

COMPUTE!'s THIRD BOOK OF COMMODORE 64 GAMES

Seventeen exciting games for the Commodore 64 home computer that will keep your fingers nimble, your mind sharp, and the whole family entertained. From fanciful children's games to absorbing adventure games and challenging strategy games, there's plenty here for every taste. Includes a powerful "Graphic Adventure Kit."

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COMPUTE!'s
**THIRD BOOK OF
COMMODORE 64
GAMES**

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Foreword

Games are more than an enjoyable pastime. Some offer intellectual diversion and stimulate analytical thinking. Some are excellent tests of hand/eye coordination and can improve your skill in rapid-fire action maneuvers. And for students of all ages, educational games are a good way to teach new concepts and reinforce them as well as entertain.

COMPUTE!'s Third Book of Commodore 64 Games is a varied assortment of each of these types of games. No matter what your interest, you'll find games here to suit you. If you like adventure games, "Vampyre Hunter" will lead you on a hunt to track down a dangerous vampire. In "Sleuth," you're the detective and must demonstrate your powers of deductive thinking as you solve the mystery.

"Graphic Adventure Kit" is an important new development tool that gives you a skeleton to use in designing your own adventure games. The programming has already been done for you. You're free to set the scenario and people it with creatures of your own imagination. You can construct as many different adventures as you wish.

Games play an important part in family entertainment. Four of these games have been specially chosen for children—and adults—to enjoy together. "Pick-A-Letter" combines the features of a word-guessing game with the element of chance. Like many of the games, it can be played alone or against an opponent. "Balloon Crazy" will amuse children as they try to keep a balloon catcher from toppling off a skateboard. "Webster Dines Out" is an intriguing game in which you help Webster, a spider, spin down on his web to capture bugs for dinner. "Number Quest" rounds out this section to give children practice with numbers.

There are games here, too, for those who enjoy traditional board games and card games. "Klondike" is the old classic solitaire with an electronic twist. In this version you can place bets on the cards you're dealt. Also included are versions of both poker and backgammon.

If strategy games are your choice, try your hand at "Queens' Quarrel," or watch the computer come up with an answer. In "Laser Strike" you and your opponent each deploy

four ships; then you must try to figure the locations of your opponent's ships and sink them.

Many of these games have appeal outside their general categories. For example, thinking through an adventure game scenario with "Graphic Adventure Kit" and bringing it to completion could be an excellent family project. "The Farm Game" is a timely simulation of managing a farm and trying to keep it solvent; it's also an excellent educational game that lets students observe economics at work.

The 17 games in *COMPUTE!'s Third Book of Commodore 64 Games* will bring you many hours of entertainment. All the programs have been thoroughly tested and are accompanied by easy-to-follow instructions. Just type in the programs, using the error-checking utilities found in the appendices, and you're ready for action.

The programs in *COMPUTE!'s Third Book of Commodore 64 Games* are ready to type in and run. However, if you prefer, you can purchase a disk that includes all the programs in the book. Call toll-free 800-346-6767 (in New York, 212-887-8525). Or use the coupon found in the back of the book.

1

Action Games



Space Dodger

Matthew Marullo

Version by Kevin Mykytyn

Try to evade menacing alien ships in this fast, colorful action game. Joystick required.

Get ready for a game that demands extremely sharp hand/eye coordination and judgment of time and distance. "Space Dodger" is an addictive test of your reflexes. Type in and save the program using "The Automatic Proofreader," found in Appendix C. Space Dodger is written in BASIC, although much of the program is machine language found in DATA statements at the end of the program. To play, just load the program and type RUN.

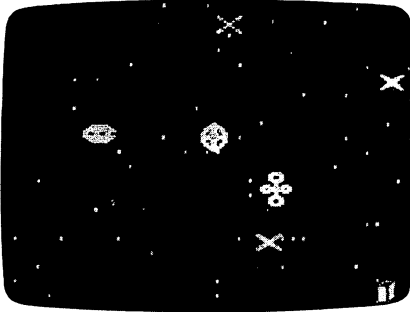
Before you start the game, plug a joystick into port 2. When the game begins, press the joystick forward to move your ship up, and pull it back to move down.

When you type RUN, there's a brief pause while the program initializes. Then the game opens with your spaceship on the left side of the screen, superimposed over a random starfield. On the right side of the screen is a lineup of several colorful alien ships. When the action starts, the aliens begin moving toward your ship at various speeds. Your job is to avoid a disastrous midspace collision that will turn your vessel into a lump of smoking metal.

To dodge the reckless aliens, you'll have to move your spaceship up or down. But don't move too far and try to escape the screen—the boundaries are guarded by cuboids (cube-shaped asteroids) zipping along at the speed of light. The cuboids are even more dangerous than the alien ships because they travel too fast for you to dodge.

Moving Up the Ranks

The longer you evade the oncoming aliens, the more points you gain. However, you won't see your final score until you crash and end the game. At that time, you'll also be ranked according to your value to the Space Service: Space Cadet, Corporal, Sergeant, Captain, Major, Lieutenant, General, or Master.



Reckless alien ships hurtling through space make life hazardous in "Space Dodger."

Every time you advance a rank, the game pauses briefly before it continues to the next level. When it restarts, you'll notice that the alien ships fly across the screen even faster than before. Your score adds up faster, too.

But beware—Space Dodger is not as easy as it looks. Chances are you'll play for quite a while before you advance beyond Space Cadet.

The ships are created with multicolor sprites. Ring modulation and filtering help produce the uncanny sound effects.

Space Dodger

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
FB 20 C=54272:POKE54296,15
RF 30 FORA=1TO8:READB$(A):NEXT:DATA SPACE CADET,CO
    RPORAL,SERGEANT,CAPTAIN,MAJOR
KS 35 DATA LIEUTENANT,GENERAL,MASTER
BR 40 FORA=16064TO16319:READB:POKEA,B:NEXT
GA 50 FORA=16256TO16319:POKEA+64,PEEK(A):NEXT:FORA
    =16347TO16352:POKEA,250:NEXT
GD 60 POKE53276,255:POKE2040,13:FORA=2041TO2045
FJ 70 POKEA,251:NEXT:POKE2046,13
JA 80 FORA=832TO959:READB:POKEA,B:NEXT
AQ 90 POKE53280,15:POKE53281,0:POKE53251,125:GOSUB
    880
CC 100 PRINT"{CLR}{10 DOWN}{14 RIGHT}{BLK}SPACE DO
    DGER"
FG 110 POKE53269,255:POKE53249,125:FORA=90TO255:PO
    KE53248,A
MS 120 POKE53250,345-A:IFA=155THENPOKE53249,120:PO
    KE53251,130
RJ 130 POKE55696+(A-24)/8,7
FH 140 NEXT:FORTD=1TO800:NEXT:POKE53269,0
```

```

RC 150 RA=1:POKE253,5:SC=0:L=200:POKE53285,7:POKE5
3286,2:POKE53287,7
DQ 160 B=50:FORA=53249TO53261STEP2:POKEA,B:B=B+30:
NEXT:PRINT"{CLR}":FORA=1TO65
PC 170 Q=1024+RND(1)*999:POKEQ,46:POKEQ+C,RND(1)*1
5:NEXT
BP 180 POKE53278,0:POKE2047,255:POKE254,0:SYS49152
:POKE53269,255
DH 190 SC=SC+(PEEK(253)-4)/2:IFSC>=LTHENGOSUB330:L
=L*3:RA=RA+1:GOTO190
XA 200 IFPEEK(53278)<128THEN190
FF 210 POKE254,1:POKE54273,4:POKE54277,27:POKE5427
8,0:POKE54276,128:POKE54276,129
AH 220 POKE2047,14:POKE53294,8
EG 230 FORTD=1TO200:NEXT:POKE53269,127:FORTD=1TO50
0:NEXT:POKE53269,0
GB 240 POKE56333,129:POKE53274,0
JK 250 PRINT"{CLR}":PRINT"{CYN}{7 DOWN}{14 RIGHT}S
CORE:"INT(SC)
BA 260 IFSC>HSTHENHS=SC
KC 270 PRINT"{3 DOWN}{12 RIGHT}HIGH SCORE:"INT(HS)
JA 280 PRINT"{3 DOWN}"SPC(17-LEN(B$(RA))/2)"RANK:
{SPACE}"B$(RA)
MG 290 PRINT"{YEL}{5 DOWN}{6 RIGHT}PLAY AGAIN? (UP
-YES DOWN-NO)
SH 300 Q=PEEK(56320):IF(QAND1)=0THEN150
FX 310 IF(QAND2)=0THENSYS832
KF 320 GOTO300
FP 330 POKE56333,129:POKE53274,0:SYS 65418:POKE532
80,2:POKE53269,0
HE 340 FORA=53248TO53260STEP2:POKEA,40
PC 350 POKEA-52569,40:NEXT:POKE 252,127:POKE53264,
127:POKE53269,255:POKE53263,140
BF 360 FORTD=1TO180
ME 370 IF(PEEK(56320)AND16)<>16THENWAIT56320,16,0:
WAIT56320,16,16:TD=180
BS 380 NEXTTD:SYS 49152:POKE53280,15:POKE253,PEEK(
253)+1
FP 390 POKE53278,0:RETURN
FG 400 DATA0,0,0,0,0,0,0,0
CA 410 DATA0,0,0,0,0,0,0,60
JK 420 DATA0,60,59,0,236,14,130,176
SM 430 DATA2,105,128,0,150,0,0,150
GP 440 DATA0,2,105,128,14,130,176,59
HM 450 DATA0,236,60,0,60,0,0,0
RM 460 DATA0,0,0,0,0,0,0,0
XJ 470 DATA0,0,0,0,0,0,0,1
FJ 480 DATA0,0,0,0,0,0,0,0
MB 490 DATA0,0,0,0,0,20,0,0

```

Chapter 1

```
DC 500 DATA85,0,1,105,64,5,235,80
FS 510 DATA5,235,80,23,235,212,23,235
RX 520 DATA212,22,190,148,22,190,148,23
FE 530 DATA235,212,23,235,212,5,235,80
BQ 540 DATA5,235,80,1,105,64,0,85
QR 550 DATA0,0,20,0,0,0,0,255
DS 560 DATA0,0,0,0,85,0,1,85
QG 570 DATA64,1,125,64,1,125,64,1
RP 580 DATA85,64,0,170,0,0,40,0
FE 590 DATA21,40,84,85,170,85,93,170
XB 600 DATA117,85,170,85,21,40,84,0
MA 610 DATA40,0,0,170,0,1,85,64
JE 620 DATA1,125,64,1,125,64,1,85
HQ 630 DATA64,0,85,0,0,0,0,1
QH 640 DATA0,0,0,0,0,0,0,0
CE 650 DATA0,0,0,0,0,0,0,1
EQ 660 DATA85,64,5,85,80,21,85,84
EH 670 DATA85,85,85,175,175,175,175,175
BJ 680 DATA175,85,85,85,21,85,84,5
DE 690 DATA85,80,1,85,64,0,0,0
BP 700 DATA0,0,0,0,0,0,0,0
RP 710 DATA0,0,0,0,0,0,0,0
SP 720 DATA0,0,0,0,0,0,0,255
CD 730 DATA192,3,3,192,12,14,192,63
PR 740 DATA250,192,53,122,192,53,122,192
XJ 750 DATA53,122,192,53,122,192,53,122
PD 760 DATA192,53,122,192,53,123,0,53
DE 770 DATA124,0,63,240,0,0,0,0
BR 780 DATA0,0,0,0,0,0,0,0
BC 790 DATA0,0,0,0,0,0,0,195
MR 800 DATA0,0,0,0,0,0,0,0
CG 810 DATA0,15,252,240,63,255,252,254
KH 820 DATA171,188,250,234,188,250,174,240
BF 830 DATA254,170,240,63,187,240,62,170
KC 840 DATA240,62,150,240,14,150,252,14
SF 850 DATA234,188,62,174,188,63,170,240
EG 860 DATA63,255,192,15,252,0,0,0
XA 870 DATA0,0,0,0,0,0,0,0
HJ 880 PRINT"{CLR}{YEL}{12 DOWN}{13 SPACES}PLEASE
      {SPACE}WAIT":I=49152
DK 890 READA:IFA=256THENRETURN
SA 900 POKE I,A:I=I+1:GOTO890
KS 910 DATA 120,169,164,141,20,3
QK 920 DATA 169,192,141,21,3,169
RP 930 DATA 127,141,13,220,169,129
XD 940 DATA 141,276,208,169,27,141
SR 950 DATA 17,208,88,169,140,141
KH 960 DATA 182,2,32,71,192,169
HJ 970 DATA 10,133,251,169,127,133
FA 980 DATA 252,169,90,141,14,208
```

CF 990 DATA 160,12,169,70,153,0
 CD 1000 DATA 208,173,27,212,240,251
 RA 1010 DATA 197,253,176,247,153,192
 CS 1020 DATA 3,136,136,16,235,162
 CX 1030 DATA 0,189,139,192,157,0
 DH 1040 DATA 212,232,224,25,208,245
 XX 1050 DATA 169,0,141,59,199,141
 SJ 1060 DATA 58,199,96,238,57,199
 MC 1070 DATA 173,57,199,141,22,212
 HH 1080 DATA 173,58,199,205,59,199
 SX 1090 DATA 176,6,206,59,199,76
 FQ 1100 DATA 119,192,238,59,199,173
 KQ 1110 DATA 59,199,41,63,24,105
 XS 1120 DATA 5,141,1,212,96,238
 RK 1130 DATA 58,199,96,206,58,199
 PQ 1140 DATA 96,100,7,0,0,0
 JR 1150 DATA 36,0,100,7,0,0
 CB 1160 DATA 21,15,240,100,255,0
 XH 1170 DATA 0,129,36,0,0,0
 DJ 1180 DATA 242,47,169,1,141,25
 FH 1190 DATA 208,32,93,192,169,7
 AK 1200 DATA 141,192,3,141,204,3
 HK 1210 DATA 169,250,141,18,208,162
 GQ 1220 DATA 25,172,27,212,173,27
 KF 1230 DATA 212,41,15,240,249,153
 BQ 1240 DATA 0,216,153,0,217,153
 GH 1250 DATA 0,218,153,200,218,202
 SQ 1260 DATA 16,231,160,12,185,167
 SA 1270 DATA 2,56,249,192,3,170
 XB 1280 DATA 185,167,2,48,72,138
 DX 1290 DATA 16,70,165,252,57,156
 SH 1300 DATA 193,240,10,165,252,89
 FP 1310 DATA 156,193,133,252,138,208
 PB 1320 DATA 53,165,252,25,156,193
 MF 1330 DATA 133,252,169,70,153,167
 AB 1340 DATA 2,173,27,212,240,251
 JP 1350 DATA 197,253,176,247,153,192
 AC 1360 DATA 3,152,74,170,240,27
 HA 1370 DATA 201,6,240,23,173,27
 JR 1380 DATA 212,74,74,74,74,74
 GG 1390 DATA 74,240,245,24,105,250
 AC 1400 DATA 157,248,7,208,4,138?
 HA 1410 DATA 153,167,2,136,136,16
 ED 1420 DATA 163,198,251,208,65,169
 CB 1430 DATA 7,133,251,165,254,208
 EM 1440 DATA 57,173,255,7,73,1
 CH 1450 DATA 141,255,7,173,0,220
 HB 1460 DATA 74,176,21,32,131,192
 MS 1470 DATA 173,182,2,201,51,144

Chapter 1

HH 1480 DATA 33,173,182,2,56,233
PA 1490 DATA 30,141,182,2,208,22
GG 1500 DATA 74,176,19,32,135,192
SQ 1510 DATA 173,182,2,201,210,176
SR 1520 DATA 9,173,182,2,24,105
SD 1530 DATA 30,141,182,2,165,252
SG 1540 DATA 141,16,208,160,12,185
SE 1550 DATA 167,2,153,0,208,136
EM 1560 DATA 136,16,246,173,182,2
GQ 1570 DATA 141,15,208,173,13,220
KR 1580 DATA 41,1,240,3,76,49
QB 1590 DATA 234,76,188,254,1,1
HX 1600 DATA 2,2,4,4,8,8
CM 1610 DATA 16,16,32,32,64,64,256

Face-Off

Kevin Mykytyn and Mark Tuttle

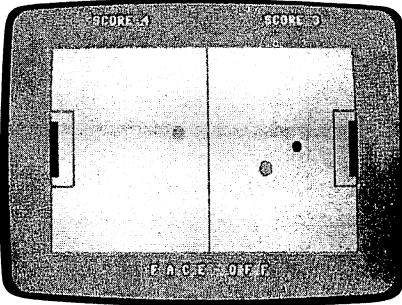
Do you like fast action and competition? This colorful simulation of Air Hockey offers both, whether you play against a friend or your computer. Joystick required (two joysticks for a two-player game).

If you've played Air Hockey, you already know how to play "Face-Off." Based on ice hockey, Air Hockey pits two players against each other, each trying to shoot a puck into the other's goal while defending his or her own goal. A center line splits the playfield. Neither player is allowed to cross this line. The object of the game is simple: The first player to score five goals wins.

Typing It In

Face-Off is written in BASIC, although a large portion of the game is in machine language (in the form of DATA statements). Type it in using "The Automatic Proofreader," found in Appendix C. After you've finished entering the program, save a copy on tape or disk. To play the game, load it and type RUN. You'll see a message (READING DATA—PLEASE WAIT), and after a brief pause you'll see a prompt (1 OR 2 PLAYERS). Press 1 or 2. (It's not necessary to press RETURN.) The one-player game pits you against your computer; the two-player game is for two human opponents, so it requires two joysticks.

Next, you're prompted to select the speed (1-3). Speed 1 is the slowest; 3 is the fastest. (It is suggested that you play your first game at the slowest speed, although speed 2 is probably the one you'll choose after playing a few times.) If you select the two-player option, the game begins after you've selected a speed. If you choose the one-player option, there's one more prompt: Skill Level (1-9). This determines the intelligence of the computer-controlled player. If you choose 1, the computer plays a pretty easy game. At 9, it's very wily. With a speed of 3 and a skill level of 9, the computer is nearly impossible to beat.



The player on the right has missed blocking the puck, which is headed straight for the goal.

When the game begins, you see a red puck, a cyan player on the left, and a yellow player on the right. The cyan player controls the puck to start. Contact with the puck starts the game. (Notice that the puck gradually slows down if it's not hit.) After each goal scored, the player scored against gets control. (You can knock the puck into your own goal, which awards a point to your opponent, but gives you control of the puck.) A total of nine pucks are used per game. If you wish to change the number of pucks, change the value in line 510.

One Player or Two?

When you're playing against the computer, plug a joystick into port 1. You control the yellow player, on the right. You can move anywhere up to the center line. (At slower speeds, one strategy is to play along the center line, like rushing the net in tennis. This keeps the puck in the computer player's territory most of the time, if you can react quickly enough.) Current scores for each player are posted at the top of the screen. After nine pucks have been used, the game is over. You're then prompted to press the fire button to play again, and then to press up on the joystick to change play options or down to play with those of the previous game.

The two-player game has the same rules as the one-player game. The cyan player, on the left, must use a joystick plugged into port 2.

Face-Off

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```

CB 100 BD=53280:BK=53281:POKEBD,1:POKEBK,1:PRINT"
      {CLR}":GOSUB690
KX 110 PRINT"{6 DOWN}"SPC(6)"READING DATA... PLEASE
      WAIT"
CH 120 FORA=49152TO49958:READB:C=C+B:POKEA,B:NEXTA
      :IFC=86769THEN140
QK 130 PRINT"{CLR}ERROR IN DATA LINES 790-1210":ST
      OP
BJ 140 FORA=14336TO14463:READB:POKEA,B:NEXT:POKE53
      287,2:POKE53288,3
BC 150 ML$="{I}" + CHR$(8) + "{X}" < " + CHR$(3) + "{2}XJ" + CH
      R$(16) + CHR$(248) + "L{B}{T}":POKE835,0
GM 160 POKE836,208:POKE830,0:POKE831,216:POKE828,0
      :POKE829,56:POKE56334,0
GK 170 POKE1,51:ML$=ML$:SYS(PEEK(51)+256*PEEK(52))
      :POKE1,55:POKE56334,1
AQ 180 FORI=12552TO12559:READJ:POKEI,J:NEXT:FORI=1
      2568TO12575:READJ:POKEI,J:NEXT
BB 190 FORI=0TO15:POKE54296,I:NEXT:FORI=0TO23:POKE
      54272+I,0:NEXT
GD 200 BD=53280:BK=53281:POKEBD,1:POKEBK,1:POKE3,1
      :GOSUB690:POKE53272,28
SD 210 POKE53274,129:H$="{RVS}{5}{20 SPACES}":GOSU
      B680
SK 220 PRINT"{6 DOWN}"TAB(6){RVS}{WHT}{27 SPACES}
      {7}{UP}"
CX 230 PRINTTAB(7)"[1]{2 SPACES}OR{2 SPACES}[2]
      {2 SPACES}PLAYERS{2 SPACES}{+}{LEFT}";:POKE
      204,0
AH 240 POKE198,0:WAIT198,1:GETA$:IFA$<"1"ORA$>"2" T
      HEN240
AX 250 POKE204,1:POKE207,0:PRINTA$
SM 260 NP=VAL(A$)-1:POKE247,NP:PRINTTAB(9)"
      {2 DOWN}WHAT SPEED [1-3]{2 SPACES}{+}{LEFT}
      ";:POKE204,0
JA 270 POKE198,0:WAIT198,1:GETA$:IFA$<"1"ORA$>"3" T
      HEN270
BX 280 POKE204,1:POKE207,0:PRINTA$:POKE146,31-VAL(
      A$)*10:IFNP=1THEN320
CM 290 PRINTTAB(9)"{2 DOWN}WHAT LEVEL [1-9]
      {2 SPACES}{+}{LEFT}";:POKE204,0
GC 300 POKE198,0:WAIT198,1:GETA$:IFA$<"1"ORA$>"9" T
      HEN300
CR 310 POKE204,1:POKE207,0:PRINTA$:POKE890,100-VAL
      (A$)*10
HR 320 DN$="{HOME}{18 DOWN}{WHT}":CO$="{RVS}{5}
      {40 SPACES}"

