut!joup!gmbnf/"
NG 2750 IF Y=N1 AND ITEMLOC(Y)=-N1 AND WE
   T THEN TEXT$="Uif!nbudift!bsf!upp!ebnq
   /"
EV 2760 GOSUB 120:TURN=TURN+N1:GOTO 670
UU 2770 TEXT$="Uif!ubs!po!uif!tublf!cfhjo
   t!up!cvso-!!qspwjejoh!zpv!xjui!b!upsdi
   /"
WC 2780 FOR X=N1 TO N6:IF INV(X)=Y THEN I
   NV(X)=29:GOSUB 120:GOTO 610
FX 2790 NEXT X:GOSUB 120:GOTO 610
WU 2800 TEXT$="Uif!tublf!cfhjot!up!cvso-!
   cvu!bt!uifsfjt!op!gmbnnbcmf!tvctubodf!
   po!ju-!uif!!gmbnf!rvjdlmz!tvctjeft/"
TZ 2810 GOTO 2760
YM 2820 TEXT$="Uijt!bddpnqmjtift!opujoh/
   "
IE 2830 IF ITEMLOC(N6)<>-N1 THEN TEXT$="Z
   pv!epo(u!ibwf!uif!sfrvjsfe!pckfdu/"
OM 2840 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
ZR 2850 IF ROOMLOC=N14 AND Y=N13 AND ITEM
   LOC(N6)=-N1 AND SCFLG(N3)=N1 THEN 2880
TL 2860 IF ROOMLOC=N14 AND ITEMLOC(N6)=-N
   1 AND Y=N13 THEN 2890
FA 2870 GOSUB 120:TURN=TURN+N1:GOTO 670
JD 2880 TEXT$="Zpv!ibwf!bmsfbez!epof!uibu
   =":GOTO 2870
ZQ 2890 IF SCFLG(N3)<>N1 THEN SCFLG(N3)=N
   1:SCORE=SCORE+N10
KH 2900 TEXT$="Dvuujoh!uispvhi!uif!ubohmf
   !pg!wjoft!!!sfwfbmt!b!nvtuz!qbttbhf!mf
   bejoh!up!uifopsui/"
DJ 2910 GOSUB 120:GOTO 610
HQ 2920 TEXT$="Zpv!dbo(u!sfbe!uibu="
OL 2930 IF ABS(ITEMLOC(Y))<>ROOMLOC AND I
   TEMLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THE
   N TEXT$="Zpv!dbo(u!tff!uibu!ifsf="
LB 2940 IF Y=23 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) THEN TEXT$="Uif!qmbo
   t!tffn!up!dpodfso!b!spdlfu/"
KC 2950 IF Y=N7 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) THEN GOTO 2990
KL 2960 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND  NOT OP2 THEN TE
   XT$="Uif!ejbsz!jt!dmptfe/"
VQ 2970 IF Y=31 AND (ITEMLOC(Y)=-N1 OR IT
   EMLOC(Y)=ROOMLOC) AND OP2 THEN 3030
FF 2980 GOSUB 120:TURN=TURN+N1:GOTO 670
LN 2990 TEXT$="Uifsf!jt!pmz!pof!sfbebcmf
   !tupsz!mfgu!po!uif!pme!ofxtqbqfs/!Ju!u
   fmmt!pg!bo!!V/T/!Obwz!bjsqmbof!uibu"
IU 3000 TEXT$(100)="!dsbti.mboefe!!tpnfxi
   fsf!jo!uif!Qbdjgjd!xijmf!!!!!!!!dbsszj
   oh!tfdsfu!qmbot!tupmfo!gspn!uif!"
YZ 3010 TEXT$(191)="Hfsnbot!evsjoh!Xpsme!
   Xbs!JJ/"
```

```
VL 3020 GOTO 2980
RT 3030 ? :? "You have opened the diary t
   o its last page. It reads as follows:"
   :?
KQ 3040 TEXT$="Efbs!Ejbsz;!!!!!!!!!!!!!!!
   !!!!!!!!!!!!!J!bn!ofbsmz!pvu!pg!gppe/
   !J!ibwf!!!!!xbjufe!tp!mpoh!up!cf!"
UC 3050 TEXT$(98)="sftdvfe/!Xijmf!!!mppljo
   h!gps!gppe!po!uif!opsui!foe!pg!!uif!jtm
   boe-!J!ejtdpwfsfe!b!usjcf!pg!"
TX 3060 TEXT$(189)="!!obujwft/!Xifo!uifz!tb
   x!nf!uifz!bmnptu":GOSUB 110:? TEXT$
DX 3070 TEXT$="kvnqfe!pvu!pg!uifjs!tljot/!J
   !uijol!!!!uifz!njhiu!cf!tvqfstujujpvt!ps
   !!!!!!!!tpnfuijoh/!J!cbsfmz!"
AN 3080 TEXT$(97)="ftdbqfe/!J!dbo(u!!gjoe!b
   oz!gppe/!J(n!tmpxmz!mptjoh!!!!!ipqf/!J!
   ipqf!J!dbo!tvswjwf/!!!!!!!!!!!!!!"
YN 3090 TEXT$(194)="!!!!!!Mu/!Kpio!Tnjui-!V/
   T/!OBWZ"
CQ 3100 GOSUB 110:? TEXT$:TURN=TURN+N1:GOTO
   670
ZC 3110 TEXT$="Zpv!dbo(u!ep!uibu="
YV 3120 IF ITEMLOC(27)<>-N1 THEN TEXT$="Zpv
   !epo(u!ibwf!uif!qspqfs!uppm/"
NW 3130 IF ABS(ITEMLOC(Y))<>ROOMLOC AND ITE
   MLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THEN T
   EXT$="Zpv!dbo(u!tff!uibu!ifsf="
EO 3140 IF Y=32 AND ITEMLOC(25)=-N1 THEN
   TEXT$="Uif!hspvoe!jt!opu!tvjubcmf!gps!ej
   hhjohifsf/"
GI 3150 IF Y=32 AND ITEMLOC(25)=-N1 AND ROO
   MLOC=30 AND ITEMLOC(29)<>-N1 THEN TEXT$
   ="Ju(t!upp!ebsl!up!ejh!ifsf/"
KD 3160 IF Y=32 AND ITEMLOC(25)=-N1 AND ROO
   MLOC=30 AND ITEMLOC(29)=-N1 THEN TEXT$=
   "Epo(u!cpuifs/"
PA 3170 IF Y=22 AND ITEMLOC(25)=-N1 AND ITE
   MLOC(29)=-N1 AND SCFLG(N9) THEN TEXT$="
   Zpv!ibwf!bmsfbez!epof!uibu="
SP 3180 IF Y=22 AND ITEMLOC(25)=-N1 AND ITE
   MLOC(29)=-N1 AND  NOT SCFLG(N9) THEN SC
   FLG(N9)=N1:GOTO 3200
ET 3190 GOSUB 120:TURN=TURN+N1:GOTO 670
EE 3200 SCORE=SCORE+N10:TEXT$="Xijmf!ejhhjo
   h!jo!uif!ipmf-!zpv!dpnf!!!bdsptt!b!tfu!
   pg!qmbot/":ITEMLOC(23)=30
CW 3210 GOSUB 120:GOTO 610
ZH 3220 TEXT$="Zpv!dbo(u!ep!uibu="
NY 3230 IF ABS(ITEMLOC(Y))<>ROOMLOC AND ITE
   MLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THEN T
   EXT$="Zpv!dbo(u!tff!uibu!ifsf="
FR 3240 IF Y=N1 AND ITEMLOC(28)=-ROOMLOC AN
   D ITEMLOC(Y)=-N1 AND  NOT SCFLG(N8) THE
   N SCORE=SCORE+N10:GOTO 3280
LH 3250 IF Y=N1 AND ITEMLOC(Y)=-N1 AND ITEM
   LOC(28)=-ROOMLOC AND  NOT WET THEN TEXT
   $="Zpv!ibwf!bmsfbez!epof!uibu="
HG 3260 IF Y=N1 AND ITEMLOC(Y)=-N1 AND ITEM
   LOC(28)=-ROOMLOC AND WET THEN 3280
EP 3270 GOSUB 120:TURN=TURN+N1:GOTO 670
JF 3280 SCFLG(N8)=N1:WET=N0:TEXT$="Uif!nbud
   ift!bsf!opx!dpngpsubcmz!esz/":GOTO 3270
AC 3290 TEXT$="Zpv!dbo(u!ep!uibu="
NR 3300 IF ABS(ITEMLOC(Y))<>ROOMLOC AND ITE
   MLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THEN T
   EXT$="Zpv!dbo(u!tff!uibu!ifsf="
LH 3310 IF Y=21 AND ITEMLOC(Y)=-N1 AND ROOM
   LOC=N13 AND COVRD THEN TEXT$="Zpv!ibwf!
   bmsfbez!epof!uibu="
IQ 3320 IF Y=21 AND ITEMLOC(Y)=-N1 AND ROOM
   LOC=N13 AND  NOT COVRD THEN COVRD=1:TEX
   T$="Uif!tublf!jt!dpwfsfe!xjui!ubs/"
EF 3330 GOSUB 120:TURN=TURN+N1:GOTO 670
ZP 3340 TEXT$="Zpv!dbo(u!ep!uibu="
FA 3350 IF ROOMLOC=N19 AND  NOT SCFLG(N5) T
   HEN TEXT$="Uif!cjse-!qspufdujoh!jut!oft
   u-!esjwft!zpv!bxbz="
OJ 3360 IF ABS(ITEMLOC(Y))<>ROOMLOC AND ITE
   MLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THEN T
   EXT$="Zpv!dbo(u!tff!uibu!ifsf="
MR 3370 IF Y=N15 AND ITEMLOC(Y)=-N4 AND OP3
   THEN TEXT$="Zpv!ibwf!bmsfbez!epof!uibu="
AN 3380 IF Y=N15 AND ITEMLOC(Y)=-N1 AND OP3
   AND ITEMLOC(N19)=-N1 THEN IN5=N1:ITEMLO
   C(Y)=-N4:TEXT$="Plbz/":GOTO 3420
MM 3390 IF Y=N15 AND ITEMLOC(Y)=-N1 AND ITE
   MLOC(N19)=-N1 AND  NOT OP3 AND SCFLG(N5)
   THEN TEXT$="Uif!qbofm!jt!dmptfe/"
JX 3400 IF SCFLG(N5) AND ROOMLOC=N19 AND (IT
   EMLOC(Y)=-N1 OR ITEMLOC(Y)=-N2) THEN IT
   EMLOC(Y)=-N3:GOTO 3420
EB 3410 GOSUB 120:TURN=TURN+N1:GOTO 670
QW 3420 TEXT$="Plbz/":FOR X=N1 TO N6:IF INV
   (X)=Y THEN INV(X)=N0:GOTO 3410
UG 3430 NEXT X:GOTO 3410
ZR 3440 TEXT$="Zpv!dbo(u!ep!uibu="
OI 3450 IF ABS(ITEMLOC(Y))<>ROOMLOC AND ITE
   MLOC(Y)<>-N1 AND ITEMLOC(Y)<>-N2 THEN T
   EXT$="Zpv!dbo(u!tff!uibu!ifsf="
LS 3460 IF Y=28 AND ROOMLOC=N17 THEN TEXT$=
   "Op!nbuufs!xibu!zpv!ep-!uif!gjsf!!!!!!s
   fgvtft!up!cf!fyujohvjtfe/"
JH 3470 IF Y=N1 AND LIT THEN LIT=N0:TEXT$="
   Zpv!tovgg!pvu!uif!nbudi/"
WU 3480 IF Y=29 AND ITEMLOC(Y)=-N1 THEN ITE
   MLOC(Y)=N0:ITEMLOC(21)=-N1:TEXT$="Plbz/"
JE 3490 FOR X=N1 TO N6:IF INV(X)=Y THEN INV
   (X)=21:GOTO 3510
LK 3500 NEXT X
ED 3510 GOSUB 120:TURN=TURN+N1:GOTO 670
UV 3520 TEXT$="Zpv!dbo(u!sjef!po!uibu="
FW 3530 IF ITEMLOC(Y)<>ROOMLOC AND ITEMLOC(
   Y)<>-N1 AND ITEMLOC(Y)<>-N2 THEN TEXT$=
   "Zpv!dbo(u!tff!uibu!ifsf="
YW 3540 IF Y=20 AND ITEMLOC(Y)=-ROOMLOC THEN
    3900
EP 3550 GOSUB 120:TURN=TURN+N1:GOTO 670
YJ 3560 ? :? "You have:"
YL 3570 INV=N0:FOR X=N1 TO NN:IF ITEMLOC(X)<
   >-N1 AND ITEMLOC(X)<>-N2 THEN NEXT X:GOT
   O 3610
HI 3580 TEXT$=ITEM$(X*5Z-5Z+N1,X*5Z):GOSUB 1
   10
XU 3590 IF ITEMLOC(X)=-N2 THEN TEXT$(N13)="
   (being worn)"
FN 3600 ? "  ";TEXT$:INV=N1:NEXT X
IH 3610 IF  NOT INV THEN ? "Nothing."
OO 3620 TURN=TURN+N1:GOTO 670
VS 3630 TEXT$="Zpv!ibwf!tvqsjtfe!b!usjcf!pg
   !tbwbhft/!Uifz!cfhjo!up!dibshf!upxbse!z
   pv-!cvu!!po!tffjoh!uif!xijuf!tiffu"
LN 3640 TEXT$(102)="!zpv!bsf!!!!!xfbsjoh-!uif
   z!uijol!zpv!bsf!b!hiptu-!!boe!gmff!joup
   !uif!csvti/"
KH 3650 GOSUB 120:SCORE=SCORE+N10:SCFLG(N1)=
   N1
BF 3660 RETURN
GB 3670 IF ROOMLOC=N17 AND  NOT SCFLG(N1) T
   HEN FLL$="D:ROOM.13A":KILLFLG=1:GOTO 37
   90
AN 3680 FLL$(N8)=STR$(ROOMLOC-N4)
JL 3690 IF ROOMLOC=31 AND  NOT SCFLG(N4) AN
   D ITEMLOC(N16)=-N2 THEN FLL$(N10)="B"
BL 3700 IF (ROOMLOC>30 AND ROOMLOC<>34 AND I
   TEMLOC(N16)<>-N2) OR (ROOMLOC=N14 AND S
   CFLG(N3)) THEN FLL$(N10)="A"
KC 3710 IF ROOMLOC=N19 AND SCFLG(N5) THEN F
   LL$(N10)="A"
SA 3720 IF ROOMLOC=30 AND ITEMLOC(29)=-N1 T
   HEN FLL$(N10)="A"
FN 3730 IF ROOMLOC=37 THEN FLL$(N10)=" "
ON 3740 IF ROOMLOC=30 AND ITEMLOC(29)<>-N
```

```
   1 THEN ITEMLOC(22)=N0
LT 3750 IF ROOMLOC=30 AND ITEMLOC(29)=-N1
    AND  NOT SCFLG(N7) THEN SCFLG(N7)=N1:
   SCORE=SCORE+N10:FLL$(N10)="A"
WM 3760 IF ROOMLOC=30 AND ITEMLOC(29)=-N1
    THEN ITEMLOC(22)=-ROOMLOC
HU 3770 IF INP$="LOOK" OR INP$="L" THEN 3
   790
AT 3780 IF BRIEF THEN 3810
ZQ 3790 OPEN #N1,N4,N0,FLL$
VN 3800 INPUT #N1;TEXT$:GOSUB 120:CLOSE #
   N1
AU 3810 RETURN
TN 3820 IF SCORE=100 THEN TEXT$="Nbtufs!B
   ewfouvsfs/"
YI 3830 IF SCORE<100 THEN TEXT$="Bewbodfe
   !Bewfouvsfs/"
BO 3840 IF SCORE<70 THEN TEXT$="Joufsnfej
   buf!Bewfouvsfs/"
JE 3850 IF SCORE<40 THEN TEXT$="Cfhjoojoh
   !Bewfouvsfs/"
EZ 3860 IF SCORE<20 THEN TEXT$="Opwjdf!Be
   wfouvsfs/"
VF 3870 ? :? "You have ";SCORE;" points o
   ut of a possible":? "100, in ";TURN;"
   turns, which gives you"
WU 3880 GOSUB 110
IX 3890 ? "the rank of ";TEXT$:RETURN
KV 3900 TEXT$="Xjui!b!tvshf!pg!besfobmjo!
   boe!b!!!!!!!gsjhiufojoh!zfmm-!zpv!hsbc
   !uif!mpoh!!!wjof!boe!txjoh!up!b"
CG 3910 TEXT$(96)="!ofbscz!usff/"
ZD 3920 IF ROOMLOC=N9 THEN ROOMLOC=N10:GO
   TO 3940
KM 3930 IF ROOMLOC=N10 THEN ROOMLOC=N9
PH 3940 IF  NOT SCFLG(N6) THEN SCFLG(N6)=
   N1:SCORE=SCORE+N10
PL 3950 ITEMLOC(N20)=-ROOMLOC:GOSUB 120:G
   OTO 610
IM 3960 GOSUB 110:X=PEEK(84):Y=PEEK(85):P
   OKE 752,N1:POKE 88,206:POKE 89,N6
LI 3970 POSITION N2,N0:? "
                         "
PL 3980 POSITION N2,N0:? TEXT$:POSITION 2
   4,N0:? "Score: ";SCORE;"/";TURN;:POKE
   84,X:POKE 85,X:POKE 752,N0
FA 3990 POKE 88,SCRL:POKE 89,SCRH:RETURN
QX 4000 ? :? "       *** You are dead! **
   *"
CP 4010 GOSUB 3820
TT 4020 ? :? "----------------------------
   ----------"
WJ 4030 ? "Would you like to restart, res
   tore,   or quit";:INPUT INP$
RN 4040 IF INP$="RESTART" THEN 100
NX 4050 IF INP$="RESTORE" THEN KILLFLG=N0
   :GOTO 4350
XZ 4060 IF INP$="QUIT" THEN 4240
QG 4070 GOTO 4030
HJ 4080 ? :? "The current finally takes i
   ts toll on you."
OZ 4090 GOTO 4000
```


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```
AN 4100 TEXT$="Zpv!ublf!b!effq!csfbui-!bo
   e!ejwf!!!!!!voefsxbufs///":GOSUB 120
PF 4110 IF ITEMLOC(N1)=-N1 THEN WET=N1
AK 4120 RETURN
GC 4130 IF LIT THEN LIT=N0:TEXT$="Zpvs!nb
   udi!ibt!cffo!fyujohvjtife/":CNTR=N0:GO
   SUB 120
IK 4140 IF ITEMLOC(29)=-N1 THEN ITEMLOC(2
   9)=N0:ITEMLOC(21)=-N1:TEXT$="Zpvs!upsd
   i!ibt!cffo!fyujohvjtife/"
MA 4150 FOR X=N1 TO N6:IF INV(X)=29 THEN
   INV(X)=21:GOSUB 120:RETURN
ND 4160 NEXT X:RETURN
YG 4170 IF INP$()"N" AND INP$()"S" AND IN
   P$()"E" AND INP$()"W" AND INP$()"D" AN
   D INP$()"U" AND INP$()"NE" THEN 4190
PW 4180 GOTO 4200
PV 4190 IF INP$()"SW" AND INP$()"SE" AND
   INP$()"NW" THEN TEXT$="J!epo(u!voefstu
   boe!uibu!dpnnboe/":GOSUB 120:GOTO 670
AG 4200 RETURN
NF 4210 TEXT$="Zpv!ibwf!tvddffefe!jo!tjho
   bmmjoh!b!!!!tijq!pggtipsf/!Ju!tfoet!b!
   mjgfcpbu!gpszpv/":GOSUB 120
KT 4220 ? :? "******* You have been rescu
   ed! *******"
XE 4230 SCORE=SCORE+N10:GOSUB 3820
FK 4240 ? :? "--- end of session ---":GOS
   UB 150
SC 4250 GOTO 4250
IQ 4260 ? :? "Saving Game..."
RX 4270 OPEN #1,8,0,"D:CASTAWAY.DAT"
HQ 4280 TEXT$=","
AV 4290 ? #1;ROOMLOC;TEXT$;OP1;TEXT$;OP3;
   TEXT$;UNL1;TEXT$;COVRD;TEXT$;WET;TEXT$
   ;LIT;TEXT$;SCORE;TEXT$;TURN;TEXT$;
ST 4300 ? #1;BRIEF;TEXT$;CNTR;TEXT$;IN5;T
   EXT$;OP2
ZI 4310 FOR X=N1 TO NN-N1:PRINT #N1;ITEML
   OC(X):NEXT X
BK 4320 FOR X=N1 TO N6:? #N1;INV(X):NEXT
   X
HE 4330 FOR X=N1 TO N10:? #N1;SCFLG(X):NE
   XT X
CB 4340 CLOSE #1:? CHR$(125):? :? "Save C
   omplete.":GOTO 620
IJ 4350 ? :? "Restoring Saved Game..."
PS 4360 OPEN #1,4,0,"D:CASTAWAY.DAT"
TB 4370 INPUT #N1,ROOMLOC,OP1,OP3,UNL1,CO
   VRD,WET,LIT,SCORE,TURN,BRIEF,CNTR,IN5,
   OP2
GE 4380 FOR X=N1 TO NN-N1:INPUT #N1,Y:ITE
   MLOC(X)=Y:NEXT X
SL 4390 FOR X=N1 TO N6:INPUT #N1,Y:INV(X)
   =Y:NEXT X
KM 4400 FOR X=N1 TO N10:INPUT #N1,Y:SCFLG
   (X)=Y:NEXT X
VN 4410 CLOSE #1:? CHR$(125):? :? "Restor
   e Complete.":KILLFLG=N0:GOTO 620
LW 4420 IF PEEK(195)=170 THEN ? CHR$(253)
   :? "You don't have a save file on this
       disk."
WN 4425 IF PEEK(195)=167 THEN ? CHR$(253)
   :? "Locked File!"
BT 4430 IF PEEK(195)=5 THEN ? :? "I don't
    understand that sentence."
SX 4435 IF PEEK(195)=162 THEN ? CHR$(253)
   :? "Disk Full!"
JU 4440 CLOSE #N1:GOTO 710
KX 4450 IF IN5 THEN TEXT$="Tpnf!cbuufsjft
   !ibwf!cffo!jotfsufe!joupuif!usbotnjuuf
   s/":GOTO 4470
GU 4460 TEXT$="Uifsf!jt!opujoh!jotjef!ui
   f!sbejp!!!!!usbotnjuufs/"
EU 4470 GOSUB 120:TURN=TURN+N1:GOTO 670
CX 4480 GOSUB 3820:GOTO 4240
HQ 4490 N0=0:N1=1:N2=2:N3=3:N4=4:N5=5:N6=
   6:N7=7:N8=8:N9=9:N10=10:N11=11:N12=12:
   N13=13:N14=14:N15=15
UP 4500 N16=16:N17=17:N18=18:N19=19:N20=2
   0:NN=N8*N4:NV=N8*N4-N1:SZ=N20:BRIEF=N0
CI 4510 SCRL=PEEK(88):SCRH=PEEK(89)
IB 4520 DIM NOUN$(NN*N3),VERB$(NV*N3),ITE
   M$(NN*SZ),TEXT$(500),INP$(30),VB$(N15)
   ,NN$(N15),LOC$(77),SPC$(35)
RM 4530 DIM CRYPT$(35),ITEMLOC(NN),V(NV),
   INV(N6),FLL$(N15),SCFLG(N10),DL$(37):F
   LL$="D:ROOM."
GG 4540 WET=N1:UNL1=N0:BRTH=N0:TURN=-N1:S
   CORE=N0:LIT=N0:COVRD=N0:CNTR=N0:IN5=N0
   :OP1=N0:OP2=N0:OP3=N0:ROOMLOC=N5
CI 4550 NOUN$="MATBEDSKEDOOSHEKNINEWTREFR
   UPOOTABKEYTANAIRBATGOGNESBIRTRAVINSTAH
   OLPLAROCSHOSWIPANFIRTORSPRDIAGRO"
OP 4560 VERB$="OPECLOLOCUNLWEAREMGETTAKMO
   VPUSFLIDROEXASEALOOTHRLIGCUTSLIREADIGD
   RYHEADIPCOVCOATARINSPUTEXTRID"
JU 4570 ITEM$(N1)=" ":ITEM$(NN*SZ)=" ":IT
   EM$(N2)=ITEM$
TO 4580 GOTO 490
IT 4590 DATA 1,2,3,4,5,6,7,7,8,8,8,9,10,1
   0,10,11,12,13,13,14,15,16,16,17,17,17,
   17,18,18,19,20
BB 4600 DATA 104,104,133,204,104,133,203,
   104,133,206,104,133,205,104,104,133,20
   7,162,0,142,255,6,134,213,232
LA 4610 DATA 160,0,177,203,209,205,208,8,
   200,192,3,208,245,134,212,96,173,255,6
   ,24,105,3,197,207,240
```


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CIRCLE #109 ON READER SERVICE CARD

```
5D 4620 DATA 16,141,255,6,165,205,24,105,
   3,133,205,144,217,230,206,176,213,169,
   0,133,212,96
ZD 4630 DATA 104,104,104,141,255,6,104,13
   3,204,104,133,203,160,0,177,203,201,32
   ,240,8,200,204,255,6,208
RE 4640 DATA 244,160,0,132,212,169,0,133,
   213,96
QI 4650 DATA 216,104,104,133,204,104,133,
   203,104,104,133,205,160,0,177,203,201,
   61,240,11,56,233,1,145,203
RI 4660 DATA 200,196,205,208,240,96,169,3
   3,208,244
WZ 4670 DATA tpnf!nbudift,-1,cfe,-27,tlfm
   fupo,-27,epps,-27,b!cfe!tiffu,27,b!loj
   gf,27,bo!pme!ofxtqbqfs,16,usff,-28
QX 4680 DATA b!qjfdf!pg!gsvju,28,qppm,-13
   ,ubcmf,-18,b!ubsojtife!lfz,18,npvoe,-1
   4,b!xsfdlfe!bjsqmbof,-37
HX 4690 DATA tpnf!cbuufsjft,37,tpnf!hphhm
   ft,37,oftu,-19,cjse,-19,b!sbejp!usbotn
   juufs,-3,wjof,-9
RB 4700 DATA b!xppefo!tublf,34,ipmf,0,b!t
   fu!pg!qmbot,0,spdl,-31,b!svtuz!tipwfm,
   26,bo!pcmpoh!txjudi,-4
EF 4710 DATA b!qbofm,-4,b!cvsojoh!gjsf,-1
   7,b!mjhiufe!upsdi,0,tqsjoh,-11,b!npmez
   !ejbsz,27,hpsvoe,0
SQ 4720 DATA 96,112,112,66,0,0,0,66,0,0,2
   ,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
   ,2,2,65,0,0
```

●

Listing 2.
BASIC listing.

```
CY 10 REM **********************
LV 20 REM *                    *
NQ 30 REM * Room Description *
DZ 40 REM *     Creator        *
LY 50 REM *                    *
DD 60 REM **********************
BE 70 REM
KF 80 DIM TEXT$(256),FLL$(15)
DH 90 ? CHR$(125);? "Creating Room Descri
   ptions...";:POKE 752,1
DF 100 TEXT$="Zpv!bsf!tuboejoh!bmpoh!b!ui
   jo!tusfudi!pg!tboe/!Xbwft!mbq!vq!up!ui
   f!tipsf-!!!dpwfsjoh!zpvs!gffu/!Qbuit!"
MJ 110 TEXT$(103)="fyufoe!bmpohuif!cfbdi!
   up!uif!opsuifbtu!boe!uif!!!!tpvuifbtu-
   !boe!zpv!dbo!tff!uif!fehft!!pg!b!"
SW 120 TEXT$(196)="ebsl!gpsftu!up!uif!fbt
   u/"
CA 130 FLL$="D:ROOM.1":GOSUB 1600
SD 140 TEXT$="Zpv!bsf!tuboejoh!bu!uif!feh
   f!pg!b!ebslgpsftu/!Ju!jt!qpttjcmf!up!f
   oufs!uif!!!gpsftu!up!uif!fbtu-!xijmf"
AD 150 TEXT$(102)="!b!tboez!qbuimfbet!upx
   bse!uif!xftu/"
CY 160 FLL$="D:ROOM.2":GOSUB 1600
GR 170 TEXT$="Zpv!bsf!tpnfxifsf!jo!uif!nj
   etu!pg!b!!!ebsl!gpsftu/!Zpv!tffn!up!cf
   !mptu/!Uif!opjtft!pg!gpsftu!efoj#fot!"
BH 180 TEXT$(103)="sjtf!boe!!!!gbmm!bspvo
   e!zpv/!Tfwfsbm!qbuit!ifbe!!!pgg!jo!ejg
   gfsfou!ejsfdujpot/"
DW 190 FLL$="D:ROOM.3":GOSUB 1600
VI 200 TEXT$="Zpv!bsf!mptu!tpnfxifsf!jo!u
   if!ebsl!!!!gpsftu/!Uif!opjtft!pg!gpsft
   u!efoj#fot!sjtf!boe!gbmm!bspvoe!zpv/"
ZF 210 TEXT$(102)="!Qbuit!mfbe!!pgg!jo!ej
   ggfsfou!ejsfdujpot/!Uifsf!jt!b!usff!xj
   ui!mpx.ibohjoh!csbodift!ifsf!"
PT 220 TEXT$(191)="xijdi!qspwjef!qbttbhf!
   vq!joup!uif!!!!!usff/"
ED 230 FLL$="D:ROOM.4":GOSUB 1600
HU 240 TEXT$="Zpv!bsf!tuboejoh!ofbs!uif!u
   pq!pg!b!!!!ivhf!usff/!Pgg!up!uif!opsui
   -!zpv!tff!bubmm-!mpofmz!npvoubjo/"
JE 250 TEXT$(99)="!Uifsf!jt!b!mpohwjof!if
   sf!joufsxpwfo!xjui!uif!usffupq/Bmtp-!t
   pnf!csbodift!ifsf!qspwjef!b!!!!"
BK 260 TEXT$(191)="qbttbhf!epxo!up!uif!gp
   sftu!gmpps/"
FD 270 FLL$="D:ROOM.5":GOSUB 1600
IC 280 TEXT$="Zpv!bsf!tuboejoh!ofbs!uif!u
   pq!pg!b!!!!ivhf!usff/!Pgg!up!uif!opsui
   -!zpv!tff!bubmm-!mpofmz!npvoubjo/"
JM 290 TEXT$(99)="!Uifsf!jt!b!mpohwjof!if
   sf!joufsxpwfo!xjui!uif!usffupq/Bmtp-!t
   pnf!csbodift!ifsf!qspwjef!b!!!!"
AZ 300 TEXT$(191)="qbttbhf!epxo!up!uif!gp
   sftu!gmpps/"
FK 310 FLL$="D:ROOM.6":GOSUB 1600
NA 320 TEXT$="Up!uif!tpvui-!zpv!tff!uif!n
   bkps!!!!!!!gfbuvsf!pg!uijt!bsfb-!b!tqb
   slmjoh!!!!!obuvsbm!tqsjoh/!B!sbqjemz!"
DZ 330 TEXT$(103)="btdfoejoh!!!qbui!dmjnc
   t!up!uif!opsuixftu/!Uifsf!!!jt!b!mbshf
   !usff!tjuvbufe!ifsf!xjui!!!!"
IU 340 TEXT$(191)="mpx.ibohjoh!csbodift!x
   ijdi!qspwjef!!!!qbttbhf!vq!joup!uif!us
   ff/"
GK 350 FLL$="D:ROOM.7":GOSUB 1600
QA 360 TEXT$="Zpv!bsf!tuboejoh!bmpoh!b!ob
   sspx!tusjq!pg!tboe/!Xbwft!mbq!vq!poup!
   uif!tipsf-!dpwfsjoh!zpvs!gffu/!Uif!"
HN 370 TEXT$(101)="cfbdi!fyufoet!up!uif!o
   psuifbtu!boe!uif!tpvuixftu-!!!boe!zpv!
   dbo!foufs!uif!ebsl!gpsftu!up!!uif!"
JD 380 TEXT$(195)="tpvuifbtu/!Up!uif!opsu
   ifbtu-!zpv!!tff!b!uijo!xjtq!pg!tnplf/"
HK 390 FLL$="D:ROOM.8":GOSUB 1600
LB 400 TEXT$="Zpv!bsf!tuboejoh!ofbs!bo!fo
   psnpvt!qppmxijdi!jt!pwfsgmpxjoh!xjui!b
   !cmbdl-!!!!cvccmjoh!nbtt/!B!cmbdlfofe"
LR 410 TEXT$(103)="!qbui!usbjmtcbdl!up!ui
   f!opsui/"
HP 420 FLL$="D:ROOM.9":GOSUB 1600
XB 430 TEXT$="Zpv!ibwf!ejtdpwfsfe!b!epxo.
   uspeefo!!!!bsfb!pg!uif!gpsftu/!Tjhot!j
   oejdbuf!b!!sfdfou!gpsftu!gjsf/!"
GY 440 TEXT$(97)="Uifsf!jt!b!ivhf!!!ubohm
   f!pg!wjoft!boe!xffet!ifsf/"
MO 450 FLL$="D:ROOM.10":GOSUB 1600
LU 460 TEXT$="Zpv!ibwf!gpvoe!b!epxo.uspee
   fo!bsfb!pg!uif!gpsftu/!B!ubohmf!pg!wjo
   ft!ibt!cffodvu!uispvhi!ifsf!up!sfwfbm"
TC 470 TEXT$(103)="!b!opsuifso!qbttbhf/"
LZ 480 FLL$="D:ROOM.10A":GOSUB 1600
HY 490 TEXT$="Zpv!bsf!tuboejoh!bu!uif!cpu
   upn!pg!b!!!tuffq!ijmm/!B!qbui!cfhjot!i
   fsf!mfbejohvq!uif!ijmm-!boe!b!"
GD 500 TEXT$(96)="tpvuifbtufso!qbui!!usbj
   mt!cbdl!upxbse!uif!tqsjoh/"
NA 510 FLL$="D:ROOM.11":GOSUB 1600
LL 520 TEXT$="Zpv!bsf!tuboejoh!po!uif!fbt
   ufso!fehf!!pg!uif!jtmboe/!Xbwft!mbq!vq
   !bmpoh!uif!tipsf!dpwfsjoh!zpvs!gffu/"
IG 530 TEXT$(102)="!B!qbui!mfbetvq!uif!cf
   bdi!up!uif!opsui!boe!b!!!!!!!opsuixftu
   fso!qbttbhf!mfbet!cbdl!upxbse!"
RB 540 TEXT$(191)="uif!npvoubjo/"
OB 550 FLL$="D:ROOM.12":GOSUB 1600
KZ 560 TEXT$="Zpv!bsf!tuboejoh!jo!uif!njeemf!pg!b!!!eftfsufe-!obujwf!wjmmbhf/!Up!uif!fbtu!jt!b!tnbmm!ivu!boe!b!"
JS 570 TEXT$(98)="cmbdlfofe!qbui!!!mfbet!tpvui/!Uifsf!jt!b!gjsf!ifsf!uibujt!tfoejoh!tnplf!ijhi!joup!uif!bjs/"
PA 580 FLL$="D:ROOM.13":GOSUB 1600
LC 590 TEXT$="Zpv!ibwf!tvqsjtfe!b!usjcf!pg!gjfsdf!!!tbwbhft/!Uifjs!jojujbm!tvqs
```

```
   jtf!xfbsjohpgg!rvjdlmz-!uifz!ljmm!"
QS 600 TEXT$(100)="zpv="
NS 610 FLL$="D:ROOM.13A":GOSUB 1600
RQ 620 TEXT$="Uijt!tnbmm!ipwfm!vtvbmmz!ip
   vtft!uif!!!wjmmbhf(t!dijfgubjo/!Ju!jt!
   ofbsmz!!!!!fnquz-!uif!pomz!opujdfbcmf"
VQ 630 TEXT$(93)="opujdfbcmf!gfbuvsf!!!!c
   fjoh!b!tnbmm!ubcmf!jo!uif!dfoufs!pg!!u
   if!ivu/"
PM 640 FLL$="D:ROOM.14":GOSUB 1600
BQ 650 TEXT$="Zpv!bsf!tuboejoh!bu!uif!upq
   !pg!uif!!!!mpofmz!npvoubjo/!Qbuit!mfbe
   !epxo!uif!!npvoubjo!boe!up!uif!fbtu/"
GG 660 TEXT$(102)="!Tjuujoh!!!!!ofbscz!po
   !upq!pg!bo!jtpmbufe!dsbh!jt!bdsvef!oft
   u/!Uifsf!jt!b!mbshf!cjse!ifsf!"
BV 670 TEXT$(191)="hvbsejoh!uif!oftu/"
QN 680 FLL$="D:ROOM.15":GOSUB 1600
BY 690 TEXT$="Zpv!bsf!tuboejoh!bu!uif!upq
   !pg!uif!!!!mpofmz!npvoubjo/!Qbuit!mfbe
   !epxo!uif!!npvoubjo!boe!up!uif!fbtu/"
HW 700 TEXT$(102)="!Tjuujoh!!!!!ofbscz!po
   !upq!pg!bo!jtpmbufe!dsbh!jt!bdsvef!oft
   u/"
PF 710 FLL$="D:ROOM.15A":GOSUB 1600
ZZ 720 TEXT$="Zpv!bsf!xbmljoh!bmpoh!b!spd
   lz!qbui!!!!ifbejoh!fbtuxbse!bxbz!gspn!
   uif!mpofmz!npvoubjo/!Jo!gspou!pg!"
PI 730 TEXT$(99)="zpv!jt!b!gpslfe!qbui-!x
   jui!pof!qbttbhf!ifbejoh!up!uif!fbtu!bo
   e!uif!puifs!mfbejoh!up!uif!"
NU 740 TEXT$(186)="!!!!!tpvuifbtu/"
RB 750 FLL$="D:ROOM.16":GOSUB 1600
LV 760 TEXT$="Zpv!bsf!tuboejoh!po!uif!fbt
   ufso!fehf!!pg!uif!jtmboe/!Xbwft!mbq!vq
   !bmpoh!uif!tipsf!dpwfsjoh!zpvs!gffu/"
AB 770 TEXT$(102)="!B!qbui!mfbetepxo!uif!
   cfbdi!up!uif!tpvui!boe!b!!!!!xftufso!q
   bui!mfbet!cbdl!upxbse!uif!"
KV 780 TEXT$(188)="!!!npvoubjo/"
SC 790 FLL$="D:ROOM.17":GOSUB 1600
UW 800 TEXT$="Zpv!bsf!tuboejoh!bmpoh!b!ui
   jo!tusfudi!pg!tboe/!Xbwft!mbq!vq!up!ui
   f!tipsf-!!!dpwfsjoh!zpvs!gffu/!Uif!"
M5 810 TEXT$(101)="cfbdi!fyufoet!up!uif!o
   psuixftu!boe!zpv!dbo!tff!uif!!ebsl!gps
   ftu!up!uif!fbtu/!Up!uif!tpvui-b!"
UT 820 TEXT$(193)="tnbmm!dbcjo!ibt!cffo!d
   potusvdufe/"
SK 830 FLL$="D:ROOM.18":GOSUB 1600
RZ 840 TEXT$="Zpv!bsf!tpnfxifsf!jo!uif!nj
   etu!pg!b!!!ebsl!gpsftu/!Zpv!tffn!up!cf
   !mptu/!Uif!opjtft!pg!gpsftu!efoj♣fot"
JI 850 TEXT$(102)="!sjtf!boe!!!!gbmm!bspv
   oe!zpv/!Tfwfsbm!qbuit!ifbe!!!pgg!jo!ej
   ggfsfou!ejsfdujpot/"
TJ 860 FLL$="D:ROOM.19":GOSUB 1600
SF 870 TEXT$="Zpv!bsf!tpnfxifsf!jo!uif!nj
   etu!pg!b!!!ebsl!gpsftu/!Zpv!tffn!up!cf
   !mptu/!Uif!opjtft!pg!gpsftu!efoj♣fot"
JO 880 TEXT$(102)="!sjtf!boe!!!!gbmm!bspv
   oe!zpv/!Tfwfsbm!qbuit!ifbe!!!pgg!jo!ej
   ggfsfou!ejsfdujpot/"
NS 890 FLL$="D:ROOM.20":GOSUB 1600
NQ 900 TEXT$="Zpv!bsf!tuboejoh!xbjtu!effq
   !jo!uif!!!!obuvsbm!tqsjoh/!Uif!xbufst!
   sjqqmf!bmm!bspvoe!zpv!jo!wbsjpvt!"
PO 910 TEXT$(99)="qbuufsot/!Voefs!uif!tvs
   gbdf!pg!uif!xbufs-!zpv!dbo!!!!!efufdu!
   b!ebsl!tibqf/"
NY 920 FLL$="D:ROOM.21":GOSUB 1600
JE 930 TEXT$="Zpv!ibwf!foufsfe!b!mbshf-!v
   oefshspvoe!dbwf/!Evtu!ibt!tfuumfe!ifbw
   jmz!ifsf!btopuijoh!tffnt!up!ibwf!"
GG 940 TEXT$(99)="cffo!ejtuvscfe!!gps!nbo
   z!zfbst/!Zpv!dbo!sffoufs!uif!!!xbufs!u
   p!uif!tpvui/"
OX 950 FLL$="D:ROOM.22":GOSUB 1600
CI 960 TEXT$="Uijt!tnbmm!dbcjo!tffnt!up!i
   bwf!cffo!!!ibtujmz!fsfdufe/!Fwfszuijoh
   !jt!jo!!!!!ejtbssbz/!Uif!pomz!"
JL 970 TEXT$(96)="opubcmf!gfbuvsf!jt!b!tn
   bmm!cfe!xjui!b!tlfmfupo!po!ju/!Uifcfbd
   i!jt!up!uif!opsui-!xijmf!up!uif!"
YY 980 TEXT$(188)="!!!fbtu-!zpv!tff!b!cbd
   l!epps/"
PY 990 FLL$="D:ROOM.23":GOSUB 1600
SQ 1000 TEXT$="Uijt!pvu!pg!uif!xbz!qmbdf!
   fodmptft!b!!cfbvujgvm!hbsefo/!Ubmm!gsv
   ju!usfft!boefypujd!qmbout!bcpvoe/!"
YT 1010 TEXT$(99)="Ofbs!uif!cbdl!pguif!hb
   sefo!jt!b!nbkftujd!usff!epuufe!!xjui!h
   pmefo!gsvju/!Zpv!dbo!tff!uif!!!!"
XQ 1020 TEXT$(191)="ebsl!gpsftu!up!uif!op
   sui!boe!uif!cbdl!epps!jt!pqfo!up!uif!x
   ftu/"
KD 1030 FLL$="D:ROOM.24":GOSUB 1600
DD 1040 TEXT$="B!tbmu!njtu!tqsbzt!poup!zp
   vs!gbdf!bt!!zpv!tuboe!ifsf!bu!uif!fehf
   !pg!uif!tfb/Up!uif!fbtu-!zpv!opujdf!"
BW 1050 TEXT$(101)="b!gpsfcpejoh!!dbwf!ui
   bu!nztufsjpvtmz!dbmmt!up!zpv/!!Zpv!dbo
   !sffoufs!uif!gpsftu!up!uif!"
BA 1060 TEXT$(186)="!!!!!opsui/"
LJ 1070 FLL$="D:ROOM.25":GOSUB 1600
FP 1080 TEXT$="Bt!zpv!foufs!uijt!ebsl!dbw
   f!zpv!bsf!!!ofbsmz!pwfsdpnf!cz!b!gmvuu
   fsjoh!nbtt!!pg!tibqft-!xijdi!tpvoe!"
RK 1090 TEXT$(100)="mjlf!cbut/!Tpnfqpsujp
   ot!pg!uif!dbwf!bsf!jmmvnjobufe!!cz!cfb
   nt!pg!tvomjhiu!tijojoh!uispvhi!!"
FM 1100 TEXT$(191)="volopxo!qffq.ipmft/"
LN 1110 FLL$="D:ROOM.26":GOSUB 1600
AQ 1120 TEXT$="Dbsszjoh!zpvs!upsdi-!zpv!b
   sf!bcmf!up!!tff!bmm!qbsut!pg!uif!dbwf/
   !Spdlt!boe!!efcsjt!bsf!tusfxo!"
VU 1130 TEXT$(95)="fwfszxifsf/!Jo!b!!!!cb
   sfmz!efufdubcmf!dpsofs!pg!uif!dbwfsozp
   v!tff!b!ibmg.ijmmfe!ipmf/"
NO 1140 FLL$="D:ROOM.26A":GOSUB 1600
HA 1150 TEXT$="Zpv!bsf!voefsxbufs!jo!uif!
   obuvsbm!!!!!tqsjoh/!B!Mbshf!spdl!ibt!c
   ffo!npwfe!!!ifsf-!dmfbsjoh!b!"
AD 1160 TEXT$(94)="qbttbhf!epxoxbse/"
MZ 1170 FLL$="D:ROOM.27":GOSUB 1600
DS 1180 TEXT$="Zpv!ibwf!foufsfe!b!xbufsz!
   xpsme!pg!!!!gv♣♣z!tibqft!boe!ejtupsufe
   !ejtubodft/!Tjodf!xbufs!gjmmt!zpvs!"
UK 1190 TEXT$(100)="fzft-!zpv!!!!!!bsfo(u
   !bcmf!up!nblf!pvu!bozuijoh/"
NY 1200 FLL$="D:ROOM.27A":GOSUB 1600
TX 1210 TEXT$="Zpv!bsf!voefsxbufs!jo!uif!
   obuvsbm!!!!!tqsjoh/!Uif!gmpps!pg!uif!t
   qsjoh!jt!!!!sfmbujwfmz!cbsf!fydfqu!"
NV 1220 TEXT$(100)="gps!b!mbshf!!!!spdl!x
   ijdi!tffnt!up!cf!cmpdljoh!tpnf!!tpsu!p
   g!epxoxbse!qbttbhf/"
PC 1230 FLL$="D:ROOM.27B":GOSUB 1600
CP 1240 TEXT$="Zpv!bsf!txjnnjoh!jo!bo!voe
   fshspvoe!!!!tusfbn/!Xbufs!svtift!cz!zp
   v!xjui!b!!!!opjtf!tp!mpve!ju!"
FP 1250 TEXT$(94)="uisfbufot!up!efbgfo!!z
   pv/!Uif!dvssfou!jt!wfsz!tuspoh!boe!!!d
   pvme!dbssz!zpv!jo!bmnptu!boz!"
KW 1260 TEXT$(183)="eftjsfe!ejsfdujpo/!Zp
   v!tfotf!b!ejn!hmpx!gspn!!bcpwf/"
NV 1270 FLL$="D:ROOM.28":GOSUB 1600
DU 1280 TEXT$="Zpv!ibwf!foufsfe!b!xbufsz!
   xpsme!pg!!!!gv♣♣z!tibqft!boe!ejtupsufe
   !ejtubodft/!Tjodf!xbufs!gjmmt!zpvs!"
BO 1290 TEXT$(100)="fzft-!zpv!!!!!!bsfo(u
   !bcmf!up!nblf!pvu!bozuijoh/!"
OU 1300 FLL$="D:ROOM.28A":GOSUB 1600
CI 1310 TEXT$="Zpv!bsf!txjnnjoh!jo!bo!voe
   fshspvoe!!!!tusfbn/!Xbufs!svtift!cz!zp
   v!xjui!b!!!!opjtf!tp!mpve!ju!"
```

```
FI 1320 TEXT$(94)="uisfbufot!up!efbgfo!!z
   pv/!Uif!dvssfou!jt!wfsz!tuspoh!boe!!!d
   pvme!dbssz!zpv!jo!bmnptu!boz!"
KP 1330 TEXT$(183)="eftjsfe!ejsfdujpo/!Zp
   v!tfotf!b!ejn!hmpx!gspn!!bcpwf/"
OI 1340 FLL$="D:ROOM.29":GOSUB 1600
DN 1350 TEXT$="Zpv!ibwf!foufsfe!b!xbufsz!
   xpsme!pg!!!!gv♣♣z!tibqft!boe!ejtupsufe
   !ejtubodft/!Tjodf!xbufs!gjmmt!zpvs!"
BH 1360 TEXT$(100)="fzft-!zpv!!!!!!bsfo(u
   !bcmf!up!nblf!pvu!bozuijoh/!"
QJ 1370 FLL$="D:ROOM.29A":GOSUB 1600
DS 1380 TEXT$="Zpv!ibwf!foufsfe!b!tnbmm!d
   bwf!mpdbufe!gbs!voefshspvoe/!Tmjnf!boe
   !sfgvtf!gspnpwfs!uif!zfbst!ibt!"
ZK 1390 TEXT$(96)="hbuifsfe!ifsf/!Zpv!dbo
   !sffoufs!uif!xbufs!up!uif!fbtu/"
HT 1400 FLL$="D:ROOM.30":GOSUB 1600
CK 1410 TEXT$="Zpv!bsf!txjnnjoh!jo!bo!voe
   fshspvoe!!!!tusfbn/!Xbufs!svtift!cz!zp
   v!xjui!b!!!!opjtf!tp!mpve!ju!"
FK 1420 TEXT$(94)="uisfbufot!up!efbgfo!!z
   pv/!Uif!dvssfou!jt!wfsz!tuspoh!boe!!!d
   pvme!dbssz!zpv!jo!bmnptu!boz!"
KR 1430 TEXT$(183)="eftjsfe!ejsfdujpo/!Zp
   v!tfotf!b!ejn!hmpx!gspn!!bcpwf/"
IZ 1440 FLL$="D:ROOM.31":GOSUB 1600
DP 1450 TEXT$="Zpv!ibwf!foufsfe!b!xbufsz!
   xpsme!pg!!!!gv♣♣z!tibqft!boe!ejtupsufe
   !ejtubodft/!Tjodf!xbufs!gjmmt!zpvs!"
BJ 1460 TEXT$(100)="fzft-!zpv!!!!!!bsfo(u
   !bcmf!up!nblf!pvu!bozuijoh/!"
LA 1470 FLL$="D:ROOM.31A":GOSUB 1600
DF 1480 TEXT$="Zpv!bsf!txjnnjoh!jo!bo!voe
   fshspvoe!!!!tusfbn/!Xbufs!svtift!cz!zp
   v!xjui!b!!!!opjtf!tp!mpve!ju!"
GF 1490 TEXT$(94)="uisfbufot!up!efbgfo!!z
   pv/!Uif!dvssfou!jt!wfsz!tuspoh!boe!!!d
   pvme!dbssz!zpv!jo!bmnptu!boz!"
QY 1500 TEXT$(183)="eftjsfe!ejsfdujpo/"
JM 1510 FLL$="D:ROOM.32":GOSUB 1600
DI 1520 TEXT$="Zpv!ibwf!foufsfe!b!xbufsz!
   xpsme!pg!!!!gv♣♣z!tibqft!boe!ejtupsufe
   !ejtubodft/!Tjodf!xbufs!gjmmt!zpvs!"
BC 1530 TEXT$(100)="fzft-!zpv!!!!!!bsfo(u
   !bcmf!up!nblf!pvu!bozuijoh/!"
LN 1540 FLL$="D:ROOM.32A":GOSUB 1600
KI 1550 TEXT$="Zpv!ibwf!dpnf!bdsptt!bo!jn
   nfotf!bsfb!!pg!tdpsdife!fbsui/!Uif!hsp
   voe!jt!!!!!!efwpje!pg!qmbou!mjgf!gps!"
SS 1560 TEXT$(102)="tfwfsbm!zbsetjo!fwfsz
   !ejsfdujpo/!Uifsf!jt!uif!tifmmpg!b!xsf
   dlfe!bjsqmbof!ifsf/!B!qbui!!!!mfbet!"
NF 1570 TEXT$(197)="cbdl!up!uif!tpvui/"
LB 1580 FLL$="D:ROOM.33":GOSUB 1600
CB 1590 ? :? CHR$(253):? "Finished!":POKE
    752,0:END
KY 1600 POSITION 2,3:? FLL$(3);" ";:OPEN
   #1,8,0,FLL$:PRINT #1;TEXT$:CLOSE #1:RE
   TURN
```