```

Chapter 1

```
QB 330 DO$="{RVS}{WHT}{40 SPACES}":POKEBD,12:POKEB
K,14
KC 340 PRINT"{CLR}{2 DOWN}":FORI=1TO18:PRINTDO$;:N
EXT:PRINT"{HOME}";:FORI=1TO3:PRINTCO$;:NEXT
CJ 350 PRINT"[5]{RVS}[N]{WHT}O[18 Y]{OFF}#{RVS}
[17 Y]P[5]{H}[N]{WHT}[H]";
QA 360 PRINTTAB(20)"B"SPC(17)"[N][5][H][N]{WHT}[H]
"SPC(18)"B"SPC(17)"[N][5][H][N]{WHT}[H]"SPC
(18)"B"SPC(17)
EJ 370 PRINT"[N][5][H][N]{WHT}[H]"SPC(18)"B"SPC(17
)"[N][5][H][N]{WHT}[H]"SPC(18)"B"SPC(17)"
{WHT}[N][5][H][N]{WHT}O[Y]P";SPC(16)
DE 380 PRINT"B"SPC(14)"O[Y]P[5][H][N]{BLK}{WHT}
{SPACE}[M]"SPC(16);"B"SPC(15)"[H]{BLK}{5}
[H][N]{BLK}{WHT}[N]"SPC(15)"B";
FS 390 PRINTSPC(15)"[H]{BLK}{5}[H][N]{BLK}{WHT}
[M]"SPC(16)"B"SPC(15)"[H]{BLK}{5}[H][N]
{BLK}{WHT}[N]{16 SPACES}B";
QG 400 PRINTSPC(15)"[H]{BLK}{5}[H][N]{BLK}{WHT}
[M]"SPC(16)"B"SPC(14)"[H]{BLK}{5}[H][N]
{WHT}L[P]@"SPC(16)"{WHT}B"SPC(15)
HJ 410 PRINT"L[P]@[5][H][N]{WHT}[H]"SPC(18)"B"SPC(
17)"{WHT}[N][5][H][N]{WHT}[H]"SPC(18)"B"SPC
(17)"[N][5][H][N]{WHT}[H]"SPC(18)
JE 420 PRINT"B"SPC(4)SPC(13)"[N][5][H][N]{WHT}[H]"
SPC(18)"B"SPC(17)"[N][5][H][N]{WHT}[H]"SPC(
18)"B"SPC(17);
SP 430 PRINT"[N][5][H][N]{WHT}L[18 P]{OFF}!{RVS}
[17 P]@[5][H]{2 UP}":FORI=1TO2
AS 440 PRINTCO$;:NEXT:PRINT"{RVS}{39 SPACES}{HOME}
"
JP 450 POKE2023,160:POKE56295,12:PRINT"{HOME}{OFF}
{WHT}"SPC(6)"SCORE 0"SPC(15)"SCORE 0"DN$
FF 460 PRINTSPC(16)"{8 UP}{RVS}{4 SPACES}B
{4 SPACES}{9 DOWN}{OFF}";:PRINTSPC(68)"F A
{SPACE}C E - O F F"
GG 470 POKE839,50:POKE840,39:POKE849,0:POKE850,1:F
ORA=868TO870:POKEA,140:NEXT
CJ 480 IFPEEK(3)=1THENPOKE838,NP*25+55:POKE848,0
DC 490 IFPEEK(3)=2THENPOKE838,9:POKE848,1
QK 500 POKE53269,15:SYS49152:POKE53269,14:GOSUB660
:A=PEEK(3):SC(A)=SC(A)+1
PF 510 PRINT"{HOME}"TAB(11)SC(2)SPC(19)SC(1):IFSC(
1)+SC(2)<9THEN470
MX 520 POKE53269,0
FK 530 PRINT"{HOME}{12 DOWN}{WHT}{RVS}"SPC(16)"GAM
EBOVER":PRINTDN$"{5 DOWN}"SPC(8)H$DN$:V=60
XB 540 A$="{RIGHT}PRESS FIRE BUTTON TO PLAY AGAIN"
:FORI=1TO16:GOSUB640:GOSUB650:NEXTI
CB 550 IFPEEK(56320)ANDPEEK(56321)AND16THEN550
```

```

SD 560 PRINTDN$:A$="{5}{RVS} {OFF}{WHT}PRESS FIRE
      {SPACE}BUTTON TO PLAY AGAIN{5}{RVS} {OFF}":
      V=63
GH 570 FORI=20TO0STEP-1:GOSUB640:PRINT"{UP}";:GOSU
      B650:NEXTI
BA 580 POKE53274,128:POKE53269,0:PRINTDN$"{5 DOWN}
      {RVS}{5}{2 SPACES}{OFF}{WHT}UP TO CHANGE OP
      TIONS";
JR 590 PRINT" / DOWN TO PLAY"
JK 600 IF(PEEK(56320)ANDPEEK(56321)AND2)<>2THENSC(
      1)=0:SC(2)=0:POKE3,1:GOTO630
QH 610 IF(PEEK(56320)ANDPEEK(56321)AND1)<>1THENPRI
      NT"{CLR}":RUN200
BK 620 GOTO600
DK 630 PRINTDN$"{5 DOWN}"H$"{17 SPACES}":GOTO450
EF 640 POKE214,22:PRINTCHR$(13)"{UP}";:PRINTTAB(V-
      I)LEFT$(A$,I)RIGHT$(A$,I):RETURN
HK 650 FORZ=1TO30:NEXTZ:RETURN
GA 660 POKE54277,20:FORM=1TO5:FORS=20TO90STEP10:PO
      KE54273,S:POKE54272,S+30
JF 670 POKE54276,32:POKE54276,33:POKEBK,S:NEXTS,M:
      POKEBK,14:RETURN
DA 680 POKE53289,7:POKE2040,224:POKE2041,225:POKE2
      042,225:RETURN
HQ 690 PRINT"{HOME}{5 DOWN}{7}{4 SPACES}{RVS}{K}
      {D}{I}{OFF}{V} {RVS}{V}{C}{OFF} {D}{RVS}{D}
      {F}{OFF}{F}{RVS}{K}{D}{I}{OFF}{V}{4 SPACES}
      {D}{RVS}{D}{F}{OFF}{F}{RVS}{K}{D}{I}{OFF}
      {V}{RVS}{K}{D}{I}{OFF}{V}"SPC(8);
RG 700 PRINT"{RVS}{K}{C}{OFF}{F} {RVS}{K}{C}{V}
      {OFF}{K}{RVS}{K}{OFF}{K}{2 SPACES}{RVS}{K}
      {C}{OFF}{F} {D}{2 I}{F}{RVS}{K}{OFF}{K}
      {RVS}{K}{OFF}{K}{RVS}{K}{C}{OFF}{F} {RVS}
      {K}{C}{OFF}{F}"SPC(9)"{RVS}{K}{OFF}{K}
      {2 SPACES}";
AH 710 PRINT"{RVS}{K}{OFF}{K}{RVS}{K}{OFF}{K}{RVS}
      {K}{OFF}{K}{D}{F}{RVS}{K}{OFF}{K}{6 SPACES}
      {RVS}{K}{OFF}{K}{RVS}{K}{OFF}{K}{RVS}{K}
      {OFF}{K}{2 SPACES}{RVS}{K}{OFF}{K}"SPC(10)"
      {C}{V}{2 SPACES}";
KX 720 PRINT"{C}{V}{C}{V} {RVS}{2 I}{OFF} {C}{RVS}
      {2 I}{OFF}{V}{5 SPACES}{RVS}{2 I}{OFF} {C}
      {V}{2 SPACES}{C}{V}":RETURN
XA 730 DATA 32,45,192,32,218,193,198,251,208,13,16
      5
DQ 740 DATA 143,133,251,32,197,192,32,49,193,32,28
PM 750 DATA 192,165,3,240,232,96,198,144,208,12,16
      9
EE 760 DATA 130,133,144,165,143,201,45,240,2,230

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QS 770 DATA 143,96,160,1,169,20,153,110,3,153,120,
3
GR 780 DATA 136,16,245,165,247,208,6,173,122,3,141
KD 790 DATA 120,3,169,27,141,17,208,162,127,142,13
XJ 800 DATA 220,232,142,15,212,142,18,212,160,23
GD 810 DATA 169,0,153,0,212,136,16,248,169,1,141,5
SS 820 DATA 212,169,15,141,24,212,169,20,141,1,212
DQ 830 DATA 169,134,141,20,3,169,192,141,21,3,169
XQ 840 DATA 129,141,26,208,169,0,133,3,133,4,133,5
JB 850 DATA 96,169,1,141,25,208,165,3,208,36,162,4
AB 860 DATA 160,2,169,0,133,2,185,70,3,157,0,208
SA 870 DATA 185,100,3,157,1,208,185,80,3,74,38,2
HX 880 DATA 202,202,136,16,233,165,2,141,16,208,16
9
BB 890 DATA 250,141,18,208,173,13,220,41,1,240,3,7
6
KK 900 DATA 49,234,76,188,254,165,4,48,25,24,109,6
0
QK 910 DATA 3,141,60,3,173,70,3,105,0,141,70,3,173
BS 920 DATA 80,3,105,0,141,80,3,16,32,73,255,24,10
5
KH 930 DATA 1,133,2,173,60,3,56,229,2,141,60,3,173
JD 940 DATA 70,3,233,0,141,70,3,173,80,3,233,0,141
QH 950 DATA 80,3,165,5,48,18,24,109,90,3,141,90,3
EH 960 DATA 173,100,3,105,0,141,100,3,76,48,193,73
JS 970 DATA 255,24,105,1,133,2,173,90,3,56,229,2
FA 980 DATA 141,90,3,173,100,3,233,0,141,100,3,96
BE 990 DATA 173,100,3,201,71,176,7,165,5,16,3,32
RG 1000 DATA 205,193,201,212,144,7,165,5,48,3,32
MS 1010 DATA 205,193,173,70,3,201,27,176,15,174,80
GR 1020 DATA 3,208,10,165,4,16,6,32,172,193,32,185
QF 1030 DATA 193,201,65,144,15,173,80,3,240,10,165
MQ 1040 DATA 4,48,6,32,172,193,32,185,193,160,1,16
9
KK 1050 DATA 2,133,142,173,80,3,217,81,3,208,39,17
3
JE 1060 DATA 70,3,56,249,71,3,201,9,144,4,201,247
QJ 1070 DATA 144,24,133,6,173,100,3,56,249,101,3
DB 1080 DATA 133,7,201,9,144,4,201,247,144,5,132
MX 1090 DATA 142,32,200,194,136,16,206,96,32,234
SK 1100 DATA 194,165,4,73,255,24,105,1,133,4,96,17
3
DD 1110 DATA 100,3,201,126,144,12,201,157,176,8,17
3
BE 1120 DATA 80,3,24,105,1,133,3,96,32,234,194,165
JR 1130 DATA 5,73,255,24,105,1,133,5,96,162,1,222
JF 1140 DATA 110,3,240,3,76,193,194,189,120,3,157
AG 1150 DATA 110,3,189,71,3,133,139,189,81,3,133
CX 1160 DATA 140,189,101,3,133,141,165,247,208,78
JM 1170 DATA 224,0,208,74,173,80,3,240,3,56,176,9

PG 1180 DATA 173,70,3,201,140,176,59,201,40,8,160
 XS 1190 DATA 254,173,100,3,201,141,176,5,56,233,1
 DD 1200 DATA 208,5,24,105,2,208,3,56,233,1,201,74
 FP 1210 DATA 176,5,40,169,253,208,28,201,207,144,5
 KH 1220 DATA 40,169,254,208,19,205,101,3,144,2,160
 GF 1230 DATA 253,152,40,176,8,73,3,76,78,194,189,0
 QX 1240 DATA 220,74,168,176,10,189,101,3,201,72,24
 0
 DG 1250 DATA 3,222,101,3,152,74,168,176,10,189,101
 XG 1260 DATA 3,201,209,240,3,254,101,3,152,74,168
 MC 1270 DATA 176,25,189,71,3,221,245,194,240,17,18
 9
 RD 1280 DATA 71,3,56,233,1,157,71,3,189,81,3,233,0
 JE 1290 DATA 157,81,3,152,74,168,176,25,189,71,3
 EM 1300 DATA 221,247,194,240,17,189,71,3,24,105,1
 PF 1310 DATA 157,71,3,189,81,3,105,0,157,81,3,152
 RM 1320 DATA 74,176,0,32,115,193,228,142,208,15,16
 5
 PX 1330 DATA 139,157,71,3,165,140,157,81,3,165,141
 CR 1340 DATA 157,101,3,202,16,1,96,76,220,193,32
 MS 1350 DATA 234,194,138,72,165,6,24,105,9,170,189
 AR 1360 DATA 19,195,133,4,165,7,24,105,9,170,189,2
 QP 1370 DATA 195,133,5,166,146,134,143,104,170,96
 BA 1380 DATA 169,128,141,4,212,169,129,141,4,212,9
 6
 KJ 1390 DATA 35,184,169,54,55,50,39,0,0,1,254,255
 EH 1400 DATA 255,149,149,180,180,210,210,240,0,0,5
 XJ 1410 DATA 25,45,75,75,106,106,106,132,138,149
 KC 1420 DATA 160,171,182,193,204,204,215,226,237
 CD 1430 DATA 248,52,67,82,82,97,116,120,0,0,0,0,0,
 0
 JK 1440 DATA 0,0,0,0,0,0,0,0,0,0,248,0,1,252,0,3
 MB 1450 DATA 254,0,3,254,0,3,254,0,3,254,0,1,252,0
 AP 1460 DATA 0,248,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 BM 1470 DATA 0,0,0,0,0,0,0,0,0,255,0,0,0,0,0,0,0,0
 JK 1480 DATA 0,0,0,0,0,254,0,3,255,128,3,255,128,7
 BF 1490 DATA 255,192,7,255,192,7,255,192,7,255,192
 AA 1500 DATA 7,255,192,3,255,128,3,255,128,0,254,0
 JA 1510 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 QP 1520 DATA 165,231,231,231,231,231,231,0,0,0,0
 AX 1530 DATA 231,231,231,231,231,231

Kablam!

Stephen Ressler

A prankster perched on the top of your apartment building is tossing firecrackers onto the street. Your job is to maneuver a water-filled bucket to catch and extinguish the firecrackers. An arcade-style action game that requires a joystick.

Your once-quiet neighborhood is suddenly being showered with firecrackers. And the culprit won't let up. You arrive on the scene in a mad dash to extinguish the firecrackers in a bucket of water.

When the title screen appears, you'll be asked to choose one of 15 skill levels, 1 being the slowest and 15 the fastest. You'll probably want to start with an easy level at first, to see how the game plays. Then go up a couple of skill levels until you have a competitive game.

Using a joystick plugged into port 2, move your bucket left and right to catch the falling firecrackers. Note that your bucket can "wrap around" the screen—that is, moving onto an edge will bring you around to the opposite side of the screen. This is extremely helpful for the more advanced levels.

If a firecracker reaches the ground, an explosion is heard, and one of your four plays is lost. The game ends only when you're out of plays. You can then choose another level and play again.

If things get too frantic, or if you need a break in the middle of the game, pause the action by pressing the space bar. Press the CTRL key to resume the game.

When you type in the program, be sure to use "The Automatic Proofreader" in Appendix C. Save a copy of the program. Then when you're ready to run it, just load it and type RUN. "Kablam!" is written in BASIC, but it owes its speed to extensive use of machine language in the form of DATA statements.

Kablam!

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```

CD 100 FORX=24573TO24593:CS=CS+PEEK(X):NEXT:IFCS=2
    907THEN160
BJ 110 PRINT"{CLR}{5 DOWN}{WHT}READING IN:"
DS 120 PRINT"ML ROUTINE";:FORX=24573TO25219:READA:
    POKEX,A:B=B+A:NEXT
JK 130 IFB<>72932THENPRINT"ERROR IN DATA":END
BB 140 PRINT"OK":PRINT"CHARACTERS":FORX=10240TO10
    575:READA:POKEX,A:NEXT
JG 150 PRINT"SPRITES":FORX=12800TO13056:READA:POKE
    X,A:NEXT
FF 160 POKE53281,1
JF 170 GOTO460:REM GOTO TITLE PAGE
KP 180 POKE53272,27:PRINT"{CLR}[5]{DOWN}";CHR$(8):
    POKE53280,7
FC 190 PRINTTAB(30)"{RED}{DOWN}'$$$$$$$$"
KQ 200 PRINTTAB(30)"{UP}#KKKKKKKKK"
DS 210 FORX=0TO1:PRINTTAB(30)"{UP}#KKKKKKKKK"
AA 220 PRINTTAB(30)"{UP}#KKMRVRNKK"
AK 230 PRINTTAB(30)"{UP}#KKX&8&WKK"
QE 240 PRINTTAB(30)"{UP}#KKPTUTOKK"
FP 250 PRINTTAB(30)"{UP}#KKKKKKKKK"
AX 260 PRINTTAB(30)"{UP}#KKMRVRNKK"
HE 270 PRINTTAB(30)"{UP}#KKX&8&WKK"
QD 280 PRINTTAB(30)"{UP}#KKPTUTOKK"
MG 290 PRINTTAB(30)"{UP}#KKKKKKKKK":NEXT
FQ 300 PRINTTAB(30)"{UP}#[8]JJJJJJJJJ{HOME}"
CG 310 PRINT"{HOME}{5 DOWN}[7]LLLLLLLLLLLLLLLLLLLL
    LLLLLLLLLL"
GD 320 PRINT"{HOME}"TAB(13)"YZ[£]!@@@@@@{DOWN}"S
    PC(5)"(←)YIC"
CG 330 POKEV+21,31
SQ 340 POKEV,128:POKEV+1,226:POKEV+2,20:POKEV+3,69
    :POKEV+4,30:POKEV+5,69
ES 350 POKE830,1:POKE832,255:POKEV+30,0
ER 360 SYS24573
HS 370 A1=210:A2=30:A3=40:A4=215:A5=190:POKEV+21,2
    6
PX 380 POKE24838,2:FORQ=1TO10
HE 390 POKEV+8,INT(RND(1)*A1)+A2:POKEV+9,INT(RND(1)
    )*A1)+A3
JS 400 POKEV+6,INT(RND(1)*A4)+A2:POKEV+7,INT(RND(1)
    )*A5)+A3
CA 410 SYS24897:NEXT
KA 420 FORX=VTOV+9:POKEX,0:NEXT:POKEV+21,0
PF 430 FORI=1TO2000:NEXT:PRINT"{CLR}":POKE53272,21

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```
KH 440 PRINT "{HOME}{12 DOWN}"TAB(15)"GAME OVER":FO
RI=1TO2000:NEXT:GOTO160
DX 450 REM TITLE PAGE
FQ 460 V=53248:S=2040:SI=54272:PRINT "{CLR}{BLU}":P
OKE53280,7
CG 470 POKEV+39,9:POKEV+40,12:POKEV+41,0:POKEV+29,
26:POKEV+43,8:POKEV+42,15
KF 480 POKES,200:POKES+1,202:POKES+2,201:POKES+4,2
03:POKES+3,203
EP 490 POKEV+21,12:POKEV+23,8:POKESI+24,15
GF 500 POKEV+4,160:POKEV+5,50:POKESI+6,240
AD 510 FORK=50TO130:POKEV+5,K:POKESI+1,255-K:POKES
I,100:POKESI+4,17:NEXT
CH 520 POKESI+1,0:POKESI,0:POKESI+4,0
GM 530 POKEV+21,8:POKEV+6,153:POKEV+7,122
SM 540 POKE24838,255:SYS24897:OPEN1,0
KA 550 PRINT "{CLR}{14 DOWN}"
RQ 560 PRINT "{DOWN}"TAB(8)"[8]ENTER SKILL LEVEL(1-
15){2 RIGHT}";
PH 570 INPUT#1,SL$:PRINT:SL=VAL(SL$):IFSL>15ORSL<1
THEN550
SC 580 POKE53281,1:CLOSE1:SK=ABS(SL-16)*15+15:POKE
24838,SK
MK 590 POKEV+6,0:POKEV+7,0:POKEV+23,0:POKEV+42,8
KM 600 GOTO180
PB 610 REM **** MACHINE LANGUAGE DATA ****
CS 620 DATA 162,0,169,10,157,192,7
ER 630 DATA 169,0,157,192,219,232,224
JG 640 DATA 40,208,241,120,169,98,141
FX 650 DATA 21,3,169,66,141,20,3
JC 660 DATA 88,32,149,97,76,168,96
MC 670 DATA 169,0,170,168,24,109,167
RS 680 DATA 2,144,1,200,202,208,247
PF 690 DATA 152,73,255,141,0,208,173
JS 700 DATA 30,208,41,5,201,5,240
GR 710 DATA 3,76,97,96,172,3,208
XH 720 DATA 140,5,208,174,2,208,232
SA 730 DATA 232,232,232,232,232,232,232
XJ 740 DATA 232,232,142,4,208,32,162
SP 750 DATA 97,169,255,141,64,3,76
JK 760 DATA 97,96,165,197,201,60,240
FC 770 DATA 3,76,49,234,169,0,141
FH 780 DATA 24,212,173,1,220,201,251
RG 790 DATA 240,2,208,247,169,15,141
CB 800 DATA 24,212,76,49,234,165,251
RH 810 DATA 240,18,174,2,208,169,1
XD 820 DATA 133,251,232,224,225,240,6
PC 830 DATA 142,2,208,76,190,96,174
GE 840 DATA 2,208,169,0,133,251,202
QA 850 DATA 224,17,240,226,142,2,208
```

SG 860 DATA 76,190,96,172,3,208,140
HS 870 DATA 5,208,174,2,208,232,232
SG 880 DATA 232,232,232,232,232,232,232
HE 890 DATA 232,142,4,208,172,5,208
BQ 900 DATA 200,192,223,240,12,140,5
MB 910 DATA 208,32,255,96,32,39,97
BA 920 DATA 76,128,96,120,173,77,4
GH 930 DATA 240,35,206,77,4,174,4
DX 940 DATA 208,142,8,208,162,0,142
GF 950 DATA 4,208,172,5,208,140,9
BM 960 DATA 208,32,65,97,169,255,141
FM 970 DATA 9,208,141,64,3,88,76
MQ 980 DATA 168,96,234,76,43,98,173
HA 990 DATA 62,3,141,60,3,169,235
MD 1000 DATA 141,61,3,206,61,3,208
RA 1010 DATA 251,206,60,3,208,241,169
QB 1020 DATA 5,141,62,3,169,64,141
MP 1030 DATA 96,3,206,96,3,173,96
HF 1040 DATA 3,208,245,96,162,32,142
CB 1050 DATA 6,212,174,64,3,202,142
MK 1060 DATA 64,3,142,1,212,162,10
QH 1070 DATA 142,0,212,162,17,142,4
BG 1080 DATA 212,96,32,149,97,169,240
SB 1090 DATA 141,13,212,162,4,169,8
QS 1100 DATA 141,8,212,169,100,141,7
CC 1110 DATA 212,169,129,141,11,212,160
DM 1120 DATA 15,140,62,3,32,255,96
KC 1130 DATA 169,4,141,8,212,169,129
HK 1140 DATA 141,11,212,202,208,220,169
HM 1150 DATA 5,141,8,212,169,129,141
PG 1160 DATA 11,212,160,160,140,62,3
AK 1170 DATA 32,255,96,162,200,142,13
GM 1180 DATA 212,169,2,141,62,3,32
PP 1190 DATA 255,96,202,208,242,32,149
BP 1200 DATA 97,96,162,0,232,169,0
JX 1210 DATA 157,0,212,224,22,208,246
BC 1220 DATA 96,173,24,4,201,9,240
KK 1230 DATA 4,238,24,4,96,173,23
FM 1240 DATA 4,201,9,240,24,169,0
GR 1250 DATA 141,24,4,238,23,4,206
GF 1260 DATA 6,97,206,6,97,206,6
CB 1270 DATA 97,206,6,97,206,6,97
RX 1280 DATA 96,173,22,4,201,9,240
SH 1290 DATA 12,169,0,141,23,4,141
CG 1300 DATA 24,4,238,22,4,96,173
AM 1310 DATA 21,4,201,9,240,12,169
QM 1320 DATA 0,141,22,4,141,23,4
PC 1330 DATA 238,21,4,96,173,20,4
GS 1340 DATA 201,9,240,15,169,0,141
BJ 1350 DATA 21,4,8,49,4,141,23

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AX 1360 DATA 4,238,20,4,96,173,19
MC 1370 DATA 4,201,9,240,15,169,0
FP 1380 DATA 141,20,4,141,21,4,141
HJ 1390 DATA 22,4,238,19,4,96,162
MP 1400 DATA 0,169,0,157,19,4,232
PH 1410 DATA 224,7,208,248,96,120,169
PQ 1420 DATA 234,141,21,3,169,49,141
MR 1430 DATA 20,3,88,173,21,208,41
MA 1440 DATA 18,141,21,208,76,149,97
AQ 1450 DATA 72,152,72,138,72,173,0
PQ 1460 DATA 220,41,4,208,11,173,167
KG 1470 DATA 2,173,167,2,105,4,141
JQ 1480 DATA 167,2,173,0,220,41,8
EA 1490 DATA 208,9,56,173,167,2,233
JR 1500 DATA 4,141,167,2,104,170,104
RB 1510 DATA 168,104,76,35,96,0,0
MB 1520 DATA 0,2,0,0,0,46,0
EX 1530 DATA 0,0,0,0,128,0,119
PM 1540 DATA 20,255,227
SX 1550 REM ***** CHARACTER DATA *****
MX 1560 DATA 126,102,102,230,230,230,254,0,24,24,2
4,56,56,56,56,0,254
EJ 1570 DATA 198,6,254,224,224,254,0,254,6,6,62,14
,14,254,0,198,198
PC 1580 DATA 198,254,14,14,14,0,254,192,192,254,14
,206,254,0,254,198
AS 1590 DATA 192,254,230,230,254,0,254,198,12,24,5
6,56,56,0,126,102
AH 1600 DATA 102,254,230,230,254,0,254,198,198,254
,14,206,254,0,255
XS 1610 DATA 255,255,255,255,255,255,255,239,239,2
39,0,127,127,127,0
HF 1620 DATA 255,66,36,24,24,36,66,255,255,255,192
,192,192,192,192
KC 1630 DATA 192,255,255,3,3,3,3,3,3,3,3,3,3,2
55,255,192,192,192
PH 1640 DATA 192,192,192,255,255,192,192,192,192,1
92,192,192,192
CP 1650 DATA 255,255,0,0,0,0,0,0,3,3,3,3,3,3,3,0
,0,0,0,0,0,255
JP 1660 DATA 255,24,24,24,24,24,24,255,255,255,255
,24,24,24,24,24
SE 1670 DATA 24,3,3,3,255,255,3,3,3,192,192,192,25
5,255,192,192
GS 1680 DATA 192,0,60,102,48,12,102,60,0,0,60,102,
96,96,102,60,0
GC 1690 DATA 0,60,102,102,102,102,60,0,0,124,102,1
02,124,102,102,0