●

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M/L Editor

For use in machine language entry.

by Clayton Walnum

M/L Editor provides an easy method to enter our machine language listings. It won't allow you to skip lines or enter bad data. For convenience, you may enter listings in multiple sittings. When you're through typing a listing with **M/L Editor**, you'll have a complete, runnable object file on your disk.

There is one hitch: it's for disk users only. My apologies to those with cassette systems.

Listing 1 is **M/L Editor**'s BASIC listing. Type it in and, when it's free of typos, save a copy to disk, then run it.

On a first run, you'll be asked if you're starting a new listing or continuing from a previously saved point. Press *S* to start, or *C* to continue.

You'll then be asked for a filename. If you're starting a new listing, type in the filename you want to save the program under, then press RETURN. If there's already a file by that name on the disk, you'll be asked if you wish to delete it. Press *Y* to delete the file, or *N* to enter a new filename.

If you're continuing a file, type in the name you gave the file when you started it. If the program can't find the file, you'll get an error message and be prompted for another filename. Otherwise, **M/L Editor** will calculate where you left off, then go on to the data entry screen.

Each machine language program in **ANALOG Computing** is represented by a list of BASIC data statements. Every line contains 16 bytes, plus a checksum. Only the numbers following the word *DATA* need be considered.

M/L Editor will display, at the top of the screen, the number of the line you're currently working on. As you go through the line, you'll be prompted for each entry. Simply type the number and press RETURN. If you press RETURN without a number, the default is the last value entered.

This feature provides a quick way to type in lines with repetitions of the same number. As an added convenience, the editor will not respond to the letter keys (except *Q*, for "quit"). You must either enter a number or press RETURN.

When you finish a line, **M/L Editor** will compare the entries' checksum with the magazine's checksum. If they match, the screen will clear, and you may go on to the next line.

If the checksums *don't* match, you'll hear a buzzing sound. The screen will turn red, and the cursor will be placed back at the first byte of data. Compare the magazine listing byte by byte with your entries. If a number's correct, press RETURN.

If you find an error, make the correction. When all data's valid, the screen will return to grey, and you'll be allowed to begin the next line.

Make sure you leave your disk in the drive while typing. The data is saved continuously.

You may stop at any time (except when you have a red screen) by entering the letter *Q* for byte #1. The file will be closed, and the program will return you to BASIC. When you've completed a file, exit **M/L Editor** in the same way.

When you've finished typing a program, the file you've created will be ready to run. In most cases, it should be loaded from DOS via the L option. Some programs may have special loading instructions; be sure to check the program's article.

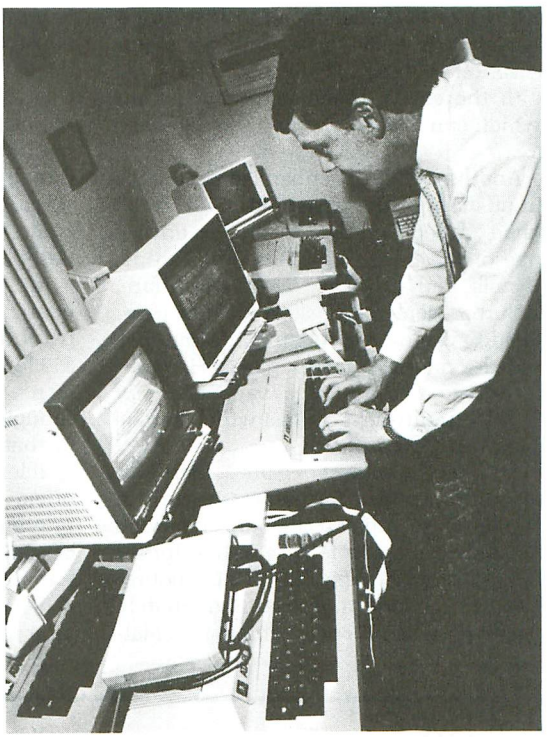
If you want the program to run automatically when you boot the disk, simply name the file AUTORUN.SYS (make sure you have DOS on the disk).

That's **M/L Editor**. Use it in good health.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the "BASIC Editor II," in issue 47.

Listing 1.
BASIC listing.

```
AZ 10 DIM BF(16),N$(4),A$(1),B$(1),F$(15)
   ,F1$(15)
LF 11 DIM MOD$(4)
BN 20 LINE=1000:RETRN=155:BACKSP=126:CHK5
   UM=0:EDIT=0
GO 30 GOSUB 450:POSITION 10,6:? "Start or
    Continue? ";:GOSUB 500:? CHR$(A)
ZG 40 POSITION 10,8:? "FILENAME";:INPUT F
   $:POKE 752,1:? " "
FE 50 IF LEN(F$)<3 THEN POSITION 20,10:?
   "  ":GOTO 40
NF 60 IF F$(1,2)<>"D:" THEN F1$="D:":F1$(
   3)=F$:GOTO 80
KL 70 F1$=F$
TN 80 IF CHR$(A)="S" THEN 120
FD 90 TRAP 430:OPEN #2,4,0,F1$:TRAP 110
HQ 100 FOR X=1 TO 16:GET #2,A:NEXT X:LINE
   =LINE+10:GOTO 100
WM 110 CLOSE #2:OPEN #2,9,0,F1$:GOTO 170
VT 120 TRAP 160:OPEN #2,4,0,F1$:GOSUB 440
   :POSITION 10,10:? "FILE ALREADY EXISTS
   !!";:POKE 752,0
ZU 130 POSITION 10,12:? "ERASE IT? ";:GOS
   UB 500:POKE 752,1:? CHR$(A)
VH 140 IF CHR$(A)="N" OR CHR$(A)="n" THEN
    CLOSE #2:GOTO 30
QG 150 IF CHR$(A)<>"Y" AND CHR$(A)<>"y" T
   HEN 130
BH 160 CLOSE #2:OPEN #2,8,0,F1$
IE 170 GOSUB 450:POSITION 10,1:? "NOW ON
   LINE: ";LINE:CHK5UM=0
GH 180 L1=3:FOR X=1 TO 16:POSITION 13*(X(
   10)+12*(X)9),X+2:POKE 752,0:? "BYTE #"
   ;X;": ";:GOSUB 310
KH 190 IF EDIT AND L=0 THEN BYTE=BF(X):GO
   TO 210
FY 200 BYTE=VAL(N$)
OZ 201 MOD$=N$
BU 210 POSITION 22,X+2:? BYTE;"  "
YZ 220 BF(X)=BYTE:CHK5UM=CHK5UM+BYTE*X:IF
    CHK5UM>9999 THEN CHK5UM=CHK5UM-10000
MS 230 NEXT X:CHK5UM=CHK5UM+LINE:IF CHK5U
   M>9999 THEN CHK5UM=CHK5UM-10000
IG 240 POSITION 12,X+2:POKE 752,0:? "CHEC
   K5UM: ";:L1=4:GOSUB 310
EW 250 IF EDIT AND L=0 THEN 270
QM 260 C=VAL(N$)
SY 270 POSITION 22,X+2:? C;"   "
IL 280 IF C=CHK5UM THEN 300
DI 290 GOSUB 440:EDIT=1:CHK5UM=0:GOTO 180
LW 300 FOR X=1 TO 16:PUT #2,BF(X):NEXT X:
   LINE=LINE+10:EDIT=0:GOTO 170
FV 310 L=0
KZ 320 GOSUB 500:IF (A=ASC("Q") OR A=ASC(
   "q")) AND X=1 AND  NOT EDIT THEN 420
PO 330 IF A<>RETRN AND A<>BACKSP AND (A(4
   8 OR A)57) THEN 320
DX 331 IF A=RETRN AND N$="" THEN N$=MOD$
TD 335 IF A=RETRN AND L=0 AND X>1 THEN 35
   0
JR 340 IF ((A=RETRN AND  NOT EDIT) OR A=B
   ACKSP) AND L=0 THEN 320
DW 350 IF A=RETRN THEN POKE 752,1:? " ":R
   ETURN
GG 360 IF A<>BACKSP THEN 400
5A 370 IF L>1 THEN N$=N$(1,L-1):GOTO 390
A5 380 N$=""
RE 390 ? CHR$(BACKSP);:L=L-1:GOTO 320
BB 400 L=L+1:IF L>L1 THEN A=RETRN:GOTO 35
   0
WX 410 N$(L)=CHR$(A):? CHR$(A);:GOTO 320
KN 420 GRAPHICS 0:END
YT 430 GOSUB 440:POSITION 10,10:? "NO SUC
   H FILE!":FOR X=1 TO 1000:NEXT X:CLOSE
   #2:GOTO 30
FD 440 POKE 710,48:SOUND 0,100,12,8:FOR X
   =1 TO 50:NEXT X:SOUND 0,0,0,0:RETURN
MY 450 GRAPHICS 23:POKE 16,112:POKE 53774
   ,112:POKE 559,0:POKE 710,4
XR 460 DL=PEEK(560)+256*PEEK(561)+4:POKE
   DL-1,70:POKE DL+2,6
HW 470 FOR X=3 TO 39 STEP 2:POKE DL+X,2:N
   EXT X:FOR X=4 TO 40 STEP 2:POKE DL+X,0
   :NEXT X
ZW 480 POKE DL+41,65:POKE DL+42,PEEK(560)
   :POKE DL+43,PEEK(561):POKE 87,0
AC 490 POSITION 2,0:? "analog ml editor":
   POKE 559,34:RETURN
WZ 500 OPEN #1,4,0,"K:":GET #1,A:CLOSE #1
   :RETURN
```



A look at Computalk

An above-average Texas bulletin board.

by Andy Eddy

In this day and age, personal computer telecommunications is a popular item, be it on free local bulletin boards (BBSs) or the potentially expensive on-line services like GEnie and Delphi. With prices dropping on equipment such as modems, software and, especially, the computers themselves, plus increasing choices, many are catching "terminal fever." Since it's simple for someone to put together an inexpensive setup, many are doing it: getting additional phone lines in their homes to run inexpensive, bare-bones BBSs of their own making.

Every once in a while, you'll come across a BBS that displays an especially strong labor of love for sharing the telecommunications bug with other users. And there's no doubt that Kris Meier's Computalk in Fort Worth, Texas, fits that bill.

There are other ways his board stands out, both in innovation and the sheer quantity of available features, making it one of the more interesting independently run boards in the country.

The 25-year-old Meier is ambitious in his endeavors. He's taken an AMIS (Atari Message Information System) public domain BBS program and reworked it (he's currently at version 6.0) to fit all the data and menus that make up the system, as well as all the features necessary to allow six users on-line simultaneously. A look at Meier's equipment list will bring back memories of the pre-Delphi, **ANALOG Computing** TCS board: 1 CORVUS 20-meg hard drive; 1 CORVUS multiplexor; 6 Atari 800 computers (48K); 6 Atari 850 interfaces; 1 Atari 1050 disk drive; 6 DAK 300/1200 modems; 1 ProWriter printer; 2 green monitors; and 1 color monitor.

The main attraction is, of course, what you have at your fingertips when you call Computalk. Claiming he "can't stand stagnation," Meier has packed the board with much variety; in fact, he's persistent in his ongoing quest for something new and fresh.

Some of the things which Computalk has on-line include: religion forum; games; electronic mail; libraries for downloading ST and 8-bit software; surveys; computer news and other information; thorough help screens for each section; an on-line newsletter, "Compu-Gabber"; and free file uploading.

The features follow along the lines of most standard BBSs, but there are some other niceties that are more innovative. Altogether, they help make Computalk a hybrid; something akin to crossbreeding a BBS and an on-line network. Intercom mode is an example of one such function, letting users pass private, one-line messages amongst themselves in real time, much like the SEND command on Delphi, or GEnie's NOTIFY.

In the same vein, Compu-Gab is Computalk's answer to the major on-line networks' conferencing mode. Perhaps the biggest draw to most telecommunications services, conferencing permits a number of users to gather for simultaneous discussion of the latest events, to ask and answer questions, or just to chat. Compu-Gab is no different; in it, you can converse with any or all of the five other users in real time. It's a nice touch, as, normally, things like this don't appear on BBSs.

Atari's Darryl May, a customer support representative, stops by once a week to field user queries. Meier hopes that May will be writing a column on Atari happenings for the board.

Easily one of the most refreshing and reassuring aspects for 8-bit users is that Computalk caters to their precious machines throughout the board. As noted in the equipment list above, the board is run entirely on 800s, and has enhanced graphic displays for those who log on in ATASCII mode (though any computer can access the system and run through it in

ASCII mode). Meier plans to institute a flag of sorts to tell users when a menu selection is ATASCII only, as is the case with the entry screen following log-on (which can be viewed from the database area).

Another ATASCII-enhanced product is an offshoot of the perennial "Star Trek" game. Called Computrek, it takes advantage of the 8-bit's graphics, with ships, planets and other extraterrestrial fare, each represented by its own display icon. To add even more excitement, Meier has added a *multi-user* Trek game. He compares it to a "mini Mega-wars," the very popular, multi-user contest which can be found on CompuServe.

And, on the subject of games, there's an adventure section for gamers to traipse through in search of challenging contests. The only annoying feature is that for all games except Computrek, you cannot re-enter the board and are immediately logged off when it's over. This is especially bothersome if you're experiencing line noise, which could alter your intended responses to game questions and bring up a less-than-timely demise to your session. Meier told me he was working on clearing up this problem, though it was intentionally implemented to discourage rapid solving of the easier games. To wit: you'll soon be able to exit from most games in mid-play, slipping back to the main board.

Meier does charge for access to the board, to cover his costs (phone and electric bills, for example), though it's only $15 for a 6-month stint. Out-of-staters also face a toll call for accessing the system, though there's a way to limit the impact of that, as well.

Telenet, the packet switching network, offers a service called PC Pursuit, that provides telecomputing nuts local call access to twenty-five major cities across the nation for as little as $25 per month. With a PC Pursuit subscription, you can call your local Telenet number, input your ID and password, and have free rein over their public data network, to tie in with other computers and BBSs in any of the areas. It's an inexpensive method for keeping in touch with other computerphiles in major cities.

Computalk is accessible through PC Pursuit in the Dallas node (under area code 214), and, other than the subscription charges for these two services, the only fee you'll face is if the nearest Telenet node is a toll call. Otherwise, your call to Computalk is treated as a local call. For more information on PC Pursuit, call Telenet at 1-800-TELENET (voice) or 1-800-835-3001 (modem).

To access Computalk, you can dial direct to 1-817-589-2588 in either 300- or 1200-baud, and follow the prompts. If you type *NEW* at the ID prompt, you'll be allowed a 15-minute sample of the system, and can subscribe by credit card (MasterCard or Visa). Meier will answer questions on his voice line at 1-817-595-0094.

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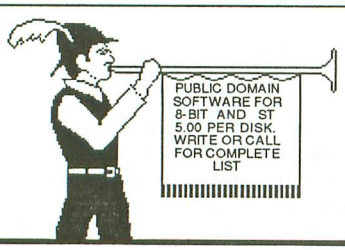

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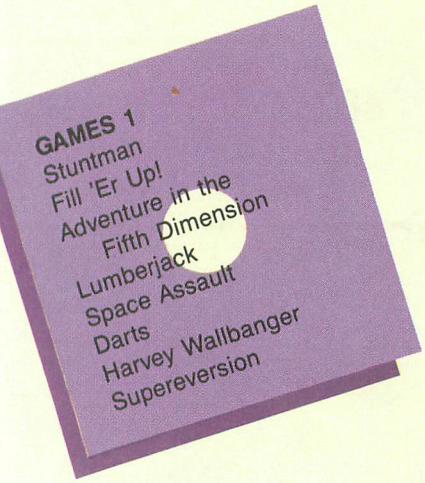

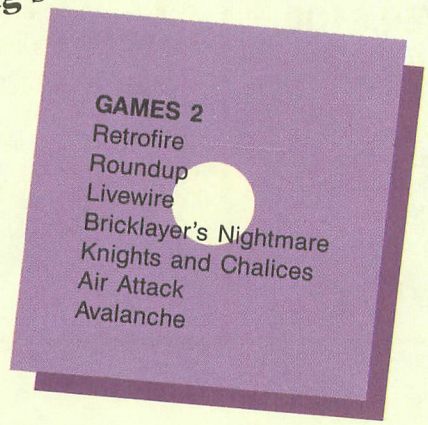

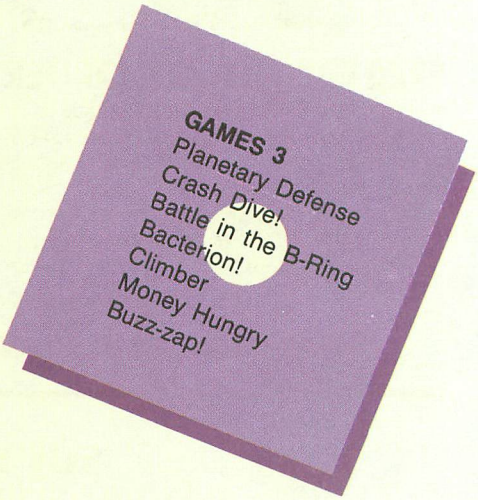

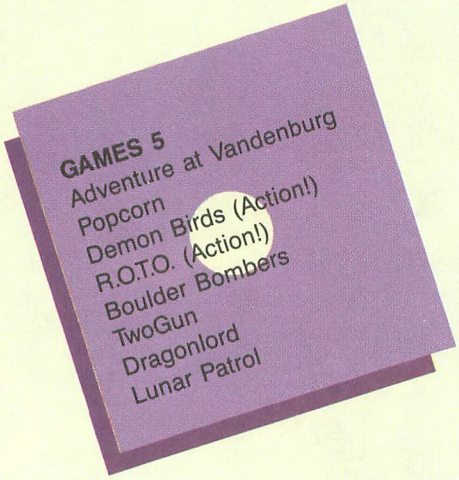

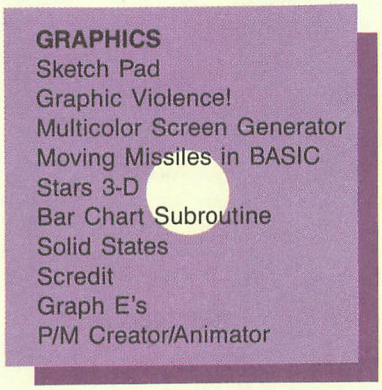

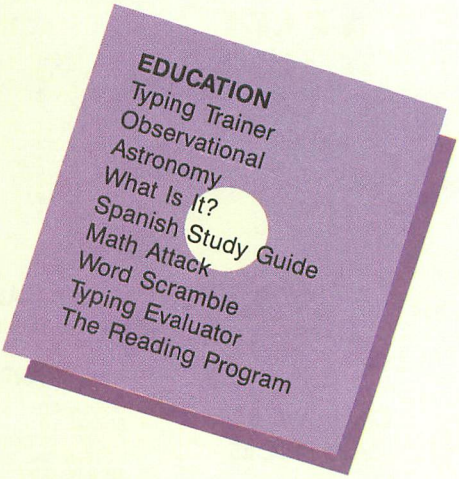

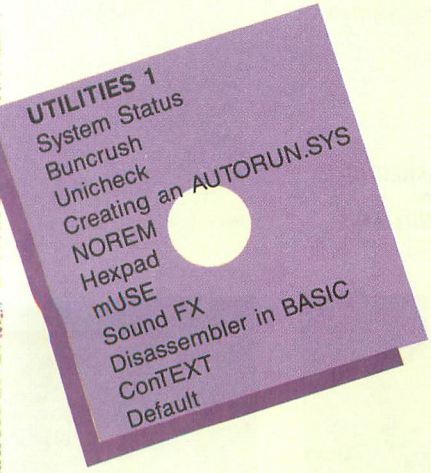

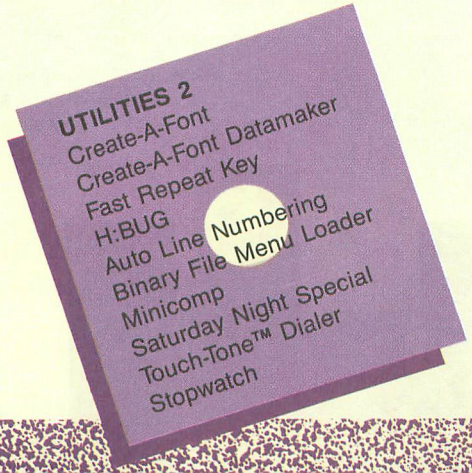

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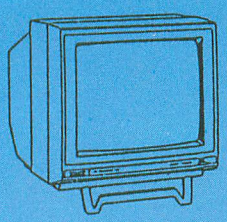

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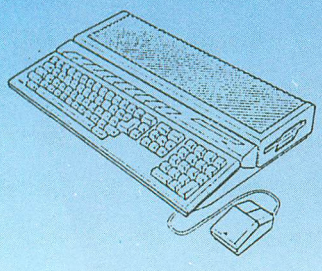

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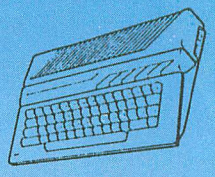

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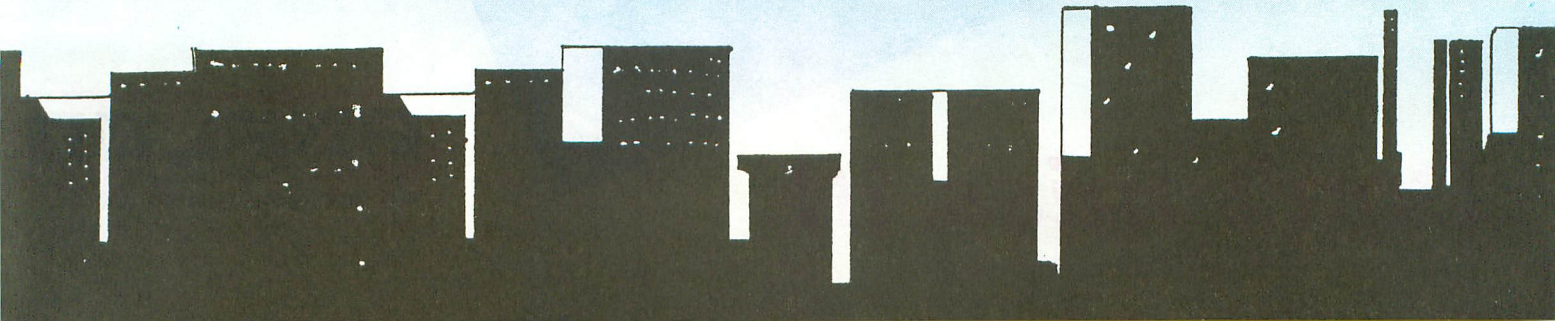

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by Blake Arnold

The Forem bulletin board system program for Atari 8-bits has been out for a few years now, and again Matthew Singer has remained ahead of the pack with one of the first Atari ST bulletin board programs. It wouldn't be fair to compare the ST version to the 8-bit version; the ST version is much more powerful and flexible (as it should be). **Forem ST** contains so many commands not in the 8-bit version that it's barely recognizable as the same BBS software.

The **Forem ST** BBS program requires at least two disk drives, either two floppy drives, or a floppy drive and a hard disk drive. It will recognize a RAMdisk as the second system drive, but, to me, it's more trouble than it's worth to configure the board that way. However, configuring the RAMdisk as a third or greater drive presents no real problems. (In fact, using a RAMdisk for the system text files, menu files, etc., will save you some wear on your drives, and also speed things up a little.)

Forem ST comes on two single-sided disks (with ST-Term on one of them, which I'll explain later), and consists of about 600K worth of files. The actual BBS program is about 200K long; the rest of that space is taken up by **Forem**'s related system files. The disks are also unprotected, as any application/utility program should be.

The program will run in medium or high resolution, but you must specify which when configuring your system. There's a reason for this: if you're using a color monitor, **Forem ST** lets you set your background and text colors, then saves that information into one of its configuration files (there's no need for the control panel).

Other than needing two drives, the program has no special requirements, but I'd recommend a hard drive if you plan to have a bulletin board system of any appreciable size. As for modems, any Hayes-compatible modem will work (all the way up to and including 9600 baud).

The documentation consists of a 100-plus page booklet that explains all the setup procedures and program options in full, as well as how to maintain the BBS (userlog maintenance, etc.). If you read the book before trying to set up your system, you shouldn't have any problems (at least none that can't be solved by referring to the manual).

When I first opened the book, I was impressed by the amount of control available to the SYSOP. It's possible to limit just about anything a user can do, if that's necessary. Surprisingly, this power doesn't make **Forem ST** overly complex for either the SYSOP or the users. (It does take a little getting used to, though.)

Forem ST's userlog is capable of containing up to 2000 users. In case you think that's not quite enough, pull out your telephone directory and count seven pages; that's what 2000 names look like in print. The userlog itself contains the information on each user, and, with the userlog editor (which is built in, as is the message base editor), it's possible to allow users access to only certain portions of the BBS, or the entire BBS.

Forem ST also has a terminal mode to allow the SYSOP to call out if he wishes. **Forem ST** loads ST-Term (which is included) when it's put in terminal mode, and through this, it's possible to upload and download files—and even define macro keys. In short, it's a *full featured* terminal mode, allowing all the options you'd expect.

As I mentioned, **Forem ST** actually loads ST-Term when put in terminal mode; the ability to load and execute TOS programs is also available with an EXEC (execute) command. With EXEC you can load a word processor (Micro Emacs, etc.) and edit text files, without taking the board down.

File transfers are one of **Forem ST**'s strong points. Matthew Singer seems to be one of first to implement new types of protocols into his programs. The newest

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//ST Review *continued*

protocol is Fmodem, which uses a 4K block (instead of a 128-byte block, like standard Xmodem). Fmodem is primarily for high baud rate transfers (**Forem ST** supports 9600 baud). **Forem ST** allows up to twenty file transfer areas, and each one may contain files of any access level, but only those files at and below a user's level will be shown to him.

When a user lists or scans the files, he'll also be shown a brief description of the file and other pertinent information. The LIST command is similar to the READ command on Delphi (full information on the file), and the SCAN command shows only the filename, length and description. **Forem ST** also has a NEW command that shows the user all the files uploaded since his last call.

As far as transfer protocols available, if **Forem ST** doesn't have it, chances are it's rare. Protocols currently supported are: ASCII (Xon-Xoff), Xmodem, Xmodem CRC (Cyclic Redundancy Checking), Y-modem, Ymodem CRC, Ymodem batch, Amodem, Kermit, Compuserve B and F-modem. It also has a VERBOSE command in the files system; this allows a user to do a verbose list of any archived (ARC) file that he can view. It's extras like these that make this one of the best BBS programs I've seen.

Forem ST allows up to sixty-four separate message bases, each with a different maximum number of messages and its own name. The message bases also have separate security masks, so it's possible to allow a user access to all, one, or any combination of message boards.

For the user, this program offers a variety of options for reading or scanning messages. The message base has the standard READ and SCAN commands, along with others for reading messages in a particular sequence, or finding messages that are addressed to you.

One of the nicest features of the message base (at least from a SYSOP's standpoint) is the ability to send a message to all users at and below a certain download privilege level. If the SYSOP uses this option, all users at and above that download level will be shown the message as if it were addressed directly to them. Messages in a base can be locked by the sender, so that only the person the message is addressed to may read it. **Forem ST** also contains a completely separate E-mail (electronic mail) message base for private messages among users.

If I had to pick a favorite feature (aside from the amount of control given to the SYSOP), it would be support of VT-52 cursor and color codes in messages and text files. With the VT-52 codes, it's possible to do animation and color changing, which can call attention to your messages. VT-52 animation seems to be the "in" thing on ST BBSs right now, and that may be one reason for **Forem ST**'s popularity; it's one of the few with this feature.

Forem ST also has several other interesting features, a few of which I'll explain here. (Keep in mind: the program is *full* of things like this.) Its prompt set (lines such as "Select" that the user sees after a menu, etc.) can be customized. This helps to keep every **Forem ST** BBS from looking like a clone. You can lower all users' access times during peak hours automatically, which lets more people use the BBS. **Forem** also lets you use the message editor on short text files, and a SYSOP can configure the BBS to lock out 300-baud callers. (If you run a large, busy BBS, this might be useful.)

I could find only one minor problem with the program. When logging on as a new user or uploading a file, you're asked several questions. After *every one* of the questions **Forem ST** echoes the users input, along with an *Is this correct?* question. It gets annoying! It seems to me that echoing the entire block of information, *then* asking the user if it's correct would be easier on everyone.

All things considered, I think **Forem ST** is a good BBS program (with a little room for improvement). It seems to be one of the most popular for the ST, so a lot of people are already used to a **Forem ST** board. And it offers excellent SYSOP control over the system, along with some powerful commands for the users. As far as updates are concerned, **Forem** is also one of the best in that field. Commnet Systems runs a bulletin board on which callers can make suggestions about new features or changes they'd like to see in the program. The next revision (which will probably be available by the time you read this) will include a function to allow users to execute TOS programs for on-line games, etc.

If you're already running a non-**Forem** BBS, or thinking about running a BBS, I don't think you could go wrong with **Forem ST**. If you'd like to take a tour of a **Forem** BBS in action, call Commnet Systems support BBS at 617-877-8756.

The Wizard
PART 1

A text adventure construction set. This month: the editor and database printer.

by Clayton Walnum

Almost two years ago, I wrote a series of articles called "Adventurous Programming," to teach intermediate and expert BASIC programmers how to create text adventure games. Unfortunately, many of **ANALOG Computing**'s faithful readers were left in the lurch; they wanted to design adventure games, but didn't know—and possibly didn't *want* to know—how to program.

There's a lot of creative talent out there just waiting to crawl free, a lot of entertaining adventure games trapped behind the brows of nonprogrammers who, nonetheless, have a contribution to make. I decided someone had to come up with the vehicle these people needed to transform their ideas into program code.

It was a tough challenge, but **The Wizard** is here.

The Wizard is a system of programs that lets you create your own BASIC text adventures without any knowledge of programming. It's actually made up of three modules: the editor and database printer, which are presented this month; and the compiler, which will be in next month's **ANALOG**.

The editor is used to create a database of all the information needed for the compiler to create your adventure. With the editor, you'll enter room, object and command data, as well as text for the game's title and introductory screens—all of which will be automatically saved to disk as you work. The database printer module reads data from the disk and sends it to the printer in a readable format, so you can print a record of your work. And, finally, the compiler reads the adventure data from the disk and creates a complete, ready-to-run BASIC adventure.

The resultant BASIC program is complete and freestanding in every way. It doesn't require other data to run, and may be handed out to friends as freely as any other BASIC program. Because **The Wizard** outputs standard BASIC, programmers have the added bonus of being able to create an adventure easily, then modify the generated program to suit their needs.

The listings.

Type in Listing 1, the editor module, using the "BASIC Editor II" (issue 47) to verify your work, then save it to disk under the filename WIZARD.BAS. Listing 2 is the database printer. Type it in and save it to disk under the filename WIZPRINT.BAS.

Writing an adventure.

I'm not going to discuss the art of designing adventure games. Anyone interested in learning more about plotting, mapping, characterization and the other essential elements of adventure design should refer to the first article in the "Adventurous Programming" series (issue 39), or to Michael Banks's "Designing an Adventure Game" in the October 1987 **ST-Log**. Here, we're more interested in the mechanical side of the process, using **The Wizard**'s editor to get the elements of the game on disk for the compiler.

I'm going to explain **The Wizard**'s editor in two sections. The following section is a detailed discussion, and serves as a reference manual for the system. After that is a tutorial section in which I'll take you step by step through the creation of a short adventure game. If you like, you can skip ahead to the tutorial, create the adventure (you won't be able to compile it until next month, though), then read the rest of the article for further clarification.

Creating a new game.

When you run **The Wizard**'s editor module, you'll be presented with a title page, followed by the main menu. If this is the first time you've ever run the program, you'll not have stored any adventure data on your disk. Your first step, then, is to choose menu selection 1, "Create Game."

Here, you'll be asked to supply the editor with your name (as you'd like it to appear on the adventure's title screen), the game's title (keep it twenty characters or less) and the filename for the data. The filename should be eight characters or less, and should not include a device or extender (for example: MYGAME, rather than D1:MYGAME.DAT).

Once you've entered the required information, you'll be asked to verify your input. If you answer *Y*, the program will create the data files it needs—so make sure you have a blank, formatted disk in drive 1. You may have only one adventure database per disk.

Note: before any of the other menu items will work, you must have either created a new game, or loaded a game already in progress (more on this below).

Loading a game in progress.

You probably won't enter all your adventure data in one sitting—that's a lot of work! Even if you do manage to complete such a marathon session, you'll almost certainly have to go back to the editor at some point. The chances of a complex adventure game running properly the first time are slim indeed.