MF 1700 DATA 0,126,96,120,96,96,126,0,0,102,102,126,102,102,102,0,0
PX 1710 DATA 126,24,24,24,24,126,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
CH 1720 DATA 24,0,102,102,102,0,0,0,0,220,222,220,216,220,222
HE 1730 DATA 220,216,255,255,0,255,255,119,34,0,24,24,24,255,255
FB 1740 DATA 24,24,24,0,0,0,255,255,0,0,0,255,255,192,223,222,220
GH 1750 DATA 216,216,0,96,96,96,96,124,0,0,102,102,102,102,60,24,0
RJ 1760 ***** SPRITE DATA *****
CR 1770 DATA 0,0,0,0,0,0,3,128,7,3,192,15,3,255,255,5,3,255,255,1
CX 1780 DATA 255,254,1,255,254,0,255,252,0,255,252,0,255,252,0,255,252,0,127
QP 1790 DATA 248,0,127,248,0
JJ 1800 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,128,0,4,32,0,1,128,0,3,8,0,6
KP 1810 DATA 32,0,6,0,0,15,0,0,15,0,0,63,192,0,255,240,1,255,248,3
XB 1820 DATA 255,252,3,255,252,3,255,252,3,255,252,1,255,248,0
DX 1830 DATA 255,240,0,127,224,0,31,128,0,0,127,0,0,255,128,0,65
EA 1840 DATA 0,0,148,128,0,128,128,0,93,0,0,34,0,0,28,0,1,255
JP 1850 DATA 128,6,8,96,8,0,16,8,201,16,9,0,144,8,129,48,4,129
KS 1860 DATA 32,4,129,32,3,195,192,1,231,128,2,195,64,2,0,64,1
XJ 1870 DATA 255,128,0,16,8,8,58,28,92,111,54,246,195,99,227,1
GE 1880 DATA 128,0,0,0,0,164,200,149,164,168,149,170,169,93,202
DE 1890 DATA 201,93,206,169,213,170,169,85,170,169,84,170,205,85
EQ 1900 DATA 0,0,0,0,0,0,192,236,3,98,187,6,55,147,116,29,1,220
SF 1910 DATA 8,0,136,0,0



2

Family Games for Education and Fun



Webster Dines Out

Walter Bulawa

Translation by Jeff Hamdani

Tired of blasting invaders from outer space? This whimsical game is set in a very different world—the miniature jungle in your own backyard. Joystick required.

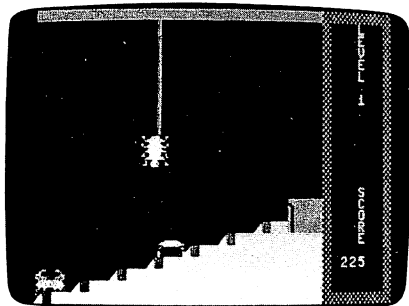
Guide Webster, the hungry tree spider, in his endless search for a square meal. Roving back and forth across his tree limb, he watches for bugs to appear in the grass below. When the time is right, he drops down on a strand of silk for a snack, then climbs back up his web to look for more.

Unfortunately, this backyard paradise isn't quite perfect. The more Webster eats, the faster the bugs move, making it harder to catch his next meal. Even worse, he's not the only one with an appetite—there's a speedy scorpion sharing the same hunting ground, stealing bugs when she can and stinging Webster whenever he drops close enough.

How to Play

"Webster Dines Out" is a BASIC program. To enter it, type it in using "The Automatic Proofreader" (Appendix C). Be sure to save a copy after you've typed it in. Then load the program and type RUN to start the action. The game is played with a joystick plugged into port 2.

The bugs and scorpion move across a sloping, multi-colored lawn. Your goal is to score points as quickly as possible. Each bug is worth 25 points, and you get 50 bonus points for snaring two bugs in a single drop. Press the fire button to make Webster drop down to catch a bug. Before Webster descends on his web, you can change his position by moving the joystick right or left. You begin with three lives, and you lose one each time you collide with the scorpion. The scorpion is a tough competitor: When Webster drops down, the scorpion speeds up to increase her chances of stealing a bug.



"Webster Dines Out" takes advantage of sprite graphics.

There are six skill levels, each harder than the last. The game ends when you lose all three lives or exhaust your time at the highest skill level.

Webster Dines Out

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
QX 100 GOSUB1130:GOSUB1150:GOSUB1190:GOSUB1580:GOS
UB1370
EB 110 LV=LV+1:CR=0:IFLV=7THEN1490
FD 120 ONLVGOSUB130,1400,1450,1460,1470,1480:IFCR>
10THEN110
MM 130 POKE214,6:PRINT:POKE211,35:PRINTLV
BR 140 POKE214,20:PRINT:POKE211,33:PRINTSC
BM 160 P=PEEK(56320):D=15-(PAND15)
QX 170 XP=XP+8*(D=4)-8*(D=8)
DB 180 YP=INT((- .208)*XP+227.2)
MX 190 IFXP>226THENXP=226
PX 200 IFXP<25THENXP=25
CS 210 POKEV,XP:POKEV+1,F
HH 220 FR=PAND16
PH 230 IFFR<>0THEN400
MQ 240 VE=V3:V3=VE/2:POKET1,17
HM 250 XX=INT(XP/8)-1:FORI=FTOYPSTEP8:POKEV,XP:POK
EV+1,I
QP 260 O=1064+XX+Z:POKEH1,I:POKEL1,(I/3)
RB 270 POKEO,66:POKEO+CL,6
AM 280 IFB3=0THEN300
CH 290 GOSUB750
DK 300 Z=Z+40:NEXTI
RH 310 A=PEEK(V+30)AND15:IF(AAND1)=1THENGOSUB860:I
FLS=0THENPOKET1,16:GOTO1030
XS 320 FORI=YPTOFSTEP-8:POKEO,32
RP 330 POKEV,XP:POKEV+1,I:POKEH1,(I/3):POKEL1,I
CD 340 IFB3=0THEN360
KJ 350 GOSUB 750
```

Family Games for Education and Fun

```
SB 360 O=O-40:NEXTI:Z=0:POKET1,16
PJ 370 REM MUSI
QX 380 V3=VE
MC 390 REM BUG1 MOVEMENT
CE 400 IFB1<>0THEN460
KF 410 POKEV+21,PEEK(V+21)OR2
SE 420 X=INT(F1*RND(0))-F2)
AX 430 IFABS(X)<>1THEN520
SH 440 B1=(-1)*(MI*(X=1)+MA*(X=-1))
HD 450 V1=X*S1
SB 460 B1=B1+V1:POKET1,17
CH 470 IFB1<MIORB1>MATHENB1=0:POKET1,16
QQ 480 Y1=INT((- .208)*B1+233.2)
CH 490 POKEV+2,B1:POKEV+3,Y1:POKEV+40,2
KR 500 POKEH1,INT(RND(0)*3+19):POKEL1,INT(RND(0)*1
+9):POKET1,16
SP 510 REM BUG2 MOVEMENT
AD 520 IFB2<>0THEN580
MJ 530 POKEV+21,PEEK(V+21)OR4
RQ 540 X=INT(F1*RND(0))-F2)
PP 550 IF ABS(X)<>1THEN640
AX 560 B2=(-1)*(MI*(X=1)+MA*(X=-1))
PQ 570 V2=X*S2
HX 580 B2=B2+V2:POKET2,17
MD 590 IFB2<MIORB2>MATHENB2=0:POKET2,16
SE 600 Y2=INT((- .208)*B2+233.2)
CG 610 POKEV+4,B2:POKEV+5,Y2:POKEV+41,3
GE 620 POKEH2,INT(RND(0)*3+25):POKEL2,INT(RND(0)*1
+9):POKET2,16
AC 630 REM BUG3 MOVEMENT
SG 640 IFB3<>0THEN710
XF 650 X=INT(F1*RND(0))-F2)
BJ 660 IFABS(X)<>1THEN 160
AG 670 CR=CR+1:IFCR>10ANDLV=1THEN850
CJ 680 IFCR>10ANDLV>1THENGOSUB850:GOTO110
RE 690 B3=(-1)*(MI*(X=1)+MA*(X=-1))
KF 700 V3=X*S3
SS 710 GOSUB750
BA 720 GOTO160
BA 730 REM END OF MAIN LOOP
EC 740 REM MOVE BUG3
CB 750 POKET3,129
EA 760 B3=B3+V3
GM 770 IFB3<MIORB3>MATHENB3=0
QM 780 Y3=INT((- .208)*B3+233.2)
GD 790 POKEV+6,B3:POKEV+7,Y3:POKEV+42,6
SS 800 POKEH3,17:POKEL3,5:POKET3,128
GQ 810 IFB3=B1ANDFR<>0THENB1=0:POKEV+40,0:POKEV+2,
B1:POKET1,16
```

Chapter 2

```
XR 820 IFB3=B1ANDFR=0THENB1=0:POKEV+40,0:POKEV+2,B
1
GR 830 IFB3=B2THENB2=0:POKEV+41,0:POKEV+4,B2:POKET
2,16
GE 840 REM MUSIC
SM 850 RETURN
RD 860 BN=0:FORX=1TO3:BG=2↑X
DE 870 IF(AANDBG)THENGOSUB900
MH 880 NEXT:IFBN=2THENSC=SC+50
HJ 885 IFBN=3THENSC=SC+100
XP 890 POKE214,20:PRINT:POKE211,33:PRINTSC:RETURN
GC 900 IFBG=8THENGOSUB960:RETURN
XG 910 IFPEEK(V+2*X)>=XP-24ANDPEEK(V+2*X)<=XP+24TH
ENGOSUB950:SC=SC+25:POKEV+2*X,0
HM 920 IFPEEK(V+2)=0THENB1=0
MP 930 IFPEEK(V+4)=0THENB2=0:POKET2,16
GA 940 RETURN
GK 950 BN=BN+1:POKEV+21,PEEK(V+21)AND15-BG:RETURN
DM 960 IFPEEK(V+2*X)>=XP-24ANDPEEK(V+2*X)<=XP+24TH
ENLS=LS-1:GOTO 980
MC 970 RETURN
CE 980 REM SPIDER HITS BIG BUG
XJ 990 FORI=8TO2STEP-2:POKE53281,I:POKE53280,I
SC 1000 PRINT"{HOME}{WHT}{9 RIGHT}LIVES REMAINING
{SPACE}";LS:NEXT
KD 1010 FORI=1TO700:NEXT:FORI=1024TO1055:POKEI+CL,
5:POKEI,160:NEXT
DS 1020 POKE53280,0:POKE53281,0:RETURN
RD 1030 REM SPIDER LOST ALL LIVES
KC 1040 O=0:XX=0:Z=0:FORI=0TO3:POKEV+21,PEEK(V+21)
AND(15-2↑I):POKEV+2*I,0:NEXT
DR 1050 PRINT"{CLR}{6 DOWN}"SPC(15)"GAME OVER"
BK 1060 B=13-LEN(STR$(SC))/2:PRINT"{2 DOWN}"SPC(B)
"YOUR SCORE IS ";SC
ER 1070 PRINT"{2 DOWN}"SPC(12){RVS}TRIGGER{OFF} T
O START"
XJ 1080 PRINT"{2 DOWN}"SPC(15){RVS}N{OFF} TO STOP
"
PH 1090 FR=PEEK(56320)AND16:GETA$:IFA$=""ANDFR<>0T
HEN1090
GM 1100 IFFR=0THEN100
XS 1110 IFA$="N"THENEND
AJ 1120 GOTO 1090
FX 1130 PRINT"{CLR}":XP=100:CL=54272:V=53248:SC=0:
LV=0:LS=3:B1=0:B2=0:B3=0:F=56
JD 1140 V1=0:V2=0:V3=0:S1=4:S2=4:S3=12:MI=0:MA=255
:F1=51:F2=25:RETURN
CJ 1150 SD=CL:FORL=SDTOSD+24:POKEL,0:NEXT:T1=SD+4:
D1=SD+5:R1=SD+6:H1=SD+1:L1=SD
```

Family Games for Education and Fun

HH 1160 T2=T1+7:T3=T2+7:D2=D1+7:D3=D2+7:R2=R1+7:R3
=R2+7:H2=H1+7:H3=H2+7:L2=L1+7
SB 1170 L3=L2+7:POKE54296,15:POKED1,17:POKER1,241:
POKED2,17:POKER2,241:POKED3,17
GJ 1180 POKER3,241:RETURN
PP 1190 POKE53281,0:POKE53280,0:FORI=1024TO1056:PO
KEI+CL,5:POKEI,160:NEXT
AD 1200 FORI=1984TO1743STEP-36:POKEI+CL,1:POKEI,23
3:NEXT
FD 1210 FORI=1985TO1733STEP-36:POKEI+CL,2:POKEI,16
0:NEXT
BR 1220 FORI=1986TO1744STEP-36:POKEI+CL,3:POKEI,16
0:NEXT
PR 1230 FORI=1987TO1705STEP-36:POKEI+CL,4:POKEI,16
0:NEXT
BQ 1240 POKE1692+CL,7:POKE1692,201:FORI=1693TO1696
:POKEI+CL,7:POKEI,160:NEXT
QM 1250 POKE1732+CL,7:POKE1732,221:FORI=1733TO1736
:POKEI+CL,7:POKEI,160:NEXT
KP 1260 POKE1772+CL,7:POKE1772,221:FORI=1773TO1776
:POKEI+CL,7:POKEI,160:NEXT
RQ 1270 FORI=1988TO2016:POKEI+CL,15:POKEI,160:NEXT
:FORI=1952TO1976:POKEI+CL,15:
BC 1280 POKEI,160:NEXT:FORI=1916TO1936:POKEI+CL,15
:POKEI,160:NEXT:FORI=1880TO1896:
BM 1290 POKEI+CL,15:POKEI,160:NEXT:FORI=1844TO1856
:POKEI+CL,15:POKEI,160:NEXT
EJ 1300 FORI=1808TO1816:POKEI+CL,15:POKEI,160:NEXT
QD 1310 FORI=1056TO1063:POKEI+CL,12:POKEI,102:POKE
I+960+CL,12:POKEI+960,102:NEXT
GK 1320 FORI=1056TO2016STEP40:POKEI+CL,12:POKEI,10
2:POKEI+7+CL,12:POKEI+7,102:NEXT
CD 1330 RESTORE:FORI=1100TO1260STEP40:READA:POKEI+
CL,1:POKEI,A:NEXT
GX 1340 FORI=1660TO1820STEP40:READA:POKEI+CL,1:POK
EI,A:NEXT
FS 1350 DATA12,5,22,5,12,19,3,15,18,5
GH 1360 RETURN
DK 1370 POKEV+21,9:POKE53275,14
AE 1380 FORI=0TO3:POKEI+2040,192+I:NEXT
XK 1390 RETURN
KR 1400 REM LEVEL 2 ADJUSTMENTS
CJ 1410 S1=5:F1=31:F2=15
PH 1420 FORI=1904TO1907:POKEI+CL,INT(RND(0)*15+1):
POKEI,160:NEXT
KX 1430 FORI=1944TO1947:POKEI+CL,INT(RND(0)*15+1):
POKEI,160:NEXT
FQ 1440 FORI=1984TO1987:POKEI+CL,INT(RND(0)*15+1):
POKEI,160:NEXT:RETURN

Chapter 2