To reload an adventure database, choose menu selection number 2, "Load Game," from the main menu. You'll be asked if your adventure data disk is in the drive. If the disk is okay, the program will load the data, after which you can continue editing your game. If you insert the wrong disk (a disk not set up by **The Wizard**), or the computer encounters any type of file error, you'll receive an error message. If you don't wish to load a game, reply with an *N* to the prompt.

Entering room data.

Your adventure game may have up to thirty rooms, each of which can be interconnected with the rest in any way you please. You're allowed six exit directions: north, south, east, west, up and down. Additionally, some exits can be conditional, requiring that the player have a particular item before he may use them.

Some of the prompts have default values that can be selected by pressing RETURN without an entry. Other prompts require input and must be filled in. If you make a mistake during data entry, you can use the BACKSPACE key to make corrections.

To enter room data, choose menu selection number 3, "Work on Rooms," from the main menu. The room editing screen, including a graphic representation of your room and its exits, will be displayed. An important note: room number 1 is always where your player will begin his adventure.

You must first enter the room's name (limit of twenty-four characters), followed by a RETURN. There's no default for this entry; you *must* supply a name for each room.

You then need to enter information for each of your room's exits. The direction prompts require a number from *0* to *30*. If you enter a *0*, there will be no exit in your room for that direction. This is the default, any other number being interpreted as the room number of that exit's destination, where the player will be moved when he chooses that exit. As you enter each exit, the on-screen graphic will be updated, showing each of the room's exits and where they lead.

Once you've entered all the exits, you must tell the editor if you want one of them to be restricted. Restricted exits are not usable unless the player has, either in the room or in his inventory, a particular item. (For instance, in the sample game found in the tutorial section, the player must have a coat before he's allowed to go outside.)

For the *RESTRICTED* prompt, enter a single letter direction (*N, S, E, W, U* or *D*) or the word *NONE*. The default is NONE. The direction you enter here must be a valid direction, one that was given a nonzero value in the exit data.

If you decided to have a restricted exit, you must then enter the name of the item that must be in the room (or in the player's inventory) for the exit to be active. The item name follows the same rules found in the "Entering item data" section below, and does not have a default value.

The required item must be found either in the room or in the player's inventory. Answer *I* (the default) or *R* for the *I/R* prompt, as appropriate.

Whenever a player attempts to use a restricted exit, he needs some textual feedback as to the outcome of his action. This is provided by the messages you enter following the *POS TEXT* and *NEG TEXT* prompts. The negative text is displayed when the player tries to use the exit without the required item. Positive text is displayed when the player succeeds in using the exit (in other words, he *does* have the required item). There are no defaults; if you have a restricted exit, you must enter the positive and negative text. Each of the lines must be no more than twenty-five characters in length.

When you're through entering the data for a room, you'll be asked to verify your work. A reply of *Y* will save the room to disk and set up the screen for the next. A reply of *N* will clear all data, allowing you to try again. To exit the room editing screen, press ESCAPE.

Editing existing room data.

You may, at any time, change previously entered room data. To do this, select "Work on Rooms" from the menu, then type the room number you wish to edit. The data will be loaded from disk, then displayed on the room editing screen. Defaults for all prompts become the displayed data (what you originally entered). Press RETURN till you get to the data you want to change, then make the correction.

Note: you cannot delete a room once it's created. You can, however, change all the data, transforming the room into a new location.

Entering item data.

Every object in your adventure must be entered into the editor as an item. If you fail to do so, when the player uses the item as the noun portion of a command, the game will return the message *No such noun*. To enter a list of items, choose menu selection 4, "Work on Items" from the main menu.

The first entry you must make is the item's name. There's no default value, and each item name must be unique. Mul-

tiple words are okay (i.e., WOODEN BOX), but you're limited to thirteen characters.

After entering the name, you must give the item a three-letter code (this entry also has no default). The code is used internally by the program to discern one object from another. It should consist of the first three letters of the item's name, though, in the case of multiple word items, you can choose which word to use as the basis for the code. Each three-letter code *must* be unique; you'll not be allowed to enter duplicates.

Keep in mind that, during game play, the first three letters of the noun portion of the player's command will be compared against these codes for a match. If you want a player to pick up a boulder with the command GET BOULDER, the three-letter code for the item must be *BOU*.

The next data needed is the room in which the item will be placed. This must be a number between *1* and *30* (the allowable range of room numbers); the letter *C* for items that will be created by an "item command" (see the section on item commands, page 44); or the word *ANY* (the default), which means the item will appear in the player's current room, once the proper command has been supplied. You should also enter *C* for objects used *only* as the noun portion of a command; that is, they don't actually appear in the game's object displays (see the tutorial section for an example of this usage).

Some game items are stationary; others may be picked up and moved by the player. The category your items fall into depends on your answer to the *GET* prompt. If you answer *Y* (the default), the item will be "getable." If you answer *N*, the player won't be able to move the object.

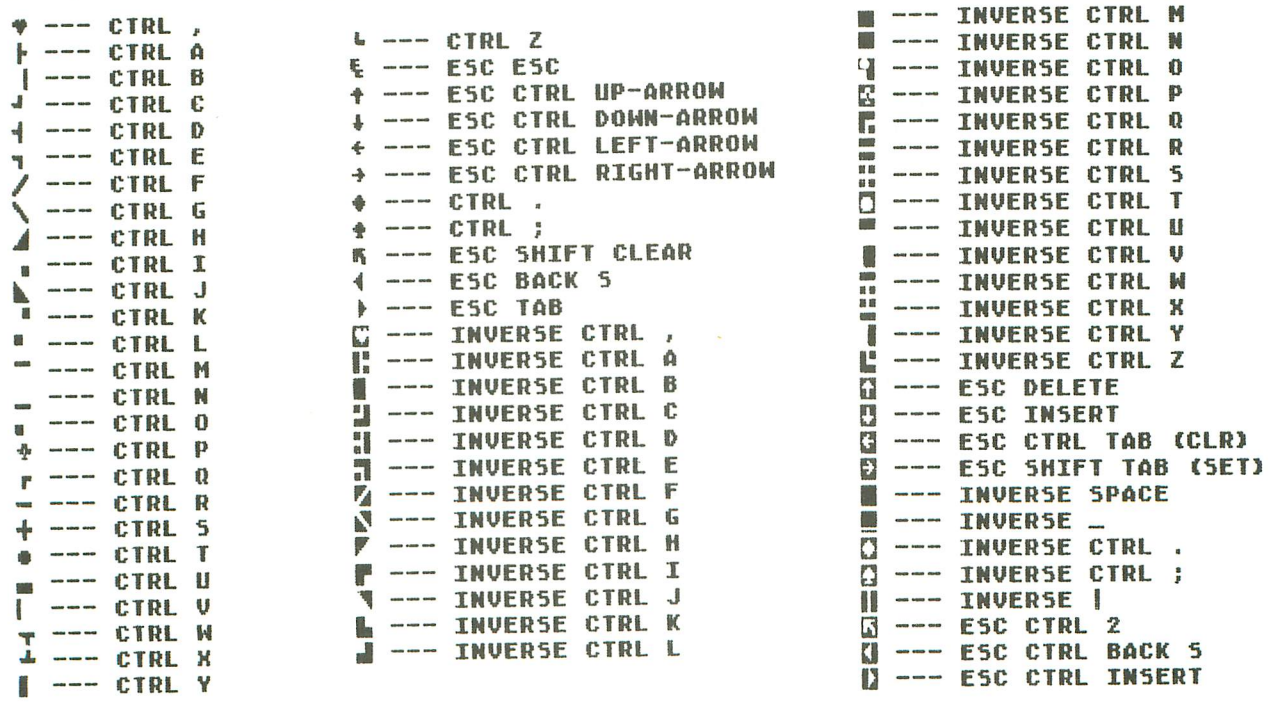
Some items can be hidden from the player and made available to him only after he's completed a certain action. Others are accessible from the beginning of the game. The information you supply the *COMMAND* prompt will determine which type your item will be. If you respond to this prompt with the word *GET* (the default), the item is visible in its destination room (the room entered at the *ROOM* prompt) at the beginning of the game. Any other command entered here must be a two-word, verb/noun combination, limited to fifteen characters in length. In order to get access to the item, the player must type this command.

The command may require that a particular item be present in the room or in the player's inventory. Either enter the name of that item after the *ITEM NEEDED* prompt, or respond with the word *NONE* (the default).

Answer the *I/R* prompt in the same manner described in the "Entering room data" section above.

If you've entered something other than *NONE* for the item needed, you must supply the negative and positive text (as described in "Entering room data"). Otherwise, you need supply only the positive text.

Some program listings reproduced in **ANALOG Computing** may contain "strange" characters not shown on the keyboards of earlier Atari models. These are special characters which use the CTRL, ESC and "ATARI LOGO" (inverse) keys. Shown below is a list of these characters and the keystrokes used to get them.



Once a new item is stored on disk, the item screen will be cleared. You may then enter another item into the database, or press ESCAPE to return to the main menu. You may have no more than fifty items in your adventure.

Editing item data.

You can change previously entered item data at any time. To do this, select the "Work on Items" menu selection, then type the name of the item you wish to edit. The data will be loaded from the disk, then displayed on the item editing screen. Editing is accomplished in the same manner as described in "Editing room data" above, pressing RETURN for data you wish unchanged and retyping those you want to modify.

Entering command data.

A command is an input from the player that will result in some sort of action in the game. **The Wizard** allows five types of commands: simple, movement, item, fatal and final.

A simple command results only in the output of text to the player. A movement command moves the player to a new location. Item commands, the most complicated, allow the player to combine, create or delete items, based on rules you've set up. Fatal commands "kill" the player and end the game. Final commands also end the game, but with the player victorious, having completed all the actions necessary to solve the adventure.

To enter command data, choose menu selection 5, "Work on Commands," from the main menu. You'll then see a secondary menu. Here, you must choose which of the five types of commands you wish to work on.

Simple, movement, final and fatal commands.

When you make a selection from the command menu, the command editing screen will be displayed. This screen is similar for all command types except item commands which, because of their greater complexity, require many additional prompts. Because they're different from the other types, item commands will be explained in their own section. Here, we'll take a look at the other four.

First, you must enter the actual command. Type it in following the *COMMAND* prompt, keeping in mind that it must be a unique verb/noun phrase limited to fifteen characters in length. This is a required entry; there is no default.

In order for the command (the one you just entered at the *COMMAND* prompt) to be effective, the item entered at the *ITEM NEEDED* prompt must be present in the room or in the player's inventory. If you don't want to require an item, enter *NONE* (the default) for this prompt. Otherwise, enter an item name (this item must, of course, be entered into the database at some point).

You must then answer the *I/R*, *POS TEXT* and *NEG TEXT* prompts in the usual manner. There are no defaults for these entries and positive text is required. You may, if you want, leave the negative text blank by pressing RETURN with no entry.

The movement command data entry screen has one additional prompt: the number of the room to which the player will be moved when he types the command. This should be entered in response to the *DESTINATION* prompt and must be a number in the range of *1* to *30*. There's no default value.

After you've completed a command's data, it will be saved to disk and the screen cleared. You can then continue entering command data, or press ESCAPE to return to the main menu.

Entering item commands.

Item commands allow the player to combine game items in various ways, create new items and delete old ones. This is a powerful feature, and the imaginative game designer will find many uses for it. An example of its use will be given in the tutorial section of this article, so if, after reading this section, you're still not sure how item commands can be used, you'll find help there.

To set up an item command, you must first supply the database with the command itself, typing it in response to the *COMMAND* prompt.

You'll notice that there are two *ITEM NEEDED* prompts, rather than the single prompt used with the other command editing screens. Also, the items needed *must* be in the player's possession (in the room isn't good enough) for the command to take affect. Other than these differences, the same rules apply. The default for these prompts is *NONE*.

The *ROOM* prompt must be filled in with either a valid room number or the word *ANY*. The player must be in this room for the command to be effective.

The item to be created is entered in response to the *CREATE* prompt. This is the item that will be added to the game when the command is carried out. At some point before the game is compiled, this item must be entered into the adventure's data using the "Work on Items" selection of the main menu.

The *I/R* prompt here is different from its counterparts on the other screens. This one's asking if the new item, once it's created, should appear in the room the player is in, or in his inventory. The default is *I*.

The *GET* prompt works as explained in the section "Entering item data" above, indicating whether the new item will be movable by the player. If you selected *I* for the *I/R* prompt, this entry will automatically be filled in as *Y*, since an item already in the player's inventory obviously can be moved.

The two *DELETE* prompts allow you to choose either one, both or none of the needed items (or any other item, for that matter) to be deleted from the game. The default is *NONE*.

Finally, you must enter the usual positive and negative text. The negative text isn' required if you've entered *NONE* for the items needed.

As usual, to return to the main menu, press ESCAPE.

Editing command data.

You may change previously entered command data at any time. To do this, select "Work on Commands," then choose the type of command you want to edit from the command menu. When you respond to the *COMMAND* prompt with the command you wish to edit, the data will be loaded from the disk then displayed on the editing screen. Editing is accomplished in the usual manner—pressing RETURN for

data you wish unchanged and retyping those you want to modify.

Entering intro text.

When a program created by **The Wizard** is run, it first displays a title screen, after which a text screen displaying the game's background story is shown. The text for this screen is entered into the database using menu selection 6, "Intro Text."

The intro text editor is very limited. It has few options (none, if you want the truth) and requires, for the most part, that you enter your text with no errors. You can backspace over text on the same line as the cursor, but that's about the extent of the correction "features."

Text is formatted by padding lines with spaces; you don't end a line (or even a paragraph) by pressing RETURN. If you want a blank line, for example, you must fill the line with spaces. The RETURN key is used only when you've finished entering all text and are ready to save your intro screen to disk.

The text will appear in the final game exactly as you've typed it on this screen.

A tutorial.

Now that I've suitably frightened you with all the technicalities, let's create an adventure together. The process isn't as complicated as it might seem, and I think you'll find that—once you get a little experience under your belt—the program is easy to use.

First, we need a plot. Let's say that a jewelry salesman just came to your door. Instead of buying something, you mention a diamond you want to get rid of. The salesman, always on the lookout for a bargain, agrees to buy the diamond. Now all you have to do is find it! The map of our adventure can be found in Figure 1. Use it for reference as we work.

In the following steps, I'll be showing you exactly what to type to create our game. For instance:

```
23 [R]
```

means to type the number 23, followed by a RETURN.

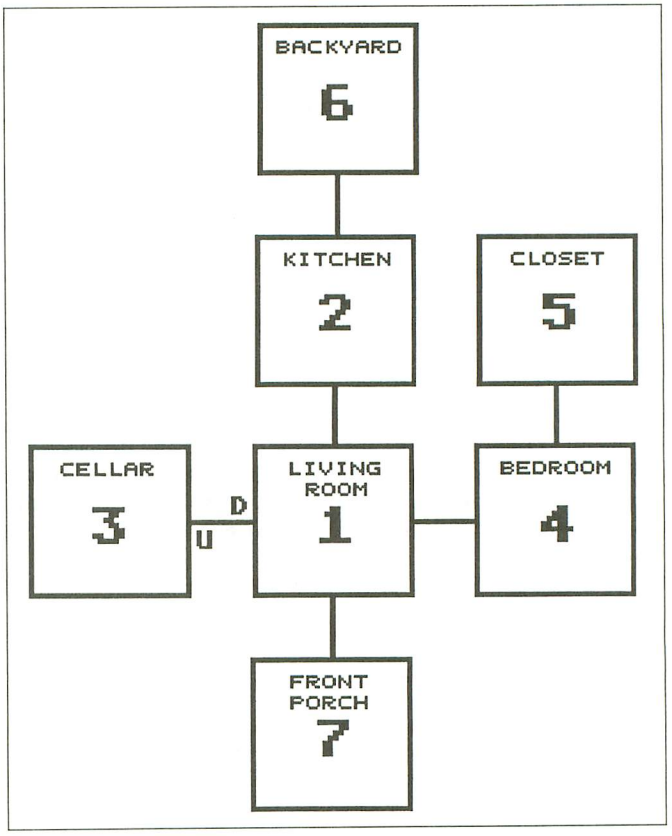


Figure 1.

Let's start by setting up a disk for our new adventure. Load **The Wizard** editor (Listing 1) and run it. When the menu appears, select the "Create a Game" option. Type the following:

```
ELMER FUDD [R] DIAMOND FOR SALE [R] DIAMOND [R] Y
```

The program should now create the files for our new adventure game, after which it'll return to the main menu.

Now we need to set up our rooms. Room number 1 is where our adventure game will start. Select the "Work on Rooms" option from the main menu and enter 1 for the room number. Now type:

```
LIVING ROOM [R] 2 [R] 7 [R] 4 [R] [R] [R] 3 [R] [R] Y
```

By entering the above data, we've created a room called LIVING ROOM that has four exits. The exits go north, south,

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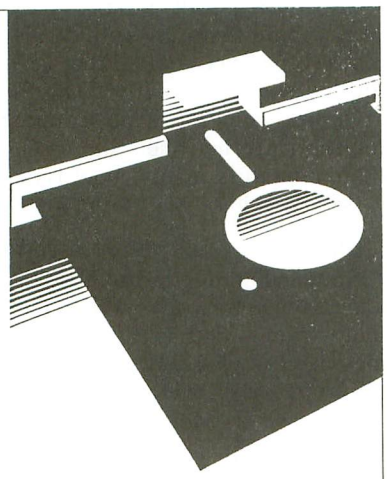

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east and down, and their destinations are rooms 2, 7, 4 and 3, respectively.

Now enter the following data for room 2:

```
KITCHEN [R] 6 [R] 1 [R] [R] [R] [R] [R] N [R] COAT [R] [R] IT'S TOO COLD
OUT THERE [R] THE COAT KEEPS YOU WARM [R] Y
```

Here, we've created a room that has a restricted exit to the north. If the player wants to use that exit, he must have the coat in his inventory. If he tries to use the exit without the coat, he'll receive the message *IT'S TOO COLD OUT THERE.* If he has the coat, he'll get the message *THE COAT KEEPS YOU WARM,* and be allowed to use the exit, ending up in room 6.

Now, enter the data for the rest of the rooms (in order) as follows:

```
CELLAR [R] [R] [R] [R] [R] 1 [R] [R] [R] Y
BEDROOM [R] 5 [R] [R] [R] 1 [R] [R] [R] [R] Y
CLOSET [R] [R] 4 [R] [R] [R] [R] [R] [R] Y
BACKYARD [R] [R] 2 [R] [R] [R] [R] [R] [R] Y
FRONT PORCH [R] 1 [R] [R] [R] [R] [R] [R] N [R] KEY [R] [R] THE DOOR
IS LOCKED [R] THE KEY UNLOCKS THE DOOR [R] Y
```

All our rooms are now created and stored on disk. Next, let's create our item data. Press ESCAPE to return to the main menu, then choose the "Work on Items" selection. Now type:

```
BULLET [R] BUL [R] 5 [R] [R] [R] Y
```

Here, we've created a movable object (one the player can pick up) named BULLET, that will be located in room 5 at the beginning of the game. The object's internal code (the way the program will recognize it) is BUL.

Let's do another one. Type:

```
KEY [R] KEY [R] 7 [R] [R] LOOK DOOR [R] [R] YOU SEE A KEY [R] Y
```

We've created an object that'll be invisible to the player until he types the command LOOK DOOR while in room 7, at which point he'll receive the message *YOU SEE A KEY,* and the key will be added to the list of visible items displayed on the screen. This item goes hand-in-hand with the room description for the front porch, where, in order to get back into the house, he must first have the key. We didn't have to enter negative text in this case, because the command doesn't require an item to be present.

Here are a couple of items that work together. Type:

```
ICE PICK [R] ICE [R] 3 [R] [R] LOOK TOOLBOX [R] BROKEN LOCK [R]
R [R] YOU FOUND SOMETHING [R] IT'S LOCKED [R] Y
BROKEN LOCK [R] BRO [R] 3 [R] N [R] KICK TOOLBOX [R] [R] YOU
BROKE THE LOCK [R] Y
```

Can you see what's going on here? In order to get the ice pick, the player must type the command LOOK TOOLBOX while in room 3. Additionally, the broken lock must be in the room for the command to be effective. To get the broken lock in the room, the player must first kick the toolbox (note, also, that the broken lock is a stationary item—it cannot be moved by the player).

In this way, we're using the lock to signal to the program that the player has completed certain actions (kicking the toolbox). This is called a *flag.*

Finally, one more variation. Type:

```
LOADED GUN [R] LOA [R] C [R] Y
```

The *C* in place of the room number here means that the loaded gun is an item that will be created later on in the game. You should also enter an item this way when the object doesn't actually appear in the game, but will be used as the noun portion of a command. For example, type:

```
DOOR [R] DOO [R] C [R] Y
```

If you look back at our data for the item named KEY, you'll notice that the player must first look at the door. Even though a door will never appear anywhere except in the room description, it must be entered into the database, because we need to use the noun in a command.

Create the rest of the items for our adventure as follows:

```
TOOLBOX [R] TOO [R] 3 [R] N [R] [R] Y
GUN [R] GUN [R] 1 [R] [R] [R] Y
FLASHLIGHT [R] FLA [R] 5 [R] [R] [R] Y
COAT [R] COA [R] 5 [R] [R] [R] Y
SALESMAN [R] SAL [R] 1 [R] N [R] [R] Y
DIAMOND [R] DIA [R] 4 [R] [R] OPEN CHEST [R] OPENED LOCK [R] R
[R] YOU FOUND SOMETHING [R] IT'S LOCKED TIGHT [R] Y
CHEST [R] CHE [R] 4 [R] N [R] [R] Y
OPENED LOCK [R] OPE [R] 4 [R] N [R] PICK LOCK [R] ICE PICK [R] [R]
YOU GET THE LOCK OPEN [R] YOU CAN'T [R] Y
KITCHEN [R] KIT [R] C [R] Y
CELLAR [R] CEL [R] C [R] Y
BEDROOM [R] BED [R] C [R] Y
PORCH [R] POR [R] C [R] Y
LOCK [R] LOC [R] C [R] Y
```

A player completes a text adventure by typing in a predefined series of commands, all of which lead to the solution of the game's puzzle. We, of course, have to supply our adventure database with all the commands our game will respond to. Some commands—DROP, GET, LOAD and SAVE—are already built into the compiler, so you don't have to worry about them. Everything else is up to us. Anytime the player types a command that isn't in our database, he'll get the message *YOU CAN'T DO THAT.*

Choose the "Work on Commands" selection from the main menu, then the "Simple Commands" selection from the commands menu. Now type:

```
LOOK COAT [R] COAT [R] [R] [R] IT LOOKS WARM [R] YOU HAVE TO
HAVE IT FIRST [R] Y
LOOK PORCH [R] [R] 7 [R] YOU SEE THE FRONT DOOR [R] Y
```

Simple commands are those whose only result is to print a message to the player. When our player types *LOOK COAT* in any room and has the coat in his inventory, he'll get the message *IT LOOKS WARM.* If he doesn't have the coat, he'll see *YOU HAVE TO HAVE IT FIRST.*

Now, select "Movement Commands" from the command menu and type:

```
GO CELLAR [R] FLASHLIGHT [R] [R] [R] OKAY [R] THE STAIRS ARE TOO
DARK [R] 3 [R] Y
```

The above command will move the player to the cellar from any room (thereby bypassing a long series of directional commands), by simply typing *GO CELLAR.* There's just one requirement: the player must have the flashlight in his inventory. If he tries this command without the flashlight, he'll get the message *THE STAIRS ARE TOO DARK.*

Movement commands don't have to be as explicit as the GO type. How about a command like WAVE WAND, that moves the player into a magician's laboratory? The player may not even know what'll happen when he waves the wand, adding an element of surprise to your game.

The final two movement commands for our adventure are set up as follows:

GO BEDROOM [R] [R] [R] OKAY [R] 4 [R] Y
GO KITCHEN [R] [R] [R] OKAY [R] 2 [R] Y

Final commands are similar to simple commands, except that they end the game, with our struggling player victorious; they're the last step in the game's solution. Select "Final Commands" from the command menu, then type:

GIVE DIAMOND [R] DIAMOND [R] [R] 1 [R] MISSION ACCOMPLISHED! [R] YOU DON'T HAVE IT [R] Y

Fatal commands also end the game, but with the player the loser. Select "Fatal Commands" from the command menu. Now type:

SHOOT GUN [R] LOADED GUN [R] [R] [R] YOU SHOT YOURSELF! [R] YOU CAN'T DO THAT [R] Y

Now, if the player types *SHOOT GUN* in any room and he has the loaded gun in his inventory, the game will end with the message *YOU SHOT YOURSELF!*

The last type of command is the item command. These complicated constructs allow you to employ "object metamorphosis" in your game. Select "Item Commands" from the command menu and type:

LOAD GUN [R] GUN [R] BULLET [R] [R] LOADED GUN [R] [R] GUN [R] BULLET [R] BE CAREFUL NOW! [R] YOU NEED SOMETHING [R] Y

Now, if the player has both the gun and the bullet in his inventory and types *LOAD GUN*, he'll get the message *BE CAREFUL NOW!*; the loaded gun will appear in his inventory; and the gun and the bullet will be deleted from the game. In a sense, we're allowing the player to combine two items, to create a third, new item. This command type has dozens of variations.

Last, we need to enter the text for the game's intro screen. Select "Intro Text" from the main menu, then type the following text as it appears here, using spaces for formatting.

NOW'S YOUR CHANCE TO MAKE A LITTLE
EXTRA CASH. A COUPLE OF MINUTES AGO,
A JEWELRY SALESMAN CAME TO CALL. IN
FACT, HE'S SITTING IN YOUR LIVING
ROOM RIGHT NOW. HE WAS AT FIRST IN-
TERESTED IN SELLING YOU SOME OF HIS
WARES, BUT THEN YOU TOLD HIM ABOUT THE
UNSET DIAMOND YOU'VE BEEN TRYING TO
SELL. HE WANTS TO BUY IT FROM YOU,
BUT FIRST YOU HAVE TO FIND IT.

GOOD LUCK!

After typing the text, press RETURN, then save the text to disk by responding to the *EVERYTHING OK?* prompt with *Y*.

That finishes up our sample adventure. That wasn't so hard, was it? It'll be a little tougher when you have to organize your own, original game—it's always easier to follow examples—but with practice, you'll be cranking out adventure games like a pro. Hold on to the data files we've created in the tutorial; next month we'll be compiling them into a complete game.

The database printer.

Listing 2 is the **The Wizard**'s database printer module. Whenever you want a hard copy of your adventure's data, just run this with your adventure database in drive 1.

As it's printed here, the program is set up for any Epson-compatible printer, but if your printer doesn't meet this requirement, don't panic. There's only one printer control code (? #2;CHR$(15)) in the program, located in Line 90, that sets the printer for compressed print. Those without compatible printers should check their manuals for the proper code to insert here. If your printer isn't capable of compressed print, you can still use the program (though the output won't be nicely formatted). Just remove the printer control from Line 90.

Coming soon: the compiler.

Next month, in these very pages, we'll present **The Wizard**'s compiler module, completing the package. That gives you plenty of time to design your own game and enter the data into the editor. Use your imagination. I'm sure there are dozens of possibilities offered by **The Wizard** that even I, the author, haven't thought of yet. Surprise me.

Listing 1.
BASIC listing.

```
AE 10 REM ******************************
BL 20 REM *        THE WIZARD          *
JJ 30 REM *      EDITOR MODULE         *
EL 40 REM *           by               *
XG 50 REM *      Clayton Walnum        *
AJ 60 REM ******************************
JK 70 N1=1:N2=2:N3=3:N4=4:N5=5:N6=6:N7=7:
   N8=8:N9=9:N10=10:N11=11:N12=12:N13=13:
   N14=14:N15=15:N16=16
JX 80 N17=17:N18=18:N19=19:N20=20:GOTO 42
   40
KA 90 RESTORE 4520:FOR X=N1 TO 100:READ A
   :SS$(X)=CHR$(A):NEXT X:RETURN
PH 100 TRAP 120:CLOSE #N1:OPEN #N1,N4,N0,
   F$
BR 110 INPUT #N1;CMD$:CCNT=CCNT+N1:CM$(CC
   NT*N15-N14)=CMD$(N1,N15):GOTO 110
ZB 120 RETURN
QJ 130 IF EDIT THEN OPEN #N1,N12,N0,F$:PO
   INT #N1,SECTOR,BYTE:GOTO 150
IF 140 CLOSE #N1:OPEN #N1,N9,N0,F$
XC 150 ? #N1;CMD$:CLOSE #N1:RETURN
EZ 160 POKE 752,N1:LOCATE COL,ROW,A:POSIT
   ION COL,ROW:IF A=ASC("■") THEN ? "■";:
   GOTO 180
GH 170 ? CHR$(A+128);
NN 180 GOSUB 860:RETURN
KZ 190 SOUND N0,20,N12,N8:FOR X=N1 TO 50:
   NEXT X:SOUND N0,N0,N0,N0:RETURN
ZJ 200 CLOSE #N1:OPEN #N1,N4,N0,"K:":GET
   #N1,A:CLOSE #N1:RETURN
YC 210 GRAPHICS N0:POKE 559,N0:DL=PEEK(56
   0)+256*PEEK(561)+N4
FZ 220 POKE DL-N1,70:POKE DL+N2,N7:POKE D
   L+N3,N6:POKE DL+N4,N6
TE 230 FOR X=N19 TO 23:POKE DL+X,N6:NEXT
   X:POKE DL+24,65:POKE DL+25,PEEK(560):P
   OKE DL+26,PEEK(561):POKE 752,N1
X5 240 POSITION 25,N0:? "the wizard":POSI
   TION N3,N17:? "press a number":RETURN
PX 250 POKE 709,N10:POKE 710,N0:POKE 712,
   112:POKE 559,34:RETURN
YM 260 GRAPHICS N0:POKE 559,N0:DL=PEEK(56
   0)+256*PEEK(561)+N4
WE 270 POKE DL-N1,71:POKE DL+N3,N6:POKE D
   L+21,N6:POKE DL+22,N6:POKE DL+23,N6
RR 280 POKE DL+24,65:POKE DL+25,PEEK(560)
   :POKE DL+26,PEEK(561)
DC 290 POKE 752,N1:POKE 710,N0:POKE 712,1
   12:POKE 82,N0
FO 300 POSITION N5,N0:? "the wizard":RETU
   RN
AK 310 POSITION N0,N5:? "    COMMAND:":?
   "↓ITEM NEEDED:":? "       I/R:"
EV 320 ? "↓      ROOM:":? "↓   POS TEXT:
   ":? "   NEG TEXT:"
```

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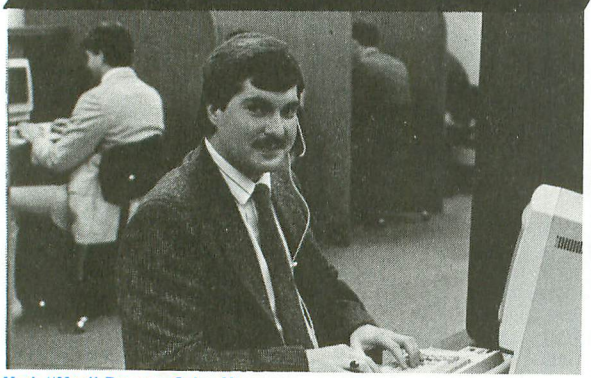

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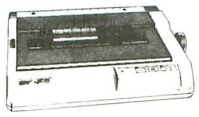

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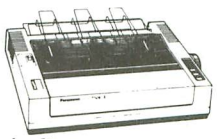

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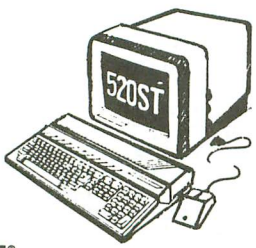

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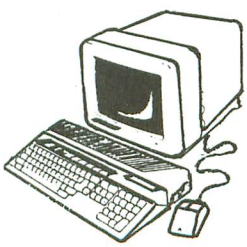

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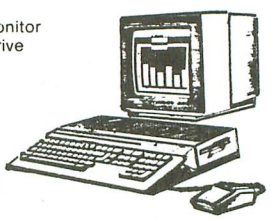

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- SM 124 Mono Monitor
- Built in 3½ inch drive
- 1040 Keyboard
- Midi In/Out Ports

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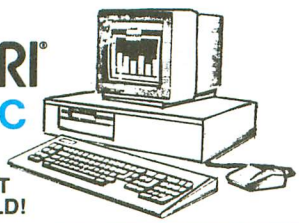

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(while supplies last)