```
XQ 1450 S1=6:F1=31:F2=15:RETURN
SH 1460 S2=6:RETURN
JB 1470 S1=8:S3=16:F1=21:F2=10:RETURN
JM 1480 S1=10:S2=10:S3=20:F1=17:F2=8:RETURN
SG 1490 FORI=0TO3:POKEV+21,PEEK(V+21)AND(15-2↑I):P
      OKEV+2*I,0:NEXT
FJ 1500 PRINT"{CLR}{6 DOWN}{9 RIGHT}YOU WON THE GA
      ME"
ED 1510 PRINT"{2 DOWN}{9 RIGHT}YOUR SCORE IS ";SC
JS 1520 PRINT"{2 DOWN}{9 RIGHT}{RVS}TRIGGER{OFF} T
      O START"
FK 1530 PRINT"{2 DOWN}{9 RIGHT}{RVS}N{OFF} TO STOP
      "
AJ 1540 FR=PEEK(56320)AND16:GETA$:IFA$=""ANDFR<>0T
      HEN1540
DE 1550 IFFR=0THEN100
CJ 1560 IFA$="N"THENEND
CH 1570 GOTO 1540
XF 1580 I=12288
BM 1590 READ A:IF A=256 THEN RETURN
FJ 1600 POKE I,A:I=I+1:GOTO 1590
HG 1610 DATA 224,126,7,96,255,6
ES 1620 DATA 39,255,228,31,255,248
SM 1630 DATA 1,255,128,193,255,131
EQ 1640 DATA 199,255,227,63,255,252
PE 1650 DATA 1,255,128,7,255,224
DD 1660 DATA 31,255,252,33,255,130
GC 1670 DATA 97,255,134,225,255,134
JQ 1680 DATA 15,255,243,31,255,248
PB 1690 DATA 16,60,4,24,126,4
XX 1700 DATA 24,219,6,120,219,7
EM 1710 DATA 0,126,0,0,0,0
RE 1720 DATA 0,0,0,0,3,255
DJ 1730 DATA 192,31,255,248,127,255
AX 1740 DATA 254,151,255,233,32,0
KC 1750 DATA 4,64,0,2,128,0
AP 1760 DATA 1,192,0,3,192,0
BK 1770 DATA 3,192,0,3,192,0
EJ 1780 DATA 3,192,0,3,192,0
MB 1790 DATA 3,128,0,1,64,0
SM 1800 DATA 2,32,0,4,16,0
XK 1810 DATA 8,24,0,24,252,0
KD 1820 DATA 63,0,0,0,0,0
EK 1830 DATA 0,0,3,255,192,31
RG 1840 DATA 255,248,127,255,254,151
QX 1850 DATA 255,233,32,0,4,64
GC 1860 DATA 0,2,128,0,1,192
AG 1870 DATA 0,3,192,0,3,192
FF 1880 DATA 0,3,192,0,3,192
GF 1890 DATA 0,3,192,0,3,128
```

Family Games for Education and Fun

BC 1900 DATA 0,1,64,0,2,32
MM 1910 DATA 0,4,16,0,8,24
MR 1920 DATA 0,24,252,0,63,0
AF 1930 DATA 15,0,240,24,129,24
AR 1940 DATA 48,0,12,240,0,15
CP 1950 DATA 152,129,25,207,0,243
DH 1960 DATA 96,0,6,31,255,248
AP 1970 DATA 63,255,254,127,255,254
EG 1980 DATA 255,255,255,127,255,254
QC 1990 DATA 49,129,140,99,0,198
BH 2000 DATA 66,0,66,132,0,33
GC 2010 DATA 132,0,33,132,0,33
XH 2020 DATA 66,0,66,99,0,198
QG 2030 DATA 247,129,239,0,0,256

Pick-A-Letter

Michael Blackmon

This challenging word game is a game the whole family can enjoy. One, two, or three players can compete.

If you like word games, you're sure to like "Pick-A-Letter." This game is especially fun when played with family or friends. By combining the elements of strategy, word knowledge, and a little luck—good and bad—Pick-A-Letter can provide hours of entertainment. There are 90 puzzles included, sorted randomly at the start of each game. When you've become familiar with these, it's easy to add new ones to the list.

Pick-A-Letter is loosely based on the game Hangman, but it adds enough new features to be considered an entirely different game. As in Hangman, you must guess the letters in a word or phrase. But in Pick-A-Letter, it pays to consider carefully which letter to choose—you're playing for points now.

Pick-A-Letter is written in BASIC. Enter the program with the help of "The Automatic Proofreader" (Appendix C). Be sure to save a copy when you've finished typing. To play, load the program and type RUN.

A Little Gambling

When Pick-A-Letter starts, you're asked for the number of players. Respond with a number from 1 through 3. Then choose the goal score. The first player to reach this goal is the winner.

The game screen now appears. The goal score is shown at the top of the screen. Below that is a table of scores, which shows the current score and the total score for each player. The current score holds the points that the player accumulates during the current puzzle. When the puzzle is solved, the appropriate player's current score is added to his or her total score. Then all current scores are set to zero for the next round.

The category name is shown below the score table. This and the configuration of the letters in the puzzle are your only clues.

In the middle of the screen is the point strip. Before you guess each letter, you must "spin" the arrow below this strip to find the point value for which you'll be playing. Near the bottom of the screen are displays indicating whose turn it is, the value of the bonus factor (which increases with each correct letter chosen), and the number of points that will be awarded for each occurrence of the letter in the puzzle.

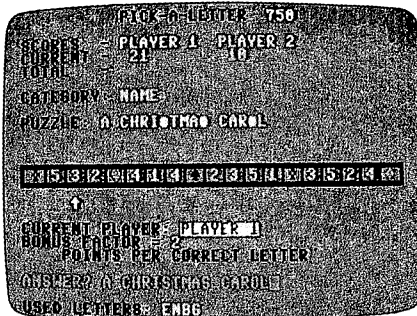
At the very bottom of the screen is a roster of all the incorrect letters that have been guessed. If any player guesses one of these letters again, that player loses a turn.

Strategies

Press the space bar to start the arrow moving. After awhile, it winds down and stops at a point value (1-5) or a card symbol. If it stops at a point value, you'll get that many points (times the bonus factor) for each occurrence of your chosen letter in the hidden phrase. This is where some good strategy can pay off. If you're going to get only one point per letter on a turn and you suspect that there are, say, three S's in the word or phrase, it would probably be wise to choose a different letter and save the S to earn more points later.

The bonus factor starts at 1, but it increases by 1 each time you correctly guess a letter. When you lose your turn, you also lose whatever bonus you've built up—you start back at 1 on your next turn.

The card symbols are special cases. If you land on a heart or diamond, you're in luck—you'll be playing for 10 or 15 points, respectively, not including your bonus. However, landing on a club or spade is unfavorable. In the first case, you lose your turn; in the second, you *also* lose all your current points.



Player 1 guesses the phrase in "Pick-A-Letter." The 21 points she has earned in this round will be added to her total score.

If you think you know the answer to the puzzle, you can press RETURN and then type your guess; or you can keep guessing letters to build up your score. But remember that it sometimes doesn't pay to wait—you lose your turn if the arrow lands on a club or a spade.

When you guess the answer or complete the answer by filling in the last letter in the puzzle, your current score is added to your total score, and your opponents lose their current scores. If a player's total score surpasses the goal, the game ends with that player being declared the winner.

Adding New Words

To add new words or phrases to the game, put them in DATA statements among the words and phrases in the program. The format for the DATA statement is

DATA *category number*, "*puzzle*"

Here are the categories and their corresponding numbers:

1. Phrase
2. Place
3. Person
4. Name
5. Object

For example, to add a person to the list, you might enter

```
2060 DATA 3,"SALLY RIDE"
```

When you've finished adding new puzzles—words and/or phrases—put the total number of puzzles in line 230 assigned to the variable NW.

Pick-A-Letter

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
SM 10 BO=53280:AC=53281:SC=1024:S=54272
HQ 20 FORI=1TO9:READH(I),L(I):NEXT
MG 30 DATA 79,191,84,125,89,131,94,214,100,121,106
    ,115,112,199,119,124,126,151
CJ 40 GOSUB50:POKES+24,15:GOTO150
PS 50 FORG1=STOS+23:POKEG1,0:NEXT:RETURN
JR 60 FORJ=B1TOT1STEPS1:POKES,L(J):POKES+1,H(J):NE
    XT:RETURN
MM 70 POKES+5,31:POKES+6,208:POKES,240:POKES+1,4:P
    OKES+4,33:POKES+24,15:GOTO90
```

Family Games for Education and Fun

```
DJ 80 POKES+5,8:POKES+6,240:POKES,0:POKES+1,90:POKES+4,17
QE 90 FORH=1TO100:NEXT:GOSUB50:RETURN
KF 100 GOSUB50:POKES,120:POKES+1,105:POKES+5,128:POKES+6,128:POKES+4,33
HQ 110 POKES+24,15:FORX5=105TO62STEP-1:FORU2=1TO30:NEXTU2:POKES+1,X5:NEXTX5
RG 120 POKES,232:POKES+1,3:FORL=1TO100:NEXT:GOSUB50:RETURN
FK 130 POKES+24,15:POKES+5,128:POKES+6,32:POKES,64:POKES+1,156:POKES+4,17
GJ 140 FORL=1TO25:NEXT:POKES+4,16:RETURN
XM 150 PRINT"{CLR}"CHR$(159);:POKEBO,11-(AL=1)*38:POKEAC,11-(AL=1)*38
CG 160 FORG=1TO11:READA,B:POKEA+SC,B:GOSUB80:POKEA+S+SC,10
QG 170 FORJ=1TO100:NEXT
MR 180 NEXT
GG 190 DATA 418,1,415,3,421,5,424,5,414,9
MJ 200 DATA 416,11,420,12,413,16,425,18
PP 210 DATA 422,20,423,20
HK 220 PRINT"{14 DOWN}{2 RIGHT}PLEASE WAIT WHILE PUZZLES ARE SORTED"
PX 230 NW=90:DIM P$(NW),P(NW),P%(NW):QQ=1
CC 240 FORG=1TONW:READ P(G),P$(G):NEXT
CH 250 GOSUB980
KE 260 FORG=1TO3:BB(G)=1000:NEXT
MP 270 PRINT"{8}{CLR}{2 DOWN}"
JH 280 PRINT"HOW MANY PLAYERS (1 TO 3)?"
RH 290 GETQ$:IFQ$=""THEN290
KX 300 IF Q$="1"THEN NP=1:GOTO340
AK 310 IF Q$="2"THEN NP=2:GOTO340
HM 320 IF Q$="3"THEN NP=3:GOTO340
RM 330 GOTO280
AM 340 PRINT"{DOWN}PLEASE ENTER WINNING SCORE (1000 IS A{3 SPACES}MEDIUM LENGTH GAME)":INPUTWS
GQ 350 CP=0:FORG=1TONP:C(G)=0:T(G)=0:B(G)=1:NEXT:J=0
MJ 360 R$(1)="PHRASE{2 SPACES}":R$(2)="PLACE{3 SPACES}":R$(3)="PERSON ":R$(4)="NAME{4 SPACES}"
RA 370 R$(5)="OBJECT{2 SPACES}":X=611+SC:D=0
MX 380 UL$="":RL$=""
RX 390 REM DRAW SCREEN
JS 400 POKEBO,11-(AL=1)*38:POKEAC,11-(AL=1)*38
PA 410 PRINT"{CLR}"CHR$(5);
BA 420 PRINTTAB(10)"{DOWN}{BLK}PICK-A-LETTER {8}";
WS:PRINT
RF 430 PRINT"{BLK}SCORES{2 SPACES}-{8}";
```

Chapter 2

```
BH 440 FORG=1TONP
BH 450 PRINT"[8] PLAYER"G;
AS 460 NEXT
SX 470 PRINT:PRINT"{BLK}CURRENT -[8]"
EF 480 PRINT"{BLK}TOTAL{3 SPACES}-[8]"
GA 490 PRINT"{DOWN}{BLK}CATEGORY:[8]"
SJ 500 PRINT"{DOWN}{BLK}PUZZLE:[8]"
RA 510 PRINT"{DOWN}{BLK}"
QB 520 FORG=1TO39:PRINT"[O]";:NEXT
DE 530 PRINT" [J]{BLK}X{BLK}-{YEL}5{BLK}-{YEL}3
      {BLK}-{YEL}2{BLK}-[3]S{BLK}-{YEL}4{BLK}-
      {YEL}1{BLK}-{YEL}4{BLK}-A-{YEL}2{BLK}-{YEL}
      3{BLK}-{YEL}5{BLK}-{YEL}1{BLK}-X-{YEL}3
      {BLK}-{YEL}5{BLK}-{YEL}2{BLK}";
KD 540 PRINT"-{YEL}4{BLK}-[3]Z{BLK}[L]"
JQ 550 PRINT"{BLK}";:FORG=1TO39:PRINT"[U]";:NEXT
AH 560 PRINT"{2 DOWN}{BLK}{RIGHT}CURRENT PLAYER:
      {RVS}[8]PLAYER "
CJ 570 PRINT"{BLK}BONUS FACTOR = [8]"
AB 580 PRINT"{4 SPACES}{BLK}POINTS PER CORRECT LET
      TER[8]"
HB 590 PRINT"{2 DOWN}"
PG 600 PRINT"{BLK}USED LETTERS:[8]"
AX 610 FORG=SC+S+600TOSC+S+638:POKEG,13:NEXT
CH 620 POKEG,30
RA 630 REM MAIN LOOP
FJ 640 NN=0:CD$=P$(P$(QQ)):CC=P(P$(QQ)):QQ=QQ+1:IF
      QQ>NWTTHENQQ=1
SD 650 NV=0:FORG=1TOLEN(CD$)
FJ 660 IF MID$(CD$,G,1)<>" "THEN NV=NV+1
PX 670 NEXTG
RX 680 PRINT"{HOME}{7 DOWN}{10 RIGHT}"R$(CC)
PQ 690 PRINT"{DOWN}"SPC(8);
QM 700 FORG=1TO LEN(CD$):B$=MID$(CD$,G,1):IFB$=" "
      THENPRINT" ";:GOTO740
KX 710 IF B$="-"THENPRINT"-";:GOTO740
ME 720 IF B$="'"THENPRINT"'"";:GOTO740
BH 730 PRINT"{CYN}Q";
FD 740 NEXTG
DG 750 FORG=1TONP:C(G)=0:NEXT
DF 760 FORG=LEN(CD$)TO29:PRINT" ";:NEXT
BF 770 CP=CP+1:IFCP>NPTHEMCP=1
GB 780 PRINT"{HOME}";:FORG=1TO17:PRINT"{DOWN}";:NE
      XT:PRINTTAB(22)"[8]{RVS}"CP
BH 790 PRINTTAB(14)"{3 SPACES}{3 LEFT}"B(CP):PRINT
      "{4 SPACES}{UP}"
RX 800 IF B(CP)=1THENPRINT"{2 DOWN}[3]PRESS SPACE
      {SPACE}BAR TO START SCORE POINTER {OFF}":GO
      TO820
```

Family Games for Education and Fun

```
JX 810 PRINT"{2 DOWN}[3]START POINTER OR PRESS RET
      URN TO ANSWER{OFF}"
QK 820 GETZ$:IFZ$=""THEN820
QM 830 IFASC(Z$)=13 THEN860
JG 840 IFZ$=" "THENGOSUB1040:GOTO890
SP 850 GOTO820
SX 860 GOTO1290
BM 870 IF PP=1 THENPP=0:GOTO630
HS 880 GOTO770
BK 890 IFD=1THEND=0:GOTO770
AM 900 PRINT"{DOWN}[3]ENTER YOUR LETTER{22 SPACES}
      {OFF}[8]";
HF 910 GETK$:IFK$=""THEN910
DE 920 IF ASC(K$)<65ORASC(K$)>90THEN910
GA 930 FORD=1TO20:PRINT"{LEFT}";:NEXT:PRINTK$:GOSU
      B1480:IFUR=1THEN1560
CR 940 GOSUB1180:IFN=0THENB(CP)=1:GOTO770
EA 950 IFZX=1THENZX=0:GOTO870
PA 960 B(CP)=B(CP)+1:PRINT"{HOME}{17 DOWN}
      {13 RIGHT}":GOTO790
SB 970 PRINT"[8]"
FP 980 R=RND(-TI/101)
XS 990 FORJ=1TONW:P%(J)=J:NEXT
PM 1000 FORJ=1TO5:FORK=1TONW:L=P%(INT(RND(1)*20+1)
      )
PQ 1010 TEMP=P%(K):P%(K)=P%(L):P%(L)=TEMP
RJ 1020 NEXTK,J
SB 1030 RETURN
XP 1040 Y=INT(RND(0)*20)+20
BJ 1050 FORG=1TOY
JX 1060 GOSUB130
AQ 1070 POKEX,32:X=X+2:IFX=SC+639THENX=SC+601
DH 1080 POKEX,30:FORW=1TOG:NEXTW
KX 1090 NEXTG
QM 1100 V=PEEK(X-80)
KA 1110 IFV=83THENPL=10*B(CP):GOTO1160
AG 1120 IFV=90THENPL=15*B(CP):GOTO1160
AC 1130 IFV=65THEND=1:C(CP)=0:N=0:B(CP)=1:GOSUB125
      0:GOSUB100:RETURN
CR 1140 IFV=88THEND=1:GOSUB70:GOSUB70:B(CP)=1:RETU
      RN
MB 1150 PL=(V-48)*B(CP)
PJ 1160 PRINT"[8]{3 UP}{3 SPACES}{3 LEFT}"PL
AP 1170 RETURN
FS 1180 N=0:PRINT"{HOME}{9 DOWN}{8 RIGHT}";
HP 1190 FORG=1TOLEN(CD$)
FX 1200 IFMID$(CD$,G,1)=K$THENN=N+1:GOSUB80:PRINTK
      $;:GOTO1220
DP 1210 PRINT"{RIGHT}";
```