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CIRCLE #115 ON READER SERVICE CARD

```
NV 330 IF M THEN ? "↓DESTINATION:"
XF 340 POKE 559,34:RETURN
HG 350 CMD$(N1)=" ":CMD$(106)=" ":CMD$(N2
   )=CMD$:EDIT=N0
DZ 360 COL=N13:ROW=N5:L1=N15:GOSUB 160:IF
    TEMP$="" THEN GOSUB 190:GOTO 360
JN 370 IF LEN(TEMP$)<N15 THEN FOR X=LEN(T
   EMP$)+N1 TO N15:TEMP$(X)=" ":NEXT X
SX 380 CM=USR(ADR(5S$),ADR(TEMP$),ADR(CM$
   ),LEN(CM$),N15):IF  NOT CM THEN 480
GJ 390 CLOSE #N1:OPEN #N1,N12,N0,F$:TRAP
   420
RN 400 NOTE #N1,SECTOR,BYTE:INPUT #N1;CMD
   $:IF CMD$(N1,N15)<>TEMP$ THEN 400
BO 410 EDIT=N1:GOTO 430
QQ 420 POSITION N3,N20:? "COMMAND USED!":
   GOSUB 190:FOR X=N1 TO 200:NEXT X:GOTO
   360
KD 430 POSITION N13,N7:? CMD$(N16,28):POS
   ITION N13,N8:? CMD$(81,81):POSITION N1
   3,N10
YA 440 IF ASC(CMD$(29))=N0 THEN ? "ANY":G
   OTO 460
UK 450 ? ASC(CMD$(29))
QO 460 POSITION N13,N12:? CMD$(30,54):POS
   ITION N13,N13:? CMD$(55,79)
EM 470 IF M THEN POSITION N13,N15:? ASC(C
   MD$(80))
IX 480 TRAP 40000:CLOSE #N1:IF  NOT EDIT
   THEN CMD$(N1,LEN(TEMP$))=TEMP$:GOTO 52
   0
DO 490 COL=N13:ROW=N5:L1=N15:GOSUB 160:IF
    TEMP$="" AND EDIT THEN ? "↤↤";CMD$(N1
   ,N15):GOTO 520
ZW 500 IF TEMP$="" THEN GOSUB 190:GOTO 49
   0
YW 510 CMD$(N1,LEN(TEMP$))=TEMP$
AX 520 ROW=N7:L1=N13:GOSUB 160:IF TEMP$="
   " AND EDIT THEN ? "↤↤";CMD$(N16,28):GO
   TO 550
HI 530 IF TEMP$="" THEN TEMP$="NONE":? "↤
   ↤";TEMP$
DW 540 CMD$(N16,N15+LEN(TEMP$))=TEMP$
JN 550 IF CMD$(N16,N19)<>"NONE" THEN 570
MX 560 POSITION N13,N8:? " ":CMD$(81,81)=
   " ":POSITION N13,N13:? B$(74):CMD$(55,
   79)=B$(75):GOTO 620
LI 570 ROW=N8:L1=N1:GOSUB 160:IF TEMP$<>"
   " AND TEMP$<>"R" AND TEMP$<>"I" THEN G
   OSUB 190:GOTO 550
NH 580 IF EDIT AND TEMP$="" AND CMD$(N16,
   N19)="NONE" THEN ? "↤↤ ":CMD$(81,81)="
    ":GOTO 620
TL 590 IF EDIT AND TEMP$="" AND CMD$(81,8
   1)="R" THEN ? "↤↤R":GOTO 620
NK 600 IF TEMP$="" THEN TEMP$="I":? "↤↤";
   TEMP$
XY 610 CMD$(81,81)=TEMP$
EA 620 ROW=N10:L1=N3:GOSUB 160:IF TEMP$<>
   "" OR  NOT EDIT THEN 660
KI 630 IF ASC(CMD$(29))=N0 THEN ? "↤↤ANY"
   :GOTO 650
TZ 640 ? "↤↤";ASC(CMD$(29))
RO 650 GOTO 690
MC 660 IF TEMP$="" OR TEMP$="ANY" THEN PO
   SITION COL,ROW:? "ANY":TEMP$="0"
UU 670 Z$=TEMP$:TRAP 620:IF VAL(Z$)<N0 OR
    VAL(Z$)>30 THEN GOSUB 190:GOTO 620
FA 680 CMD$(29,29)=CHR$(VAL(Z$))
WJ 690 ROW=N12:L1=25:GOSUB 160:IF TEMP$="
   " AND EDIT THEN ? "↤↤";CMD$(30,54):GOT
   O 720
CU 700 IF TEMP$="" THEN GOSUB 190:GOTO 69
   0
NI 710 CMD$(30,29+LEN(TEMP$))=TEMP$
CO 720 IF CMD$(N16,N19)="NONE" THEN 760
NW 730 ROW=N13:GOSUB 160:IF TEMP$="" AND
   EDIT THEN ? "↤↤";CMD$(55,79):GOTO 760
IU 740 IF TEMP$="" THEN ? "↤↤  ":GOTO 760
PI 750 CMD$(55,54+LEN(TEMP$))=TEMP$
UO 760 IF  NOT M THEN 800
CL 770 ROW=N15:L1=N2:GOSUB 160:IF TEMP$="
   " AND EDIT THEN TEMP$=STR$(ASC(CMD$(80
   ))):? "↤↤";TEMP$:GOTO 790
BX 780 IF TEMP$="" THEN GOSUB 190:GOTO 77
   0
EM 790 TRAP 770:Z$=TEMP$:CMD$(80,80)=CHR$
   (VAL(Z$)):M=N0
NG 800 POSITION N3,N20:? "EVERYTHING OK?"
   :GOSUB 200
MP 810 IF A=ASC("N") OR A=ASC("n") THEN R
   ETURN
AI 815 IF A<>ASC("Y") AND A<>ASC("y") THE
   N 800
M5 820 IF EDIT THEN CM$(CM*15-14,CM*15)=C
   MD$(N1,N15)
IN 830 IF  NOT EDIT THEN CM$(LEN(CM$)+N1)
   =CMD$(N1,N15)
ZM 840 RETURN
SL 850 REM ****** INPUT ROUTINE *******
WL 860 L=N0:L2=N0:L3=N0:TEMP$="":POKE 764
   ,255
IR 870 GOSUB 200:IF A=RETRN THEN POKE 752
   ,N1:? " ";:RETURN
JC 880 POKE 752,N0:IF A=BACKSP THEN 930
PV 890 IF A=ESCAPE THEN POKE 752,N1:POP :
   GOTO 980
UR 900 L=L+N1:L2=L2+N1:IF L>L1 THEN POKE
   752,N1:POSITION COL+L2-N1,ROW:? " ":RE
   TURN
ZZ 910 IF L2>38 THEN L2=N1:ROW=ROW+N1
KP 920 POSITION COL+L2-N1,ROW:? CHR$(A);:
   TEMP$(L)=CHR$(A):GOTO 870
EP 930 IF L>N0 THEN ? "↤";:L=L-N1:L2=L2-N
   1:IF L=N0 THEN TEMP$=""
BV 940 IF L2=N0 THEN L2=38:ROW=ROW-N1:L3=
   L3+1
HV 950 IF L>N0 THEN TEMP$=TEMP$(N1,L)
RR 960 GOTO 870
IA 970 REM ********* MAIN MENU ********
YX 980 GRAPHICS N0:POKE 559,N0:DL=PEEK(56
   0)+256*PEEK(561)+N4
GU 990 POKE DL-N1,70:POKE DL+N2,N7:POKE D
   L+N3,N6:POKE DL+N4,N6
GU 1000 FOR X=N20 TO 23:POKE DL+X,N6:NEXT
    X:POKE DL+24,65:POKE DL+25,PEEK(560):
   POKE DL+26,PEEK(561):POKE 752,N1
TL 1010 POSITION 25,N0:? "the wizard":POS
   ITION 23,N17:? "press a number"
UO 1020 POSITION N12,N3:? "1) Create a ga
   me":POSITION N12,N5:? "2) Load a game"
   :POSITION N12,N7:? "3) Work on rooms"
DE 1030 POSITION N12,N9:? "4) Work on ite
   ms":POSITION N12,N11:? "5) Work on com
   mands"
CE 1040 POSITION N12,N13:? "6) Intro text
   ":POSITION N12,N15:? "7) Quit":GOSUB 2
   50
XN 1050 GOSUB 200:M=N0
AL 1060 TRAP 1050:A=A-48:IF  NOT LD AND A
   >N2 AND A<7 THEN POSITION 21,N17:? "no
    game in memory":GOSUB 190:GOTO 1050
UT 1070 ON A GOTO 1370,1180,1590,2340,110
   0,4120,1160
PZ 1080 GOTO 1050
HL 1090 REM ****** COMMAND MENU *******
YX 1100 GOSUB 210:POSITION N10,N4:? "1) S
   imple Commands":POSITION N10,N6:? "2)
   Movement Commands"
JP 1110 POSITION N10,N8:? "3) Item Comman
   ds":POSITION N10,N10:? "4) Fatal Comma
   nds"
MR 1120 POSITION N10,N12:? "5) Final comm
   ands":GOSUB 250
KS 1130 GOSUB 200:TRAP 1130:A=A-48:IF A<N
   1 OR A>N5 THEN 1130
```

```
VP 1140 ON A GOTO 3180,3240,3420,3300,336
   0
VN 1150 REM ********** QUIT **********
VL 1160 POSITION 22,N17:? "  ARE YOU SURE
   ?  ":GOSUB 200:IF A<>ASC("Y") AND A<>A
   SC("y") THEN 980
UN 1165 GRAPHICS 0:POKE 82,2:END
GG 1170 REM ******** LOAD GAME ********
AV 1180 TRAP 1350:POSITION 23,N17:? "
              ":POSITION 21,N17:? "  disk
   inserted";:INPUT FI$
SU 1182 IF FI$<>"Y" AND FI$<>"y" THEN 980
QC 1185 CLOSE #N1:OPEN #N1,N4,N0,"D:FILEN
   AME.DAT":INPUT #1;FI$:CLOSE #1
TN 1190 FN$=FI$:F$="D:":F$(LEN(F$)+N1)=FI
   $:F$(LEN(F$)+N1)=".NAM"
FY 1195 ICNT=N0:ITM$="":CCNT=N0:CM$="":CD
   $="":R$(N1)=" ":R$(30)=" ":R$(N2)=R$
SI 1200 CLOSE #N1:OPEN #N1,N4,N0,F$:INPUT
    #N1;N$:INPUT #N1,T$:CLOSE #N1
UV 1210 TRAP 40000:LD=1
VE 1220 F$(LEN(F$)-N2)="ITM":OPEN #N1,N4,
   N0,F$:TRAP 1270
XV 1230 INPUT #N1;I$:ICNT=ICNT+N1:ITM$(IC
   NT*N13-N12)=I$(N1,N13)
OM 1240 CD$(ICNT*N3-N2)=I$(N14,N16)
WI 1250 IF I$(N18,N20)="GET" OR I$(N18,21
   )="DROP" OR I$(N18,21)="NONE" OR I$(N1
   8,N18)=" " THEN 1230
EX 1260 CCNT=CCNT+N1:CM$(CCNT*N15-N14)=I$
   (N18,32):GOTO 1230
TJ 1270 F$(LEN(F$)-N2)="RM5":CLOSE #N1:OP
   EN #N1,N4,N0,F$:TRAP 1290
GZ 1280 INPUT #N1;RM5$:R=ASC(RM5$(N1)):R$
   (R,R)="*":GOTO 1280
JD 1290 CLOSE #N1:F$(LEN(F$)-N2)="COM":GO
   SUB 100
BD 1300 F$(LEN(F$)-N2)="FAT":GOSUB 100
VK 1310 F$(LEN(F$)-N2)="MOV":GOSUB 100
CX 1320 F$(LEN(F$)-N2)="FIN":GOSUB 100
TD 1330 F$(LEN(F$)-N2)="CHG":GOSUB 100
RD 1340 CLOSE #N1:GOTO 980
QH 1350 POSITION 20,N17:? "
          ":POSITION 27,N17:? "ERROR!":FOR
    X=N1 TO 250:NEXT X:GOTO 980
YX 1360 REM ***** CREATE NEW GAME ******
KD 1370 GRAPHICS N0:POKE 559,N0:DL=PEEK(5
   60)+256*PEEK(561)+N4:POKE DL-N1,70
IL 1380 FOR X=N2 TO N6:POKE DL+X,N6:NEXT
   X:POKE DL+N8,N6:POKE DL+N9,N6
LZ 1390 POKE DL+N11,N6:POKE DL+N12,N6
KO 1400 FOR X=N14 TO 24:POKE DL+X,N6:NEXT
    X:POKE 708,54
YC 1410 POSITION 25,N0:? "the wizard":POS
   ITION N2,N3:? "Your name?"
BU 1420 POSITION N2,N5:? "Game's title?"
PU 1430 POSITION N2,N7:? "Name for files?
   ":POKE 559,34
PY 1440 POSITION N11,N3:INPUT N$:IF N$=""
    THEN 980
GP 1450 POSITION N14,N5:INPUT T$:IF T$=""
    THEN 1450
SB 1460 POSITION N16,N7:INPUT A$:IF A$=""
    THEN 1460
YN 1470 F$(N3)=A$:FN$=A$:POSITION N3,N12:
   ? "EVERYTHING OK?":GOSUB 200
CR 1480 IF A=ASC("N") OR A=ASC("n") THEN
   1370
FI 1490 IF A<>ASC("Y") AND A<>ASC("y") TH
   EN 1470
FX 1500 POSITION N3,N12:? "CREATING FILES
   ":LD=N1
EA 1510 F$(LEN(F$)+N1)=".NAM":OPEN #N1,N8
   ,N0,F$:? #N1;N$:? #N1;T$:CLOSE #N1
WA 1520 F$(LEN(F$)-N2)="COM":OPEN #N1,N8,
   N0,F$:CLOSE #N1:F$(LEN(F$)-N2)="RM5":O
   PEN #N1,N8,N0,F$:CLOSE #N1
UL 1530 F$(LEN(F$)-N2)="ITM":OPEN #N1,N8,
   N0,F$:CLOSE #N1:F$(LEN(F$)-N2)="FAT":O
   PEN #N1,N8,N0,F$:CLOSE #N1
HD 1540 F$(LEN(F$)-N2)="MOV":OPEN #N1,N8,
   N0,F$:CLOSE #N1:F$(LEN(F$)-N2)="FIN":O
   PEN #N1,N8,N0,F$:CLOSE #N1
OE 1550 F$(LEN(F$)-N2)="CHG":OPEN #N1,N8,
   N0,F$:CLOSE #N1:OPEN #N1,N8,N0,"D:FILE
   NAME.DAT":? #N1;A$:CLOSE #N1
XE 1560 F$(LEN(F$)-N2)="INT":OPEN #N1,N8,
   N0,F$:CLOSE #N1
ZT 1565 OPEN #N1,N8,N0,"D:FILENAME.DAT":?
    #N1;FN$:CLOSE #N1
UZ 1570 GOTO 980
GN 1580 REM ****** WORK ON ROOM5 ******
NW 1590 TRAP 1590:POSITION 23,N17:? "
                    "
DO 1600 POSITION 24,N17:? "What room";:IN
   PUT R:IF R<N1 OR R>30 THEN 1590
SQ 1610 EDIT=N0:DIR=N0:F$(LEN(F$)-N2)="RM
   5"
JN 1620 IF R$(R,R)<>"*" THEN 1660
VL 1630 TRAP 1660:OPEN #N1,N12,N0,F$
AV 1640 NOTE #N1,SECTOR,BYTE:INPUT #N1;RM
   5$:IF ASC(RM5$)<>R THEN 1640
DI 1650 TRAP 40000:EDIT=N1
SR 1660 NT=N0:ED=N0:CLOSE #N1:GRAPHICS N0
   :POKE 756,CS:POKE 752,N1:POKE 82,N1:PO
   KE 559,N0:DL=PEEK(560)+256*PEEK(561)+4
ON 1670 POKE DL-N1,71:POKE DL+N3,N6:POKE
   DL+24,65:POKE DL+25,PEEK(560):POKE DL+
   26,PEEK(561)
CM 1680 POSITION N5,N0:? "the wizard":POS
   ITION 26,N1:? "ROOM #";R
WJ 1690 POSITION N1,N3:? " ROOM NAME:";?
MZ 1700 ? " NORTH:";? " SOUTH:";? " E
   AST:";? " WEST:";? " UP:";? "
   DOWN:"
DP 1710 POSITION N1,N13:? " RESTRICT:";?
   :? " ITEM:";? " I/R:";? :? :? " NEG T
   EXT:";? " POS TEXT:"
GL 1720 POSITION N22,N5:? RM$:POSITION 22,
   N6:? RM$:POSITION 22,N15:? RM$:POSITIO
   N 22,N16:? RM$
GQ 1730 FOR X=N7 TO N14:POSITION 22,X:? R
   M1$:NEXT X
V5 1740 POKE 708,54:POKE 710,N0:POKE 712,
   112:POKE 559,34
GS 1750 IF  NOT EDIT THEN 1820
CT 1760 POSITION N13,N3:? RM5$(N2,25)
RP 1770 FOR X=N0 TO N5:POSITION N10,N5+X:
   E=ASC(RM5$(27+X)):IF E>30 THEN E=E-30:
   DIR=X+N1
CO 1780 ? E:NEXT X:POSITION N12,N13:IF  N
   OT DIR THEN ? "NONE":GOTO 1840
AZ 1790 ? DIR$(DIR,DIR)
SH 1800 POSITION N8,N15:? RM5$(33,45):POS
   ITION N8,N16:? RM5$(96,96):POSITION N1
   2,N19:? RM5$(71,95)
UC 1810 POSITION N12,N20:? RM5$(46,70):GO
   TO 1840
OF 1820 RM5$(N1)=" ":RM5$(95)=" ":RM5$(N2
   )=RM5$
RB 1830 RM5$(N1,N1)=CHR$(R)
MH 1840 COL=N13:ROW=N3:L1=24:GOSUB 160:IF
    TEMP$="" AND EDIT THEN ? "←←";RM5$(N2
   ,25):GOTO 1870
MB 1850 IF TEMP$="" THEN GOSUB 190:GOTO 1
   840
OK 1860 RM5$(N2,N1+LEN(TEMP$))=TEMP$
EZ 1870 COL=N10:FOR RN=N0 TO N5:ROW=N5+RN
   :L1=N2
YQ 1880 POSITION COL+N2,ROW:? " ":GOSUB 1
   60
XY 1890 IF TEMP$="" AND EDIT THEN Z$=STR$
   (ASC(RM5$(27+RN))):? "←←";:IF VAL(Z$)>
   30 THEN ? VAL(Z$)-30:GOTO 1990
EY 1900 IF TEMP$="" AND EDIT THEN ? Z$:VZ
```

```
   =VAL(Z$):GOTO 1940
QI 1910 IF TEMP$="" THEN TEMP$="0":POSITI
   ON COL,ROW+L3:L3=0:? TEMP$
JN 1920 TRAP 2020:Z$=TEMP$:VZ=VAL(Z$):VR=
   ASC(RM5$(27+RN)):IF VZ<N0 OR VZ>30 THE
   N GOSUB 190:GOTO 1880
SA 1930 IF EDIT AND VZ<>VR AND VZ<>VR-30
   THEN IF VR>30 AND VZ>N0 THEN VZ=VZ+30
SG 1940 RM5$(27+RN,27+RN)=CHR$(VZ)
BM 1950 IF  NOT EDIT OR Z$<>"0" OR DIR<>R
   N+N1 THEN 1990
NY 1960 POSITION N12,N13:? "NONE":POSITIO
   N N8,N15:? B$(86):POSITION N8,N16:? "
   "
KN 1970 POSITION N12,N19:? B$(74):POSITIO
   N N12,N20:? B$(74)
KL 1980 RM5$(33,96)="
         ":DIR=N0:GOTO 2010
AX 1990 IF EDIT AND VAL(Z$)>30 THEN Z$=ST
   R$(VAL(Z$)-30)
VP 2000 IF VAL(Z$)>N0 THEN POSITION P(RN+
   N1,N1),P(RN+N1,N2):? EX$;"↑←←";VAL(Z$)
GT 2010 NEXT RN:TRAP 40000:GOTO 2030
HO 2020 GOSUB 190:GOTO 1880
UK 2030 COL=N12:ROW=N13:L1=N4:ODIR=N0:GOS
   UB 160
WB 2040 IF EDIT AND TEMP$="" AND DIR THEN
    ? "←←";DIR$(DIR,DIR):GOTO 2140
LQ 2050 IF  NOT EDIT OR TEMP$<>"NONE" THE
   N 2080
AG 2060 POSITION N8,N15:? B$(86):POSITION
    N8,N16:? " "
FP 2070 POSITION N12,N19:? B$(74):POSITIO
   N N12,N20:? B$(74):ED=N1:GOTO 2270
QJ 2080 IF TEMP$="" THEN ? "←←NONE":GOTO
   2270
KB 2090 IF DIR>N0 THEN ODIR=DIR
DJ 2100 FOR DIR=N1 TO N6:IF DIR$(DIR,DIR)
   <>TEMP$ THEN NEXT DIR:GOSUB 190:GOTO 2
   030
MS 2110 POP :? "   ":IF RM5$(26+DIR,26+DI
   R)="♥" THEN GOSUB 190:DIR=ODIR:GOTO 20
   30
LZ 2120 RM5$(26+DIR,26+DIR)=CHR$(ASC(RM5$
   (26+DIR,26+DIR))+30):NT=N1
WX 2130 IF ODIR>N0 THEN RM5$(26+ODIR,26+O
   DIR)=CHR$(ASC(RM5$(26+ODIR))-30)
BD 2140 COL=N8:ROW=N15:L1=N13:GOSUB 160:I
   F EDIT AND TEMP$="" AND RM5$(33,33)<>"
    " THEN ? "←←";RM5$(33,45):GOTO 2170
CN 2150 IF TEMP$="" THEN GOSUB 190:GOTO 2
   140
OZ 2160 RM5$(33,32+LEN(TEMP$))=TEMP$
GK 2170 ROW=N16:L1=N1:GOSUB 160:IF EDIT A
   ND TEMP$="" AND RM5$(96,96)<>" " THEN
   ? "←←";RM5$(96,96):GOTO 2210
IN 2180 IF TEMP$<>"" AND TEMP$<>"R" AND T
   EMP$<>"I" THEN GOSUB 190:GOTO 2170
CN 2190 IF TEMP$="" THEN TEMP$="I"
MX 2200 RM5$(96,96)=TEMP$:POSITION N8,N16
   :? TEMP$
OA 2210 COL=N12:ROW=N19:L1=25:GOSUB 160:I
   F EDIT AND TEMP$="" AND RM5$(71,71)<>"
    " THEN ? "←←";RM5$(71,95):GOTO 2240
ZD 2220 IF TEMP$="" THEN GOSUB 190:GOTO 2
   210
QM 2230 RM5$(71,70+LEN(TEMP$))=TEMP$
PF 2240 ROW=N20:GOSUB 160:IF EDIT AND TEM
   P$="" AND RM5$(46,46)<>" " THEN ? "←←"
   ;RM5$(46,70):GOTO 2270
EC 2250 IF TEMP$="" THEN GOSUB 190:GOTO 2
   240
TD 2260 RM5$(46,45+LEN(TEMP$))=TEMP$
ZC 2270 POSITION 25,N9:? "Everything":POS
   ITION 28,N11:? "OK?":GOSUB 200
FP 2280 IF A=ASC("N") OR A=ASC("n") THEN
   1660
DN 2290 IF A<>ASC("Y") AND A<>ASC("y") TH
   EN 2270
BO 2300 IF ED THEN RM5$(33)=B$(36):RM5$(2
   6+DIR,26+DIR)=CHR$(ASC(RM5$(26+DIR,26+
   DIR))-30)
ID 2310 IF EDIT THEN OPEN #N1,N12,N0,F$:P
   OINT #N1,SECTOR,BYTE:? #N1;RM5$:CLOSE
   #N1:EDIT=N0:GOTO 980
YQ 2320 OPEN #N1,N9,N0,F$:? #N1;RM5$:CLOS
   E #N1:R$(R,R)="*":R=R+N1:GOTO 1610
FU 2330 REM ******* WORK ON ITEMS *****
SM 2340 I$(N1)=" ":I$(120)=" ":I$(N2)=I$:
   CNT=N0:EDIT=N0:GOSUB 260
UW 2350 POSITION 27,N1:? "Items":POSITION
    N0,N3:? "          ITEM:":? "          CODE
   :"
IA 2360 ? "↓          ROOM:":? "↓          GET
   :"
OR 2370 ? "↓       COMMAND:":? "↓ITEM NEEDED
   :":? "          I/R:"
FY 2380 ? "↓    POS TEXT:":? "    NEG TEXT:
   ":POKE 559,34
BZ 2390 F$(LEN(F$)-N2)="ITM"
LL 2400 COL=N13:ROW=N3:L1=N13:GOSUB 160:I
   F TEMP$="" THEN GOSUB 190:GOTO 2400
NC 2410 IF LEN(TEMP$)<N13 THEN TEMP$(LEN(
   TEMP$)+N1)=B$(87+LEN(TEMP$))
BE 2420 IF LEN(ITM$)=N0 THEN 2550
TG 2430 I=USR(ADR(55$),ADR(TEMP$),ADR(ITM
   $),LEN(ITM$),N13):IF  NOT I THEN 2550
EJ 2440 CLOSE #N1:OPEN #N1,N12,N0,F$:EDIT
   =N1
LD 2450 NOTE #N1,SECTOR,BYTE:INPUT #N1;I$
   :CNT=CNT+N1:IF I$(N1,LEN(TEMP$))<>TEMP
   $ THEN 2450
AO 2460 POSITION N13,N4:? I$(N14,N16):POS
   ITION N13,N6:A=ASC(I$(N17)):IF A=65 TH
   EN ? "ANY":GOTO 2500
OR 2470 IF A>30 AND A<61 THEN ? ASC(I$(N1
   7))-30:GOTO 2500
AM 2480 IF A<31 THEN ? ASC(I$(N17)):GOTO
   2500
GH 2490 ? "C":GOTO 2550
YL 2500 POSITION N13,N8:IF A>30 AND A<>65
    THEN ? "N":GOTO 2520
YS 2510 ? "Y"
HB 2520 POSITION N13,N10:? I$(N18,32):IF
   I$(N18,21)="NONE" THEN 2550
GO 2530 POSITION N13,N12:? I$(33,45):POSI
   TION N13,N13:? I$(96,96)
YU 2540 POSITION N13,N15:? I$(46,70):POSI
   TION N13,N16:? I$(71,95)
CG 2550 CLOSE #N1
PP 2560 IF  NOT I THEN 2580
LQ 2570 COL=N13:ROW=N3:L1=N13:GOSUB 160:I
   F EDIT AND TEMP$="" THEN ? "←←";I$(N1,
   N13):GOTO 2590
CT 2580 I$(N1,LEN(TEMP$))=TEMP$
XE 2590 ROW=N4:L1=N3:E=N0:GOSUB 160:IF LE
   N(TEMP$)<N3 AND EDIT THEN ? "←←";I$(N1
   4,N16):GOTO 2650
ZH 2600 IF LEN(TEMP$)<N3 THEN GOSUB 190:G
   OTO 2590
RA 2610 IF LEN(CD$)=N0 THEN 2640
TK 2620 IF EDIT THEN E=USR(ADR(55$),ADR(I
   $(N14,N16)),ADR(CD$),LEN(CD$),N3)
CW 2630 A=USR(ADR(55$),ADR(TEMP$),ADR(CD$
   ),LEN(CD$),N3):IF A THEN GOSUB 190:GOT
   O 2590
FE 2640 I$(N14,N16)=TEMP$
YD 2650 ROW=N6:L1=N3:GOSUB 160:Z$=TEMP$:I
   F Z$="C" THEN I$(N17,N17)=Z$:? "←←C  "
   :GOTO 3030
CZ 2660 IF Z$="ANY" THEN I$(N17,N17)="A":
   GOTO 2760
AQ 2670 IF EDIT AND Z$="" AND ASC(I$(N17)
   )<31 THEN ? "←←";ASC(I$(N17)):GOTO 276
   0
```

```
QD 2680 IF EDIT AND Z$="" AND ASC(I$(N17)
   )<61 THEN ? "↤";ASC(I$(N17))-30:GOTO
   2760
JS 2690 IF EDIT AND Z$="" AND I$(N17,N17)
   ="A" THEN ? "↤ANY":GOTO 2760
KY 2700 IF EDIT AND Z$="" THEN Z$="C":? "
   ↤";Z$:GOTO 3030
XJ 2710 IF Z$="" THEN ? "↤ANY":I$(N17,N1
   7)="A":GOTO 2760
DS 2720 TRAP 2750:IF VAL(Z$)<N0 OR VAL(Z$
   )>30 THEN GOSUB 190:GOTO 2650
JE 2730 I$(N17,N17)=CHR$(VAL(Z$)):IF VAL(
   Z$)=N0 THEN 3030
UG 2740 GOTO 2760
VH 2750 GOSUB 190:? "↤ ":GOTO 2650
GH 2760 TRAP 40000:ROW=N8:L1=N1:GOSUB 160
   :A$=TEMP$
LY 2770 IF TEMP$<>"Y" AND TEMP$<>"N" AND
   TEMP$<>"" THEN GOSUB 190:GOTO 2760
UW 2780 IF EDIT AND TEMP$="" THEN LOCATE
   COL,ROW,A:TEMP$=CHR$(A-128):? "↤";TEMP
   $:A$=TEMP$:GOTO 2820
MW 2790 IF TEMP$="" THEN A$="Y":? "↤↤";A$
OJ 2800 IF TEMP$="N" THEN I$(N17,N17)=CHR
   $(ASC(I$(N17))+30)
MD 2810 IF EDIT AND TEMP$="Y" AND ASC(I$(
   N17,N17))>30 THEN I$(N17,N17)=CHR$(ASC
   (I$(N17))-30)
CN 2820 ROW=N10:L1=N15:GOSUB 160:IF TEMP$
   ="" AND EDIT THEN ? "↤↤";I$(N18,32):GO
   TO 2860
EP 2830 IF TEMP$="" AND A$="Y" THEN TEMP$
   ="GET":? "↤↤";TEMP$
ZL 2840 IF TEMP$="" AND A$="N" THEN TEMP$
   ="NONE":? "↤↤";TEMP$
YT 2850 I$(N18,N17+LEN(TEMP$))=TEMP$
IG 2860 IF I$(N18,N20)="GET" OR I$(N18,21
   )="NONE" THEN 3030
LJ 2870 ROW=N12:L1=N13:GOSUB 160:IF TEMP$
   ="" AND EDIT AND I$(33,33)<>" " THEN ?
    "↤↤";I$(33,45):GOTO 2900
PF 2880 IF TEMP$="" THEN TEMP$="NONE":POS
   ITION COL,ROW:? TEMP$
KX 2890 I$(33,32+LEN(TEMP$))=TEMP$
LE 2900 IF I$(33,36)<>"NONE" THEN 2920
EQ 2910 POSITION COL,ROW+N1:? " ":I$(96,9
   6)=" ":POSITION COL,N16:? B$(74):I$(71
   ,95)=B$(74):GOTO 2960
SZ 2920 ROW=N13:L1=N1:GOSUB 160:IF EDIT A
   ND TEMP$="" AND I$(96,96)<>" " THEN ?
   "↤↤";I$(96,96):GOTO 2960
PX 2930 IF TEMP$<>"R" AND TEMP$<>"I" AND
   TEMP$<>"" THEN GOSUB 190:GOTO 2900
FP 2940 IF TEMP$="" THEN TEMP$="I":? "↤↤"
   ;TEMP$
CU 2950 I$(96,96)=TEMP$
AP 2960 ROW=N15:L1=25:GOSUB 160:IF TEMP$=
   "" AND EDIT AND I$(46,46)<>" " THEN ?
   "↤↤";I$(46,70):GOTO 2990
SL 2970 IF TEMP$="" THEN GOSUB 190:GOTO 2
   960
OI 2980 I$(46,45+LEN(TEMP$))=TEMP$
AR 2990 IF I$(33,36)="NONE" THEN 3030
MT 3000 ROW=N16:GOSUB 160:IF TEMP$="" AND
    EDIT THEN ? "↤↤";I$(71,95):GOTO 3030
WQ 3010 IF TEMP$="" THEN ? "↤↤  ":GOTO 30
   30
KZ 3020 I$(71,70+LEN(TEMP$))=TEMP$
ZY 3030 IF EDIT AND I$(N18,21)="NONE" THE
   N FOR X=N12 TO N17:POSITION N13,X:? B$
   (74):NEXT X
WA 3040 IF EDIT AND I$(N17,N17)="C" THEN
   FOR X=N8 TO N17:POSITION N13,X:? B$(74
   ):NEXT X
PE 3050 POSITION N3,N20:? "everything ok?
   ":GOSUB 200:IF A=ASC("Y") OR A=ASC("y"
   ) THEN 3090
FA 3060 IF EDIT AND (A=ASC("N") OR A=ASC(
   "n")) THEN 2340
ZC 3070 IF A=ASC("N") OR A=ASC("n") THEN
   2340
PX 3080 GOTO 3030
SO 3090 IF EDIT THEN 3110
GO 3100 ICNT=ICNT+N1:IF ICNT>50 THEN GOSU
   B 190:POSITION N2,N20:? "TOO MANY ITEM
   S!!":FOR X=N1 TO 200:NEXT X:GOTO 980
SR 3110 IF EDIT AND I$(N18,21)="NONE" THE
   N I$(22)=B$
ZQ 3120 IF EDIT AND E THEN CD$(E*N3-N2,E*
   N3)=I$(N14,N16)
OO 3130 IF EDIT AND I THEN ITM$(I*N13-N12
   ,I*N13)=I$(N1,N13)
AP 3140 IF EDIT THEN OPEN #N1,N12,N0,F$:P
   OINT #N1,SECTOR,BYTE:GOTO 3160
ES 3150 CD$(ICNT*N3-N2,ICNT*N3)=I$(N14,N1
   6):ITM$(ICNT*N13-N12,ICNT*N13)=I$(N1,N
   13):CLOSE #N1:OPEN #N1,N9,N0,F$
YP 3160 ? #N1;I$:CLOSE #N1:GOTO 2340
CG 3170 REM ***** SIMPLE COMMANDS *****
SG 3180 F$(LEN(F$)-N2)="COM"
ND 3190 GOSUB 260:GOSUB 310
GU 3200 POSITION 22,N1:? "simple commands
   ":GOSUB 350
EW 3210 IF A=ASC("N") OR A=ASC("n") THEN
   3190
BI 3220 GOSUB 130:GOTO 3190
PI 3230 REM **** MOVEMENT COMMANDS ****
IQ 3240 F$(LEN(F$)-N2)="MOV"
BB 3250 M=N1:GOSUB 260:GOSUB 310
YN 3260 POSITION 21,N1:? "movement comman
   ds":GOSUB 350
AU 3270 IF A=ASC("N") OR A=ASC("n") THEN
   3250
ZI 3280 GOSUB 130:GOTO 3250
YC 3290 REM ***** FATAL COMMANDS *****
OC 3300 F$(LEN(F$)-N2)="FAT"
MJ 3310 GOSUB 260:GOSUB 310
KK 3320 POSITION 23,N1:? "fatal commands"
   :GOSUB 350
VQ 3330 IF A=ASC("N") OR A=ASC("n") THEN
   3310
WG 3340 GOSUB 130:GOTO 3310
TO 3350 REM ****** FINAL COMMANDS *****
QI 3360 F$(LEN(F$)-N2)="FIN"
NB 3370 GOSUB 260:GOSUB 310
MU 3380 POSITION 23,N1:? "final commands"
   :GOSUB 350
FU 3390 IF A=ASC("N") OR A=ASC("n") THEN
   3370
BE 3400 GOSUB 130:GOTO 3370
UU 3410 REM ****** ITEM COMMANDS ******
SY 3420 F$(LEN(F$)-N2)="CHG":EDIT=N0
TZ 3430 GOSUB 260:POSITION 23,N1:? "item
   commands"
MV 3440 POSITION N0,N3:? "     COMMAND:":?
    "↓ITEM NEEDED:":? "              :":? "↓
       ROOM:"
EM 3450 ? "↓     CREATE:":? "     R or I:
   ":? "       GET:"
JK 3460 ? "↓     DELETE:":? "           :
   "
EK 3470 ? "↓   POS TEXT:":? "   NEG TEXT:
   ":GOSUB 250
NG 3480 COL=N13:ROW=N3:L1=N15:GOSUB 160:I
   F TEMP$="" THEN GOSUB 190:GOTO 3480
CK 3490 IF LEN(TEMP$)<N15 THEN FOR X=LEN(
   TEMP$)+N1 TO N15:TEMP$(X)=" ":NEXT X
HB 3500 C=USR(ADR(SS$),ADR(TEMP$),ADR(CM$
   ),LEN(CM$),N15):IF  NOT C THEN 3600
VX 3510 CLOSE #N1:OPEN #N1,N12,N0,F$:TRAP
    4100
WQ 3520 NOTE #N1,SECTOR,BYTE:INPUT #N1;CM
   D$:IF CMD$(N1,LEN(TEMP$))<>TEMP$ THEN
   3520
II 3530 EDIT=N1
MO 3540 POSITION N13,N5:? CMD$(N16,28):PO
   SITION N13,N6:? CMD$(122,134)
ZA 3550 POSITION N13,N8:A=ASC(CMD$(29)):I
```

```
   F A=N0 THEN ? "ANY":GOTO 3570
QZ 3560 ? A
DE 3570 POSITION N13,N10:? CMD$(81,93):PO
   SITION N13,N11:? CMD$(94,94):POSITION
   N13,N12:? CMD$(95,95)
FW 3580 POSITION N13,N14:? CMD$(96,108):P
   OSITION N13,N15:? CMD$(109,121):POSITI
   ON N13,N17:? CMD$(30,54)
DU 3590 POSITION N13,N18:? CMD$(55,79):GO
   TO 3610
WO 3600 CMD$(N1)=" ":CMD$(134)=" ":CMD$(N
   2)=CMD$:CLOSE #N1:CMD$(N1,LEN(TEMP$))=
   TEMP$:GOTO 3630
ST 3610 GOSUB 160:IF TEMP$="" THEN ? "↤↤"
   ;CMD$(N1,N15):GOTO 3630
PX 3620 CMD$(N1,LEN(TEMP$))=TEMP$
UO 3630 ROW=N5:L1=N13:GOSUB 160:IF TEMP$=
   "" AND EDIT THEN ? "↤↤";CMD$(N16,28):G
   OTO 3660
OQ 3640 IF TEMP$="" THEN TEMP$="NONE":POS
   ITION COL,ROW:? TEMP$
FR 3650 CMD$(N16,N15+LEN(TEMP$))=TEMP$
QO 3660 IF CMD$(N16,N19)<>"NONE" THEN 368
   0
DW 3670 CMD$(122,134)="NONE          ":POS
   ITION COL,ROW+1:? CMD$(122,134):GOTO 3
   710
EW 3680 ROW=N6:GOSUB 160:IF EDIT AND TEMP
   $="" THEN ? "↤↤";CMD$(122,134):GOTO 37
   10
PF 3690 IF TEMP$="" THEN TEMP$="NONE":POS
   ITION COL,ROW:? TEMP$
YQ 3700 CMD$(122,121+LEN(TEMP$))=TEMP$
JU 3710 ROW=N8:L1=N3:GOSUB 160:IF EDIT AN
   D TEMP$="" AND CMD$(29,29)<>"♥" THEN ?
    "↤↤";STR$(ASC(CMD$(29))):GOTO 3770
XG 3720 IF TEMP$="" THEN ? "↤↤ANY":TEMP$=
   "0"
LK 3730 IF TEMP$="ANY" THEN Z$="0":GOTO 3
   750
KC 3740 Z$=TEMP$
XI 3750 TRAP 3710:IF VAL(Z$)<N0 OR VAL(Z$
   )>30 THEN GOSUB 190:GOTO 3710
QT 3760 CMD$(29,29)=CHR$(VAL(Z$))
CI 3770 TRAP 40000:ROW=N10:L1=N13:GOSUB 1
   60:IF TEMP$="" AND EDIT THEN ? "↤↤";CM
   D$(81,93):GOTO 3800
PE 3780 IF TEMP$="" THEN TEMP$="NONE":POS
   ITION COL,ROW:? TEMP$
KM 3790 CMD$(81,80+LEN(TEMP$))=TEMP$
ZD 3800 IF CMD$(81,84)<>"NONE" THEN 3820
QC 3810 CMD$(94,94)=" ":CMD$(95,95)=" ":P
   OSITION COL,ROW+N1:? " ":POSITION COL,
   ROW+2:? " ":GOTO 3900
NR 3820 ROW=N11:L1=N1:GOSUB 160:IF TEMP$(
   )"" AND TEMP$<>"I" AND TEMP$<>"R" THEN
    GOSUB 190:GOTO 3820
LY 3830 IF EDIT AND TEMP$="" AND CMD$(94,
   94)="R" THEN ? "↤↤R":GOTO 3860
VM 3840 IF TEMP$="" THEN TEMP$="I":POSITI
   ON COL,ROW:? TEMP$
GA 3850 CMD$(94,94)=TEMP$:IF TEMP$="I" TH
   EN POSITION COL,ROW+N1:? "Y":CMD$(95,9
   5)="Y":GOTO 3900
NQ 3860 ROW=N12:GOSUB 160:IF TEMP$<>"" AN
   D TEMP$<>"Y" AND TEMP$<>"N" THEN GOSUB
    190:GOTO 3860
MX 3870 IF EDIT AND TEMP$="" AND CMD$(95,
   95)="N" THEN ? "↤↤N":GOTO 3900
YM 3880 IF TEMP$="" THEN TEMP$="Y":? "↤↤"
   ;TEMP$
ZF 3890 CMD$(95,95)=TEMP$
OM 3900 ROW=N14:L1=N13:GOSUB 160:IF TEMP$
   ="" AND EDIT THEN ? "↤↤";CMD$(96,108):
   GOTO 3930
ON 3910 IF TEMP$="" THEN TEMP$="NONE":POS
   ITION COL,ROW:? TEMP$
PZ 3920 CMD$(96,95+LEN(TEMP$))=TEMP$
MP 3930 IF CMD$(96,99)<>"NONE" THEN 3950
PK 3940 CMD$(109,121)="NONE          ":POS
   ITION COL,ROW+N1:? "NONE          ":GO
   TO 3980
VI 3950 ROW=N15:GOSUB 160:IF EDIT AND TEM
   P$="" THEN ? "↤↤";CMD$(109,121):GOTO 3
   980
IM 3960 IF TEMP$="" THEN TEMP$="NONE":? "
   ↤↤";TEMP$
FN 3970 CMD$(109,108+LEN(TEMP$))=TEMP$
KT 3980 ROW=N17:L1=25:GOSUB 160:IF TEMP$=
   "" AND EDIT THEN ? "↤↤";CMD$(30,54):GO
   TO 4010
XG 3990 IF TEMP$="" THEN GOSUB 190:GOTO 3
   980
II 4000 CMD$(30,29+LEN(TEMP$))=TEMP$
IB 4010 IF CMD$(N16,N19)="NONE" THEN POSI
   TION COL,ROW+N1:? B$(74):CMD$(55,79)=B
   $(75):GOTO 4050
RX 4020 ROW=N18:GOSUB 160:IF TEMP$="" AND
    EDIT AND CMD$(55,56)<>"  " THEN ? "↤↤
   ";CMD$(55,79):GOTO 4050
AQ 4030 IF TEMP$="" THEN GOSUB 190:GOTO 4
   020
KR 4040 CMD$(55,54+LEN(TEMP$))=TEMP$
SV 4050 POSITION 23,N19:? "EVERYTHING OK?
   ":GOSUB 200
YX 4060 IF A=ASC("N") OR A=ASC("n") THEN
   3420
AK 4065 IF A<>ASC("Y") AND A<>ASC("y") TH
   EN 4050
AS 4070 IF EDIT THEN CM$(C*N15-N14,C*N15)
   =CMD$(N1,N15)
VG 4080 IF  NOT EDIT THEN CM$(LEN(CM$)+N1
   )=CMD$(N1,N15)
YJ 4090 GOSUB 130:GOTO 3420
JO 4100 CLOSE #N1:POSITION N4,N20:? "COMM
   AND USED!":GOSUB 190:GOTO 3480
HQ 4110 REM ********** INTRO **********
GI 4120 F$(LEN(F$)-N2)="INT":GOSUB 260:PO
   SITION 25,N1:? "intro text":POKE 559,3
   4:POKE 82,N2
ZO 4130 TRAP 4160:OPEN #N1,N4,N0,F$:GET #
   N1,LH:GET #N1,LL:L=LH*78+LL
PY 4140 FOR X=N1 TO LH+N1:INPUT #N1;TM$:T
   EMP$(X*78-77,X*78)=TM$:NEXT X:CLOSE #N
   1
KK 4150 POSITION N2,N4:? TEMP$
5G 4160 POSITION N2,N4:COL=N2:ROW=N4:L1=4
   94:GOSUB 160
IV 4170 IF TEMP$="" THEN 980
TG 4180 POSITION 23,N19:? "EVERYTHING OK?
   ":GOSUB 200
WF 4190 IF A=ASC("N") OR A=ASC("n") THEN
   4120
HO 4195 IF A<>ASC("Y") AND A<>ASC("y") TH
   EN 4180
XF 4200 OPEN #N1,N8,N0,F$:L=LEN(TEMP$):LH
   =INT(L/78):LL=L-LH*78:PUT #N1,LH:PUT #
   N1,LL
MA 4210 TEMP$(LH*78+LL+N1)=B$(LL+N1)
LJ 4220 FOR X=N1 TO LH+N1:? #N1;TEMP$(X*7
   8-77,X*78):NEXT X:CLOSE #N1:GOTO 980
HG 4230 REM ******** TITLE PAGE *******
JE 4240 POKE 1788,N1:POKE 106,PEEK(106)-N
   5
BB 4250 GRAPHICS N0:POKE 559,N0:DL=PEEK(5
   60)+256*PEEK(561)+N4
GB 4260 POKE DL+N5,N7:POKE DL+N8,N6:POKE
   DL+N9,N6:POKE DL+N10,N6
XF 4270 POKE DL+24,65:POKE DL+25,PEEK(560
   ):POKE DL+26,PEEK(561)
BF 4280 POKE 752,N1:POKE 710,N0:POSITION
   N5,N4:? "the wizard":POSITION 27,N6:?
   "A TEXT"
DJ 4290 POSITION 21,N7:? "ADVENTURE CREAT
   OR":POSITION N18,N13:? "By"
MI 4300 POSITION N12,N15:? "Clayton Walnu
```

```
   M":POKE 559,34
OL 4310 REM ******** INITIALIZE ********
NY 4320 DIM N$(20),A$(8),F$(14),RM$(16),R
   M1$(N16),EX$(N7),IT$(N13),ITM$(650),TE
   MP$(800),T$(N20),B$(99),TM$(78),FN$(8)
PS 4330 DIM Z$(N3),RM5$(96),DIR$(N6),I$(1
   20),FI$(N8),CMD$(134),P(N6,N2),S5$(100
   ),R$(30),CD$(150),CH$(N13),CM$(1500)
WU 4340 RESTORE 4370:FOR X=N1 TO N6:FOR Y
   =N1 TO N2:READ A:P(X,Y)=A:NEXT Y:NEXT
   X
AS 4350 GOSUB 90:R$(N1)=" ":R$(30)=" ":R$
   (N2)=R$:CM$="GET            DROP
        ":CCNT=N2:LD=N0
KM 4360 B$(N1)=" ":B$(99)=" ":B$(N2)=B$
UM 4370 DATA 29,5,29,15,36,10,22,10,24,5,
   34,15
TK 4380 RM$="[16 ++]":RM1$="[2 ++]
           [2 ++]":EX$="  ↓↑←  ":F$="D:"
GC 4390 DIR$="NSEWUD"
VM 4400 RETRN=155:BACKSP=126:ESCAPE=27
JU 4410 ICNT=N0
QH 4420 REM **** MOVE CHARACTER SET ****
FN 4430 CHSET=(PEEK(106)+N1)*256:CS=CHSET
   /256
UO 4440 DIM MV$(20):POKE 203,0:POKE 204,C
   S:POKE 205,N0:POKE 206,224
MQ 4450 MV$="h[2 ♥][4 LM,KHPU,FNFLJPI]♦":D=USR(
   ADR(MV$))
MI 4460 RESTORE 4500
NB 4470 READ A:IF A=-1 THEN 980
XY 4480 FOR Z=0 TO 7:READ J:POKE CHSET+A*
   8+Z,J:NEXT Z
UQ 4490 GOTO 4470
SN 4500 DATA 11,85,85,85,85,85,85,85,85
EU 4510 DATA -1
DV 4520 DATA 104,104,133,204,104,133,203,
   104,133,206,104,133,205,104,141,1,6,10
   4,141,0,6,104,104,133,207
KN 4530 DATA 162,0,142,2,6,142,3,6,134,21
   3,232,160,0,177,203,209,205,208,8,200,
   196,207,208,245,134
DL 4540 DATA 212,96,173,2,6,24,101,207,14
   1,2,6,144,3,238,3,6,173,2,6,205,0,6,20
   8,8,173
KL 4550 DATA 3,6,205,1,6,240,13,165,205,2
   4,101,207,133,205,144,200,230,206,176,
   196,169,0,133,212,96
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Listing 2.
BASIC listing.