Chapter 2

```
PE 1220 NEXTG
GK 1230 C(CP)=C(CP)+PL*N
DF 1240 GOSUB1630:GOSUB1250:RETURN
HP 1250 PRINT"{HOME}{4 DOWN}{RIGHT}";
MQ 1260 PRINTTAB(10*CP)"[8]{4 SPACES}{4 LEFT}"C(CP
);
SR 1270 NN=NN+N:IFNN=NVTHENGOSUB1340:ZX=1
CA 1280 RETURN
XE 1290 PRINT"{HOME}";:FORG=1TO21:PRINT"{DOWN}";:N
EXT:FORG=1TO39:PRINT" ";:NEXT
XJ 1300 FORG=1TO39:PRINT"{LEFT}";:NEXT:INPUT "ANSW
ER";A$
EQ 1310 IFA$=CD$THEN1340
XD 1320 C(CP)=C(CP)-10:IFC(CP)<0THENC(CP)=0
RS 1330 GOSUB70:GOSUB1250:GOTO870
PC 1340 PRINT"{HOME}{9 DOWN}{8 RIGHT}"CD$
SJ 1350 BC=8
SP 1360 FORG=1TO5:GOSUB80
GA 1370 POKEBO,BC-1:BC=BC-1
BG 1380 NEXT:POKEBO,11-(AL=1)*38
FG 1390 T(CP)=T(CP)+C(CP)
PD 1400 FORG=1TONP:B(G)=1:NEXT
PS 1410 PRINT"{HOME}{5 DOWN}{RIGHT}";
FH 1420 PRINTTAB(10*CP)"[8]{4 SPACES}{4 LEFT}"T(CP
);
MH 1430 PRINT"{HOME}{4 DOWN}{RIGHT}";
CE 1440 PRINTTAB(10):FORG=1TO29:PRINT" ";:NEXT
QM 1450 UL$="":RL$="":GOSUB1690:PP=1
HE 1460 IF T(CP)>=WSTHENGOTO1710
SX 1470 GOTO870
MA 1480 U=LEN(UL$):R=LEN(RL$)
CE 1490 IFR=0THEN1520
AB 1500 FORG=1TOR:IFK$=MID$(RL$,G,1)THENUR=1:RETUR
N
RG 1510 NEXTG
EF 1520 IFU=0THENRETURN
HX 1530 FORG=1TOU:IFK$=MID$(UL$,G,1)THENUR=1:RETUR
N
EP 1540 NEXTG
ED 1550 RETURN
DE 1560 PRINT"{HOME}";:FORG=1TO21:PRINT"{DOWN}";:N
EXT:FORG=1TO39:PRINT" ";:NEXT
GK 1570 FORG=1TO39:PRINT"{LEFT}";:NEXT
HX 1580 GOSUB70
HH 1590 PRINT"{YEL}THAT LETTER HAS BEEN USED";
FP 1600 FORI=1TO750:NEXT
GG 1610 FORG=1TO25:PRINT"{LEFT}";:NEXT:PRINT"[8]
{2 UP}";
CE 1620 UR=0:GOTO770
CC 1630 IFN=0THEN1650
```

Family Games for Education and Fun

```
PP 1640 RL$=RL$+K$:RETURN
BF 1650 UL$=UL$+K$:GOSUB70
QK 1660 PRINT"{HOME}";:FORG=1TO23:PRINT"{DOWN}";:N
EXT
QC 1670 PRINT"{14 RIGHT}"UL$
KP 1680 RETURN
HP 1690 PRINT"{HOME}";:FORG=1TO23:PRINT"{DOWN}";:N
EXT
DX 1700 PRINT"{14 RIGHT}{20 SPACES}":RETURN
AP 1710 IFAL=0THENPOKE54296,12
DA 1720 POKEAC,6:PRINTCHR$(5);
FK 1730 IFAL=0THENPOKES+24,10:POKES+5,128:POKES+6,
128:POKES+4,33
AR 1740 FORI5=1TO3:B1=1:T1=9:S1=1:GOSUB60:B1=9:T1=
1:S1=-1:GOSUB60:NEXTI5
QE 1750 IFAL=0THENPOKES+4,32
QR 1760 PRINT"{CLR}{YEL}{2 DOWN}THE WINNER IS PLAY
ER"CP;:PRINT"WITH "T(CP)"POINTS"
GG 1770 FORG=1TO40:PRINT"[I]";:NEXT:PRINT
PD 1780 FORG=1TONP-1
EE 1790 CP=CP+1:IFCP>NPTHEMCP=1
PE 1800 PRINT"{DOWN}PLAYER"CP"ACCUMULATED -"T(CP)"
POINTS"
DC 1810 NEXT
FB 1820 FORI=1TO1000:NEXT
CC 1830 PRINT"{5 DOWN}WOULD YOU LIKE TO PLAY AGAIN
(Y/N) ?[8]"
GA 1840 GETPA$:IFPA$=""THEN1840
QQ 1850 IFASC(PA$)=78THENPRINT"{CLR}":END
CX 1860 IFASC(PA$)=89THEN260
SK 1870 DATA 1,"IN THE GOOD OLD DAYS"
RC 1880 DATA 1,"IN THE STILL OF THE NIGHT"
JA 1890 DATA 1,"ALL FOR ONE AND ONE FOR ALL"
PP 1900 DATA 1,"I TOLD YOU SO"
GK 1910 DATA 2,"WRIGLEY FIELD"
CB 1920 DATA 1,"LOOKING FOR A WAY OUT"
RC 1930 DATA 2,"SALT LAKE CITY"
SF 1940 DATA 1,"TO BE OR NOT TO BE"
MG 1950 DATA 1,"ONCE IN A BLUE MOON"
KX 1960 DATA 2,"HONOLULU"
CF 1970 DATA 2,"SILICON VALLEY"
MF 1980 DATA 3,"MAILMAN"
FD 1990 DATA 3,"NEXT DOOR NEIGHBOR"
CR 2000 DATA 1,"TAKE IT OR LEAVE IT"
MR 2010 DATA 3,"DAVID AND GOLIATH"
QJ 2020 DATA 2,"LONDON ENGLAND"
RB 2030 DATA 2,"SAN ANTONIO TEXAS"
HK 2040 DATA 2,"NIAGARA FALLS"
FK 2050 DATA 2,"YELLOWSTONE NATIONAL PARK"
PD 2060 DATA 2,"NEVER-NEVER LAND"
```

Chapter 2

XG 2070 DATA 2, "ON TOP OF OLD SMOKEY"
AC 2080 DATA 3, "PROFESSIONAL ATHLETE"
PD 2090 DATA 2, "DISTRICT OF COLUMBIA"
GS 2100 DATA 2, "WHITE HOUSE"
RH 2110 DATA 2, "SOMEWHERE OVER THE RAINBOW"
KJ 2120 DATA 3, "PRESIDENT OF THE UNITED STATES"
BQ 2130 DATA 3, "HUNCHBACK OF NOTRE DAME"
QE 2140 DATA 3, "KEEPER OF THE KEYS"
KD 2150 DATA 3, "MAN IN THE MOON"
HX 2160 DATA 3, "BIRDMAN OF ALCATRAZ"
CM 2170 DATA 3, "QUEEN OF ENGLAND"
CX 2180 DATA 3, "ROOKIE OF THE YEAR"
GX 2190 DATA 3, "CHIMNEY SWEEP"
HF 2200 DATA 3, "ACADEMY AWARD NOMINEE"
BC 2210 DATA 3, "MISS AMERICA"
GM 2220 DATA 4, "BABE RUTH"
JE 2230 DATA 4, "WHISTLER'S MOTHER"
CS 2240 DATA 4, "THE LAST OF THE MOHICANS"
JQ 2250 DATA 4, "PONCE DE LEON"
HP 2260 DATA 4, "GEORGE WASHINGTON"
DG 2270 DATA 4, "GONE WITH THE WIND"
FA 2280 DATA 4, "ELIZABETH TAYLOR"
BE 2290 DATA 4, "FRANKLIN DELANO ROOSEVELT"
CR 2300 DATA 3, "SUPERMAN"
XB 2310 DATA 4, "ROMEO AND JULIET"
JR 2320 DATA 5, "BICYCLE BUILT FOR TWO"
GK 2330 DATA 5, "HIGH-TOP SHOES"
SM 2340 DATA 5, "A YELLOW SUBMARINE"
HJ 2350 DATA 5, "LONDON BRIDGE"
SP 2360 DATA 5, "VIDEO CASSETTE RECORDER"
KK 2370 DATA 1, "GONE FISHING"
BH 2380 DATA 1, "ON THE FIRST DAY OF CHRISTMAS"
KM 2390 DATA 1, "BE MY VALENTINE"
KH 2400 DATA 5, "XYLOPHONE"
CR 2410 DATA 2, "MEXICO CITY"
GR 2420 DATA 1, "RETURN TO SENDER"
RF 2430 DATA 1, "TAKE IT TO THE LIMIT"
XG 2440 DATA 4, "A CHRISTMAS CAROL"
SC 2450 DATA 2, "MISSISSIPPI RIVER"
QC 2460 DATA 3, "CHAMPIONSHIP SWIMMER"
KJ 2470 DATA 4, "HOWARD COSELL"
RS 2480 DATA 2, "TRANQUILITY BASE"
QK 2490 DATA 2, "THE HALLS OF MONTEZUMA"
AG 2500 DATA 4, "MUHAMMAD ALI"
GA 2510 DATA 4, "JOE DIMAGGIO"
AS 2520 DATA 4, "WASHINGTON MONUMENT"
KR 2530 DATA 4, "GOLDEN GATE BRIDGE"
AD 2540 DATA 4, "ALCATRAZ"
HD 2550 DATA 4, "YOSEMITE NATIONAL PARK"

Family Games for Education and Fun

QQ 2560 DATA 5, "COMPUTER PRINTOUT"
SF 2570 DATA 5, "COLLEGE TEXTBOOK"
FF 2580 DATA 5, "TOOTHPICK"
DM 2590 DATA 1, "HANDLE WITH CARE"
ME 2600 DATA 5, "DIGITAL WATCH"
XC 2610 DATA 5, "CANDLE OPERA"
EG 2620 DATA 5, "KITCHEN SINK"
BD 2630 DATA 1, "DO UNTO OTHERS"
CK 2640 DATA 5, "TEDDY BEAR"
JC 2650 DATA 5, "TELEPHONE BOOK"
AD 2660 DATA 3, "PROM QUEEN"
FC 2670 DATA 5, "BASEBALL GLOVE"
FH 2680 DATA 5, "WEATHER VANE"
PJ 2690 DATA 5, "LIMOUSINE"
DM 2700 DATA 5, "TELEPHONE POLE"
CH 2710 DATA 3, "CONSTRUCTION WORKER"
DB 2720 DATA 4, "JACK NICKLAUS"
PQ 2730 DATA 2, "THE NORTH POLE"
SG 2740 DATA 1, "TOMORROW IS ANOTHER DAY"
RB 2750 DATA 1, "THE CREAM OF THE CROP"
RD 2760 DATA 1, "THE EARLY BIRD GETS THE WORM"

Number Quest

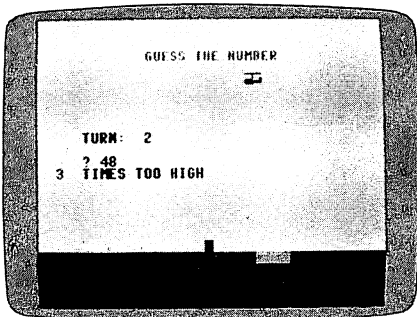
Gerald and Betty Schueler

Your arithmetic skills may just steer a skydiver to safety in this math game for children. It's also useful for practicing multiplication and division.

"Number Quest" gives children a chance to reinforce some number concepts while playing a game. Type in the program using "The Automatic Proofreader," found in Appendix C. Be sure to save a copy of the program when you've finished entering it. To play, load the program and type RUN.

In Number Quest you're given five chances to guess a number between 10 and 100. For each incorrect guess, you're given a hint. This hint can be a number indicating approximately how many times greater or smaller the answer is. For example, if the correct number is 75 and you guess 15, the computer responds 5 TIMES TOO LOW. But if your guess is less than two times greater or smaller than the correct number, the screen displays TOO HIGH or TOO LOW.

You can guess any number from 3 to 100. If you guess correctly within the allotted five turns, you see a skydiver descend safely to the ground. But if your quest is unsuccessful, the skydiver plunges into a lake.



The clues in "Number Quest" teach children math concepts.

The hints offered in Number Quest make it a useful program for teaching multiplication and division. By entering 3 for each new number, for instance, you will get a drill of the "threes" times table.

Numbers 1 and 2 are illegal guesses—many children can easily figure out that entering 1, for example, will give them the answer on the next turn. If 1 or 2 is entered, the computer responds with THAT'S TOO EASY!

If you want to modify the number of guesses (5), change the 5 in line 250 and the value for TN (6) in line 500. The 6 in this statement should be changed to the number of guesses plus one. For example, if you want to give the player eight guesses, line 500 should be

```
500 TN=TN+1:IFTN=9 THEN 530
```