```
AE 10 REM ******************************
BL 20 REM *         THE WIZARD         *
RX 30 REM *  DATABASE PRINTER MODULE   *
EL 40 REM *           by               *
NA 50 REM *      Clayton Walnum        *
AJ 60 REM ******************************
BT 70 DIM HD$(120),HD2$(120),DT$(135),PL$
   (130),F$(15),F1$(8),D$(7),LINE$(128),T
   XT$(1000)
PS 80 D$=" NSEWUD":F$="D:":LINE$(1)="-":L
   INE$(128)="-":LINE$(2)=LINE$:FL=0
NY 90 OPEN #2,4,0,"P:":OPEN #1,4,0,"D:FIL
   ENAME.DAT":INPUT #1;F1$:CLOSE #1:F$(3)
   =F1$
KA 100 ? #2;CHR$(15);"FILENAME: ";F1$:? #
   2:? #2
ZM 110 ? #2;"*******> ROOM DATA"
RC 120 HD$(1,66)="RN DESCRIPTION
         N   S   E   W   U   D    R   ITEM NEED
   ED   "
CV 130 HD$(67)="I/R  POS TEXT
            NEG TEXT"
BK 140 ? #2;HD$:F$(LEN(F$)+1)=".RM5":OPEN
    #1,4,0,F$:TRAP 230:? #2;LINE$
ZJ 150 INPUT #1;DT$:DIR=0:A=ASC(DT$(1)):P
   L$(1)=STR$(A):IF A<10 THEN PL$(2)=" "
YA 160 PL$(3)=" ":PL$(4)=DT$(2,26):PL$(29
   )=" "
YH 170 FOR X=1 TO 6:A=ASC(DT$(26+X)):IF A
   >30 THEN A=A-30:DIR=X
HN 180 PL$(27+X*3)=STR$(A):IF A<10 THEN P
   L$(28+X*3)=" "
QD 190 PL$(29+X*3)=" ":NEXT X:PL$(48)=" "
   :PL$(49)=D$(DIR+1,DIR+1):PL$(50)="   "
UA 200 PL$(53)=DT$(33,45):PL$(66)="  ":PL
   $(68)=DT$(96)
JK 210 PL$(69)="   ":PL$(72)=DT$(46,70):P
   L$(97)="   ":PL$(100)=DT$(71,95)
TN 220 ? #2;PL$:? #2;LINE$:GOTO 150
QH 230 CLOSE #1:F$(LEN(F$)-2)="ITM":OPEN
   #1,4,0,F$:TRAP 390
RO 240 ? #2:? #2:? #2;"*******> ITEM DATA
   "
ZM 250 HD$="ITEM            CODE  RM  COM
   MAND          ITEM NEEDED     I/R  GET
    POS TEXT                      NEG TEXT"
XT 260 ? #2;HD$:? #2;LINE$
BH 270 INPUT #1;DT$:PL$(1)=DT$(1,13):PL$(
   14)="   ":PL$(17)=DT$(14,16):PL$(20)="
     "
TB 280 A=ASC(DT$(17)):OA=A:IF A=65 THEN P
   L$(23)="ANY":PL$(26)=" ":GOTO 330
AG 290 IF A=67 THEN PL$(23)="C   ":GOTO 3
   80
ED 300 IF A>30 THEN A=A-30
CY 310 PL$(23)=STR$(A):IF A<10 THEN PL$(2
   4)="   ":GOTO 330
UA 320 PL$(25)="  "
DN 330 PL$(27)=DT$(18,32):PL$(42)="  ":PL
   $(44)=DT$(33,45)
RB 340 PL$(57)="   ":PL$(60)=DT$(96,96):P
   L$(61)="   "
TW 350 IF OA>30 AND OA<65 THEN PL$(65)="N
   ":GOTO 370
GQ 360 PL$(65)="Y"
RD 370 PL$(66)="   ":PL$(69)=DT$(46,70):P
   L$(94)=" ":PL$(95)=DT$(71,95)
XO 380 ? #2;PL$:? #2;LINE$:GOTO 270
QQ 390 CLOSE #1:F$(LEN(F$)-2)="COM":OPEN
   #1,4,0,F$
IC 400 ? #2:? #2:? #2;"*******> SIMPLE CO
   MMANDS"
GN 410 HD$="COMMAND             ITEM NEEDED
        I/R   RM   POS TEXT
        NEG TEXT":? #2;HD$:? #2;LINE$
EZ 420 GOSUB 430:GOTO 520
LY 430 TRAP 510
BF 440 INPUT #1;DT$:PL$(1)=DT$(1,15):PL$(
   16)="   ":PL$(19)=DT$(16,28):PL$(32)="
     "
OH 450 PL$(36)=DT$(81,81):PL$(37)="    ":
   IF DT$(29,29)="♥" THEN PL$(41)="ANY":P
   L$(44)="  ":GOTO 480
IT 460 PL$(41)=STR$(ASC(DT$(29))):IF ASC(
   DT$(29))<10 THEN PL$(42)="    ":GOTO 4
   80
PJ 470 PL$(43)="   "
KD 480 PL$(46)=DT$(30,54):PL$(71)="   ":P
   L$(73)=DT$(55,79)
MN 490 IF FL THEN PL$(98)="   ":PL$(101)=
   STR$(ASC(DT$(80)))
VT 500 ? #2;PL$:? #2;LINE$:GOTO 440
ZD 510 RETURN
L5 520 CLOSE #1:F$(LEN(F$)-2)="FAT":OPEN
   #1,4,0,F$
TJ 530 ? #2:? #2:? #2;"*******> FATAL COM
   MANDS":? #2;HD$:? #2;LINE$:GOSUB 430
NY 540 CLOSE #1:F$(LEN(F$)-2)="FIN":OPEN
   #1,4,0,F$
VR 550 ? #2:? #2:? #2;"*******> FINAL COM
   MANDS":? #2;HD$:? #2;LINE$:GOSUB 430
JY 560 HD$(LEN(HD$)+1)="
     DES"
```

```
ML 570 CLOSE #1:F$(LEN(F$)-2)="MOV":OPEN
   #1,4,0,F$
BT 580 ? #2:? #2:? #2;"*******) MOVEMENT
   COMMAND$":? #2;HD$:? #2;LINE$:FL=1:GOS
   UB 430
BM 590 CLOSE #1:F$(LEN(F$)-2)="CHG":OPEN
   #1,4,0,F$
FM 600 HD$="COMMAND              ITEM 1 NEED
   ED   ITEM 2 NEEDED   CREATE ITEM     R
   M    R/I   GET"
DW 610 HD$(80)="  ITEM 1 DELETE   ITEM 2
   DELETE"
OT 620 HD2$="POS TEXT
   NEG TEXT"
ST 630 ? #2:? #2:? #2;"*******) ITEM COMM
   AND$":? #2;HD$:? #2;HD2$:? #2;LINE$:TR
   AP 720
PW 640 INPUT #1;DT$:PL$=DT$(1,15):PL$(16)
   ="   ":PL$(19)=DT$(16,28):PL$(32)="
   ":PL$(35)=DT$(122,134):PL$(48)="   "
FS 650 PL$(51)=DT$(81,93):PL$(64)="   "
JA 660 A=ASC(DT$(29)):IF A=0 THEN PL$(67)
   ="ANY":GOTO 690
KO 670 PL$(67)=STR$(A):IF A<10 THEN PL$(6
   8)="  ":GOTO 690
DT 680 PL$(69)=" "
TT 690 PL$(70)="   ":PL$(73)=DT$(94):PL$(
   74)="   ":IF DT$(95,95)=" " THEN DT$(
   95,95)="Y"
WK 700 PL$(78)=DT$(95):PL$(79)="   ":PL$(
   82)=DT$(96,108):PL$(95)="   ":PL$(98)=
   DT$(109,121):? #2;PL$
ZM 710 PL$=DT$(30,54):PL$(26)="   ":PL$(2
   9)=DT$(55,79):? #2;PL$:? #2;LINE$:GOTO
    640
VW 720 CLOSE #1:F$(LEN(F$)-2)="INT":OPEN
   #1,4,0,F$:GET #1,A:GET #1,A:TRAP 750
VX 730 ? #2:? #2:? #2;"*******) INTRO TEX
   T":? #2;LINE$:C=1
DC 740 INPUT #1;DT$:TXT$(C*78-77)=DT$:C=C
   +1:GOTO 740
UP 750 C=1:TRAP 770
DB 760 ? #2;TXT$(C*38-37,C*38):C=C+1:GOTO
    760
OK 770 END
```


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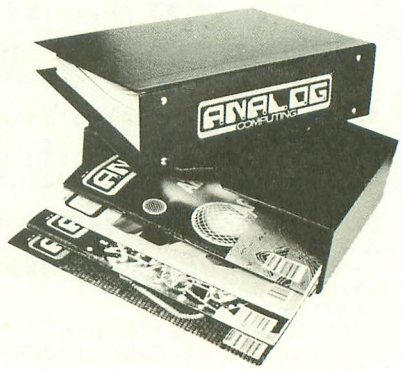

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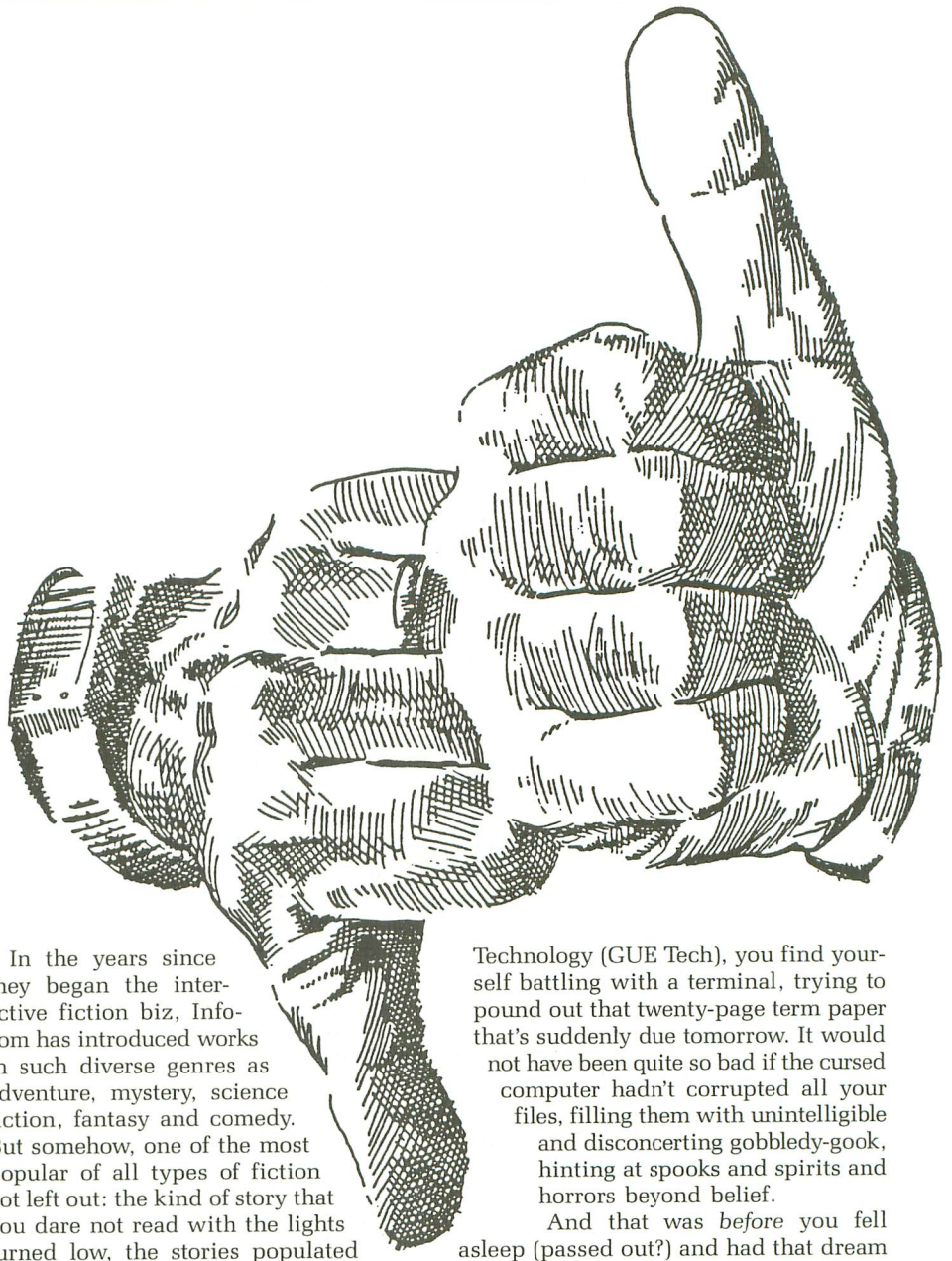

by Steve Panak

If there's one thing I'll remember the most about the June 1987 Summer CES, it would have to be that it was one weekend that was full of surprises. Fickle weather, at one moment bathed us in blindingly bright sunlight—the next moment, my car almost spun out of control in a six-lane highway, a victim of hydroplaning during a sudden, torrential downpour. Surviving the storm, I was again surprised—this time pleasantly—by a floor full of new software, nestled in a dense nucleus around a healthy, airplane-capped Atari display.

The two-story black plastic structure played home to a number of software developers, in addition to the full and expanding line of Atari hardware. And a couple of software producers erected equally impressive displays, to hype their own new products.

Infocom was showing their two new games, **The Lurking Horror** (which we'll get to shortly) and **Stationfall**, a sequel to an earlier Infocom game, whose title I'll reveal later, if you find yourself unable to guess it at this point.

The Lurking Horror

by Dave Lebling
INFOCOM
125 CambridgePark Drive
Cambridge, MA 02140
48K Disk $34.95

In the years since they began the interactive fiction biz, Infocom has introduced works in such diverse genres as adventure, mystery, science fiction, fantasy and comedy. But somehow, one of the most popular of all types of fiction got left out: the kind of story that you dare not read with the lights turned low, the stories populated with creatures and incidents of unspeakable terror. Well, much to our nightmarish dismay, they have rectified that oversight.

The Lurking Horror is one of the latest releases from Infocom, and the first to boldly barge into the world dominated by the dread poetic ravings of Edgar Allen Poe and the shudder-inducing tales of Stephen King. And, while its sales might not surpass those of either of these authors' works, it is destined to become yet another jewel in the Infocom crown. As the main character, if you're not careful, it could prove to be the nail in your coffin.

A procrastinating student at good old George Underwood Edwards Institute of Technology (GUE Tech), you find yourself battling with a terminal, trying to pound out that twenty-page term paper that's suddenly due tomorrow. It would not have been quite so bad if the cursed computer hadn't corrupted all your files, filling them with unintelligible and disconcerting gobbledy-gook, hinting at spooks and spirits and horrors beyond belief.

And that was *before* you fell asleep (passed out?) and had that dream . . . about the pit and finding the stone, and the hoards of people chanting and crushing in on you, and then there's the horrible creature that shocked you back into consciousness. Of course, can you really call it a dream, since, when you awoke, the small stone was still in your hand? The strangely inscribed (clawed?) rock is the least of your troubles, though, as you muster up your courage and begin to explore the vast network of old, underground tunnels connecting the various buildings of GUE. You see, they've been closed for a reason. Rumor has it, a not-so-pleasant reason.

So, as the wind blows up a winter blizzard, sealing you into the university's science complex, you find yourself drawn to

the old tunnels, confronting supernatural beings of all descriptions. Just don't forget to carry your common sense with you—as well as that fire axe in the hallway.

The puzzles in this game are logical and well designed (I hoped I'd find a reason to use the forklift), the prose horrific and seasoned with dashes of patented Infocom humor. For instance, I've been *waiting* for the kind of response I got when I used one of my favorite commands, "kill man with axe," on the maintenance man. The outcome: *The fire axe chops into his chest, where it sticks. Ed Ames would be proud. He looks down at the axe with a certain perplexity, then pulls it free, the wound making a sickening sucking sound.*

While this is a peculiar response, it's nowhere near as surprising as the feel of his icy hands as they strangle you to death. Fortunately, there's always a rebirth, thanks to the save and restore commands. The standard Infocom program is superb and features a large vocabulary, as well as allowing abbreviations of the most often used commands, such as *X* for examine and *I* for inventory.

In addition to assaulting a new genre, in a major shift in strategy, Infocom has also adopted a new packaging design. Continuing the evolution of their always-creative containers (remember the original Starcross plastic spacecraft?), they have refined their book-shaped box, eliminating the page-filled cover and substituting a removable inner box, which slides in opposite the spine. This narrow box contains a technical manual (that tells how to run the program, and is supplemented with a machine-specific reference card), a student I.D., and a creepy creature. Also included is a freshman guide to the University, chock-full of background and hints. As always, you'll have to pay attention to all these details to get through the chilling, thrilling adventure.

The Lurking Horror is a fine addition to your Infocom library, and a must for horror fans. While it probably won't scare you out of a night's sleep, its entertaining prose and challenging puzzles *will* provide you with many sleepless hours. With **The Lurking Horror**, the masters at Infocom have laid waste to yet another genre.

Night Mission Pinball

by Bruce Artwick
subLOGIC
713 Edgebrook Drive
Champaign, IL 61820
32K Disk $29.95

When I bought my first 8-bit Atari (an 800, at the incredible cost of $1200), there was little software available, and even less that was any good. But one of the first games I owned and loved was a pinball simulation, **Night Mission Pinball**, from subLOGIC. It is only now, nearly three years later, that I've gotten around to bringing it to you. I only hope that you find it to be as enjoyable the second time around as I did the first.

This classic simulation shows just what can be done with 32K of efficient and compact code. It was the first program to capture the look and feel of a pinball machine—from the banks of drop targets to the infuriating "tilt" light, this game is as close as you can get without leaving your keyboard. There have been others since, but even now, almost five years after its initial release, this program can still hold its own against them.

Designed around the theme of a WWII bombing run, this game allows multiple-ball play of up to four silver spheres. The playfield is jam-packed with five bumpers, seven drop targets, and enough rollovers and ball-captures to keep it interesting and challenging for months to come. Even with a television as a monitor, the board is crystal clear. After careful adjustment of the color controls, you'll be able to distinctly make out the letters and score values associated with the various rollovers and targets. Dual-channel sound is achieved by driving the internal speaker of the 800 along with the monitor's speaker, and the speed of play is oftimes incredible.

You can control play with joysticks or the keyboard. The SHIFT and START keys control the left and right flippers, respectively, while hitting any key on the left half of the board simulates bumping the machine to the left, the right keys bumping the board to the right.

Although I prefer the keyboard, note that the position of the START key along the top of the XE makes play on this new model rather awkward. I usually find the use of two sticks (one to control each flipper) likewise clumsy, since slapping the keyboard to jostle the machine typically causes me to fumble with one of the sticks. Other active keys read and write to a high-score disk, and freeze play.

The program also supports a large degree of customization. Typing *FIX* while in the "game over" mode accesses the fix menu, which allows adjustment of such parameters as ball speed, bounce and randomness of motion (otherwise, each game might be the same, at least until you hit the ball). As in real pinball machines, you have control over the incline, the balls per game, tilt sensitivity and the free game score. Other settings make the game more difficult by limiting the amount of bonus and the ease of activating multiball play. The impulses given the ball by the various traps and bumpers can be preset, as can flipper power.

And, to make sure your new design is playable, you can test it via a self-play mode (a good idea, since some settings can crash the game or freeze play, as when a ball sticks in a kickhole which lacks the power to dislodge it). Using all these options, it's possible to simulate the game as it exists on this planet—or on any other which might lack gravity or friction. You can save up to 110 different modes (17 if you should be so unfortunate as to have only 32K of memory) for future use. However, a drawback of the game is the fact that, unlike some of its competitors, this program will not allow you to design a new playfield.

Night Mission boasts a new packaging scheme which is quite an improvement over the plain zip-lock bag my original copy arrived in. Inside the bulky but colorful box is an equally bulky and colorful manual. Unwilling to be satisfied by good looks alone, the 24-page booklet goes on to cover such diverse topics as customization, program statistics and pinball jargon. Its table of contents bounces you rapidly to the correct page, and a separate reference card keeps important commands, as well as the scores assigned to the various drop targets, lights and rollovers, in easy view. Finally, a label is provided to identify your high-score disk.

Overall, while this program is nearly five years old, it does not look dated at all. Although it lacks some of the features of its competitors, it is an amazingly fast and challenging pinball simulation, and is an exemplary example of efficient assembly language coding. It is a classic that's destined to endure.

As for next month, look for **Stationfall**, the sequel to Infocom's Planetfall mentioned a number of paragraphs ago. We'll also take a look at SSI's **Rebel Charge at Chickamauga**, and perhaps there'll be a couple more surprises. Until then, get down to your favorite dealer and take a look at the new Atari software and hardware filling up the shelves. And get them off the shelves and into good homes, where they belong.

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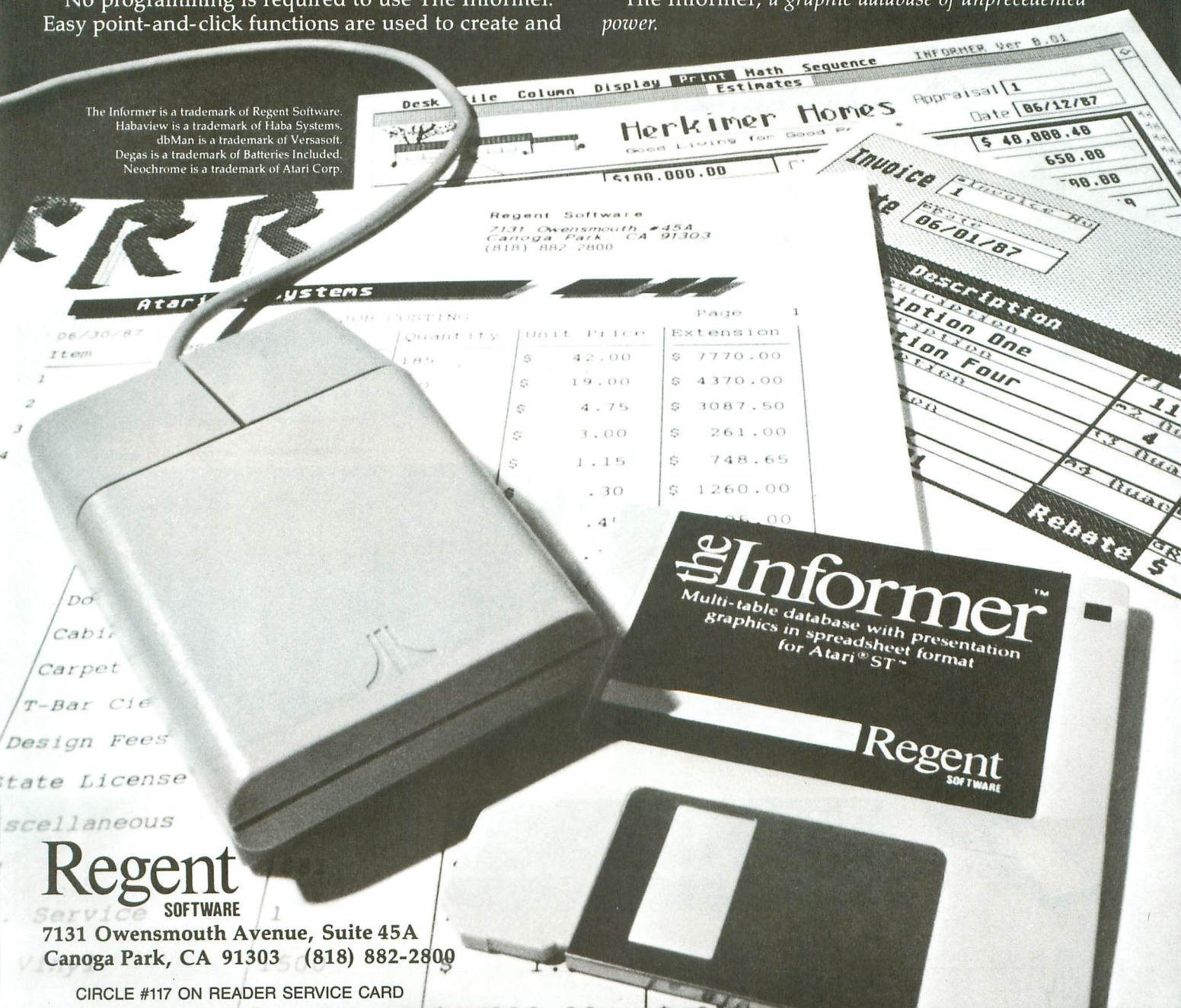

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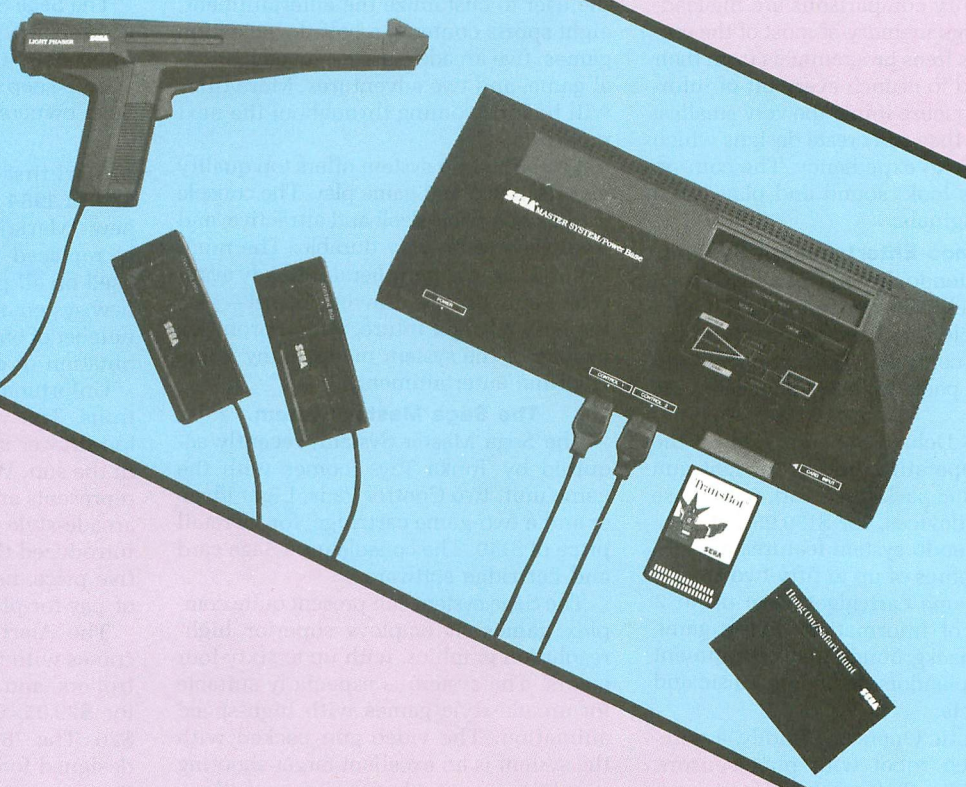

Video Games

A buyer's guide to the systems.

by Joyce Worley,
Arnie Katz and Bill Kunkel

The experts said it would never happen. The experts were wrong. Video games are back, and they're better-looking, more intriguing and cheaper than ever.

Some basic information.

Video game systems connect to TV sets through adaptors included with the consoles. And, whether you use a black-and-white or a color TV, video games will *not* damage regular picture tubes in any way. (Projection TV owners should check their manuals before using video games.)

All of the systems use game cartridges, but different companies' games are not interchangeable. Cartridges are designed specifically for the system used.

In 1983-1984, thousands of game cartridges were sold at deep discount. They literally swamped the market, destroying retailers' profits, as well as their faith in the future of the games. These older games are long vanished, although elderly titles for older machines like the Atari 2600 sometimes turn up in bargain displays.

Games published for the first time in the last year are generating most of the excitement. Better game design and programming techniques, coupled with improved resolution and increased memory, deliver the best video games ever seen. Cartridges with up to 2 megabytes of game information are now available, and games with even more memory are on the horizon. Compare the "classics" like Space Invaders, a 2K memory product, and it's easy to see the potential inherent in a 2000K program.

Yet memory comparisons are misleading. The large memory of most of the current systems frees programmers from their former need to crunch every bit of information to squeeze it into the very smallest space. Now they can create designs which concede less to expediency. The coin-op translations look, sound and play much like the originals.

The Nintendo Entertainment System.

The Nintendo Entertainment System Control Deck package contains the NES game console, two hand-held rectangular pushbutton controllers, and a Super Mario Bros. game pack, for a $99 suggested list price.

The NES Deluxe Set adds R.O.B., the "Robotic Operating Buddy," a light gun and two game packs that work with these peripheral devices, for $179.95 list.

The Nintendo system features arcade-quality graphics of up to fifty-two colors, and NES game cartridges have up to 2 megabytes of information. Every game has audio backgrounds that compliment the visual splendors, including music and sound effects.

The Robotic Operating Buddy, a wireless ten-inch robot with photosensors, reads light signals from the TV to trigger movements. His best trick was to help Nintendo market this new gaming console, and R.O.B. deserves a place in the Video Game Hall of Fame for firing the enthusiasm of a new generation of video gamers. This hard-working little dude single-clawedly scratched out a place for video games in the computer age, by attracting the attention of kids. However, despite R.O.B.'s charms, veteran video gamers may want to pass on this accessory, since there are currently only two game packs that use the robot.

On the other hand, the light gun is a must-have item for NES-ers. Named the Zapper, it has light sensors which interact with flashes from the screen, and it's accurate within a fraction of an inch—even when fired from across the room. The four target-shooting games which use the Zapper are high-quality marksmanship tests, and the Zapper is definitely recommended to anyone who enjoys this sport.

There are currently about three dozen games available for the NES from Nintendo. An additional thirty-five are scheduled for release this year from thirteen third-party software developers, so there's plenty of variety. The catalog of game packs includes, in addition to the robotic and target gun titles, three games that allow the user to customize the entertainment, eight sports contests, a half-dozen action games, five arcade classics, an educational game, and two adventures. More titles will be forthcoming throughout the next months.

The Nintendo system offers top quality visuals, audio and game play. The console itself is compact, sleek and attractive, and it appears to be very durable. The number of titles and peripherals already available—and on the drawing board—give the NES a bright future, which promises owners of the system many, many hours of prime entertainment.

The Sega Master System.

The Sega Master System, recently acquired by Tonka Toys, comes with the game unit, two Control Pads, Light Phaser and a two-game cartridge, for its retail price of $150. The console uses Sega card and cartridge software.

The Sega system can present quite complex games. It employs superior high-resolution graphics, with up to sixty-four colors. The system is especially suitable for arcade-style games with high-speed animation. The video gun packed with the system is an excellent target-shooting pistol that every video marksman will enjoy using to blast away the on-screen targets.

The SMS accepts two kinds of games. The company introduced a new software medium, the Sega Card, in 1986. This slim credit-card sized game pack looks much like the guts of an Atari 2600 gaming cartridge when you crack off the plastic casing. But there's a big difference, since these elegant cards can hold up to 256K of memory.

The 256K Sega Card games are impressive, but the real top of the line Sega entertainments are packed on either the Sega Mega Cartridges (1048K of memory) or the company's Two Mega Cartridges (2096K).

Sega Cards retail for about $25, and One Mega Cartridge games are $30. Two Mega Cartridges will retail for $40. There are currently about thirty games available, with more set for release before this holiday season.

In the past, Sega opted not to invite third-party software manufacturers to design games for the SMS. Instead, the company has licensed games from other software firms, to be produced under Sega's own banner. The recent change in ownership may make management reconsider this policy. Tonka's strategies have not yet been announced.

The Sega System incorporates top quality graphics, sound and action. Future peripherals—such as 3-D games and glasses—will keep the fun at a fever pitch for Sega owners.

Atari 7800.

Atari first unveiled the 7800 Pro System in 1984. The big innovation was its new "Maria" graphics chip, which totally replaced the player-missile graphics used on all previous Atari consoles. The new system made it possible to move any number of objects, of any size, in any combination of directions, simultaneously.

Unfortunately, the timing was disastrous. The video game slump kept this top-drawer system from getting its hour in the sun. Well, maybe it will now, as it represents an outstanding bargain for the arcade-style action game lover. Atari reintroduced the 7800 in 1986 at an attractive price, helping refire the enthusiasm of pay-for-play video gamers.

The Atari 7800 Video Game System comes with the console, two Proline controllers, and a Pole Position II cartridge, for $79.95. Game cartridges cost about $20. The 7800 also can play cartridges designed for the Atari 2600 Video Game System.

Atari plans to produce translations of popular arcade games for the 7800, and to acquire top computer action titles that were previously unavailable to the video game audience because of their high memory requirements. As with the other video game machines, new software techniques make upper memory designs possible for the Atari 7800. There should be almost twenty titles available this Christmas, and more 7800 games are planned for spring release. In addition, hundreds of 2600 games can be plugged into the 7800, with no extra attachments.

Ask the Game Doctor

Got a question about video game hardware or software? *Video Game Digest* has the man with all the answers, the Game Doctor. Yes, the celebrated software sawbones who once hung his shingle in *Electronic Games* is opening his office in these pages, beginning next month.

So, if you have a question for the megabyte medico, just send it to: Game Doctor, *Video Game Digest*, c/o **ANALOG Computing**, P.O. Box 23, Worcester, MA 01603.

The INTV III.

In January of 1983, Mattel Corporation sneak-previewed the Intellivision III for a few journalists and software mavens. The new machine ran smack into the plummeting video game market. Mattel subsequently abandoned the business before it actually put the Intellivision III on the retail market. The Intellivision III, once billed as the ultimate video game, was indefinitely delayed.

This machine proved to be just too good to die so young. In 1987, the long-awaited Intellivision III is finally a reality. The INTV Corporation is marketing titles from the original Intellivision software catalog, but—better still—is also actively publishing new titles.

The INTV System III Master Component lists for $69.99. It comes with the gaming console and two nondetachable controllers. Cartridge prices range from $10 to $20.

The INTV III has a built-in voice synthesizer, and about 12K of ROM and 10K of RAM memory. A larger range of available colors, plus the ability to manipulate sixty-four objects on-screen simultaneously, open up the options for Intellivision game designers.

The newer releases reflect this, with more complicated entertainments against strikingly handsome backgrounds, instead of against the solid black backgrounds seen in most low-memory video game systems.

The INTV III is not a state-of-the-art machine, but it does offer decent video game graphics, a tolerable sound system and a wide selection of cartridges—especially sports titles—at an economical price.

The Atari 2600.

The world's best-selling video game device, the Atari 2600, is the machine on which most home electro-gamers cut their teeth. Though newer game systems have stolen its thunder, the 2600 is still a great entertainment bargain, and the only one of the original video game machines to survive into this new age of gaming.

The company retooled the unit to give it a more modern, sleek and handsome appearance, but it's still the same great entertainer.

It comes with the console and one joystick controller, for $50. For head-to-head play, a second joystick sells separately for $9.95.

There were thousands of games designed for the 2600 in the first video game era, and the old titles still have a lot of life. In addition, Atari Corp. is now releasing brand new 2600 game designs, as are third-party developers like Activision and Epyx. The new game cartridges cost about $10.

While the Atari 2600 lacks the sophisticated sound and graphics capabilities of the upper memory machines, it is still a family pleaser, priced appreciably lower than other large kid's toys.

Presenting... Video Game Digest

Video games are back—and **ANALOG Computing** has them. Beginning with this issue, *Video Game Digest* will present reviews, news and insights into the exciting, fast-changing world of cartridge games.

On hand to produce this magazine-within-a-magazine is the well-known team of Arnie Katz, Bill Kunkel and Joyce Worley. They will write and edit each issue of *Video Game Digest*, under the direction of **ANALOG** Publishers Lee H. Pappas and Michael J. DesChenes.

Katz, Kunkel and Worley were pioneers in video game journalism and created the first magazine exclusively devoted to the subject, *Electronic Games*. Their work appears regularly in **ST-Log** and other top computer and general interest publications.

The fate of *Video Game Digest* is in your hands. If you want a monthly video game magazine, perhaps even a bigger and better one, you've got to write and tell us so. We'd also like to hear from readers on any aspect of video gaming. Tell us what you'd like to see in the *Digest*. Just send your comments and suggestions to: *Video Game Digest*, c/o **ANALOG Computing**, P.O. Box 23, Worcester, MA 01603.

HOTLINE: Video Game News Update

Atari's new XE Game System includes a 64K console, attachable keyboard, video gun and joystick, plus three game cartridges, for about $150. Games included are Flight Simulator II (from subLOGIC), Missile Command (Atari), and Blast 'Em (a new shooting game specifically developed for the XE system). Atari plans to convert to cartridge disk games written for their XE and XL computers.

Additional peripherals soon to be available from Nintendo can make gameplay even more exciting. The NES Advantage joystick is a full-size, arcade-style joystick with a weighted base. The stick features two adjusters, so the rapid-fire action of each button can be set individually, and a slow-motion feature which slows the game action on some Nintendo titles. The stick retails for $49.99. The company also plans two different styles of 3-D glasses, with 3-D game titles, scheduled for release this winter.

Speaking of controllers, here's some good news for Intellivision owners: the Intellivision Attachable Joysticks sell for $12.95 a pair, and go a long way toward ending the INTV controller blues. They snap onto the control disk and will make gameplay easier.

Slalom

NINTENDO
4820 150th Ave., N.E.
P.O. Box 957
Redmond, WA 98052
Nintendo Entertainment System
$29.95

by Bill Kunkel

Although skiing simulations have been around for years, very few possess the sheer visceral power of **Slalom**. This impact results from the game's modified first-person perspective. There's a delightful, cartoon-style user surrogate who stands in the immediate foreground, and can be moved left or right, made to tuck (speed up) or snowplow (slow down) through the control pad. The action buttons inaugurate jumps and stunts.

Once the skier starts down the mountain, the game kicks into overdrive. **Slalom** impressively communicates the sheer exhilaration and the kinetic thrill of high-speed movement, as well as the abruptness of collisions. Obstacles like drone skiers, trees, snowmen and sledders pepper the mountainside, in addition to the flags which must be navigated and the ubiquitous moguls, rocky outcroppings which jut up through the snow to serve as launch pads for skiers. Hitting a mogul launches the skier skyward, and, if the player hits the action button while his skier is in the air, it's possible to do some hot-dogging and stunt skiing.

The graphics are simple enough to allow the program to handle high-speed movement, while sufficiently stylish to satisfy the user's aesthetic requirements. The play system is appropriately straightforward and easy to learn, though the left to right movement is occasionally sluggish.

While not a groundbreaker, **Slalom** is a solid entry in the Nintendo line, one to please most action game fans.

Super Mario Bros.

NINTENDO
4820 150th Ave., N.E.
P.O. Box 957
Redmond, WA 98052
Nintendo Entertainment System
$29.95

by Bill Kunkel

Super Mario Bros. is the game packed with the Nintendo Entertainment System, and it's an excellent choice on the manufacturer's part. **Super Mario Bros.** stars one of Nintendo's most enduring characters, Mario, the parody of an organ grinder who became famous during his quest to recapture the escape-happy Donkey Kong. (I have no idea why they call it "Mario Bros.," since only Mario himself appears, albeit in a variety of forms: invincible, super, fireball-throwing, etc.)

Here's the story: the mushroom people have been invaded by the Koopa, a tribe of black-magic-practicing turtles (that's the worst kind), who transformed the peace-loving fungus folk into bricks, stones and "field horsehair plants" (surely a fate worse than death). Who can save them? Why Princess Toadstool, of course! Alas, she is a prisoner of the Koopa King, and it's up to the player, as Mario, to rescue her.

Mario can be moved along the easterly-scrolling playfields with the directional control pad. The A button lets Mario jump and swim, and the B button permits accelerated speed and fireball-throwing (when Mario has picked up a "fire flower"). The plucky paisan must travel over a series of scenarios, above and below ground, searching for the castles at each scenario's end, in hopes of locating the Princess.

The playfields contain not only the Koopas, but the dastardly Little Goombas (mushrooms who betrayed their own people to the Koopa, if you can imagine such a thing), Koopa Troopas (and Paratroopas), Buzzy Beetles (invulnerable to fireballs), the Hammer Brothers, Lakitu and his pet Spiny, Pirana Plants, Bowser, the Koopa King, and more—and one touch from any of them is deadly. But, if Mario can jump in the air and land on top of them, they're squashable; in fact, once a Koopa has been KO'd, its shell can be sent flying in either direction, in order to whomp any approaching nasties.

Meanwhile, the screens are just bristling with goodies, most of which have been placed within bricks inscribed with question marks. If Mario bounds and punches these bricks from underneath, their treasures come popping out the top. Treasures include not only gold coins (100 coins buy an extra life), but magic mushrooms (which bestow extra life and cause Mario to become Super Mario), fire flowers and stars (which make Mario invincible for several seconds).

Super Mario Bros. is a lot of fun, but the game's inability to scroll to the left is a real problem. Once an object has been passed by to its right, there's no returning. Still, it does have save, pause and continue features.

Like the best of the Nintendo games, there are plenty of different creatures to fight, an assortment of prizes and bonus features, and lots and lots of pretty scenery. **Super Mario Bros.** is a super playable showcase for the Nintendo Entertainment System.

Centipede and Robotron 2084

ATARI CORP.
1196 Borregas Ave.
Sunnyvale, CA 94086
(408) 745-2000
Atari 7800
$19.95

by Arnie Katz

Atari created its 7800 with one primary aim: to present home versions of popular coin-op contests. Like Pole Position II, which comes with the console, both **Centipede** and **Robotron 2084** are superb home versions of games which have raked in millions upon millions of quarters in family amusement centers. Though no conventional television set can rival a coin-op monitor in visual resolution or audio fidelity, these cartridges are as close to the arcade originals as possible.

Centipede remains a brilliant variation on the "invasion game" play mechanic pioneered by Space Invaders. It banishes the aliens in favor of wave after wave of wriggling centipedes, spiders, and other similar creatures. And, instead of the trusty horizontal cannon, there's a bug sprayer which can move vertically within a limited area, as well as side-to-side.

The garden theme makes **Centipede** a perennial favorite of female video gamers. Evidently, women have less compunction about killing slimy bugs than about annihilating aliens from outer space.

Centipedes have twelve distinct attack modes. In the first wave, the insect has eleven body segments and an attached head. Each wave subtracts a segment and substitutes a detached head. The critters on the screen also move faster and faster as the game progresses, to insure that the challenge keeps pace with the player's growing mastery of the situation. A choice of four skill levels also promotes replayability.

The graphics and audio of this one- or two-player contest, as mentioned, are terrific. The symphony of sounds and con-

stantly shifting colors keep eyes riveted to the screen.

Williams Electronics introduced **Robotron 2084** as a sequel to Defender and Stargate. The relationship is purely thematic, since this nonstop blastathon is quite different from the two earlier titles, both of which were duo-directional scrolling shoot-outs.

When humanity created the robotron robots, no one had any idea of the threat they would eventually pose. The gamer, as the last defender of his species, zaps the enemy automotons and tries to rescue as many human clones as possible. Clearing a playfield of robotrons takes the computer user to the next playfield.

One of the things arcaders liked best about **Robotron 2084** was its two-stick control system. This allows the player to move in one direction while laying down a stream of withering fire in another. In the coin-op, it comes in mighty handy when the player wants to keep menaces like Indestructible Hulks, Sinister Spheroids, Enforcers, and the rest of the robotic rogue's gallery at arm's length while blowing them to smithereens with the anti-robot laser gun.

The control scheme employed in the 7800 edition is a reasonable compromise. The player moves the fighter around the nonscrolling playfield with the stick. Pressing the action button causes the laser to fire in the direction of movement. Purists may well yearn for the double-joystick configuration, but this alternative works fine, although it's not quite as easy to escape when the robotron mechanoids close in for the kill.

Robotron 2084 provides unlimited racks of truly frenetic action to delight every joystick jockey. The strategic challenge is admittedly minimal, but few video games can rival this classic shoot-'em-up for sheer excitement.

The Legend of Zelda

NINTENDO
4820 150th Ave., N.E.
P.O. Box 957
Redmond, WA 98052
Nintendo Entertainment System
$39.95

by Bill Kunkel

Ganon the usurper, Prince of Darkness (and all-around unpleasant guy) now rules in the land of Hyrule. The Princess Zelda, last keeper of the "Triforce," the golden triangles of mystical power, has been captured and imprisoned, but her faithful maid Impa escaped Ganon's villainous clutches and fled, seeking a paladin to take up Zelda's cause.

The player in this action-strategy extravaganza is cast as Link, the brave young lad who agrees to help overthrow Ganon, rescue Zelda and reunite the eight triangles of the Triforce—which the Princess dispersed and hid in different locations, rather than see them fall into Ganon's hands.

The Legend of Zelda is a delightful, omni-directional scrolling adventure, in which the player moves over a wide variety of terrain and battles a collection of some of the weirdest adversaries this side of the fifth dimension: spidery Tektites, slimey Octoroks, burrowing Leevers, bulldog-like Molblins, stone Armoses, spectral Ghinis, and more—and that's just the denizens of the Overworld! Head into the underground dungeons and meet an even stranger assortment of creepsters: Darknuts, Lanmolas, Wall Masters and worse. Work your way through this bestiary, and the old Prince of Darkness himself, Ganon, is waiting on you.

Not all the denizens of this land are hostile, however; Link also encounters wise men, little old ladies, merchants, and even fairies held prisoner by monsters (vanquish the beastie, and the grateful fairy will extend your lifespan). Still, the vast majority of the residents respond exclusively to a sword in the mush.

Its wide range of treasures and weaponry provides the meat of this game. There are three kinds of swords, two kinds of shields, precious stones, keys (magical and mundane), ladders, rafts (for travel over water), maps, compasses, enchanted rings, magic clocks and power bracelets. These are accessed through the A action button, while the B button controls a series of special weapons and gadgets which can be purchased from cave-dwelling merchants. These include boomerangs, bombs, bows and two kinds of arrows, two types of candles, a magic whistle, "enemy bait," water of life and a magic wand.

Then, of course, there are those eight pieces of the Triforce which must be collected and assembled. One piece awaits in each of the eight labyrinths; collect the set, blow the magic whistle and summon a whirlwind which warps you to the ninth labyrinth.

The graphics are delightful, making even tiny on-screen objects easily discernible. The perspective is slightly modified overhead, with physical landmarks further distinguished by the skillful use of color. Special sound effects, ranging from soft tinkles to bomb blasts, are slickly executed.

Nintendo is, obviously, quite proud of **The Legend of Zelda**. Television commercials devoted entirely to this game have been running heavily in the New York area—the first single-subject video game TV ad in years. The game pack is beautifully documented (including lots of hints and strategy) and comes encased in a golden shell, further indicating its singular quality.

The game is a high-water mark in terms of video game design and programming. Sophisticated plot and gameplay combine with classic video game elements, to allow the user to learn while he plays—and play while he learns.

Zelda's outstanding. It leaves one hoping for more, more, more of the same.

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Choplifter!

SEGA c/o TONKA CORP.
6000 Clearwater Drive
Minnetonka, MN 55343
(800) 328-3628
Sega Master System
$30.00

by Arnie Katz

Free the hostages! An unnamed country has seized sixty-four Americans and imprisoned them in heavily guarded barracks and caverns. Only a skilled helicopter pilot, daring the defenses by flying in low, can land near the detention centers, load as many hostages as possible into the chopper, and fly them to a safe landing on American soil.

The direction disk moves the Hawk helicopter in any of eight directions. The right-hand control button changes the direction the craft is facing. A quick press causes the whirlybird to face front, while a long push turns it from left to right, or vice versa. When the screen shows the chopper's side view, the left-hand button fires projectiles. The same button drops bombs when the helicopter faces front.

Those evil hostage-takers are well armed, too. The defenders have tanks, planes and ships to keep the gamer from saving the POWs. Naturally, the foe becomes more tenacious and aggressive as the game continues.

Choplifter! was designed by Dan Gorlin and published for home computers by Broderbund in 1982. Critics who proclaimed it an all-time great would be shocked to see the many improvements made in the Sega version. This video game edition isn't just a good translation; it is clearly superior to the original program. The detailed background graphics and more sophisticated artificial intelligence for the computer-controlled enemy are especially notable. The cartridge preserves the essence of Gorlin's triumph, while it brings the product up to 1987 standards, with audiovisual effects which surpass the capabilities of any of the low-memory home computer systems.

It takes coordination rather than blinding speed to pilot the Hawk like a combat vet. **Choplifter!** is thus particularly suitable for all-family entertaining, since quick-fingered youngsters won't automatically show up their elders. This is a truly outstanding game, which every Sega owner will want to own.

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MaxPak

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by Andy Eddy

Multiple function accessories are becoming the latest rage, with programs like Cornerman (MichTron), MacroDesk and MacroManager (both by the now-defunct Shanner), giving users the ability to have a calculator, set alarms and take notes, among other things. Another entry in that field has emerged, with the introduction of **MaxPak** by a new company on the ST scene, Softwerx.

What makes **MaxPak** helpful is that it combines many features employed by ST users in their regular sessions, but does so from only *one* accessory slot. Once you configure the program and place it on your boot disk, the program will load at boot-up with all those options in place.

The first thing you see when booting up is the **MaxPak** setup screen. Here, you see the size of the RAMdisk and print spooler configured in memory by the accessory. Both are variable in size, up to the limit of available memory, using a separate configuration program supplied by Softwerx. In this opening dialog box, you can also input the date and time, though if you have a clock cartridge or other hardware for that purpose, the time will be taken from there.

Other features on this menu include: a screen saver with variable delay time (to prevent image burn-in; the screen will go blank if the mouse or keyboard aren't accessed for a time, much like the attract mode on the 8-bit); toggles for the on-screen clock; an option to enable or disenable write verification (which will conserve time over normal operations); and a RAMdisk copy function. The latter will, given a configuration file in the **MaxPak** folder, automatically load whatever files you choose into the RAMdisk at boot-up.

The next option lets you vary the spooler functions. The spooler, for those uninitiated, allocates a section of memory for routing of printer data. When the spooler is in place, it frees up the computer for your use, while separately controlling the printer output. This spooler can be set to repeat the last thing printed as many times as needed, choose certain pages to print, or abort in midstream if you make a mistake. The spooler's contents can be sent to a disk file, also.

Working in conjunction with the spooler is Print Magic, which lets you embed printer control codes into any piece of text you want to print. This can be important for use outside a word processor, which most likely already has those features in place. The other nicety is the availability of the *entire* ST character set. In many situations, foreign, mathematical and other special characters may not be printable or used in a word processor like Word Writer ST. With **MaxPak**, a dialog box allows you to click on a desired character and plug it into your document at the cursor location.

Perhaps the most eccentric option in this package is Math Magic. Let's say you're in the middle of putting together a large report. You don't have a calculator handy and need to get some figures compiled quickly. Bringing up Math Magic will display a dialog box with a long empty line and a bunch of button selections underneath. If you plug in your formula on the provided line and hit "Calculate," your answer will come up in the dialog box.

You can have the whole formula—or just the answer—automatically plugged into your report by clicking on the SEND ALL—or SEND—buttons, respectively. You also have the same options for direct-to-printer output.

Rounding out **MaxPak**'s offerings is an alarm function that allows up to eight different alarm times; a capture screen selection that grabs whatever's on-screen and routes it to the spooler, where you can print it or save it to disk as a DEGAS-compatible file; and a keyboard-activated macro system that lets you assign commonly used phrases to a single keystroke.

The most potentially powerful feature of **MaxPak** is its ability to be brought up using the command key in combination

with the number of the option you're interested in. This means you can utilize it from most non-GEM programs.

Of course, all this sounds good, but **MaxPak** is not without its problems. For example, when I placed it on my word processing disk, Thunder! refused to load its dictionary for the accessory version. This problem was mentioned in the **MaxPak** docs, but they claim you can "request" Thunder! to load the dictionary from the options menu. Unfortunately, this didn't work for me. When I called Mark Ostlund, **MaxPak**'s programmer, he told me he's received other complaints and is contacting the people responsible for Thunder! to help come up with a solution.

Another annoyance is the implementation of macros. The program requires you to set up the command key that will be used to trigger the macros and that will call up the accessory from the keyboard. The choices are the CONTROL, ALTERNATE, LEFT SHIFT or RIGHT SHIFT keys, and your choice is loaded at boot-up from your original configuration file. As mentioned in the manual, some programs might already use these keys, so your choice is important.

The problem is that **MaxPak** disables normal use of the chosen command key. This became apparent when I tried to select a macro while using Flash. Being a touch typist, use of either SHIFT key as the command key would have been impossible. Flash uses the ALTERNATE key for its commands. And many telecommunications services require CONTROL-key combinations; not much is left for **MaxPak**'s macros.

In my conversation with Ostlund, he said they may change **MaxPak** to give the option of using a *pair* of keys, such as an ALT-SHIFT combination.

Given the overall quality of the product, the few flaws can be worked around. **MaxPak**'s ability to be used with both GEM and non-GEM programs (in most cases) makes it a full-time employee for your ST, particularly if you do a lot of word processing or business applications, as its features are better tailored to those tasks. If Softwerx clears up the minor glitches apparent in this first release, **MaxPak** could end up being one of the better investments you can make for your ST.

Andy Eddy works as a cable TV technician in Connecticut, but has been interested in computers since high school. While his family's Atari 800 is four years old, he's been avidly playing arcade games since Space Invaders and is a former record holder on Battlezone.

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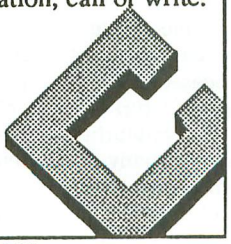

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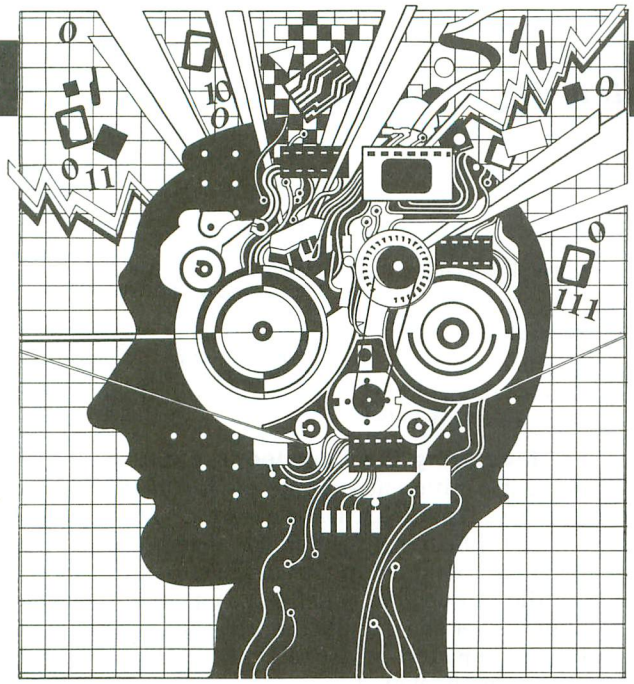

Learning power for your ST.

Artificial Intelligence

by Dr. Ron Schaefer

While the Japanese are working furiously to develop a fifth-generation computer capable of true artificial intelligence (fondly known as AI), I thought I would see if I could come up with a short AI program of my own for the Atari 520ST, a mere third-generation machine.

The fifth generation.

First, a little background on AI. . .The idea of AI is not new; in fact, computer scientists have been working on it for decades. In essence, it is both a problem of software and of hardware.

Computers themselves have gone through a succession of generations; the first-generation computers built in the fifties were very slow by today's standards and were room sized. With the advent of the transistor, the smaller, faster second generation was born. In the sixties, the development of the semiconductor chip—which could do the job of hundreds of transistors—gave rise to the third-generation machines. In the seventies, the number of transistors that could fit on a chip increased to thousands. These very large scale integrated chips have given rise to a super-fast fourth generation. Each successive generation has been faster than the previous one, but all work essentially the same way, by processing one instruction at a time.

Fifth-generation computers will use large databases of knowledge and symbolic logic to mimic the human brain. Through the use of coprocessing, splitting up a task into parts and running each part simultaneously, today's speed limit of millions of arithmetic operations per second will be raised to billions of logical inferences per second, each logical inference a kind of symbolic if/then-type statement. This tremendous speed will be necessary if all the complex rules and exceptions are to be included for tasks such as true speech recognition.

AI, the program.

In a nutshell, my program, modestly enough called **Artificial Intelligence**, will read a set of rules from a separate knowledge base file and ask you a set of yes and no questions, using GEM alert boxes, until an answer is reached. If the answer is unknown to the database, you have the option of entering in new questions and answers, which will be added to the database. On request, this modified data is saved back onto the disk for future use, enabling the program to use any number of knowledge bases on different subjects, and to be able to learn new information as the program is used.

Creating a title.

This **AI** program makes extensive use of subroutines to perform many of the GEM and VDI calls. These subroutines can easily be modified for use in your own programs.

Let's go through some of the more interesting aspects of the program. Line 10 gives the string TITLE$ a value, then calls the subroutine TITLE on Line 660. This will replace the word *OUTPUT* at the top of the output window with the contents of the string TITLE$, giving the program a certain professional look. By the way, if you want to include the Atari logo in your titles, this can be entered from the keyboard in the BASIC editor by pressing CONTROL-period (.) and CONTROL-slash (/).

Alert boxes.

Lines 80 through 85 set up the first GEM-type alert box. This simplifies the use of the boxes through repeatedly employing the subroutine DOALERT on Line 1490.

First, a string called TYPE$ is set equal to: *1*, the exclamation mark; *2*, the question mark; *3*, the stop sign; or a blank, which prints nothing. Next, a string called TEXT$ is set to the text that you want displayed in the alert box. According to the books, you can have up to five lines of text, each line up to forty characters long. However, when-

ever my text got over four lines or longer than about thirty characters, I started to get lots of errors and system crashes.

The string TEXT$ that appears inside the alert box can be more than one line long, each line separated by a |, a character created by pressing SHIFT-backslash (\). This | serves the function of a carriage return, telling the alert box to start a new line. For an example of how this is done, see Lines 970 through 980. Text should not contain square brackets ([or]), and, for this particular application, no commas (,) are allowed in the knowledge base rule file data.

Finally, the string BUTTON$ is set. There can be up to three buttons. If only one button is used, it can be up to twenty characters of text. These buttons, when activated with the mouse, will return a value in C obtained on Line 1550, which will be 1-3, depending on which button was pressed. The name of each button should be separated with a | as demonstrated in Line 830. One of these buttons can be set to be the default, so a return will have the same effect as activating that button. This is accomplished in Line 1530; in this program it's always the leftmost button or button number one.

Reading in the rules.

Next, the **AI** program reads in the rules, the knowledge base the program "thinks" with. In Line 70, the default knowledge base or rule filename is set equal to the string DBNAME$. This can easily be modified by editing the program to the name of your favorite set of rules. I like to use folders, so, for this program to work properly, the rule files must be in their own folder, called AI. If you're not a folder fan—or would like to store your rule files in a folder with a different name—then change the default knowledge base folder variable ROOT$ in Line 65. If you do *not* want to use a folder to store your rule files, set ROOT$ = "".

A rule file consists of the following: the first line is the number of rules, a value which is stored in the variable FLEN and is used to dimension the arrays of the next four variables. The next line is a string containing the rule's number (Rule#). This string is stored in RULE$(n,1). Following that is the text for the question or answer, which gets stored in RULE$(n,2). Finally come two numbers that tell the program which rule to go to, based on the answer to the question. These values are stored in the variables CASE(n,1), and CASE(n,2), respectively. If *yes* is selected and CASE(n,1) is equal to *0*, then that is the final answer; there are no further branch points. If, on the other hand, *no* is selected and CASE(n,2) is equal to negative *1*, then the answer is unknown to the database. At this point, you're given the option of adding a new question and answer, thus creating a new branch point.

Here's an example of a short rule file that tries to figure out what type of car you drive.