Number Quest

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
EC 10 PRINT "{CLR}{WHT}{12 RIGHT}{12 DOWN}"; "JUST A
      MOMENT..."
GC 20 POKE56,48:CLR:K=12288:PC=56334:CP=53272
EF 40 POKEPC,PEEK(PC)AND254:POKE1,PEEK(1)AND251
EX 50 FORJ=0TO4095:POKEK+J,PEEK(53248+J):NEXTJ
RD 60 FORI=216TO255:READA$:POKEK+I,A$:NEXTI:FORI=2
      80TO295:READA$:POKEK+I,A$:NEXTI
RM 70 POKE1,PEEK(1)OR4:POKEPC,PEEK(PC)OR1
FA 80 POKECP,21:BC=53280:BK=53281:POKEBC,2:POKEBK,
      1:PRINT "{CLR}"
QF 90 PRINTSPC(90)" {BLK}{2 SPACES}[M]M[2 G][2 M]MN
      [G]O[G]O O[G]"
CX 100 PRINT "{12 SPACES}[M] [G]L[M]{2 SPACES}[G]O
      [G]O O[G]"
AK 110 PRINTTAB(21)"[T] [T]"
HP 120 PRINT:PRINT "{RED}{13 SPACES}OP [G][M] O O P
      O"
EH 130 PRINT "{13 SPACES}L@[F]L@ O P [M][G]"
MA 140 PRINTTAB(19)"[T] [T]"
GM 150 PRINTSPC(131)" {BLU}PRESS THE F1 KEY"
AD 160 V=54272:FORSL=VTOV+24:POKESL,0:NEXT
EX 170 POKEV+5,88:POKEV+4,33:POKEV+24,143:POKEV+6,
      195
XH 180 READLF,HF,DR:IFLF=-1THEN200
GB 190 POKEV,LF:POKEV+1,HF:FORT=1TODR:NEXTT:GOTO18
      0
BR 200 POKEV,0:POKEV+1,0:POKEV+24,0
AQ 210 GETA$:IFA$=""THEN210
```


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```
EA 560 FORM=125TO15STEP-5:POKEV+24,M:FORT=1TO20:NE
XTT:NEXTM:POKEV+24,0
SB 570 PRINT"{CLR}":POKESC,216:PRINTSPC(210)"{BLK}
SORRY, YOU{2 SPACES}MISSED"
CK 580 PRINTSPC(130)"THE NUMBER WAS{RED} ";R
PS 590 PRINTSPC(49)"{BLK}BETTER LUCK NEXT TIME":FO
RU=1TO 1200:NXTU
QQ 600 GOTO850
RC 610 D=INT(S/R):D$="HIGH":IFD<=1THEN680
RQ 620 GOTO640
RH 630 D=INT(R/S):D$="LOW":IFD<=1THEN680
BK 640 PRINT"{RED} ";D;"{BLK} TIMES TOO ";"{RED}";
D$
BK 650 POKEV+24,143:FORM=50TO0STEP-1:POKEV,INT(M/2
):POKEV+1,M:NEXTM
QE 660 FORT=1TO600:NEXT:POKEV+24,0
DP 670 PRINT"{UP}{19 SPACES}":PRINT"{5 UP}":GOTO40
0
QF 680 PRINT"{RED}{4 SPACES}TOO ";"{BLU}";D$:FORT=
1TO400:NEXT:GOTO650
BD 690 PRINT"{RED}{5 SPACES}TRY 1-100{2 SPACES}":F
ORT=1TO800:NEXTT
SQ 700 PRINT"{UP}{14 SPACES}":PRINT"{5 UP}";:RETUR
N
JC 710 X=1024+(5*40)+26:CX=X+54272:Z=1024+(5*40)+2
4:CZ=Z+54272
KE 720 FORN=1TOP:POKEZ,32:POKEZ+1,32:POKEX,32:POKE
X+40,32
EM 730 POKEZ-1,27:POKECZ-1,0:POKEZ,28:POKECZ,0
MP 740 POKEX+40,31:POKECX+40,2:POKEX+80,35:POKECX+
80,0
EP 750 Z=Z-1:CZ=CZ-1:X=X+40:CX=CX+40:NXTN:RETURN
PJ 760 BL=53265:FORN=1TO6:POKEBL,PEEK(BL)AND239:FO
RT=1TO50:NEXTT
XF 770 POKEBL,PEEK(BL)OR16:FORT=1TO40:NEXTT:NXTN:
RETURN
FR 780 GOSUB760:P=5:GOSUB710:FORN=1TO7
HP 790 POKEX,32:POKEX+40,32
PG 800 POKEX+39,31:POKECX+39,2:POKEX+79,35:POKECX+
79,0:X=X+39:CX=CX+39:NXTN
JB 810 POKEV+24,143:FORM=30TO60:POKEV,INT(M/2):POK
EV+1,M:FORT=1TO10:NEXTT:NEXTM
GD 820 POKEV+24,0:POKEV,0:POKEV+1,0
DQ 830 PRINT"{CLR}":POKEBC,2:POKEBK,1:PRINT:PRINT:
PRINTSPC(130)"{BLK}**CONGRATULATIONS**"
FR 840 PRINTSPC(173)"{RED}YOU GUESSED IT"
AP 850 PRINTSPC(191);
GM 860 FOR Q= 1TO 1000:NEXT:TN=1:GOTO300
CS 870 DATA255,1,1,1,127,255,255,127,255,0,0,3,3,2
55,255,0
```

Chapter 2

CP 880 DATA255,255,255,255,255,255,255,255,170,170
,255,255,255,255,255,255
QG 890 DATA60,126,255,255,129,66,36,24,16,18,60
FH 900 DATA88,40,36,66,0,17,130,68,37,6,148,93,126
MG 910 DATA31,21,200,30,25,450,31,21,200,96,22,200
,30,25,200,96,22,200,31,21,200
DD 920 DATA30,25,500,-1,-1,-1

Balloon Crazy

Joseph Russ

Version by Kevin Mykytyn

Catch as many balloons as you can—but be careful not to fall off your skateboard. Requires joystick.

“Balloon Crazy” is a game that children can enjoy, yet its higher levels are a challenge for adults. The goal is simple: You must zip back and forth across the screen on a skateboard while catching falling balloons on top of your head. Since some of the balloons fall very fast, that’s not as easy as it sounds. When you’ve caught six balloons, you can reach up to pop them and then catch some more. If you miss just one, you lose all the balloons currently in your possession.

Entering and Running the Program

Balloon Crazy is written completely in machine language and must be typed in with the new “MLX” machine language entry program found in Appendix D. Be sure to read the instructions for using MLX carefully before you start, even if you’ve used the old version of MLX many times in the past, since this is a completely new version. *No previous version of MLX can be used to enter the data from this program.* After you have finished entering the game, be sure to save a copy of the game before you play it. Here are the starting and ending addresses required for MLX:

Starting address: C000

Ending address: C81F

Plug a joystick into port 2; then load Balloon Crazy with
LOAD “name”,8,1 (for disk)

or

LOAD “name”,1,1 (for tape)

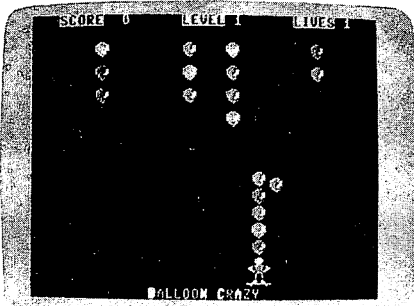
(replacing *name* with the filename you used when you saved the program). Then type

SYS 49152

and press RETURN.

Oodles of Balloons

The game begins by displaying several rows of multicolored balloons at the top of the screen. You are the skateboarder at the bottom. When a balloon begins to fall, move directly under it and catch it on your head. The blue balloons fall slowly, which makes them easy to catch (but worth the fewest points). The green balloons fall faster, and swiftest of all are the red balloons. As soon as you snare a balloon, it joins the pile on top of your head.



"Balloon Crazy" uses sprites as well as character graphics.

Should you miss a balloon, you immediately fall off the skateboard. All the balloons on your head fall and pop. Points are scored only when you have caught the required number of balloons. You have three players to work with in each game: Falling off the skateboard costs you one player. Clearing all the balloons from a screen permits you to advance to the next level—where everything becomes more difficult. Bonuses are awarded at appropriate intervals, and you can earn an extra player by scoring 1000 points.

Though the balloons become harder to catch at higher levels, you are never helpless to prevent them from hitting the ground. Should a balloon miss the top of the pile, you can bounce it back into the air by holding down the fire button and running into it. The balloon will then float back into the air, and you can try to catch it again.

You must collect six balloons on your head in order to score points. Blue, green, and red balloons are worth 10, 20, and 30 points, respectively. Use the joystick to move left and right, and press the fire button when you have missed a balloon and wish to bounce it upward. You must hit the balloon

with the upper part of the player's body. Note that the player can wrap around from one side of the screen to the other, but the balloons cannot. As a bonus, you are awarded an extra player after you've completed level 5.

Balloon Crazy

For instructions on entering this listing, please refer to the "MLX" article, Appendix D.

C000:20 56 C0 20 DE C1 20 5A D9
 C008:C1 4C D6 C5 20 DE C1 20 D4
 C010:5A C1 A5 A5 0A 85 A7 0A FD
 C018:85 A6 C6 03 D0 0A A5 04 0D
 C020:38 E5 A7 85 03 20 C8 C0 6F
 C028:C6 F9 D0 0D A5 FA 38 E5 E5
 C030:A6 85 F9 20 7A C4 20 3F 0E
 C038:C3 AD 8D 02 D0 FB A0 46 D6
 C040:88 D0 FD 4C 12 C0 98 48 CB
 C048:A0 32 20 B3 EE 88 D0 FA 1C
 C050:CA D0 F5 68 A8 60 A9 1B E5
 C058:8D 11 D0 A9 7F 8D 0D DC C2
 C060:A9 70 8D 14 03 A9 C0 8D 93
 C068:15 03 A9 81 8D 1A D0 60 59
 C070:A9 01 8D 19 D0 AD 8D 02 A4
 C078:D0 3C A4 F8 F0 14 AD 3C 05
 C080:03 18 69 05 99 3D 03 AD 7C
 C088:46 03 69 00 99 47 03 88 93
 C090:D0 EC A0 07 A2 0E A9 00 DA
 C098:85 B7 B9 3C 03 9D 00 D0 25
 C0A0:B9 50 03 9D 01 D0 B9 46 52
 C0A8:03 4A 26 B7 CA CA 88 10 21
 C0B0:E9 A5 B7 8D 10 D0 A9 FA 72
 C0B8:8D 12 D0 AD 0D DC 29 01 A9
 C0C0:F0 03 4C 1C C3 4C BC FE 8E
 C0C8:20 C1 C2 AD 00 DC 4A 4A 50
 C0D0:4A B0 2F AE 46 03 D0 13 67
 C0D8:AE 3C 03 E0 1E D0 0C A9 25
 C0E0:3B 8D 3C 03 A9 01 8D 46 CD
 C0E8:03 D0 13 48 AD 3C 03 38 A3
 C0F0:E9 01 8D 3C 03 AD 46 03 7B
 C0F8:E9 00 8D 46 03 68 A2 FF 84
 C100:86 05 4A B0 2F AE 46 03 20
 C108:F0 13 AE 3C 03 E0 3C D0 47
 C110:0C A9 1F 8D 3C 03 A9 00 02
 C118:8D 46 03 F0 13 48 AD 3C B4
 C120:03 18 69 01 8D 3C 03 AD 79
 C128:46 03 69 00 8D 46 03 68 B0
 C130:A2 01 86 05 4A B0 22 AD 6D
 C138:1E D0 29 01 F0 1B AD 03 86

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C140:D0 C9 D2 90 14 C9 DC B0 34
C148:10 20 9E C2 A5 C4 49 FF AE
C150:18 69 01 85 C4 A5 05 85 FE
C158:C3 60 A9 93 20 D2 FF 20 B0
C160:D6 C1 A9 03 85 FB A9 05 99
C168:85 FC AD 1B D4 29 03 C9 70
C170:03 F0 F7 A8 B9 7D C7 48 D6
C178:A9 03 38 E5 FB 0A 0A 0A 1D
C180:85 02 A9 05 38 E5 FC 18 38
C188:65 02 A8 68 99 1F C8 8D 43
C190:86 02 A9 71 A0 C7 20 1E A6
C198:AB C6 FC 10 CD 20 D6 C1 A2
C1A0:C6 FB 10 C2 A0 03 A9 3F 58
C1A8:99 64 03 88 10 FA A9 00 BA
C1B0:85 F7 85 F8 18 A2 18 A0 51
C1B8:0D 20 F0 FF A9 EA A0 C7 EA
C1C0:20 1E AB 20 31 C5 A9 96 DD
C1C8:8D 3C 03 A9 00 8D 46 03 E2
C1D0:A2 14 20 46 C0 60 A9 8A 78
C1D8:A0 C7 20 1E AB 60 A2 07 AF
C1E0:A0 00 A9 00 85 FB 85 FD 0F
C1E8:A9 38 85 FC A9 D0 85 FE 6A
C1F0:78 A9 33 85 01 B1 FD 91 36
C1F8:FB B9 31 C6 99 C0 3E B9 81
C200:71 C6 99 00 3F 88 D0 ED CE
C208:E6 FC E6 FE CA D0 E6 A9 1E
C210:37 85 01 58 A0 1F B9 11 3E
C218:C6 99 D8 38 88 10 F7 A9 24
C220:1E 8D 18 D0 A9 D8 8D 16 0A
C228:D0 A0 01 8C 25 D0 88 8C 31
C230:21 D0 88 8C 1C D0 8C 15 A6
C238:D0 A9 01 8D 25 D0 A0 07 3E
C240:8C 26 D0 88 8C 27 D0 C8 A3
C248:A9 00 99 50 03 B9 BD C7 1D
C250:99 F8 07 88 10 F2 A9 DC C6
C258:8D 50 03 A9 0A 85 04 85 A7
C260:03 A9 00 85 A3 85 A4 85 2C
C268:A5 A9 03 85 A8 A0 17 A9 83
C270:00 99 00 D4 88 10 FA A9 CD
C278:0F 8D 18 D4 A9 0C 8D 03 D4
C280:D4 A9 05 8D 05 D4 A9 0F 32
C288:8D 01 D4 A9 80 8D 12 D4 7D
C290:8D 0F D4 A9 0A 8D 0C D4 49
C298:A9 08 8D 0A D4 60 20 B2 62
C2A0:C2 AD A7 02 8D A9 02 A9 C8
C2A8:11 8D 0B D4 A9 00 8D AA DB
C2B0:02 60 A9 10 8D 0B D4 EE B6
C2B8:AA 02 A9 00 8D 08 D4 60 DF
C2C0:60 AD 00 DC 29 0F C9 0F D7
C2C8:D0 16 A9 10 8D 04 D4 A9 42

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C2D0:00 8D AB 02 8D AC 02 8D FF
C2D8:01 D4 A9 08 8D AD 02 60 51
C2E0:AD AB 02 D0 19 A9 01 8D 74
C2E8:AB 02 A9 10 8D 04 D4 A9 CA
C2F0:0F 8D 05 D4 A9 00 8D 06 BD
C2F8:D4 A9 11 8D 04 D4 18 AD 9F
C300:AC 02 69 23 8D AC 02 AD 8E
C308:AD 02 69 00 8D AD 02 AD E8
C310:AC 02 8D 00 D4 AD AD 02 DA
C318:8D 01 D4 60 AD AA 02 D0 34
C320:12 AD A9 02 F0 10 18 AD 17
C328:A9 02 6D A8 02 8D A9 02 D8
C330:8D 08 D4 4C 31 EA AD A7 18
C338:02 8D A9 02 4C 31 EA A5 1C
C340:F7 F0 03 4C FD C3 20 9E 03
C348:C2 E6 F7 A9 00 85 C3 A9 CB
C350:FF 8D F9 07 A9 01 85 C4 0C
C358:A9 00 A0 03 19 64 03 88 E1
C360:10 FA C9 00 D0 1B A5 F8 1F
C368:F0 03 20 B4 C4 A5 A5 C9 4A
C370:04 D0 04 E6 A8 D0 02 E6 90
C378:A5 20 5A C1 68 68 4C 12 D1
C380:C0 A0 03 AD 1B D4 29 07 51
C388:C9 06 B0 F7 AA BD C5 C7 AB
C390:39 64 03 D0 05 88 10 F5 9B
C398:30 E7 BD C5 C7 59 64 03 B5
C3A0:99 64 03 BD D3 C7 8D 3D 60
C3A8:03 BD D9 C7 8D 47 03 B9 22
C3B0:DF C7 8D 51 03 98 0A 0A 79
C3B8:0A 85 02 8A 18 65 02 84 6E
C3C0:02 A8 B9 1F C8 29 07 8D 23
C3C8:28 D0 A8 0A 0A 8D A7 02 26
C3D0:B9 83 C7 85 FA 8D A8 02 C8
C3D8:20 9E C2 A4 02 8A 85 02 02
C3E0:0A 0A 18 65 02 18 69 07 93
C3E8:85 02 98 0A 18 69 02 AA 7C
C3F0:A4 02 18 20 F0 FF A9 CB F6
C3F8:A0 C7 4C 1E AB A5 C4 30 DB
C400:0E 18 6D 51 03 8D 51 03 4D
C408:C9 E6 90 1A 4C 6B C5 49 C8
C410:FF 18 69 01 85 02 AD 51 BD
C418:03 38 E5 02 C9 82 B0 06 CD
C420:A5 02 85 C4 D0 03 8D 51 F8
C428:03 A5 C3 30 25 18 6D 3D B9
C430:03 AE 47 03 F0 0F C9 3C 93
C438:90 0B A5 C3 49 FF 18 69 A1
C440:01 85 C3 D0 34 8D 3D 03 86
C448:AD 47 03 69 00 8D 47 03 39
C450:10 27 49 FF 18 69 01 85 C2