```
Rule File                          Comment
6                                  {number of rules}
Rule# 1                            {set = rule$(1,1)}
Does your vehicle|have 4 wheels?   {text for 1st rule = rule$(1,2)}
 2 , -1                            {goto rule #2 for yes, ? for no}
Rule# 2                            {set = rule$(2,1)}
Do you drive a|car?                {text for 2nd rule = rule$(2,2)}
  4 , 3                            {goto rule #4 for yes, #3 for no}
Rule# 3                            {set = rule$(3,1)}
You drive a|pick-up truck.         {text for 3rd rule = rule$(3,2)}
 0 ,-1                             {final answer for yes, ? for no}
Rule# 4                            {set = rule$(4,1)}
Do you drive a|sports car?         {text for 4th rule = rule$(4,2)}
 5 , 6                             {goto rule #5 for yes, #6 for no}
Rule# 5                            {set = rule$(5,1)}
You drive a Lotus.                 {text for 5th rule = rule$(5,2)}
 0 ,-1                             {final answer for yes, ? for no}
Rule# 6                            {set = rule$(6,1)}
You drive a station|wagon.         {text for 6th rule = rule$(6,2)}
 0 ,-1 {final answer for yes, ? for no}
```

Modifying the knowledge base.

There are two different subroutines for modifying the knowledge base, LEARNQ (learn question) and LEARNA (learn answer). LEARNQ, the simpler of the two, will append a new question and answer to the end of the knowledge base file. A question is defined as a rule in which a *yes* response is set equal to another rule number and a *no* response is set equal to *-1*, (see Rule #1 in the car knowledge base example, above).

LEARNA is a little more complex. This subroutine will be run if you disagree with a final answer. A final answer is defined as a rule in which a *yes* response is set equal to *0* and a *no* response is set equal to *-1*, (see Rule #5 in the car knowledge base example, above). In this instance, you must supply a new final answer, and a yes-no question that will differentiate between the old final answer and the new final answer. The old answer and the new answer are now appended to the end of the knowledge base, and the new question takes the place of the old answer. Confused? Well, perhaps the following examples will help.

Going back to the car knowledge base as an example, let's say you've loaded this knowledge base into the program. You start answering questions with Rule# 1, *Does your vehicle have 4 wheels?* Let's say you actually drive a motorcycle; this statement would be false. You answer *no*. Since the value assigned to a *no* response in the knowledge base is *-1*, (see line number 4 in the above example knowledge base), this tells the program that the answer to this question is unknown, and you're asked if you want to modify the knowledge base. If you do the modification, the program will ask you to enter the correct answer. At this point, you should type in *You drive a motorcycle.*

You will next be asked to enter a new question, such that a *yes* answer will lead to the conclusion *You drive a motorcycle.* This new question could be entered as *Does your vehicle have only two wheels?* If you now indicate that you want this modified knowledge base saved, there will be two new rules appended onto the end of the file, and the new knowledge base listing will be as follows:

```
 8
Rule# 1
Does your vehicle|have 4 wheels?
 2 , 7
Rule# 2
Do you drive a|car?
 4 , 3
Rule# 3
You drive a|pick-up truck.
 0 ,-1
Rule# 4
Do you drive a|sports car?
 5 , 6
Rule# 5
You drive a Lotus.
```

```
 0 ,-1
Rule# 6
You drive a station|wagon.
 0 ,-1
Rule# 7
Does your vehicle have|only 2 wheels?
 8 ,-1
Rule# 8
You drive a motorcycle.
 0 ,-1
```

Now, let's say that you drive a Mazda RX-7 rather than a Lotus. When you get to Rule #5, *You drive a Lotus*, you indicate *no*. The program will once again inform you that the answer to this question is unknown. If you want to modify the knowledge base, the program will ask you for a new answer. You type in *You drive a Mazda RX-7*.

You'll then be asked to supply a yes-no-type question, such that a yes answer will conclude that *You drive a Mazda RX-7* and a no answer will conclude that *You drive a Lotus*. Such a question might be: *Is the make of the car Japanese?* You're then asked if you want to modify the knowledge base. If you indicate *yes*, the new car knowledge base will look like this:

```
 10
Rule# 1
Does your vehicle|have 4 wheels?
 2 , 7
Rule# 2
Do you drive a|car?
 4 , 3
Rule# 3
You drive a|pick-up truck.
 0 ,-1
Rule# 4
Do you drive a|sports car?
 5 , 6
Rule# 5
Is the car a japanese|make?
 9 , 10
Rule# 6
You drive a station|wagon.
 0 ,-1
Rule# 7
Does your vehicle have|2 wheels?
 8 ,-1
Rule# 8
You drive a motorcycle.
 0 ,-1
Rule# 9
You drive a Mazda RX-7
 0 ,-1
Rule# 10
You drive a Lotus.
 0 ,-1
```

Error!

Occasionally, when using this program and calling up successive rule files, I would get an "Undefined Error." I was unable to trap this error using error-handling routines like the one on Lines 200 and 430 through 480.

I believe that this represents a disk-reading error. If it does occur, just restart the program; it will often read the file successfully on the second try. If you continue to have problems with a rule file, be sure to review the rules when the alert box asks you to, and see if there are any errors in the data.

Now, run and use **AI**—give your computer a chance to live and learn.

Ron Schaefer, M.D. graduated from medical school at the University of California in San Francisco, and has just finished a residency at the University of Hawaii, specializing in Internal Medicine. He's been programming for almost seventeen years and has published research on three-dimensional molecular modeling of proteins and DNA, as well as numerous articles on programming the Atari ST. He recently started his own software company, called Schaefer Supergraphics. All his previous experience has been with mainframes, mostly VAX 11/70s, 11/750s and the Evans on Sutherland Picture System. The ST is his first personal computer.

Listing 1.
ST BASIC listing.

```
10 title$=" /|\ Artificial Intelligence
 by Dr. Schaefer /|\ ":gosub TITLE
20 MAINPROGRAM:'############ MAIN PROGR
AM ############################
30 fullw 2:clearw 2:learning$="off"
40 gotoxy 10,1:?"This program uses a F
orward  Chaining inference engine"
50 gotoxy 10,2:?"and a self modifying
knowledge base to aid in decision"
60 gotoxy 10,3:?"analysis or to create
 an expert system."
65 Root$="AI\":'<------------DEFAULT K
NOWLEDGE BASE FOLDER NAME
70 dbname$="car.r":' <----------------
-DEFAULT KNOWLEDGE BASE NAME
80 text$="Artificial Intelligence|by R
on Schaefer MD|Continue?"
85 type$="2":button$="Yes|Quit":gosub
DOALERT
90 if c=2 then end
100 text$="Choose your knowledge base.
":button$=dbname$+"|Other":type$="3"
110 gosub DOALERT:clearw 2
120 if c= 2 then gotoxy 18,0:input;"En
ter knowledge base file name";dbname$
130 type$="2":text$="Do you want to re
view|the rules":button$="No|Yes"
140 gosub DOALERT
150 ' ########################## Read Data
 Base ##########################
160 num=1:olddbname$=dbname$
170 on error goto 430
180 filename$ = Root$+dbname$
190 close #1:open "I",#1,filename$
200 on error goto 430
210 input #1,flen
220 erase rule$:erase case:erase logic
230 dim rule$(flen+10,2),case(flen+10,
2),logic(flen+10,2)
240 gotoxy 18,1:?"The file ";dbname$;"
 has";flen;"rules    "
250 input #1,rule$(num,1),rule$(num,2)
260 input #1,case(num,1),case(num,2)
270 if c = 1 then goto 390
280 gotoxy 0,5
290 for t=1 to 4
300 gotoxy 20,5+t:?"
                    "
310 next t:gotoxy 0,5
320 gotoxy 30,5:?rule$(num,1):nxt=6
330 lines$=rule$(num,2):gosub LINESOUT
```

```
:nxt=nxt+1
340 gotoxy 25,nxt:?"Yes=";case(num,1);
" No=";case(num,2)
350 linef 160,40,430,40:linef 430,40,4
30,95
360 linef 430,95,160,95:linef 160,95,1
60,40
370 linef 157,37,433,37:linef 433,37,4
33,98
380 linef 433,98,157,98:linef 157,98,1
57,37
390 on error goto 430
400 gotoxy 18,2:?"Reading file ";dbnam
e$;" on rule#";num
410 num=num+1
420 goto 250
430 if err=62 then 500
440 if err=53 then 450 else 470
450 error$="The file "+dbname$+" was n
ot found"
460 gosub ERRALERT:resume 490
470 error$="There was an error in open
ing|the file "+dbname$
480 gosub ERRALERT:resume 490
490 close #1:goto 10
500 resume 510
510 clearw 2
520 BRAIN:'####################### The Br
ain ##########################
530 rule=1:count=1:erase logic:dim log
ic(flen+10,2)
540 logic(count,1)=rule
550 if case(rule,2)=-1 and case(rule,1
)=0 then 560 else 590
560 gosub ANSWERALERT:logic(count,2)=c
:count=count+1
570 if case(rule,c)=0 then 620
580 if case(rule,c)=-1 then gosub LEAR
NA:goto 620
590 gosub RULEALERT
593 if c=3 then 620
595 if case(rule,c)=-1 then gosub LEAR
NR:goto 620
600 if case(rule,c)=0 then 620
610 rule = case(rule,c):logic(count,2)
=c:count=count+1:goto 540
620 gosub REPALERT:if c=1 then BRAIN
630 if c=2 then gosub LOGIC:goto 620
640 if learning$="on" then gosub WRITE
FILE
650 goto MAINPROGRAM
660 TITLE:'################## Makes a ti
tle ############################
670 a#=gb:gintin=peek(a#+8):poke ginti
n+0,peek(systab+8)
680 poke gintin+2,2:s#=gintin+4:title$
=title$+CHR$(0):poke s#,varptr(title$)
690 gemsys(105)
700 return
710 ERRALERT:'################## Alert bo
x for file errors ###########
720 gotoxy 30,4:?"Error #";err
730 text$="ERROR!!!|"+error$:button$="
Bummer":type$="1"
740 gosub DOALERT
750 return
760 RULEALERT:'################## Alert b
ox for rules #################
770 type$="2":text$=rule$(rule,1)+"|"+
rule$(rule,2):button$="Yes|No|Quit"
780 gosub DOALERT
790 return
800 REPALERT:'############### Repeat sam
e data base ###############
810 txt$="Do you want to use the|same
knowledge base,"
820 text$=txt$+"|review the logic, or|
use another data base?"
830 type$="3":button$="Same|Logic|Anot
her"
840 gosub DOALERT
850 return
860 LOGIC:'################ Reviews the
logic ######################
870 q=1
880 while q < count
890 if logic(q,2)=1 then yorn$=" (Yes)
" else yorn$=" (No)"
900 text$=rule$(logic(q,1),2)+yorn$
910 type$="1":button$="Logic Review"
920 gosub DOALERT:q=q+1
930 wend
940 return
950 LEARNA:'################## Learn new
 question ##################
960 type$="2":button$="No|Yes"
970 text$="ANSWER UNKNOWN|Would you li
ke to add|another rule and answer|"
980 text$=text$+"to the data base":gos
ub DOALERT
990 if c=1 then return else learning$=
"on"
1000 clearw 2:linef 158,90,409,90:line
f 409,90,409,150
1010 linef 409,150,158,150:linef 158,1
50,158,90
1020 linef 155,87,412,87:linef 412,87,
412,153
1030 linef 412,153,155,153:linef 155,1
53,155,87
1040 gotoxy 20,10:?"Enter the correct
answer"
1050 flen=flen+1:case(flen,1)=0:case(f
len,2)=-1
1060 a=flen:b=2:gosub INLINES:rule$(fl
en,1)="New Rule"
1070 clearw 2
1080 gotoxy 20,1:?"Enter a yes no ques
tion such"
1090 gotoxy 20,2:?"that the following
is true"
1100 gotoxy 20,3:?"(YES)":nxt=4
1110 lines$=rule$(flen,2):gosub LINESO
UT:nxt=nxt+1
1120 gotoxy 20,nxt:?"(NO)":nxt=nxt+1
1130 lines$=rule$(logic(count-1,1),2):
gosub LINESOUT
1140 flen=flen+1:rule$(flen,2)=rule$(l
ogic(count-1,1),2)
1150 rule$(flen,1)=rule$(logic(count-1
,1),1):case(flen,1)=0:case(flen,2)=-1
1160 case(logic(count-1,1),1)=flen-1:c
ase(logic(count-1,1),2)=flen
1170 linef 160,8,423,8:linef 423,8,423
,150
1180 linef 423,150,160,150:linef 160,1
50,160,8
1190 linef 157,5,426,5:linef 426,5,426
,153
1200 linef 426,153,157,153:linef 157,1
```

```
53,157,5
1210 a=logic(count-1,1):b=2:gosub INLI
NES
1220 clearw 2:return
1230 LINESOUT:'################## Prints
 lines to screen ###############
1240 start=1:ends=LEN(lines$)
1250 if INSTR(start,lines$,"|")=0 then
 1260 else 1270
1260 gotoxy 20,nxt:?MID$(lines$,start,
ends):return
1270 ends=INSTR(start,lines$,"|")
1280 gotoxy 20,nxt:?MID$(lines$,start,
ends-start)
1290 start=ends+1:nxt=nxt+1:goto 1250
1300 INLINES:'################### Templa
te for input lines ################
1310 gotoxy 19,12:?"(25 char/line max
of 3 lines)
1320 gotoxy 20,13:?"<________________
_______>  "
1330 gotoxy 20,14:?"<________________
_______>  "
1340 gotoxy 20,15:?"<________________
_______>  "
1350 gotoxy 19,13:input;"=>",an1$:if L
EN(an1$) > 25 then 1320
1360 gotoxy 20,14:?"<________________
_______>  "
1370 gotoxy 19,14:input;"=>",an2$:if L
EN(an2$) > 25 then 1360
1380 gotoxy 20,15:?"<________________
_______>  "
1390 gotoxy 19,15:input;"=>",an3$:if L
EN(an3$) > 25 then 1380
1400 rule$(a,b)=an1$+"|"+an2$+"|"+an3$
1410 if RIGHT$(rule$(a,b),1)="|" then
1420 else 1430
1420 rule$(a,b)=MID$(rule$(a,b),1,LEN(
rule$(a,b))-1):goto 1410
1430 return
1440 ANSWERALERT:'################## Aler
t box for an answer ##############
1450 text$="ANSWER "+rule$(rule,1)+"|"
+rule$(rule,2)
1460 type$="1":button$="Yes|No"
1470 gosub DOALERT
1480 return
1490 DOALERT:'################### Creats
an alert box #################
1500 'accepts to strings type$, text$,
 and button$, outputs value c
1510 a#=gb:control=peek(a#):global=pee
k(a#+4):gintin=peek(a#+8)
1520 gintout=peek(a#+12):addrin=peek(a
#+16):'initialize alert box
1530 N#=addrin:poke gintin,1:'1 is the
 default button
1540 alert$="["+type$+"][|"+text$+"|][
"+button$+"]"+CHR$(0)+CHR$(0)
1550 poke N#,varptr(alert$):gemsys(52)
:c=peek(gintout):'c=button
1560 return
1570 WRITEFILE:'############ Writes a m
odified database file ############
1580 type$="2":button$="No|Yes"
1590 text$="Do you want to save|the mo
dified knowledge|base?"
1600 gosub DOALERT
1610 if c=1 then return
1620 button$="New Name|"+dbname$
1630 text$="Save the modified|knowledg
e base file|as."
1640 gosub DOALERT
1650 if c=2 then newdbname$=Root$+dbna
me$:goto 1680
1660 if c=1 then gotoxy 10,5:input;"En
ter the new file name";ndbname$
1670 newdbname$=Root$+ndbname$
1680 on error goto 1770
1685 gotoxy 10,6:?"Writing new knowled
ge base file: ";newdbname$
1690 close #2:open "O",#2,newdbname$
1700 ?# 2,flen
1710 for newloop=1 to flen
1720 ?# 2,"Rule#";newloop
1730 ?# 2,rule$(newloop,2)
1740 ?# 2,case(newloop,1);",";case(new
loop,2)
1750 next newloop
1760 return
1770 if err=57 then 1780 else 1780
1780 error$="Error in|writing the file
|"+newdbname$
1790 gosub ERRALERT
1800 resume 1760
1950 LEARNR:'################## Learn ne
w rule question ##################
1960 type$="2":button$="No|Yes"
```


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```
1970 text$="ANSWER UNKNOWN|Would you l
ike to add|another rule and answer|"
1980 text$=text$+"to the data base":go
sub DOALERT
1990 if c=1 then return else learning$
="on"
2000 clearw 2:linef 158,90,409,90:line
f 409,90,409,150
2010 linef 409,150,158,150:linef 158,1
50,158,90
2020 linef 155,87,412,87:linef 412,87,
412,153
2030 linef 412,153,155,153:linef 155,1
53,155,87
2040 gotoxy 20,10:?"Enter the new ques
tion"
2045 'NEW QUESTION will be placed at e
nd of rule file
2050 flen=flen+1:case(flen,1)=flen+1:c
ase(flen,2)=-1
2060 a=flen:b=2:gosub INLINES:rule$(fl
en,1)="New Rule"
2070 clearw 2:linef 158,90,409,90:line
f 409,90,409,150
```

●

ST CHECKSUM DATA.
(see page 9)

```
 10 data  956, 641, 754, 160, 141, 430
, 666, 56, 165, 382, 4351
 90 data  277, 410, 492, 380, 352, 335
, 584, 561, 624, 622, 4637
 190 data  62, 605, 119, 164, 571, 19,
 634, 453, 48, 734, 3409
 290 data  858, 326, 782, 391, 465, 10
1, 640, 694, 719, 773, 5749
 390 data  634, 987, 639, 402, 488, 50
0, 920, 886, 903, 892, 7251
 490 data  445, 704, 377, 771, 488, 45
, 14, 184, 658, 161, 3847
 590 data  596, 90, 203, 639, 266, 636
, 490, 841, 822, 298, 4881
 670 data  251, 740, 796, 342, 97, 988
, 553, 347, 357, 897, 5368
 770 data  863, 359, 369, 595, 997, 54
9, 579, 349, 359, 165, 5184
 870 data  791, 449, 152, 477, 198, 62
, 69, 358, 573, 214, 3343
 970 data  396, 0, 535, 63, 84, 837, 8
6, 20, 756, 318, 3095
 1070 data  537, 640, 282, 765, 608, 5
82, 656, 898, 889, 140, 5997
 1170 data  485, 892, 518, 944, 276, 6
67, 277, 726, 446, 671, 5902
 1270 data  263, 427, 715, 452, 929, 7
36, 738, 740, 450, 741, 6191
 1370 data  463, 744, 472, 779, 437, 6
18, 862, 736, 83, 746, 5940
 1470 data  794, 867, 861, 922, 210, 8
0, 294, 440, 222, 868, 5558
 1570 data  458, 707, 632, 793, 924, 9
36, 587, 797, 498, 582, 6914
 1670 data  24, 723, 226, 534, 761, 33
3, 618, 721, 948, 955, 5843
 1760 data  874, 960, 917, 67, 364, 49
9, 717, 814, 318, 386, 5916
 2000 data  135, 832, 590, 834, 989, 4
16, 221, 170, 142, 839, 5168
 2090 data  597, 834, 699, 621, 22, 43
1, 407, 3611
```

●

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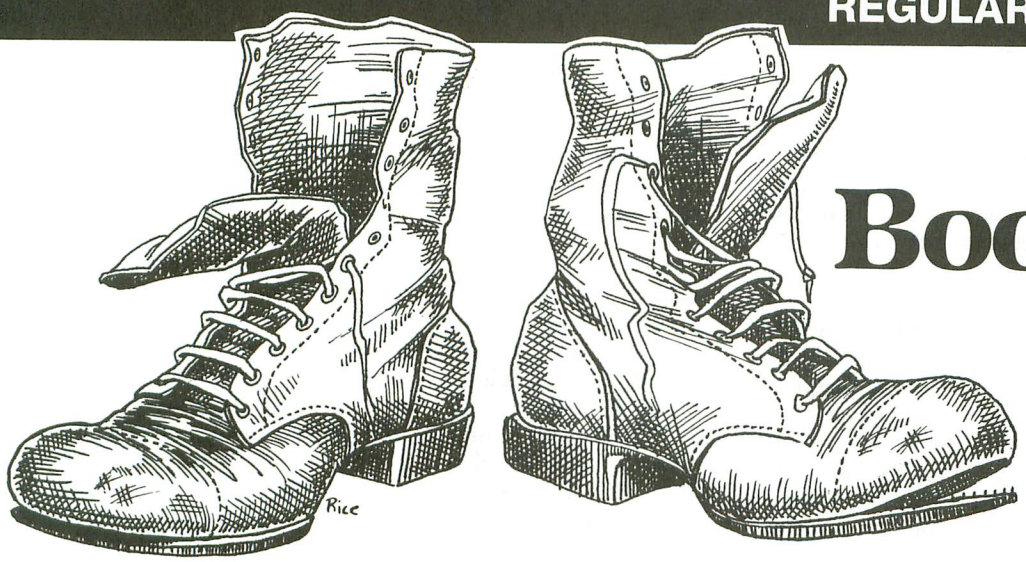

Boot Camp

Revenge of Macromania.

by Karl E. Wiegers

Last month's **Boot Camp** ended with a homework assignment. I asked you to write an INPUT macro that would read a string up to a specified maximum number of characters from a particular IOCB, and store the string at a particular address in RAM. Don't bother trying to tell me why you didn't get around to doing this assignment. I used to teach organic chemistry to pre-med students at the University of Illinois—I've heard all the excuses. I'll just assume you *did* do it, and we'll proceed from there.

Today I'll present my version of the INPUT macro, along with other macros and subroutines that do some pretty neat things. Would you believe a delay subroutine to do nothing for a precise period of time? How about a FOR/NEXT loop implementation in assembly language? Or a MOVE macro to copy a block of data of any length from one address to another? All this, and more, lies in the next few pages.

Perhaps you're among the readers who don't own a macro assembler. You flip to **Boot Camp** each month and groan, "When is this clown going to quit with the macros already and get back to something I can use?" Please don't feel left out.

Virtually everything we've discussed during the foray into macroland is useful to you, anyway. Remember, a macro is just a shorthand way to write assembly programs. You can adapt all the macros I've presented just by expanding the source code yourself when writing a program where you would otherwise invoke a macro. In fact, since you'll know exactly what your parameters are, you can skip all the conditional assembly (.IF/.ELSE/.ENDIF) code I've built into the general macro formats. And, of course, you can use the subroutines exactly as I've written them.

Philosophy of the month.

How about another programming philosophy discourse: efficiency. I think of three kinds of programming efficiency: the time I spend developing the program; size of the resulting object code; and execution speed. Programming in assembly is a great way to come up with fast, compact object code. However, the act of designing and writing the source code is a lot slower than it is if you're using a high-level language like BASIC.

To make your programming more efficient, use good tools —like a fast assembler, a RAMdisk, macros and common subroutines. But all is still not roses. These shortcuts exact a toll in both size and speed. Consider the way we .INCLUDE the subroutine library file we've been constructing, SUBS.LIB. Those subroutines get assembled into object code whether or not the main program calls any of them. This both slows the assembly process as the file is read and results in larger object files than we'd get if only the subroutines actually called were included in the source code.

Similarly, many of our macros are written to be flexible, handling a variety of parameters and situations. This sometimes results in more assembled instructions than does individually coding each instance. And more instructions to be executed mean slightly longer execution times. In essence, we've been building our own "high-level" language, with the accompanying benefits and drawbacks.

Are these compromises worth it? Assembly programs generally run fast enough that a few extra instructions don't do any harm. Our computers have a lot more RAM now than they used to, so a longer object file doesn't hurt much, either. And these shortcuts save a lot of *your* time. I usually prefer to program for ease of comprehension and maintainability, rather than for fastest or shortest code.

Format reprise.

Just one more thing before we get to the business at hand. Last month, I showed how to format a disk using an XIO macro. The CIO command value I mentioned, $FE, will actually format a disk in an Atari 1050 disk drive in enhanced-

density mode. Drives other than the 1050 automatically format in single density with this command. If you're using a 1050 drive and want to format in single density, use command value $FD instead. This is equivalent to option P at the DOS 2.5 menu, "Format Single."

New macros.

Please merge Listing 1 with the MACRO.LIB file you've been building over the past few months. Be sure to use the line numbers shown. Listing 1 contains a few more equates for some variables used in the new macros. Notice that I am using four zero-page locations ($CB-$CE); these bytes are free for your own needs, except when using the MOVE macro. Also, bytes $0681-$0687 are used by the FOR/NEXT and MOVE macros. MAC/65 gobbles up locations $0600-$067F, so I might as well keep consuming page 6 for these work variables.

Lines 845-915 of Listing 1 modify our existing POKE macro to accept either an address or a value as parameter 2. If parameter 2 is smaller than 256, it's assumed to be a value. Otherwise, it's assumed to be an address, and the contents of that address are copied into the address specified in parameter 1.

The rest of Listing 1 is the code for eight new macros: INPUT, PAUSE, ADD, SUBTRACT, DPOKE, FOR, NEXT and MOVE. Listing 2 contains two new subroutines that should be added to your SUBS.LIB file.

Let's start very simply. Lines 1970-2020 of Listing 2 define a subroutine called CLS, for clear screen. If you want to completely erase a graphics 0 screen, use a JSR CLS instruction. This simply prints character 125, the ATASCII clear screen character, on IOCB 0. The BASIC equivalent is: PRINT CHR$(125).

Readin'.

Last month we talked about writin', so this time we'll do some readin'. My INPUT macro lives in Lines 3590-3950 of Listing 1. It takes three parameters: the IOCB number; the buffer address where the string read is to be stored; and the number of bytes to be read. Parameter 3 is optional. If absent, the buffer length is set to 255 bytes, although an end-of-line character (EOL) will also terminate the input step. The CIO command is GETREC (Lines 3760-3770). The rest of the macro just involves the familiar CIO activities of pointing to the buffer address (Lines 3780-3810) and setting the buffer length (Lines 3820-3920).

The easiest way to use INPUT is to reserve space for the string to be input, with a statement such as: *FILENAME .DS 17*, which will reserve 17 bytes at address FILENAME. To let the user enter a filename at the keyboard, then, you'd use a statement like: *INPUT 0,FILENAME,17*. There's another example in Listing 3, which is a sample program to exercise a bunch of our macros.

Take a break.

Sometimes you feel like giving the computer (or maybe its user) a breather, simply doing nothing for a period of time. In BASIC, the empty FOR/NEXT loop is often employed. Four hundred iterations consume about a second of time, but this is only approximate. The macro called PAUSE (Lines 3990-4290 of Listing 1) lets you suspend execution of your program for a precise period of time.

PAUSE takes one parameter, the number of "jiffies" that you want to wait before continuing execution of the program. A jiffy is 1/60th of a second, and the Atari has an internal real-time clock that increments a particular byte every jiffy. This is part of the system housekeeping performed during every vertical blank period, which you no doubt recall occurs sixty times per second. The PAUSE parameter can be either a value or an address (not zero-page).

The real-time clock is located in bytes $12-$14. The equate for RTCLOK is in the first line in Listing 1. Address $14 (RTCLOK+2) is the one that gets incremented every jiffy. After 255 jiffies (about 4.27 seconds), RTCLOK+2 is reset to 0 and RTCLOK+1 is incremented. After 65,535 jiffies (18.2 minutes), RTCLOK+1 is reset to 0 and RTCLOK is incremented. The PAUSE macro uses only RTCLOK+2, so you're limited to a delay of just over four seconds, precise to 1/60th of a second. To wait longer, you could call PAUSE several times in a row. If you're more ambitious, modify PAUSE to accept a 2-byte parameter, and you could then set wait times up to 18.2 minutes.

PAUSE simply stores the desired number of jiffies to wait at address @TIMER. Lines 4180-4190 use the contents of an address as the delay time, and Lines 4210-4220 use a value. RTCLOK+2 must be initialized to 0 (Lines 4150-4160). Then a loop simply compares RTCLOCK+2 to @TIMER until they match. Of course, the computer really isn't doing "nothing" during the pause; computers don't know how to do nothing. It's frantically looping as fast as it can through Lines 4240-4270.

'Rithmetic.

Let's return to the roots of computing: mathematical operations. Lines 4330-4660 of Listing 1 define a macro called ADD. To preserve the symmetry of the universe (can you guess I'm a Libra?), SUBTRACT is found immediately following ADD.

Both macros need two parameters. The first is the address of a 2-byte number; the second, either a value or another address. In ADD, the contents of the first address are added to either the value or contents of the second address; the resulting 2-byte number is stored back at the first address. More concisely, *%1=%1+%2*. SUBTRACT can be summarized as *%1=%1-%2*. The algorithms are straightforward 2-byte binary arithmetic, processing first the low bytes and then the high bytes of each pair of operands. Notice that the carry flag is cleared (CLC) before the additions, and it's set (SEC) before a subtraction.

These macros can be very handy when working with customized mixed graphics mode displays. If you turn back to **Boot Camp** in issue 44, you'll recall that, to write in different graphics mode segments of the screen, we treated each segment as a separate little screen. We changed the pointer to the beginning of screen RAM (SAVMSC, $58 and $59) to point at the beginning of the RAM used by each segment. To accomplish this, we figured out how many bytes of screen RAM were consumed by the first segment and added that number to the contents of SAVMSC. SAVMSC then pointed to the second segment, and POSITION and PRINT statements were relative to the upper left corner of that segment. The ADD macro is perfect for such operations.

Conversely, if you write in, say, the fourth segment of a mixed-mode display and then need to write in the second segment, you can use SUBTRACT to reset SAVMSC to where you need it. If this discussion leaves you baffled, please review Lines 980-1210 of the listing in issue 44's **Boot Camp**.

Poke two, they're small.

A short macro called DPOKE (for double poke) is in Lines 5070-5250 of Listing 1. DPOKE is similar to POKE, except the first parameter is a 2-byte *address* and the second is a 2-byte *value*. DPOKE lets you store a value greater than *255* in the usual low/high format.

It would be nice to let parameter 2 take either a value or an address, but how could we tell them apart? In macros like POKE, if the parameter is larger than *255*, we can safely conclude that it's an address. Things are not so simple in DPOKE. Actually, if you find it more useful to have DPOKE expect parameter 2 to be an address, just rewrite it. Or you could have two versions, say, DPOKEA and DPOKEV. Or you could add a third parameter, a "flag" to tell the macro if parameter 2 is a value or an address. The possibilities are endless; the decision is yours.

Loop-the-loop.

Ah, I like this one! I was very smug when I figured out how to simulate (at least in a simple way) the useful FOR/NEXT construct from BASIC. Lines 5290-5590 of Listing 1 are the FOR macro, and Lines 5630-5910 are the NEXT macro. Let's review how FOR/NEXT works.

Sample FOR/NEXT statements are: *FOR I=4 TO 12 STEP 2/NEXT I*. The FOR statement defines an "index variable" *(I)* that will be changed systematically each time we go through the loop. It also states the initial *(4)* and final *(12)* values of the index variable, and an optional increment *(2)* by which the index variable is changed on each iteration. If STEP is omitted, it's assumed to be *1*. In BASIC, the initial, final and increment values can all be variables.

When a NEXT statement is encountered, the index variable is changed by the value of the increment. The result is compared to the final value. If the index variable is greater than the final value (for a loop in which it's increasing), the loop is terminated. Otherwise, the statement immediately following the FOR statement is executed again, and the process continues.

My FOR/NEXT macros simulate the BASIC situation reasonably well, with some restrictions. First, you can't have nested FOR/NEXT loops (that is, a loop having index variable *J* within a loop having index variable *I*). Also, I've reserved only 1 byte for the value of the index variable, limiting it to values from *0* through *255*. The equates used by my FOR/NEXT macros are in Lines 351-354 of Listing 1. These are 1-byte integers. A statement like *FOR I=35.4 TO 114.6 STEP 0.2* is perfectly legal in BASIC, but not here. Also, as written, the FOR macro accepts only values for all parameters except the index variable, which is an address.

On the plus side, my FOR/NEXT macros do permit loops with negative increments. You could write more elaborate macros to overcome the limitations I mentioned, but you'll probably find that even these simple ones are very useful.

Now for the nitty-gritty. The FOR macro is invoked with either three or four parameters. Parameter 1 is the name of the index variable (address). Parameter 2 is the initial index value, and parameter 3 is the final value. The optional parameter 4 is the increment. If absent, an increment of *1* is assumed, just as in BASIC. Lines 5420-5430 load the index variable with the initial value, and Lines 5440-5450 stash the final value at address ENDLOOP ($0682). Lines 5460-5520 store the increment value at address INCLOOP ($0683), based on the number of parameters supplied.

It would be nice to remember where the first executable statement in the loop is, so we can go back to the right place when the NEXT macro is executed. The 2 bytes at LOOPADD ($0684) are used to store the address where code in the loop actually begins. If you think about it, you'll realize that this address is 1 byte past the end of the object code generated by the FOR macro. I called this @LOOPSTART (following my practice of beginning label names inside macros with an "at" sign).

The NOP instruction at address @LOOPSTART (Line 5580) means "no operation"; don't do anything, just continue on with the next instruction. I'm simply using this as a placeholder, and it's actually the first instruction inside the loop. Lines 5540-5570 store the actual address of @LOOPSTART in LOOPADD, which will be used by the NEXT macro. Naturally, the address of @LOOPSTART will be different every time the macro is invoked within a particular program.

The NEXT macro is responsible for changing the index variable, seeing if we're finished yet, and going back to @LOOPSTART to run through the loop again if it's not time to quit.

NEXT only needs one parameter, the name of the index variable. Lines 5740-5750 check to see if the increment is positive or negative. If positive, Line 5760 adds the increment value to the current value of the index variable, and Line 5770 compares the sum to the final value in ENDLOOP. The result of this comparison sets one or more flags in the 6502's processor status register; more about that later. Based on the results of the comparison, we either save the new value of the index variable and go back to the beginning of the loop (Lines 5810-5820), or terminate the whole process by branching to the last line of the macro, @LOOPDONE.

Lines 5830-5880 handle the case in which the increment is negative. We can still add the increment to the current value, because adding a negative number is the same as subtracting.

The JMP instructions in Lines 5820 and 5880 look a little funny. Rather than using the normal absolute addressing, this is an "indirect absolute addressing" mode. JMP is the only 6502 operation that uses this mode. The JMP (LOOPADD) syntax means to jump to the *address* stored at address LOOPADD and continue execution. Contrast this with the usual JMP SOMEWHERE format, which means to jump to address SOMEWHERE and continue execution. Now you see why FOR stored the address of the first instruction in the loop in LOOPADD. NEXT refers to the contents of LOOPADD when deciding where to jump if it wants to go through the loop again.

Let's examine the comparison operation. Remember the processor status register in the 6502? That's the register with 7 bits that indicate, among other things, whether the result of the last operation was 0 or negative, and whether it caused a carry operation. The compare instructions, such as CMP 45, affect the 0, negative and carry flags.

Table 1 shows how these flags appear, based on whether (for a CMP operation) the contents of the accumulator are smaller than the operand (45 in the example above), equal to it, or greater than the operand. The results are the same for CPY and CPX operations.

Table 1.
Flags set by compare operations: CMP operand.

Situation	Negative	Zero	Carry
A < operand	1	0	0
A = operand	0	1	1
A > operand	0	0	1

You can use the branch instructions to control the flow of program execution, based on the results of a comparison. BEQ and BNE look at the zero flag (cleared or set, respectively), BPL and BMI use the negative flag (cleared or set), and BCC and BCS examine the carry flag (cleared or set). Since all three flags are affected, we might need a couple of branch operations in sequence, to get where we want to go.

Lines 5770-5790 of Listing 1 provide an illustration. We're comparing the contents of the accumulator (A) with the contents of ENDLOOP. If they're equal or if A is smaller than ENDLOOP, we want to loop again (go to @RELOOP). Otherwise we're done (go to @LOOPDONE). Table 1 shows that the carry flag is clear only if A is less than ENDLOOP, so we must use a second test to distinguish between A equalling ENDLOOP and A being greater than ENDLOOP.

In English, Line 5780 asks, "Does A equal ENDLOOP (is the zero flag set)?" If yes, go to @RELOOP. If no, Line 5790 asks, "Is A greater than ENDLOOP (is the carry flag set)?" If yes, go to @LOOPDONE. If no, fall through to @RELOOP. You'll have to use the old noodle to test these flags in the correct sequence when making such comparisons.

Head 'em out, move 'em up.

That's what my girlfriend said when we visited my home state of Idaho, trying to get into the spirit of the Old West. Close enough. Our final macro for today is called MOVE, and it lives in Lines 5950-6170 of Listing 1. Actually, the MOVE macro just handles the setup; the rather lengthy MOVESUB subroutine in Listing 2 does the hard part. The MOVE routines are great for such operations as copying the ROM character set into RAM or moving players vertically.

MOVE is used to transfer (copy, really) a block of bytes of any length from one part of memory (RAM or ROM) to another (RAM, obviously). The ranges can overlap, but of course, you'll overwrite part of the source range if they do. Three parameters are needed: the starting address of the block to be copied; the address to which it is to be copied; and the number of bytes to transfer, a value. The MOVE macro just loads some work registers with these parameters, using the DPOKE macro, and calls MOVESUB. The equates for the work registers are at the top of Listing 1.

MOVESUB first determines if the destination address is at a higher or lower address in memory than the source, using Lines 2100-2150 in Listing 2. This is important. If moving data to a lower address, you want to begin with the first byte in the source block (lowest address). However, if moving to a higher address, move the highest byte in the range first. This prevents you from overwriting data in the source block in case the ranges overlap. The routine to move data to a higher address is in Lines 2300-2590, and the copying to a lower address takes place in Lines 2630-2930.

These routines are a little complicated. To handle any arbitrary number of bytes, we need a 2-byte register (I called it HOWMANY) to store the number of bytes to move. When moving to higher addresses, I first move the number of bytes indicated by the low-byte of HOWMANY. Then I use another loop to transfer the number of pages (256 bytes each) indicated by the high-byte of HOWMANY. Conversely, I move data in one-page blocks first when shifting to lower addresses (Lines 2710-2800), and wrap up the partial page, if any, in Lines 2810-2930. You might want to walk through this code and convince yourself it makes sense.

A demo program.

So far, I've just given you a bunch of tools and some thoughts on how to use them. The program in Listing 3 applies most of these new routines—and some old ones—to give you an idea of how easy it is to write assembly programs using all these shortcuts. Experiment!

Despite having a Ph.D. in organic chemistry, Karl Wiegers earns a living writing applications software for photographic research at Eastman Kodak Company, mostly on an IBM mainframe. He is also interested in educational applications of Atari 8-bit, Atari ST and Apple II computers.

Listing 1.
Assembly listing.

```
0229 RTCLOK = $12
0241 MOVEFROM = $CB
0242 MOVETO = $CD
0351 I    =    $0681
0352 ENDLOOP = $0682
0353 INCLOOP = $0683
0354 LOOPADD = $0684
0355 HOWMANY = $0686
0845 ;or address
0892       .IF %2>256
0894       LDA %2
0896       STA %1
0898       .ELSE
0915       .ENDIF
3560 ;
3570 ;*******************************
3580 ;
3590 ;INPUT macro
3600 ;
3610 ;Usage: INPUT IOCB,address,length
3620 ;
3630 ;'IOCB' is the IOCB number to use
3640 ;'address' is a label or actual
3650 ; buffer address where the input
3660 ; string is to be stored
3670 ;'length' is the number of bytes
3680 ; to be input - if missing, then
3690 ; length is set to 255 bytes
3700 ;
3710      .MACRO INPUT
```

```
3720        .IF %0<2 .OR %0>3
3730        .ERROR "Error in INPUT"
3740        .ELSE
3750        LDX #%1*16
3760        LDA #GETREC
3770        STA ICCOM,X
3780        LDA # <%2
3790        STA ICBAL,X
3800        LDA # >%2
3810        STA ICBAH,X
3820          .IF %0=2
3830          LDA #255
3840          STA ICBLL,X
3850          LDA #0
3860          STA ICBLH,X
3870          .ELSE
3880          LDA # <%3
3890          STA ICBLL,X
3900          LDA # >%3
3910          STA ICBLH,X
3920          .ENDIF
3930        JSR CIOV
3940        .ENDIF
3950      .ENDM
3960 ;
3970 ;**********************************
3980 ;
3990 ;PAUSE macro
4000 ;
4010 ;Usage: PAUSE jiffies
4020 ;
4030 ;'jiffies' is the number of
4040 ;jiffies (1/60 sec) to pause, a
4050 ;value up to 255, or an address
4060 ;
4070      .MACRO PAUSE
4080        .IF %0<>1
4090        .ERROR "Error in PAUSE"
4100        .ELSE
4110        CLC
4120        BCC @SKIPPAUSE
4130 @TIMER .BYTE 0
4140 @SKIPPAUSE
4150        LDA #0
4160        STA RTCLOK+2
4170          .IF %1>255
4180          LDA %1
4190          STA @TIMER
4200          .ELSE
4210          LDA # <%1
4220          STA @TIMER
4230          .ENDIF
4240 @DELAY
4250        LDA RTCLOK+2
4260        CMP @TIMER
4270        BNE @DELAY
4280        .ENDIF
4290      .ENDM
4300 ;
4310 ;**********************************
4320 ;
4330 ;ADD macro
4340 ;
4350 ;Usage: ADD first,second
4360 ;
4370 ;'first' is an address of a two-
4380 ;byte number
4390 ;'second' is either the address
4400 ;of a two-byte number, or a value
4410 ;
4420 ;first = first + second
4430 ;
4440      .MACRO ADD
4450        .IF %0<>2
4460        .ERROR "Error in ADD"
4470        .ELSE
4480          .IF %2<256
4490          CLC
4500          LDA %1
4510          ADC #%2
4520          STA %1
4530          BCC @SKIPADD
4540          INC %1+1
4550 @SKIPADD
4560          .ELSE
4570          CLC
4580          LDA %1
4590          ADC %2
4600          STA %1
4610          LDA %1+1
4620          ADC %2+1
4630          STA %1+1
4640          .ENDIF
4650        .ENDIF
4660      .ENDM
4670 ;
4680 ;**********************************
4690 ;
4700 ;SUBTRACT macro
4710 ;
4720 ;Usage: SUBTRACT first,second
4730 ;
4740 ;'first' is an address of a two-
4750 ;byte number
4760 ;'second' is either the address
4770 ;of a two-byte number, or a value
4780 ;
4790 ;first = first - second
4800 ;
4810      .MACRO SUBTRACT
4820        .IF %0<>2
4830        .ERROR "Error in SUBTRACT"
4840        .ELSE
4850          .IF %2<256
4860          SEC
4870          LDA %1
4880          SBC #%2
4890          STA %1
4900          BCS @SKIPSUB
4910          DEC %1+1
4920 @SKIPSUB
4930          .ELSE
4940          SEC
4950          LDA %1
4960          SBC %2
4970          STA %1
4980          LDA %1+1
4990          SBC %2+1
5000          STA %1+1
5010          .ENDIF
5020        .ENDIF
5030      .ENDM
5040 ;
5050 ;**********************************
5060 ;
5070 ;DPOKE macro
5080 ;
5090 ;Usage:  DPOKE to,from
5100 ;
5110 ;'to' is a 2-byte destination
5120 ;   address
5130 ;'from' is source value (0-65535)
5140 ;
5150 ;
5160      .MACRO DPOKE
5170        .IF %0<>2
5180        .ERROR "Error in DPOKE"
5190        .ELSE
5200        LDA # <%2
5210        STA %1
5220        LDA # >%2
5230        STA %1+1
5240        .ENDIF
5250      .ENDM
5260 ;
5270 ;**********************************
5280 ;
```

```
5290 ;FOR macro
5300 ;
5310 ;Usage: FOR label,start,stop,inc
5320 ;
5330 ;'label' is byte to hold index
5340 ;'start' is initial index value
5350 ;'stop' is final index value
5360 ;'inc' is optional step increment
5370 ;
5380     .MACRO FOR
5390       .IF %0<3 .OR %0>4
5400       .ERROR "Error in FOR"
5410       .ELSE
5420       LDA # <%2
5430       STA %1
5440       LDA # <%3
5450       STA ENDLOOP
5460         .IF %0=3
5470         LDA #1
5480         STA INCLOOP
5490         .ELSE
5500         LDA # <%4
5510         STA INCLOOP
5520         .ENDIF
5530       .ENDIF
5540     LDA # <@LOOPSTART
5550     STA LOOPADD
5560     LDA # >@LOOPSTART
5570     STA LOOPADD+1
5580 @LOOPSTART NOP
5590     .ENDM
5600 ;
5610 ;**********************************
5620 ;
5630 ;NEXT macro
5640 ;
5650 ;Usage: NEXT label
5660 ;
5670 ;'label' is byte holding index
5680 ;
5690     .MACRO NEXT
5700       .IF %0<>1
5710       .ERROR "Error in NEXT"
5720       .ELSE
5730       CLC
5740       LDA INCLOOP
5750       BMI @LOOPDOWN
5760       ADC %1
5770       CMP ENDLOOP
5780       BEQ @RELOOP
5790       BCS @LOOPDONE
5800 @RELOOP
5810       STA %1
5820       JMP (LOOPADD)
5830 @LOOPDOWN
5840       ADC %1
5850       CMP ENDLOOP
5860       BMI @LOOPDONE
5870       STA %1
5880       JMP (LOOPADD)
5890 @LOOPDONE
5900       .ENDIF
5910     .ENDM
5920 ;
5930 ;**********************************
5940 ;
5950 ;MOVE macro
5960 ;
5970 ;Usage:  MOVE from,to,length
5980 ;
5990 ;'from' is starting address of
6000 ;  block to be moved
6010 ;'to' is starting address where
6020 ;  block is to be copied to
6030 ;'length' is number of bytes to
6040 ;  be copied (value, not address)
6050 ;
6060 ;calls subroutine MOVESUB
6070 ;
6080     .MACRO MOVE
6090       .IF %0<>3
6100       .ERROR "Error in MOVE"
6110       .ELSE
6120        DPOKE  MOVEFROM,%1
6130        DPOKE  MOVETO,%2
6140        DPOKE  HOWMANY,%3
6150       JSR MOVESUB
6160       .ENDIF
6170     .ENDM
```

Listing 2.
Assembly listing.

```
1940 ;
1950 ;**********************************
1960 ;
1970 ;CLS (clear screen) subroutine
1980 ;
1990 CLS
2000      PRINT  0,CLEARSCR
2010     RTS
2020 CLEARSCR .BYTE 125,EOL
2030 ;
2040 ;**********************************
2050 ;
2060 ;sub. to move a block of data
2070 ;called by MOVE macro
2080 ;
2090 MOVESUB
2100     SEC          ;find out if
2110     LDA MOVETO   ;moving data up
2120     SBC MOVEFROM ;or down in RAM
2130     LDA MOVETO+1
2140     SBC MOVEFROM+1
2150     BMI MOVEDOWN
2160 ;
2170 ;move to higher RAM address
2180 ;
2190     CLC          ;start with
2200     LDA MOVEFROM+1 ;byte having
2210     ADC HOWMANY+1 ;highest
2220     STA MOVEFROM+1 ;address
2230     CLC
2240     LDA MOVETO+1
2250     ADC HOWMANY+1
2260     STA MOVETO+1
2270 ;
2280 ;move block with < 256 bytes
2290 ;
2300 STARTUP
2310     LDY HOWMANY ;if low byte of
2320     BEQ FINISHUP ;HOWMANY=0, this
2330     LDX HOWMANY ;part is done
2340 PARTIAL1
2350     DEY
2360     LDA (MOVEFROM),Y
2370     STA (MOVETO),Y
2380     DEX
2390     BNE PARTIAL1
2400 ;
2410 ;move remainder in 1-page blocks
2420 ;
2430 FINISHUP
2440     DEC MOVEFROM+1
2450     DEC MOVETO+1
2460     DEC HOWMANY+1 ;when high byte
2470     BPL PAGEUP  ;of HOWMANY=0
2480     RTS         ;then all done
2490 PAGEUP
2500     LDY #0      ;use Y as index,
2510     LDX #0      ;X as counter
2520 NEXTUP
2530     DEY
```

```
2540      LDA (MOVEFROM),Y
2550      STA (MOVETO),Y
2560      INX
2570      BNE NEXTUP
2580      CLC
2590      BCC FINISHUP
2600 ;
2610 ;move to lower RAM address
2620 ;
2630 MOVEDOWN
2640      LDA HOWMANY+1
2650      BEQ FINISHDOWN
2660      LDY #0
2670 ;
2680 ;start with lowest address, move
2690 ;data in 1-page blocks
2700 ;
2710 NEXTDOWN
2720      LDA (MOVEFROM),Y
2730      STA (MOVETO),Y
2740      INY
2750      BNE NEXTDOWN
2760      INC MOVEFROM+1
2770      INC MOVETO+1
2780      DEC HOWMANY+1
2790      CLC
2800      BCC MOVEDOWN
2810 FINISHDOWN
2820      LDA HOWMANY
2830      BEQ DONEDOWN
2840 ;
2850 ;finish with block of < 256 bytes
2860 ;
2870 PARTIAL2
2880      LDA (MOVEFROM),Y
2890      STA (MOVETO),Y
2900      INY
2910      CPY HOWMANY
2920      BNE PARTIAL2
2930 DONEDOWN
2940      RTS
```

Listing 3.
Assembly listing.

```
0100 ;Macro Workout Example
0110 ;Karl E. Wiegers
0120 ;
0130      .OPT OBJ,NO LIST
0140 ;
0150 ;pull in macro definitions
0160 ;and equates
0170 ;
0180      .INCLUDE #D8:MACRO.LIB
0190 ;
0200 ;some equates we need
0210 ;
0220 TEMP =  $CB
0230 SDLSTL = $0230
0240 ;
0250 ;*********************************
0260 ;MAIN PROGRAM STARTS HERE
0270 ;*********************************
0280 ;
0290      *=  $5000
0300 ;
0310 ;-------------------------------
0320 ;clear screen, set screen colors
0330 ;ask you to enter your name
0340 ;-------------------------------
0350 ;
0360      JSR CLS
0370       SETCOLOR  2,12,6
0380       SETCOLOR  1,0,0
0390       POSITION  8,5
0400       PRINT  PROMPT
0410       POSITION  14,7
0420       INPUT  0,NAME,10
0430 ;
0440 ;-------------------------------
0450 ;go to Graphics 2 screen, change
0460 ;two lines to Graphics 1 by
0470 ;finding and changing display
0480 ;list
0490 ;-------------------------------
0500 ;
0510       GRAPHICS  2+16
0520       POKE  TEMP,SDLSTL
0530       POKE  TEMP+1,SDLSTL+1
0540      LDA #6
0550      LDY #7
0560      STA (TEMP),Y
0570      INY
0580      INY
0590      STA (TEMP),Y
0600 ;
0610 ;-------------------------------
0620 ;write some stuff on the screen
0630 ;change colors of your name
0640 ;using a loop
0650 ;-------------------------------
0660 ;
0670       POSITION  4,2
0680       PRINT  6,LINE1
0690       POSITION  5,4
0700       PRINT  6,LINE2
0710       POSITION  5,6
0720       PRINT  6,NAME
0730       POKE  COLOR0,0
0740       FOR  I,0,254
0750      INC COLOR0
0760       PAUSE  3
0770       NEXT  I
0780 END JMP END
0790 ;
0800 ;-------------------------------
0810 ;text strings
0820 ;-------------------------------
0830 ;
0840 PROMPT .BYTE "Please enter "
0850      .BYTE "your name:",EOL
0860 LINE1 .BYTE "welcome  to",EOL
0870 LINE2 .BYTE "boot camp",EOL
0880 NAME .DS 10
0890      .BYTE EOL
0900 ;
0910 ;-------------------------------
0920 ;bring in subroutines
0930 ;-------------------------------
0940 ;
0950      .INCLUDE #D8:SUBS.LIB
```


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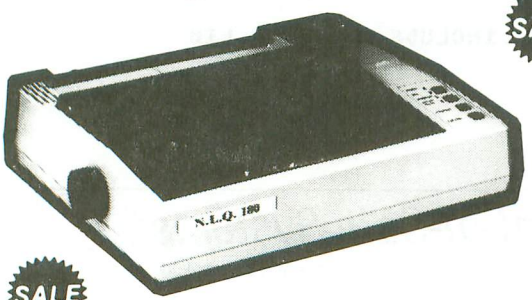

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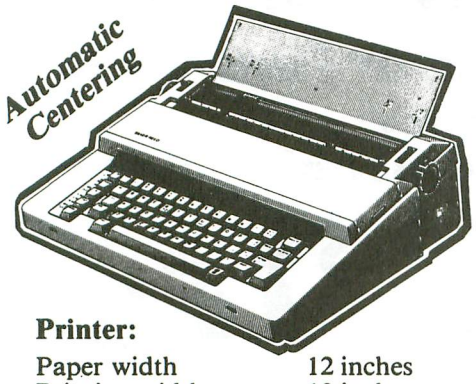

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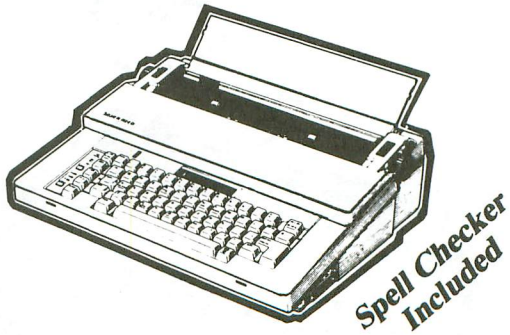

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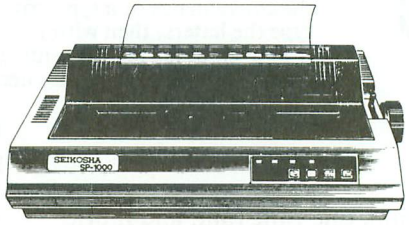

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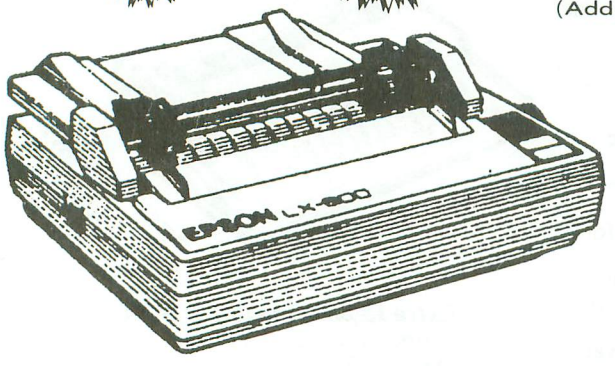

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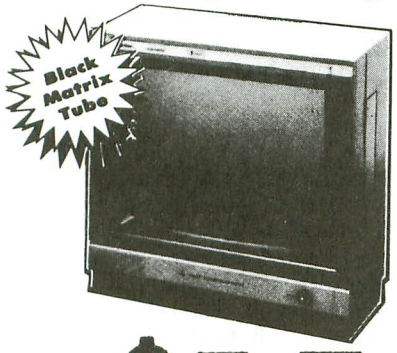

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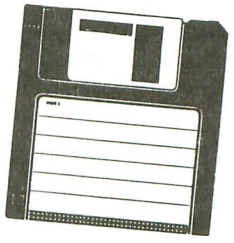

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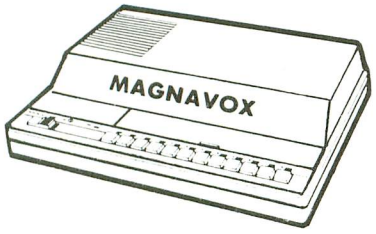

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The Home Network is available only through a Delaware phone number, so most readers will have to pay long distance phone rates. However, our off-peak connect time charges are low enough that some former Homelink customers have found it a reasonable way to keep their PLATO access. Home Network is available 24 hours a day, with the following rate schedule:

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For readers with more recreational gaming tastes, Home Network offers interterminal war games, board games, dungeon games and games of choice.

Local and national PLATO bulletin boards are available on a wide range of subjects, including microcomputers (notefile "Antic" is a national forum especially for Atari users), movies, C programming language, recipes, religion, and more. PLATO notefiles are among the most sophisticated bulletin boards available on any network. Each notefile has easy access to notes and responses via title, number, date written or text search. And, for truly efficient note reading, users can make a list of notefiles and cycle through automatically, seeing only those notes or responses which have been written since the last time they cycled.

For more information, readers can call (302) 451-8161 and ask to speak to the Home Network Representative.

Although we have subscribers as far away as California, Delaware may be too far for many readers to call. The University of Illinois at Champaign-Urbana also offers a PLATO home service. To contact them, call (217) 333-6210. Florida State University offers PLATO home access via its "accesslink" service and may be contacted at (904) 644-2591.

Sincerely,
Rae D. Stabosz
PLATO Services Organization
University of Delaware

The Korean conflict.

I've been a subscriber to your excellent magazine for the last three years. I am currently stationed overseas and am having problems finding good books and programs for the Atari 130XE. Since Apple, Commodore and IBM computers are cloned here, they are more popular. This means that we Atari users must mail order our software/hardware because our military exchange doesn't stock any Atari items at all. I know for a fact that other exchanges around the world do sell Atari products, but in Korea, none.

I asked the store manager why they don't sell Atari-related products. His reply: "Atari is no longer in business." This comment got my goat, and I stated that he should get his facts straight; Atari does exist and always will exist!

After I told him the truth about Atari, his reply changed to, "Well, that particular product isn't popular." Again this angered me. Why? Because, (a) they stock software and hardware for those other computers and they've been sitting on the shelf for months; (b) if you use the other computers, you can go off-base and buy the same software (pirated, of course) and the documentation at a cheaper price; and finally, (c) how can someone say a particular item is not popular when they haven't stocked that item for over two years? Shouldn't they at least give it a try?

This is my thought: because Korea clones these other computers and we are in Korea, the exchange is trying to limit our choice to help the Korean economy. I feel because we members of the military are away from the U.S., the exchange should market Atari products as much as they do those other computer-related items.

I know I can mail order, but it would be nice to walk into the store and purchase a product and take it home the same day to use it. Mail orders take four to eight weeks to arrive at an APO/FPO. (That's one to two months!) And if it's damaged you have to wait another four to eight weeks to receive a replacement. Luckily, I've been fortunate; I purchased my Atari 130XE and Batteries Included PaperClip XE through mail order with the wait, but no damage.

What I'd like to find out is: are other military members, who are Atari users, experiencing the same problems as we are here in Korea? If so, has the store manager's response been the same?

I urge all Atari users to help their fellow men and women in uniform by writing to Atari and to any military exchange, demanding equal billing for the Atari product line.

Sincerely,
William L. Carpinona
Osan AB, Korea

Send your letters to:

Reader comment

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ST notes

by D.F. Scott

Newsworthy happenings in the ST world.

Mega-pricing.

The new Mega STs are now being sold where 75 percent of all the current model STs have reportedly been purchased: Europe. What has held up distribution of the Megas in the U.S. appears to be the search for sales channels which meet Atari's new, more strict guidelines. A knowledgeable ST distributor tells us one of Atari's new rules is that distributors will sell the Megas on commission. Atari will handpick its commissioned Mega distributors for the U.S.

The first semi-official Mega retail price list from Atari shows these figures: Mega 2, monochrome system $1699, color $1899; Mega 4, mono $2399, color $2599. Atari stipulates these prices are not finalized, and may drop within the next few months.

The British publication *Personal Computer World* quotes Mega 2 and 4 monochrome system prices as 995 and 1295 pounds, respectively. Judging from mid-August currency exchange rates, a comparable U.S. list price for the Mega 4 may be as low as $2300.

In Canada, the Megas are being introduced with Atari's first-ever one-year manufacturer's warranty. There, the Mega 2 and 4 monochrome systems list for $2299.95 and $2500 Canadian, respectively. Dealer qualifications in all of North America will be very strict, in an effort by Atari to improve quality control. Sources tell us a Mega dealer must: (1) have one ST serviceman attend a training seminar in California; (2) retain at least one outside salesman; and (3) meet a sales quota or else be erased from Atari's distribution list.

Such policies may be new to Atari, but are quite common for the microcomputer sales industry, especially where the targeted market is businesses which purchase them in large quantities as office terminals. These businesses aren't fond of 90-day warranties.

At an Atari show in Toronto, we're told, Mega ST 2s were on display, bearing the new keyboard mechanism originally discussed when the concept of the Mega was first introduced. The new keyboard has been said to have a "positive key click"—which, I suppose, is the opposite of a "negative key click," or typing on baked beans. The Mega 2s' pre-installed blitter chips were, however, *de*-installed at the end of the show, for unexplained reasons.

Mega STs have been available to registered high-level ST developers in the U.S. at a reduced cost. Improved-mechanism hard disk drives will also be available soon, according to an Atari Canada press release.

Atari's financial fountain is still spewing black ink. For the second quarter of '87, sales were up $10 million over the same quarter in '86, totaling $70.7 million. Earnings for second-quarter '87 were $13.5 million, compared to $9.7 million in '86. Sales margins were also up, reaching 21.2 percent in second-quarter '87 versus 11.7 percent the previous year. ///

The ST's "OS II."

Whitesmiths, Ltd., of Westford, Massachusetts, is the developer of an operating system called **Idris**. It is designed for small- and large-scale computers not equipped internally to run AT&T's UNIX OS or its derivatives, in order that they may run UNIX software, as well as function within a UNIX-based hardware environment. Previously, Whitesmiths has published versions of **Idris** and its cooperative sister OS, Co-Idris, for DEC PDP-11 and VAX mainframes, and the IBM PCs.

The company has been searching for a low-cost, 68000-based computer to have **Idris** ported to, in targeting the small business market. Wisely, it has chosen the ST.

Idris's programming, utilization and file-handling environment is based upon a proposed IEEE standard form of UNIX, called POSIX. This way, future cooperation between UNIX, POSIX and **Idris** systems is assured.

Idris achieves UNIX-like multitasking on the ST without necessarily having to have a standard Memory Management Unit installed. It does so by reshuffling elements and memory blocks—performing block memory moves, or blits—so that the programs literally come to the program counter, rather than the counter to them.

In a true multitasking environment such as UNIX or **Idris**, several programs can be run concurrently. On a UNIX system, each program resides in a specially-apportioned area of memory and stays there. Data is shared between programs by streaming them, literally, through "pipelines"—reserved memory caches. Control is passed between programs in order of their priority, but that type of control can only be achieved with the aid of a real Memory Management Unit. Neither the PDP-11 nor the Atari ST has one.

Idris is an operating system which doesn't need an MMU to run UNIX software. It juggles position-

independent programs around in memory, passing them by the program counter like platoons in a 4th of July parade past the reviewing stand.

The OS is not designed, however, to work with GEM, nor with the rest of TOS; and disks require their own specific formats. Nonetheless, Whitesmiths is currently collaborating with its partner companies worldwide —among them, Computer Tools of Seattle, Washington, which performed the actual ST port of **Idris**, and American Network Development of Westwego, Louisiana—to port over top-rated UNIX software to the ST. AND, for instance, has already released its "cash register" package for ST **Idris**, which lists for $49.95 and handles inventory, invoicing and billing.

Idris is currently available for a list price of $800, which doesn't seem so steep when put in perspective. A 1040ST with a 20Mb hard disk drive and **Idris** retails for around $2500—considerably less than a standard 68000-based UNIX terminal. Networking hardware is reportedly forthcoming for the 520/1040s.

Ace Systems and EEC Systems, two British mainframe software firms, reportedly found their UNIX word processor, LEX, running faster on the ST than they had ever seen it run, after having been ported from the binary 68000 version here in the U.S.

Whitesmiths Vice President for Development, Telford B. Sartell, exclaims it is a myth that the ST cannot multitask. Our interview with Sartell will be featured as part of the first installment of "Vantage Point," a new **ST-Log** regular series which will focus on ST developers *outside* Atari. Charles Bachand, our technical editor, will also have a review of **Idris**, soon to be published in **ST-Log**. //

Dial 1-800-RAY-GUNS! Operators are standing by. . .

Sierra, which has broken new grounds—for better or worse—with its graphic adventure game **Leisure Suit Larry in the Land of the Lounge Lizards**, promises to port to the ST the program which it says sold "over 500,000 units" in Japan, for an MS-DOS machine whose name Sierra for the moment cannot recall.

Thexder is a graphic arcade-style game where you portray a "Gobot"-like half-android/half-fighter-plane, traveling through caves, spaceships and rose gardens in search of twenty different forms of hostile aliens. The game is played on a 2D field with what is promised to be "hypnotic music"—in other words, this game is destined to be the "Slim Whitman's Greatest Hits" of the ST.

As for when Sierra intends to release the ST version, well, they're not saying. The MS-DOS version will be released first, for machines we're sure the company can name, followed by the Apple IIGS version. Expect a release date perhaps in the first quarter of '88, sometime after every man, woman and child in Japan owns a copy.

Those are the **notes** for this month. I'll see you on Delphi. //

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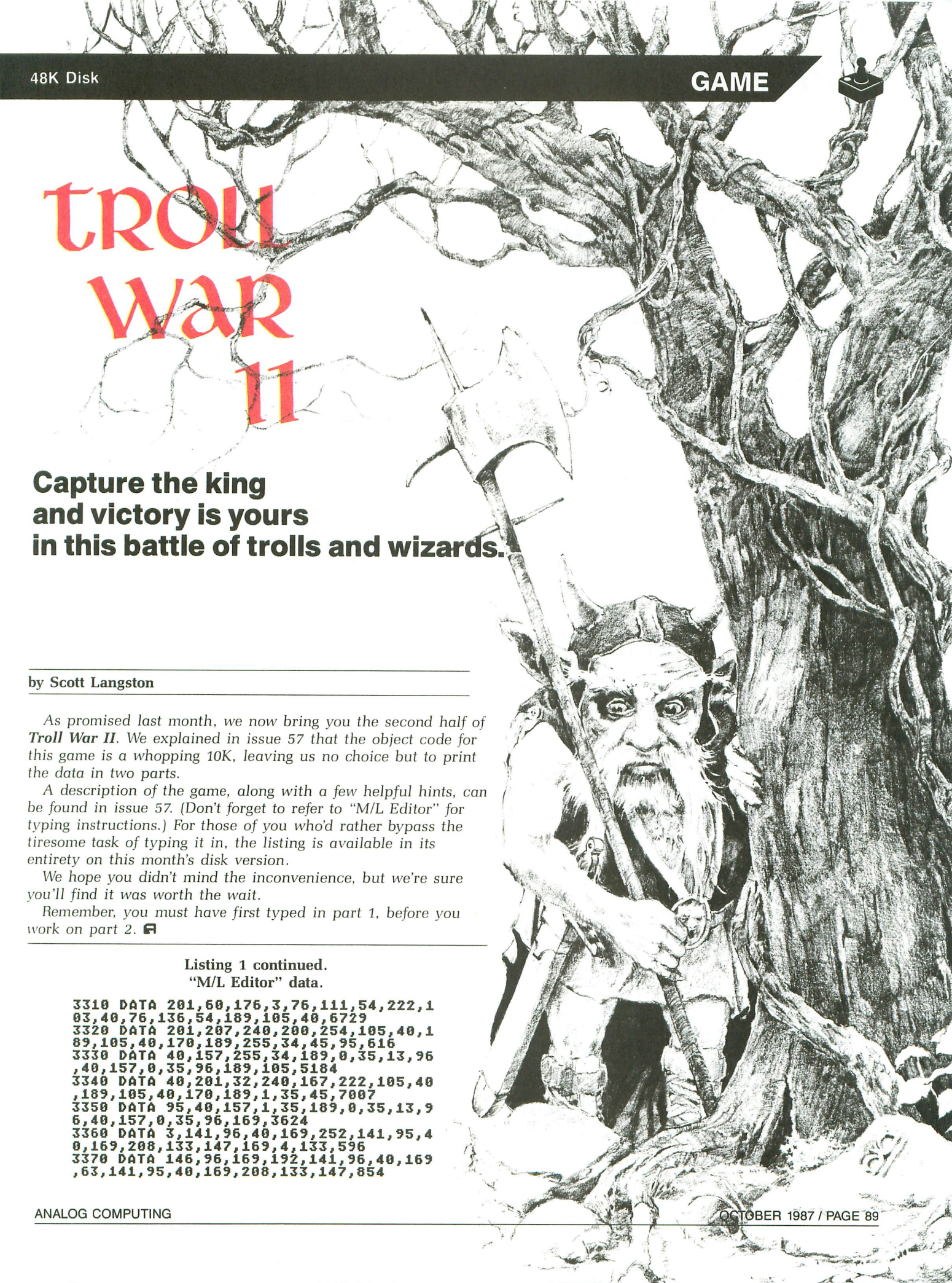
Troll War II

Capture the king and victory is yours in this battle of trolls and wizards.



by Scott Langston

As promised last month, we now bring you the second half of ***Troll War II****. We explained in issue 57 that the object code for this game is a whopping 10K, leaving us no choice but to print the data in two parts.*

A description of the game, along with a few helpful hints, can be found in issue 57. (Don't forget to refer to "M/L Editor" for typing instructions.) For those of you who'd rather bypass the tiresome task of typing it in, the listing is available in its entirety on this month's disk version.

We hope you didn't mind the inconvenience, but we're sure you'll find it was worth the wait.

Remember, you must have first typed in part 1, before you work on part 2.

Listing 1 continued.
"M/L Editor" data.

```
3310 DATA 201,60,176,3,76,111,54,222,1
03,40,76,136,54,189,105,40,6729
3320 DATA 201,207,240,200,254,105,40,1
89,105,40,170,189,255,34,45,95,616
3330 DATA 40,157,255,34,189,0,35,13,96
,40,157,0,35,96,189,105,5184
3340 DATA 40,201,32,240,167,222,105,40
,189,105,40,170,189,1,35,45,7007
3350 DATA 95,40,157,1,35,189,0,35,13,9
6,40,157,0,35,96,169,3624
3360 DATA 3,141,96,40,169,252,141,95,4
0,169,208,133,147,169,4,133,596
3370 DATA 146,96,169,192,141,96,40,169
,63,141,95,40,169,208,133,147,854
```

```
3380 DATA 169,7,133,146,96,8,55,207,55
,172,50,40,162,7,189,2,5431
3390 DATA 139,153,0,36,189,10,139,25,0
,35,153,0,35,136,202,16,3835
3400 DATA 237,169,0,141,3,210,96,169,1
76,141,50,40,169,169,141,55,9420
3410 DATA 40,169,0,141,8,208,141,12,20
8,169,228,141,192,2,162,180,2319
3420 DATA 142,59,40,142,0,208,232,142,
6,208,232,232,232,142,5,208,4253
3430 DATA 96,173,59,40,201,197,176,248
,238,59,40,174,59,40,76,63,8347
3440 DATA 55,173,59,40,201,53,144,232,
206,59,40,174,59,40,76,63,6812
3450 DATA 55,173,50,40,201,207,176,40,
238,50,40,174,50,40,160,16,6996
3460 DATA 189,255,35,157,0,36,189,255,
34,41,60,29,0,35,157,0,3040
3470 DATA 35,189,255,34,41,195,157,255
,34,202,136,208,227,238,55,40,3364
3480 DATA 96,173,55,40,201,33,144,40,2
06,50,40,206,55,40,174,55,6809
3490 DATA 40,160,16,189,1,36,157,0,36,
189,1,35,41,60,29,0,427
3500 DATA 35,157,0,35,189,1,35,41,195,
157,1,35,232,136,208,227,941
3510 DATA 96,208,55,203,56,169,0,133,7
7,173,77,112,201,116,208,75,528
3520 DATA 173,76,112,201,193,208,68,32
,134,46,32,182,45,32,15,46,4126
3530 DATA 173,108,40,240,6,206,108,40,
76,125,56,169,42,141,195,2,7396
3540 DATA 32,243,56,162,0,160,0,169,5,
141,22,40,32,96,48,32,2355
3550 DATA 1,57,32,134,46,32,182,45,32,
15,46,173,15,208,208,3,5648
3560 DATA 76,122,56,169,0,141,195,2,76
,117,56,173,77,112,201,113,8889
3570 DATA 208,86,173,76,112,201,41,208
,79,32,119,46,32,182,45,32,5533
3580 DATA 87,46,173,108,40,240,6,206,1
08,40,76,125,56,169,90,141,8448
3590 DATA 194,2,32,243,56,32,119,46,32
,182,45,32,87,46,32,1,1787
3600 DATA 57,162,1,169,33,141,22,40,16
0,0,32,96,48,173,14,208,5673
3610 DATA 208,3,76,122,56,169,0,141,19
4,2,141,0,210,169,90,141,8981
3620 DATA 108,40,141,30,208,76,98,228,
173,49,2,201,112,208,243,173,3619
3630 DATA 48,2,201,0,208,236,173,32,40
,208,231,32,245,54,162,1,9960
3640 DATA 173,3,208,32,82,54,162,1,173
,3,208,32,82,54,32,202,6240
3650 DATA 53,32,226,54,162,0,173,0,208
,32,82,54,162,0,173,0,5125
3660 DATA 208,32,82,54,32,14,54,173,8,
208,41,14,240,13,173,40,5708
3670 DATA 40,204,56,199,57,240,3,206,4
0,40,169,1,141,32,40,173,6756
3680 DATA 11,208,41,1,240,16,173,41,40
,240,3,206,41,40,169,1,5978
3690 DATA 141,32,40,141,67,40,141,30,2
08,76,98,228,162,0,32,63,6421
3700 DATA 44,160,0,32,100,45,32,118,45
,96,162,1,32,80,44,160,4045
3710 DATA 0,32,109,45,32,118,45,96,169
,0,141,200,2,169,112,141,8032
3720 DATA 49,2,169,31,141,48,2,169,65,
141,111,2,141,27,208,169,8038
3730 DATA 112,133,1,169,225,133,0,162,
22,32,161,40,169,96,141,244,335
3740 DATA 2,169,38,141,102,40,32,133,4
1,169,200,141,47,40,169,40,7093
3750 DATA 141,1,2,169,113,141,0,2,173,
14,212,9,128,141,14,212,7379
3760 DATA 169,40,141,74,40,32,41,41,16
9,0,141,112,40,32,63,42,2736
3770 DATA 160,0,32,239,42,174,112,40,1
89,181,112,141,0,210,238,112,2077
3780 DATA 40,173,112,40,201,8,144,5,16
9,0,141,112,40,206,74,40,6333
3790 DATA 208,219,160,0,140,0,210,169,
1,145,0,169,2,200,145,0,6926
3800 DATA 32,63,42,32,63,42,32,172,40,
32,139,40,169,7,162,55,4673
3810 DATA 160,208,32,92,228,32,78,41,1
73,128,128,240,5,173,40,40,7908
3820 DATA 240,17,32,63,44,32,97,44,32,
115,44,162,22,32,161,40,3540
3830 DATA 32,200,57,231,57,127,44,173,
103,131,240,5,173,41,40,240,296
3840 DATA 229,32,80,44,32,106,44,32,11
5,44,162,44,32,161,40,32,3476
3850 DATA 127,44,76,175,57,0,112,188,1
12,112,112,68,152,131,4,4,5676
3860 DATA 4,4,4,4,4,4,4,4,4,4,4,4,4,4,
4,4,4404
3870 DATA 4,4,4,4,4,65,0,112,112,112,1
12,112,112,112,112,112,6416
3880 DATA 112,112,79,88,135,15,15,15,1
5,15,15,15,15,15,15,15,7295
3890 DATA 15,15,15,15,15,15,15,143,112
,112,68,225,112,65,31,112,5653
3900 DATA 112,69,109,112,68,0,128,4,4,
4,4,4,4,4,4,6593
3910 DATA 4,4,4,4,4,4,4,4,4,4,4,4,4,65
,71,112,8041
3920 DATA 21,62,242,124,18,40,0,0,0,0,
0,0,0,0,0,5617
3930 DATA 0,0,222,223,224,225,226,227,
228,229,0,230,231,232,233,234,1948
3940 DATA 235,236,0,0,0,0,0,0,0,0,0,0,
0,0,254,136,633
3950 DATA 144,96,64,32,37,64,32,48,80,
23,64,80,80,48,1,1,140
3960 DATA 0,0,1,1,0,1,1,1,0,1,0,1,1,1,
243,193,770
3970 DATA 217,162,243,182,217,162,221,
112,216,113,1,1,12,12,0,0,3889
3980 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,3980
3990 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,3990
4000 DATA 0,0,0,0,0,1,2,8,8,8,8,8,8,8,
8,8,4937
4010 DATA 8,8,8,8,8,8,8,8,8,8,8,8,8,8,
8,8,5098
4020 DATA 8,8,8,8,8,8,0,0,0,0,0,0,0,0,
0,0,4188
4030 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4030
4040 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4040
4050 DATA 0,0,0,45,46,47,46,0,0,0,47,4
8,0,0,0,0,6157
4060 DATA 0,0,0,0,0,47,48,0,0,45,46,47
,48,0,0,0,6822
4070 DATA 45,46,0,0,47,46,0,0,0,0,0,18
2,184,0,181,182,4921
4080 DATA 183,184,45,46,0,0,0,0,0,0,45
,46,47,46,47,48,8725
4090 DATA 0,72,72,73,47,48,0,45,46,0,6
8,59,60,63,0,0,9157
4100 DATA 0,0,0,181,182,183,184,0,0,0,
0,0,0,0,0,0,8120
4110 DATA 0,0,73,72,73,86,74,75,86,86,
84,85,75,74,86,0,3495
4120 DATA 0,57,58,61,62,64,0,0,0,0,0,0
,0,0,0,0,5346
4130 DATA 0,0,0,0,0,0,0,217,113,212,114,
0,0,0,0,0,0,9601
4140 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,243,8028
4150 DATA 76,77,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,4380
```

```
4160 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4160
4170 DATA 0,0,0,0,0,0,0,243,0,78,79,0,0,
0,0,0,0,7363
4180 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4180
4190 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,243,8078
4200 DATA 78,79,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,4436
4210 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4210
4220 DATA 0,0,0,0,0,0,0,243,0,76,77,0,0,
0,0,0,0,7375
4230 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4230
4240 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,243,8128
4250 DATA 76,77,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,4480
4260 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4260
4270 DATA 0,0,0,0,0,0,0,243,0,78,79,0,0,
0,0,0,0,7463
4280 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4280
4290 DATA 0,0,0,0,0,0,0,213,114,208,115,
0,0,0,0,0,0,9715
4300 DATA 0,0,0,243,78,79,0,0,0,0,0,0,
0,0,0,0,6136
4310 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4310
4320 DATA 0,0,0,0,0,0,0,0,0,0,243,0,76
,77,0,0,9059
4330 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4330
4340 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4340
4350 DATA 0,0,0,243,76,77,0,0,0,0,0,0,
0,0,0,0,6164
4360 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4360
4370 DATA 0,0,0,0,0,0,0,0,0,0,243,0,78
,79,0,0,9163
4380 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4380
4390 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4390
4400 DATA 0,0,0,243,76,77,0,0,0,0,0,0,
0,0,0,0,6214
4410 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4410
4420 DATA 0,0,0,0,0,0,0,0,0,0,243,0,76
,77,0,0,9159
4430 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4430
4440 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4440
4450 DATA 0,0,0,243,76,77,209,115,192,
116,0,0,0,0,0,0,1535
4460 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4460
4470 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
243,0,8115
4480 DATA 78,79,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,4716
4490 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4490
4500 DATA 0,0,0,0,0,0,0,0,243,78,79,0,0,
0,0,0,0,7936
4510 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4510
4520 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
243,0,8165
4530 DATA 76,77,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,4760
4540 DATA 0,0,0,0,0,0,0,72,74,73,75,74,7
2,73,86,84,87,3526
4550 DATA 84,85,72,73,72,73,72,75,74,7
3,0,0,45,46,0,47,591
4560 DATA 48,0,0,0,0,45,46,47,48,47,46,0
,0,45,46,0,0,7934
4570 DATA 0,0,0,0,0,0,0,0,0,45,46,45,46,
47,48,47,46,9206
4580 DATA 0,0,0,49,50,52,49,50,51,52,0
,0,49,50,52,0,9177
4590 DATA 0,49,50,51,52,0,45,46,47,48,
0,45,46,45,46,0,9346
4600 DATA 45,46,47,46,45,46,0,49,50,52
,193,116,188,117,0,0,4522
4610 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4610
4620 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4620
4630 DATA 0,0,0,0,0,0,59,60,63,65,0,45
,46,47,46,76,442
4640 DATA 87,0,47,48,0,0,0,0,0,0,0,0,0
,47,48,0,6438
4650 DATA 0,45,46,47,48,0,0,0,0,0,0,0,
0,0,61,62,7213
4660 DATA 64,66,67,0,0,0,80,81,73,75,7
4,86,87,0,0,0,649
4670 DATA 0,0,45,46,0,0,47,48,45,46,0,
0,47,48,0,45,8570
4680 DATA 46,45,46,0,0,0,80,81,72,73,8
7,0,0,76,86,72,2003
4690 DATA 73,72,73,86,74,75,86,86,84,8
5,0,0,0,0,0,0,9186
4700 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
76,77,7072
4710 DATA 0,114,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,4938
4720 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4720
4730 DATA 0,0,0,0,0,0,0,78,79,114,0,0,0,
0,0,0,0,6934
4740 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4740
4750 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
78,79,7184
4760 DATA 0,114,0,0,0,0,0,0,0,0,189,11
7,184,118,0,0,2515
4770 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4770
4780 DATA 0,0,0,0,0,0,0,0,0,0,76,77,11
4,0,0,0,8022
4790 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4790
4800 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
25,26,5591
4810 DATA 0,0,76,77,0,114,0,0,0,0,0,0,
0,0,0,0,6030
4820 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4820
4830 DATA 0,0,0,0,0,0,0,0,0,0,0,78,79,11
4,0,0,0,8118
4840 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4840
4850 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4850
4860 DATA 0,0,78,79,0,114,0,0,0,0,0,0,
0,0,0,0,6094
4870 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4870
4880 DATA 0,0,0,0,0,0,25,26,0,0,76,77,
114,0,0,0,8505
4890 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4890
4900 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4900
4910 DATA 0,0,76,77,0,114,0,0,0,0,0,0,
0,0,0,0,6130
4920 DATA 0,0,0,0,0,0,0,0,0,0,185,118,
180,119,0,0,2377
4930 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
78,79,7364
```

```
4940 DATA 114,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,5054
4950 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4950
4960 DATA 0,0,0,0,0,0,0,76,77,0,114,0,0,
0,0,0,0,7248
4970 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,4970
4980 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
76,77,7352
4990 DATA 114,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,5104
5000 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5000
5010 DATA 0,0,0,0,0,0,0,76,77,0,114,0,0,
0,0,0,0,7298
5020 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5020
5030 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
78,79,7464
5040 DATA 114,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,5154
5050 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5050
5060 DATA 0,0,0,0,0,0,0,78,79,0,114,0,0,
0,0,0,0,7378
5070 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5070
5080 DATA 0,0,0,0,0,0,0,0,0,0,0,181,119,
128,120,0,0,1843
5090 DATA 0,0,76,77,114,0,0,0,0,0,0,0,0,
0,0,0,0,6196
5100 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5100
5110 DATA 0,0,0,0,0,0,0,0,0,0,0,82,83,72
,73,72,73,1214
5120 DATA 72,75,74,73,72,74,73,75,74,7
2,73,86,84,87,0,0,3302
5130 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5130
5140 DATA 0,0,0,0,45,46,0,47,48,0,0,0,
45,46,47,48,9151
5150 DATA 47,46,0,0,45,46,0,0,0,0,0,0,
0,0,0,0,5790
5160 DATA 45,46,45,46,47,48,47,46,0,0,
0,49,50,52,49,50,337
5170 DATA 51,52,0,0,49,50,52,0,0,49,50
,51,52,0,45,46,9973
5180 DATA 47,48,0,45,46,45,46,0,45,46,
47,46,45,46,0,49,272
5190 DATA 50,52,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,5344
5200 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5200
5210 DATA 0,0,0,0,0,0,0,0,0,0,0,0,128,25
1,128,0,0,1801
5220 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5220
5230 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5230
5240 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,69
,69,69,8345
5250 DATA 69,69,69,69,69,69,69,69,69,6
9,69,69,69,69,69,69,4634
5260 DATA 69,69,69,69,69,69,69,0,0,0,0
,0,0,0,0,7192
5270 DATA 59,60,63,65,0,69,0,0,1,2,0,0
,0,0,0,0,6341
5280 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
69,0,6315
5290 DATA 0,0,0,0,0,0,0,0,0,61,62,64,66,
67,1,2,0,8870
5300 DATA 0,0,0,0,0,0,0,0,45,46,0,0,0,0,
0,0,0,6074
5310 DATA 0,0,0,0,0,0,0,69,0,0,0,0,0,0,0
,0,0,5793
5320 DATA 0,0,0,0,0,0,69,0,0,0,0,1,2,0,0
,0,0,5769
5330 DATA 0,0,0,45,46,47,48,0,0,47,48,
0,0,0,69,0,8391
5340 DATA 0,0,0,0,0,0,0,0,0,45,46,47,48,
0,69,0,1,8280
5350 DATA 2,0,0,0,0,0,0,0,182,184,0,0,0,
0,0,0,47,9216
5360 DATA 48,0,0,0,0,0,0,69,181,183,184,
0,0,0,0,0,0,0,826
5370 DATA 0,0,47,48,0,69,0,0,0,0,252,1
28,247,129,0,0,5442
5380 DATA 0,0,0,184,0,0,0,0,0,0,0,0,0,
0,0,0,6116
5390 DATA 181,182,183,184,45,46,0,0,0,
0,0,47,46,45,46,0,203
5400 DATA 0,69,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,5538
5410 DATA 0,0,0,0,0,0,181,182,183,184,0,
69,0,0,0,47,48,3122
5420 DATA 0,0,0,0,0,0,0,182,183,0,69,0,0
,0,0,0,0,8848
5430 DATA 0,0,0,0,0,0,0,0,0,0,0,181,182,
183,184,0,0,4560
5440 DATA 0,0,69,0,0,45,46,47,48,0,0,0
,47,48,184,0,1090
5450 DATA 0,69,0,0,45,46,47,48,0,0,0,0
,0,0,0,0,6802
5460 DATA 0,0,184,0,0,0,0,0,0,0,69,0,0
,0,0,0,6771
5470 DATA 0,0,0,0,0,0,45,46,47,48,69,47,
48,0,0,0,0,8653
5480 DATA 45,46,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,5617
5490 DATA 0,0,69,0,49,50,51,52,0,0,70,
71,0,0,0,0,8637
5500 DATA 0,69,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,5638
5510 DATA 0,0,0,0,0,0,0,0,0,0,0,69,0,0,0
,0,49,7053
5520 DATA 50,52,90,91,0,0,0,0,0,0,69,0,0
,0,0,0,0,6998
5530 DATA 0,0,0,0,0,0,0,0,0,0,0,248,129,
243,130,0,0,4785
5540 DATA 0,0,0,0,0,0,0,69,0,49,50,52,0,
0,0,0,0,7536
5550 DATA 0,0,0,0,0,0,69,0,0,0,0,0,0,0,0
,0,0,5964
5560 DATA 0,0,0,0,0,0,49,50,52,0,0,0,0,0
,0,69,0,7655
5570 DATA 0,0,0,0,0,92,93,0,47,46,0,0,0,
0,69,0,0,8344
5580 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5580
5590 DATA 0,0,49,50,51,52,69,0,0,0,47,
48,0,0,0,182,992
5600 DATA 183,47,48,0,0,69,0,0,0,0,0,0
,0,0,0,0,6435
5610 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
69,0,6645
5620 DATA 0,45,46,53,49,50,0,45,46,0,0
,0,0,69,0,0,8345
5630 DATA 0,0,0,0,0,0,0,0,0,0,0,0,49,50,
51,52,0,8362
5640 DATA 0,0,0,0,0,0,0,69,0,0,0,0,184,0
,0,0,0,8331
5650 DATA 0,0,0,0,0,0,69,0,0,0,0,0,0,0,0
,0,0,6064
5660 DATA 0,45,46,0,0,0,0,0,0,0,0,0,0,
0,69,0,6923
5670 DATA 0,0,49,50,52,0,0,45,46,0,0,4
7,48,69,0,0,9205
5680 DATA 0,0,0,0,0,0,0,49,50,52,0,0,0,0
,0,0,0,6891
5690 DATA 0,23,24,0,0,0,69,0,0,49,244,
130,151,131,50,51,6388
5700 DATA 52,0,0,0,0,45,46,0,0,69,181,
183,184,0,0,0,3613
5710 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5710
```

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5720 DATA 23,24,69,0,0,0,0,0,0,0,0,0,0
,0,47,46,7439
5730 DATA 182,183,184,0,0,0,0,0,0,0,0,
0,0,0,0,0,6830
5740 DATA 0,47,46,23,24,0,0,0,0,0,69,0
,68,59,60,63,561
5750 DATA 0,0,0,0,0,0,0,0,0,0,69,0,0,0,0
,0,0,6440
5760 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
23,24,6489
5770 DATA 0,0,0,57,58,61,62,64,0,0,0,0
,0,0,0,0,7600
5780 DATA 0,69,69,69,69,69,69,69,69,69
,69,69,69,69,69,5095
5790 DATA 69,69,69,69,69,69,69,69,69,6
9,69,0,0,0,0,0,344
5800 DATA 0,0,152,131,147,132,116,116,
116,116,116,116,116,116,116,116,1647
5810 DATA 116,116,116,116,116,116,116,
116,116,116,116,116,116,116,116,116,15
86
5820 DATA 116,116,116,116,116,116,116,
116,116,116,116,116,116,116,116,0,9740
5830 DATA 0,0,0,0,0,0,0,0,116,0,0,0,0,
0,0,0,6874
5840 DATA 0,0,0,0,0,0,0,0,0,0,116,116,0,
0,0,0,0,8276
5850 DATA 0,0,0,0,0,0,116,116,0,0,0,45,4
6,0,0,0,0,8405
5860 DATA 116,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,5976
5870 DATA 116,116,0,0,0,0,0,49,50,52,0,0
,0,0,116,116,0,793
5880 DATA 47,48,0,0,0,0,0,0,0,116,0,0,0,
0,0,0,0,7067
5890 DATA 45,46,0,116,0,0,0,0,0,0,0,49,5
0,51,52,0,0,9021
5900 DATA 49,50,51,52,0,116,116,0,0,0,
0,0,47,48,0,0,9201
5910 DATA 116,0,0,0,0,0,0,0,0,0,0,0,116,
0,0,0,0,7418
5920 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,11
6,116,0,9284
5930 DATA 0,0,0,0,0,0,0,116,116,116,0,0,
0,0,0,45,46,125
5940 DATA 47,48,0,116,0,0,0,0,0,0,0,0,0,
0,0,49,50,8082
5950 DATA 51,52,116,0,0,116,116,0,0,0,
0,0,0,0,0,0,7961
5960 DATA 0,0,148,132,143,133,0,0,0,0,
0,116,116,116,116,116,6565
5970 DATA 0,45,46,0,0,0,0,0,0,0,116,116,
49,50,52,116,0,2340
5980 DATA 0,116,116,0,0,0,116,116,0,0,
0,0,0,0,0,0,8300
5990 DATA 0,0,0,0,0,0,0,116,116,0,0,0,0,
0,0,0,0,7730
6000 DATA 0,0,116,0,0,0,0,116,116,116,
116,0,0,0,0,116,2612
6010 DATA 0,0,0,0,0,0,0,0,0,0,45,46,0,0,
0,116,116,562
6020 DATA 0,0,0,0,0,0,0,0,45,46,0,0,47,4
8,0,0,0,7982
6030 DATA 0,116,116,0,0,0,0,116,0,0,0,
0,0,0,0,0,47,8290
6040 DATA 48,0,0,0,0,0,0,116,116,0,0,0,0
,0,0,0,0,7828
6050 DATA 0,0,0,0,0,0,0,0,0,0,116,116,0,
0,0,0,116,342
6060 DATA 0,0,0,47,48,0,0,0,0,0,0,0,0,
0,116,116,84
6070 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6070
6080 DATA 0,116,116,116,0,0,116,116,11
6,116,116,116,116,0,0,116,7100
6090 DATA 116,116,116,116,0,0,0,116,116,
116,116,116,116,116,0,0,116,7226
6100 DATA 116,116,116,116,116,116,116,
0,0,116,116,0,0,0,0,0,1784
6110 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6110
6120 DATA 0,0,144,133,139,134,0,116,0,
0,0,0,0,49,50,51,1763
6130 DATA 52,0,0,0,0,116,116,0,0,0,45,
46,47,48,0,0,20
6140 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,11
6,116,116,1360
6150 DATA 0,0,0,0,0,0,0,0,49,50,52,0,0,0
,116,116,0,876
6160 DATA 0,0,45,46,0,0,45,46,116,0,0,
0,0,0,0,0,8206
6170 DATA 0,0,0,0,0,0,116,0,0,49,50,51,5
2,0,0,0,0,8992
6180 DATA 0,0,0,0,0,0,116,116,0,47,46,0,
0,0,0,116,116,2167
6190 DATA 116,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,6306
6200 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,11
6,116,0,9564
6210 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6210
6220 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6220
6230 DATA 0,45,46,0,0,116,116,0,0,0,0,
0,0,0,0,0,7966
6240 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6240
6250 DATA 0,0,0,116,116,116,116,116,11
6,116,116,47,48,116,116,0,7762
6260 DATA 0,47,48,0,45,46,0,0,0,0,0,0,
0,0,0,116,8855
6270 DATA 116,0,0,45,46,47,48,0,0,0,0,
0,0,0,0,0,7414
6280 DATA 0,0,140,134,87,135,0,0,0,116
,116,45,46,0,0,0,2055
6290 DATA 0,0,0,0,0,116,0,0,45,46,0,11
6,0,0,0,0,9243
6300 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,47
,48,0,7678
6310 DATA 0,116,116,0,0,0,45,46,0,0,11
6,116,116,116,0,0,3373
6320 DATA 0,47,48,116,0,0,0,0,0,0,0,0,
0,0,0,0,7022
6330 DATA 0,49,50,51,52,0,0,0,0,116,11
6,0,0,0,0,0,9478
6340 DATA 0,0,116,0,0,0,0,0,45,46,0,11
6,116,0,0,0,453
6350 DATA 0,0,0,0,0,0,0,49,50,52,0,0,0
,0,0,0,7712
6360 DATA 0,116,116,0,0,0,0,0,0,116,11
6,0,0,0,0,0,9376
6370 DATA 0,0,0,0,116,0,0,0,0,0,0,0,0,
0,0,0,6950
6380 DATA 0,0,0,0,0,0,0,0,0,116,116,11
6,116,116,116,116,6936
6390 DATA 116,116,116,116,116,116,116,
116,116,116,116,116,116,116,116,116,21
66
6400 DATA 116,116,116,116,116,116,116,
116,116,116,116,116,116,116,116,116,21
76
6410 DATA 116,116,88,135,83,136,0,0,0,
0,0,0,0,170,170,170,6443
6420 DATA 170,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,6590
6430 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6430
6440 DATA 0,0,0,0,0,153,153,153,153,0,
0,0,0,0,0,0,1030
6450 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6450
6460 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,13
6,8,128,532
6470 DATA 136,8,136,136,8,136,136,8,12
8,0,8,128,0,0,0,0,0,2222
6480 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6480
6490 DATA 0,0,0,0,0,0,0,7,112,0,7,112,11
```

```
9,7,119,119,7,3819
6500 DATA 112,0,7,112,0,0,0,0,0,0,0,0,
0,0,0,0,7081
6510 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
6,96,8136
6520 DATA 0,6,96,102,6,96,102,6,96,0,6
,96,0,0,0,0,678
6530 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6530
6540 DATA 0,0,0,0,0,0,5,80,0,5,85,80,5
,80,85,5,1700
6550 DATA 80,0,5,80,0,0,0,0,0,0,0,0,0,
0,0,0,6965
6560 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
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6570 DATA 0,4,84,136,79,137,68,68,4,64
,68,4,64,0,4,64,2999
6580 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6580
6590 DATA 0,0,0,0,0,0,0,0,0,0,0,3,48,0,3
,48,51,8777
6600 DATA 3,51,51,3,51,51,3,51,51,0,0,
0,0,0,0,0,8319
6610 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6610
6620 DATA 0,0,34,34,0,2,32,34,2,34,34,
2,34,34,2,34,9614
6630 DATA 34,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,6664
6640 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6640
6650 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6650
6660 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6660
6670 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6670
6680 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6680
6690 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6690
6700 DATA 0,0,0,0,0,0,170,0,0,170,0,0,0,
0,0,0,0,9250
6710 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6710
6720 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,15
3,0,0,8862
6730 DATA 153,0,80,137,75,138,0,0,0,0,
0,0,0,0,0,0,8874
6740 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6740
6750 DATA 0,0,0,0,0,0,0,0,0,0,136,0,0,13
6,8,136,136,4206
6760 DATA 8,136,136,0,8,136,136,0,0,0,
0,0,0,0,0,0,9256
6770 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
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6780 DATA 0,119,7,112,119,7,112,119,7,
112,119,0,0,112,112,0,5600
6790 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6790
6800 DATA 0,0,0,0,0,0,0,0,0,0,102,6,96,1
02,6,96,102,3520
6810 DATA 6,96,102,0,0,96,96,0,0,0,0,0
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6820 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
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6830 DATA 0,85,85,85,85,5,85,85,5,85,8
0,0,0,80,80,0,3420
6840 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6840
6850 DATA 0,0,0,0,0,0,0,0,0,0,4,64,4,64,
4,68,68,638
6860 DATA 4,68,68,0,0,64,64,0,0,0,0,0,
0,0,0,0,8036
6870 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,6870
6880 DATA 0,3,48,3,48,3,48,51,3,48,51,
0,0,48,48,0,504
6890 DATA 0,0,76,138,119,138,0,0,0,0,0
,0,0,0,0,0,9093
6900 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,2,
32,2,7440
6910 DATA 32,2,32,34,2,32,34,0,2,34,34
,0,0,0,0,0,8350
6920 DATA 0,0,120,138,17,139,8,10,138,
174,255,174,138,10,8,128,864
6930 DATA 160,168,234,255,234,168,160,
128,124,68,108,56,0,0,0,0,7126
6940 DATA 0,16,16,0,0,68,40,108,0,0,0,
198,186,56,0,0,4150
6950 DATA 15,3,3,14,0,0,0,0,15,3,3,14,
0,0,0,0,7402
6960 DATA 0,28,12,0,36,0,43,17,0,28,12
,0,36,0,4,12,8801
6970 DATA 0,0,0,1,27,14,0,0,0,0,0,1,27
,14,0,0,7752
6980 DATA 240,192,192,112,0,0,0,0,240,
192,192,112,0,0,0,0,6164
6990 DATA 0,56,48,0,36,0,212,136,0,56,
48,0,36,0,32,48,2802
7000 DATA 0,0,0,128,216,112,0,0,0,0,0,
128,216,112,0,0,5176
7010 DATA 56,108,68,68,254,186,124,62,
0,0,24,0,0,36,0,0,2276
7020 DATA 0,96,251,96,0,0,0,0,0,0,0,0,
21,19,23,165,1873
7030 DATA 138,58,12,60,80,16,80,104,13
6,176,192,240,0,3,0,12,7658
7040 DATA 2,0,12,3,85,245,245,86,186,1
68,207,3,5,63,15,5,8307
7050 DATA 235,10,3,15,80,80,80,96,160,
128,0,0,85,95,95,149,8546
7060 DATA 174,44,243,192,0,192,0,48,12
8,0,48,192,5,5,5,9,4693
7070 DATA 10,2,0,0,80,252,240,80,235,1
60,192,240,0,0,5,5,178
7080 DATA 5,9,10,2,0,0,80,252,240,83,2
32,160,15,12,0,0,7542
7090 DATA 0,0,0,0,51,12,0,0,0,0,0,0,0,
0,0,0,7417
7100 DATA 5,5,5,9,0,0,0,0,80,252,240,8
0,10,2,0,0,4164
7110 DATA 0,0,0,0,235,160,192,240,0,0,
0,0,0,0,0,0,2509
7120 DATA 0,0,5,5,0,0,0,0,0,0,80,252,5
,9,10,2,1432
7130 DATA 15,12,0,0,240,83,232,160,51,
12,0,0,5,20,28,16,3371
7140 DATA 85,117,21,5,64,80,208,16,84,
116,80,85,0,0,0,0,3742
7150 DATA 0,3,0,3,84,85,85,20,117,245,
85,207,21,21,21,5,6737
7160 DATA 29,253,21,15,0,64,64,0,64,64
,64,0,21,85,85,20,3628
7170 DATA 93,95,85,243,0,0,0,0,0,192,0
,192,0,1,1,0,2933
7180 DATA 252,96,247,97,1,1,1,0,84,84,
84,80,116,127,84,240,637
7190 DATA 0,0,0,1,1,0,1,1,0,0,84,84,84
,80,116,127,5130
7200 DATA 1,3,0,0,0,0,0,0,84,207,0,0,0
,0,0,0,33
7210 DATA 0,0,0,0,0,1,1,0,0,0,0,0,84,8
4,84,80,2031
7220 DATA 1,1,1,0,0,0,0,0,116,127,84,2
40,0,0,0,0,3344
7230 DATA 0,0,0,0,0,0,0,1,0,0,0,0,0,0,
84,84,9842
7240 DATA 1,0,1,1,1,3,0,0,84,80,116,12
7,84,207,0,0,5617
7250 DATA 15,63,255,247,61,0,0,0,252,2
55,255,247,223,80,64,64,6039
7260 DATA 15,63,247,253,13,1,1,1,60,25
5,255,247,220,64,0,0,1855
7270 DATA 0,0,2,2,10,10,42,170,0,128,1
29,165,169,169,170,170,3560
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(Continued on page 96)

INDEX TO ADVERTISERS

READER SERVICE #	ADVERTISER	PAGE #
115	Advan Language Designs	40
104	Alpha Systems	9
106	American Techna-Vision	18
—	ANALOG Publishing	5, 35, 38
111	B&C Computers	34
124	Beckemeyer Development Tools	81
105	Computability	16, 17
110	Computer Creations, Inc.	31
109	Computer Elite	28
118	Computer Games Plus	66
130	Computer Mail Order	96, IBC
116	Computer Repeats	56
124	Computer Service Land	88
129	Future Systems Software	94
107	Electronic One	24
125	Industrial Machine Products	88
—	Jesse Jones	56
115	Lyco	48, 49
119	Megamax, Inc.	68
101	Microdaft	IFC, 2
108	Microtyme	27
128	Mindscape	OBC
—	N.E. Atari Computer Fair	20
114	Newell Industries	40
123	Protecto	82, 83, 84, 85
117	Regent Software	59
112	S & S Wholesalers	36, 37
103	Side-line Computer	9
121	Southern Software	73
102	subLOGIC Corporation	7
122	Twenty-fifth Century	74

This index is an additional service. While every effort is made to provide a complete and accurate listing, the publisher cannot be responsible for inadvertent errors.

Troll War II *continued from page 94*

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7280 DATA 16,84,85,85,85,85,85,85,0,0,
0,64,64,80,84,85,5609
7290 DATA 0,0,0,15,63,63,255,252,3,63,
63,255,255,255,255,240,804
7300 DATA 195,255,255,255,240,192,0,0,
252,252,240,0,0,0,0,0,9570
7310 DATA 0,0,0,2,8,85,255,255,8,32,12
8,0,0,85,255,255,2588
7320 DATA 68,85,85,21,21,21,149,21,64,
64,64,0,17,85,85,21,4281
7330 DATA 21,21,21,21,21,85,213,255,21
,85,85,85,85,85,255,2330
7340 DATA 248,97,243,98,0,0,0,0,17,85,
85,85,85,85,69,69,6295
7350 DATA 85,85,85,255,0,0,0,0,0,0,128
,32,8,2,0,0,804
7360 DATA 21,64,255,255,0,0,128,32,85,
0,255,255,0,0,0,0,7076
7370 DATA 0,0,0,2,170,170,170,170,170,
170,170,170,1,4,16,85,607
7380 DATA 16,4,1,0,128,32,8,170,8,32,1
28,0,85,64,74,96,6102
7390 DATA 64,98,64,85,85,105,65,105,65
,65,105,85,85,96,74,64,8525
7400 DATA 104,64,104,85,85,1,41,1,169,
9,161,85,85,73,73,65,7674
7410 DATA 65,97,97,85,85,137,129,1,33,
33,129,85,85,72,64,98,8165
7420 DATA 98,64,72,85,85,73,65,73,73,6
5,97,85,85,66,66,96,8053
7430 DATA 98,64,72,72,85,0,40,10,128,4
2,128,129,72,72,64,64,7401
7440 DATA 72,72,64,85,1,0,168,128,10,1
60,0,85,85,9,1,161,6925
7450 DATA 41,1,1,85,85,129,129,33,33,1
,1,85,85,41,1,161,5810
7460 DATA 1,41,1,85,85,97,97,65,65,97,
97,85,128,244,244,254,6538
7470 DATA 254,250,242,144,1,8,95,127,6
3,127,123,33,0,255,255,243,6129
7480 DATA 3,3,3,15,0,255,255,207,192,1
92,192,240,0,240,243,243,2062
7490 DATA 255,255,60,60,0,15,207,207,2
55,255,60,60,255,255,243,3,8673
7500 DATA 244,98,167,99,3,3,3,15,255,2
55,207,192,192,192,192,240,341
7510 DATA 0,0,63,60,60,63,60,60,0,0,24
3,243,243,195,243,243,8528
7520 DATA 0,0,255,207,207,207,207,255,
0,0,60,60,60,60,63,63,9832
7530 DATA 0,0,15,15,15,15,207,207,0,0,
0,0,0,240,240,8345
7540 DATA 240,240,243,243,255,60,60,60
,15,15,207,207,255,60,60,60,3557
7550 DATA 0,0,63,60,60,63,60,60,0,0,24
3,243,243,243,243,243,9240
7560 DATA 0,0,255,207,207,252,207,207,
0,0,15,3,3,3,3,15,5372
7570 DATA 0,0,252,48,48,48,48,252,68,2
1,35,43,106,117,21,60,7412
7580 DATA 68,80,32,160,164,116,80,240,
136,42,28,16,85,117,21,5,7822
7590 DATA 136,160,208,16,84,116,80,85,
255,255,255,255,255,255,255,255,6590
7600 DATA 0,84,95,184,191,168,48,60,84
,85,85,20,117,245,85,60,1535
7610 DATA 85,85,85,85,85,85,85,85,226,
2,227,2,15,57,0,0,6238
```

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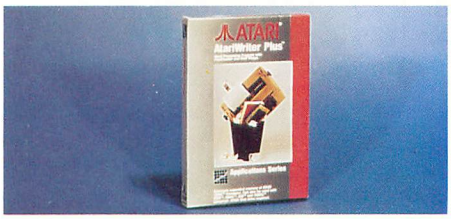

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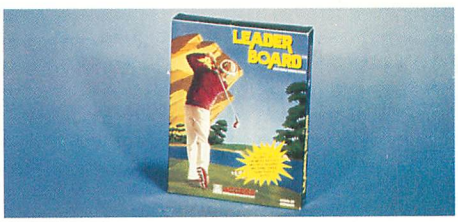

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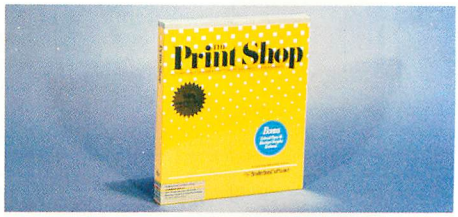

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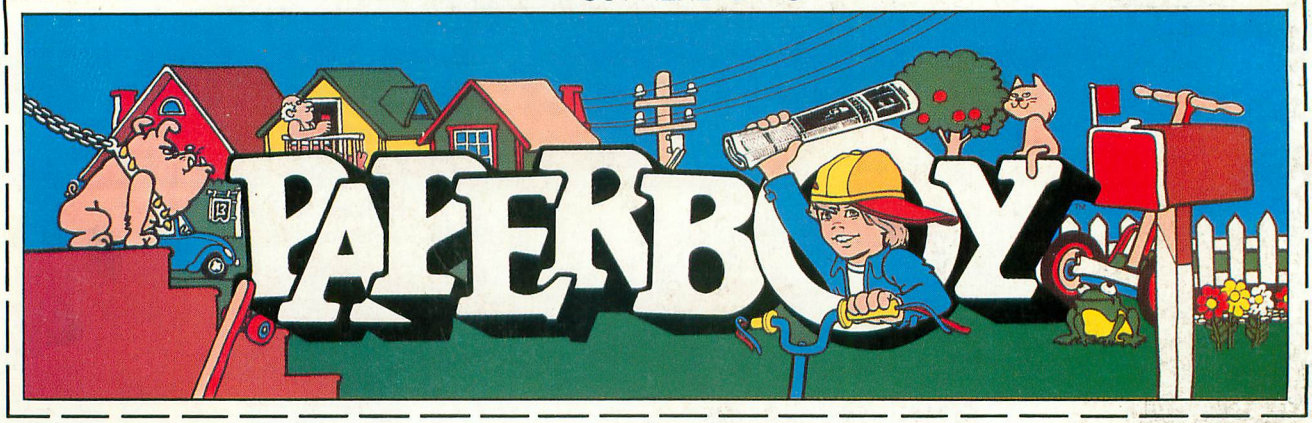

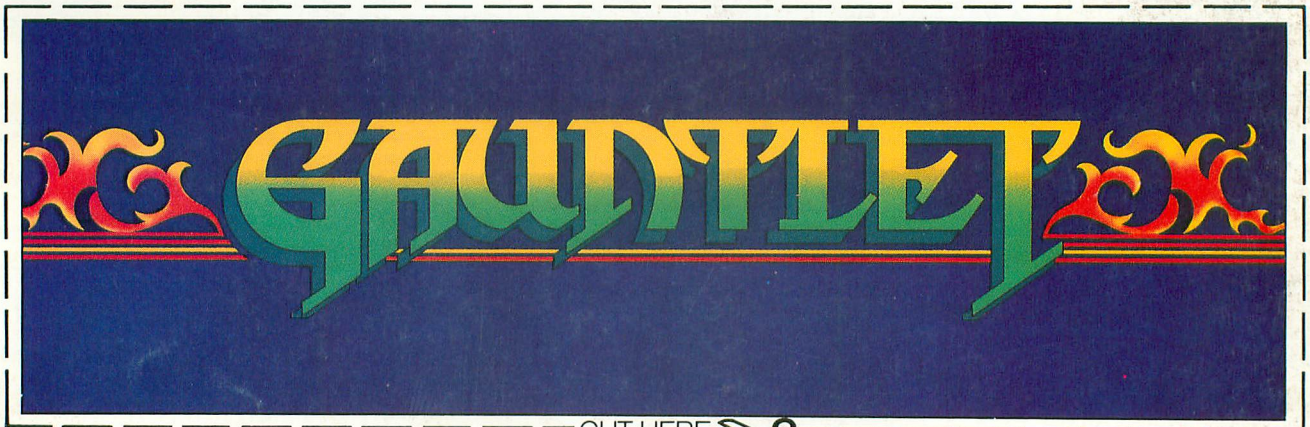

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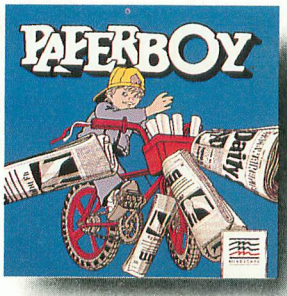

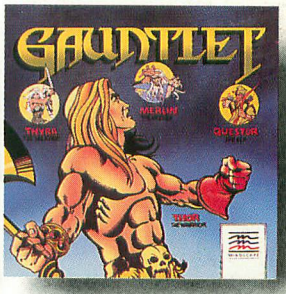

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