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C458:02 AD 3D 03 38 E5 02 AE 32
C460:47 03 D0 0A C9 1E B0 06 37
C468:A5 02 85 C3 D0 0B 8D 3D 3D
C470:03 AD 47 03 E9 00 8D 47 B1
C478:03 60 AD 1E D0 29 02 F0 53
C480:32 AD 03 D0 A4 F8 F9 E3 DC
C488:C7 C9 03 90 04 C9 FB 90 A1
C490:22 E6 F8 A4 F8 B9 E3 C7 8C
C498:99 51 03 AD 28 D0 29 07 5C
C4A0:99 28 D0 C6 F7 A9 FF 99 87
C4A8:F9 07 A5 F8 C9 06 D0 03 40
C4B0:20 B4 C4 60 A9 00 85 A9 18
C4B8:A0 00 8C 51 03 A6 A9 D0 10
C4C0:25 A9 FC 8D F8 07 B9 29 40
C4C8:D0 29 07 09 08 A2 FF E8 2A
C4D0:DD 7D C7 D0 FA BD 80 C7 46
C4D8:18 65 A3 85 A3 A5 A4 69 FA
C4E0:00 85 A4 20 31 C5 A9 FE 55
C4E8:99 FA 07 20 F4 C5 A2 05 E9
C4F0:20 46 C0 A9 00 99 52 03 DC
C4F8:A6 A9 D0 05 A9 FD 8D F8 04
C500:07 A2 04 20 46 C0 C0 05 F5
C508:F0 17 C8 84 06 A2 01 BD AD
C510:E3 C7 99 52 03 E8 C8 C4 E9
C518:F8 90 F4 A4 06 C4 F8 D0 33
C520:9C 88 C8 A9 00 99 51 03 DB
C528:C0 07 D0 F6 A9 00 85 F8 B0
C530:60 98 48 A9 94 A0 C7 20 8C
C538:1E AB 18 A2 00 A0 0A 20 A1
C540:F0 FF A5 A4 A6 A3 20 CD 15
C548:BD 18 A2 00 A0 17 20 F0 9F
C550:FF A9 00 A6 A5 E8 20 CD 8F
C558:BD 18 A2 00 A0 24 20 F0 E3
C560:FF A9 00 A6 A8 20 CD BD DF
C568:68 A8 60 CE F9 07 20 F4 6C
C570:C5 C6 F7 A2 04 20 46 C0 A7
C578:A9 00 8D 51 03 A9 FB 8D E3
C580:F8 07 A5 F8 F0 07 A9 01 86
C588:85 A9 20 B8 C4 A2 09 20 B3
C590:46 C0 A9 FD 8D F8 07 C6 A9
C598:A8 20 31 C5 A5 A8 D0 4F C3
C5A0:A9 03 8D 15 D0 A9 FE 8D 7D
C5A8:F9 07 20 81 C3 A9 00 A0 74
C5B0:03 19 64 03 88 10 FA 48 83
C5B8:A2 02 20 46 C0 68 D0 EA B2
C5C0:A9 01 8D 15 D0 68 68 18 75
C5C8:A2 0B A0 0F 20 F0 FF A9 DB
C5D0:04 A0 C8 20 1E AB 18 A2 14
C5D8:0D A0 0D 20 F0 FF A9 0F A0

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C5E0:A0 C8 20 1E AB AD 00 DC C5
C5E8:29 10 D0 F9 4C 0C C0 A9 84
C5F0:00 85 F8 60 20 B2 C2 A9 FD
C5F8:80 8D 04 D4 A9 05 8D 05 77
C600:D4 A9 00 8D 06 D4 A9 0F 21
C608:8D 01 D4 A9 81 8D 04 D4 F0
C610:60 00 00 00 0F 3F FF FF 43
C618:FF 00 00 00 C0 F0 FC DC 46
C620:DC FF FF 3F 3F 0F 03 00 4C
C628:00 DC 7C F0 F0 C0 00 00 16
C630:00 0C 00 30 FF FF FF 01 C4
C638:45 00 01 04 00 02 08 00 E0
C640:02 08 00 02 20 00 02 80 76
C648:00 02 AA 85 02 55 95 02 96
C650:AA 85 00 00 00 00 00 00 94
C658:00 00 00 00 00 00 00 00 E5
C660:00 00 00 00 00 00 00 00 ED
C668:00 00 00 00 00 00 00 00 F5
C670:FE 01 14 00 04 55 00 10 C5
C678:55 00 04 14 00 02 AA 00 CF
C680:00 AA 80 00 AA 10 00 AA 09
C688:04 00 AA 10 00 AA 40 00 99
C690:AA 00 00 82 00 00 82 00 A0
C698:00 82 00 00 82 00 00 82 5D
C6A0:00 00 41 00 01 41 40 FF E3
C6A8:FF FF 0C 00 30 00 00 00 39
C6B0:00 00 14 00 00 55 00 00 16
C6B8:55 00 00 14 00 00 AA 00 87
C6C0:02 AA 80 04 AA 10 10 AA AA
C6C8:04 04 AA 10 01 AA 40 00 E2
C6D0:AA 00 00 82 00 00 82 00 E0
C6D8:00 82 00 00 82 00 00 82 9D
C6E0:00 00 41 00 01 41 40 FF 24
C6E8:FF FF 0C 00 30 00 00 00 79
C6F0:00 00 00 00 00 00 00 00 7E
C6F8:00 00 08 80 00 20 00 00 10
C700:02 08 00 20 80 00 88 00 A9
C708:00 00 88 00 88 08 00 02 0F
C710:00 00 20 20 00 00 80 00 A6
C718:02 00 00 00 00 00 00 00 A8
C720:00 00 00 00 00 00 00 00 AF
C728:00 00 00 00 00 00 00 00 B7
C730:35 00 00 00 00 00 00 00 5A
C738:00 00 0A 80 00 2A A0 00 FA
C740:AA A8 00 AA 98 00 AA 98 AC
C748:00 AA 98 00 AA 68 00 2A B6
C750:A0 00 2A A0 00 0A 80 00 A8
C758:02 00 00 00 00 00 00 00 E8
C760:00 00 00 00 00 00 00 00 EF

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C768:00 00 00 00 00 00 00 00 F7
C770:35 5B 5C 11 9D 9D 5D 5E 8A
C778:91 1D 1D 1D 00 0A 0D 0E DD
C780:1E 14 0A 00 00 14 00 00 B5
C788:19 1E 0D 11 20 20 20 20 C0
C790:20 20 20 00 13 1D 1D 1D A0
C798:9E 12 53 43 4F 52 45 1D 06
C7A0:1D 1D 1D 1D 1D 1D 1D 1D 30
C7A8:4C 45 56 45 4C 1D 1D 1D FC
C7B0:1D 1D 1D 1D 1D 4C 49 56 8E
C7B8:45 53 92 9F 00 FD FF FF 04
C7C0:FF FF FF FF FF 01 02 04 5C
C7C8:08 10 20 20 20 11 9D 9D 84
C7D0:20 20 00 50 78 A0 C8 F0 46
C7D8:19 00 00 00 00 00 01 42 39
C7E0:52 62 72 D8 CC C0 B4 A8 89
C7E8:9C 90 05 42 1C 41 9F 4C 21
C7F0:9C 4C 1E 4F 1F 4F 9E 4E 5C
C7F8:20 05 43 1C 52 9F 41 9C 34
C800:5A 1E 59 00 9E 47 41 4D 53
C808:45 20 4F 56 45 52 00 9E A5
C810:48 49 54 20 46 49 52 45 E5
C818:42 55 54 54 4F 4E 00 00 A3

3

Mystery
and Adventure



Graphic Adventure Kit

Robert A. Stoerrle

If you've ever become engrossed in an adventure game, you've probably thought of scenarios you'd like to design and play yourself. "Graphic Adventure Kit" lets you do just that. The programming has been done for you, leaving you free to concentrate your efforts on the creative elements of constructing your adventure. Requires disk drive and joystick.

Text adventure games were the first computer adventure games to be developed. As the graphics capabilities of computers increased, so did the popularity of games that featured fast, realtime animation and sound. Recently, the trend has been toward games that combine the best of both worlds: the complex plot and puzzles of a text adventure and the detailed graphics of an arcade-style game.

"Graphic Adventure Kit" is a tool that allows you to design your own quality graphic adventure games without the need for programming. Each adventure can have hundreds of rooms, or scenes, containing hundreds of different creatures, tricks, traps, friends, foes, or whatever other surprises you come up with. Each adventure starts as a blank slate. You design everything—from what goes into each room to what a troll looks like to what happens when the player enters a magic door.

Entering the Program

Graphic Adventure Kit is written entirely in machine language, which makes it faster and more memory-efficient than if it were written in BASIC. To insure a program that will run correctly, type it in using "MLX," the machine language entry program found in Appendix D. When you load and run MLX, you will be asked to enter the starting and ending addresses of the program:

Starting address: 0801

Ending address: 3D21

Since Graphic Adventure Kit is such a long program (13K), you'll probably want to type it in over several sittings. Be sure to read the MLX article for details on saving your work between typing sessions.

Saving the Program

When you have finished typing in the program, MLX will save it for you on disk. Then you'll be able to load and run Graphic Adventure Kit as you do a BASIC program. You can also use SAVE to copy it to another disk. It's a good idea to save a backup copy, in case there is an accident with your original version. While Graphic Adventure Kit is running, the RUN/STOP and RESTORE keys will be disabled. This prevents you from accidentally breaking out of the program before important information about your game has been updated on the disk.

Caution: Always be sure to exit the program by using Graphic Adventure Kit's QUIT option, which also resets the computer. (So if you want to make a copy of Graphic Adventure Kit, save it on another disk before running it.) It's also safe to turn off the computer when the main menu is displayed.

The Main Menu

When you run the program, the main menu and title screen will appear on the screen. You will notice the words PLAY ADVENTURE flashing between normal and reverse video. Graphic Adventure Kit is menu-driven, which means that you select options from a list of choices, so you don't have to remember any commands or function keys to use the program. By using a joystick plugged into port 2, you can move the flashing bar among the various menu items. Just move the bar to the option you want. When the item you want is highlighted, press the fire button to select it.

Creating an Adventure Disk

Each adventure game that you create with Graphic Adventure Kit must be stored on its own disk. To prepare a disk to hold an adventure, select the NEW ADVENTURE option in the main menu. This message will be displayed:

**INSERT A BLANK OR SCRATCH DISK. ALL
DATA ON THE DISK WILL BE ERASED.
PRESS <F1> TO PROCEED**

You must use a blank disk, because Graphic Adventure Kit will format it, a process that will erase any data or programs that might already be on the disk. Be careful before you proceed—no check will be made to see whether the disk is blank. If you change your mind, press the fire button to return to the main menu.

When you have inserted the blank disk, press the f1 function key. There will be a delay of about a minute and a half while the disk is formatted. If a disk error should occur, you will be notified and given a chance to correct the problem before resuming.

Incidentally, the program does not use ordinary disk files. Instead, it accesses individual disk sectors, which is faster and more efficient. The drawback is that you cannot store anything else on an adventure disk, not even Graphic Adventure Kit itself. *Attempting to save a program on an adventure disk would probably destroy parts of your game.* All information on the disk is encoded to protect your game from prying eyes.

When the disk has been prepared, the main editing menu will appear, and you can begin designing your adventure. Subsequently, each time you work on this adventure, choose the EDIT ADVENTURE option in the main menu; use NEW ADVENTURE only when you're beginning to design a new game.

The Main Editing Menu

Creating an adventure program involves the use of several editors. The main editing menu is used to move between the various editors and to set a few important parameters.

When this menu first appears, the flashing selection bar will be beside the word PASSWORD. If you've spent considerable time creating a challenging adventure, you'll want to insure that other people can't alter your game. By specifying a password, you enable people to play the game you have created, but they won't be able to edit it without knowing the password. Press the fire button to set or change the password. A square cursor will appear, and you can enter the password. Use the cursor keys to edit and the INST/DEL key to back-space. Pressing RETURN or the fire button will return you to the menu.

Also on the screen you'll see the names of two colors. (Their significance will be discussed later.) To change a color,

move the selection bar on top of it and keep pressing the fire button until the color you want appears.

Other items in the menu are used to access the editors: Images, Things, Rooms, Player.

The Images Editor

The first editor you should use is the Images Editor. An *image* is the onscreen representation of an element in your adventure, like a tree, a mountain, a wizard, or a sword. Each adventure can have as many as 255 different images, numbered from 1 through 255. Image 0 is always blank and may not be edited.

At the top of the Images Editor screen, you will see the image currently being edited and its number. Initially, all images are blank. In the grid on the left side of the screen, where all editing takes place, a blowup of the image will appear. This feature is similar to those in popular character and sprite editor programs.

Coloring Images

An image can contain as many as three different colors, not including the background color, black. Two of the colors must be the same for all images, but one color can vary from image to image. You can draw with any of these colors in the image grid by using one of the three pens—initially white, blue, and cyan. Simply move the selection bar to the pen color you want and press the fire button. A cursor will appear in the editing grid. Use the joystick to move the cursor around. Pressing the trigger sets a dot in the chosen color. You can hold down the button and move the joystick to achieve a drawing effect. Notice that if you move the cursor off the top or bottom of the grid it will wrap around in the other direction. However, moving the cursor off the grid to the right or left will take you back to the Images Editor menu.

You're not limited to using white, blue, and cyan. If you move to the CHANGE option, next to the cyan pen, and press the fire button, the cyan pen will become purple. Everything that has been drawn with the cyan pen will also turn purple. The third pen is the only color that can vary from image to image. The first two pens remain constant for all the images, but they don't have to be white and blue. You can change

those colors from the main editing menu screen, which you saw earlier.

If you make a mistake and color in the wrong dot, you can use the ERASER. It works like a pen, but clears the dot underneath it when you press the fire button. If you decide that your image is beyond repair, use CLEAR to erase it entirely and start over.

Selecting Other Images

To change images, move the selection bar as far as it will go toward the top of the screen. It will turn into a flashing box over the current image. Press the fire button and push the joystick up or down to select the image number that you want. Then, press the fire button again to return to editing.

You may be surprised to see that the Images Editor does not remember what color you used for the third pen in each image. The new image will be drawn with the last pen color selected. Don't be alarmed. This color will be set in the Things Editor so that two different objects can have the same image, but will have different colors for the third pen.

Image Libraries

The two remaining commands concern image libraries. It would be very tedious if you had to design the same images every time you started a new adventure. By using the SAVE LIBRARY option, you can save the images from a finished adventure and load them into a new adventure by using the LOAD LIBRARY option. You must save each set of images under a unique filename on a separate disk. *Don't accidentally save them onto your adventure disk.* Please note that all images in the adventure will be saved—you cannot save selected images. In addition, a LOAD erases any images already in memory before the image file is loaded. Be sure to put your adventure disk back into the disk drive after a load or save.

Program 2 is a set of images that will help get you started. Again, be sure to use MLX to type it in. Here are the starting and ending addresses:

Starting address 4000
Ending address 41FF

After Program 2 has been entered and saved, you can use the LOAD LIBRARY feature to access the images.

The Things Editor

The most sophisticated and powerful editor in Graphic Adventure Kit is the Things Editor. It allows you to add characteristics to object images. There are four different types of objects. You can set an object's type by toggling the selection bar over the word beside TYPE.

Terrain objects are simple objects whose main purpose is to provide the setting—for example, mountains, water, and trees. They can be either passable objects, which allow the player to walk through them, or obstacles, which block the player.

Special objects are an extension of terrain objects. They have the ability to do certain things when the player walks through them or tries to walk through them. An example of a special object is a locked door that allows the player to pass only if he or she has a matching key.

Possessable objects are items that the player can take, drop, use, or give away. The key that fits the locked door mentioned above is an example of a possessable object. You can specify what happens when the object is used, taken, dropped, or given.

Creature objects make up the final type of object category. Among other things, a creature can be made to move, attack the player, give the player something, or take something from the player. In addition, creatures can be killed by the player in combat.

Characteristics of Objects

Each object has four basic characteristics, which appear at the top of the Things Editor screen. **NAME** is simply what you call the object. Each object should have a unique name. To set the name, move the selection bar to **NAME** and press the fire button. You may then enter or edit the name, using the regular editing keys. When you have finished, press **RETURN** or the fire button.

To set an object's image, move the selection bar to the right of the screen after the word **IMAGE**. You can then change the image by pressing the fire button, moving the joystick up or down, and pressing the fire button again. To change the color of any dots drawn with pen 3, move the selector to **COLOR** and press the fire button until the desired color appears. To change the type of object, move the bar to

TYPE and press the fire button. You will notice that the screen is reformatted for certain types.

Objects are numbered from 1 through 255, although only 32 can be displayed in a room. Object 0 is always a blank obstacle of the *terrain* type. To change the object currently being edited, move the selection bar to the top of the screen and press the fire button. Then, to change the object number, just move the joystick up or down. When the number of the object you want is displayed, press the fire button again.

For terrain and special objects, the word **CLASS** will appear on the screen followed by the word **PASSABLE**. To make the object an obstacle instead of passable, move the selector on top of **CLASS** and press the fire button.

When you select an object to be of *possessable* type, three additional parameters will appear in the center of the screen. If the object you are designing is a weapon, you will want to change the number next to the word **WEAP**. The higher that number (to a maximum of 200), the more effective the object is as a weapon. (What happens is that many points are added to your strength when you possess that object and attack a creature.)

Similarly, for armor you should adjust the **ARMOR** value; the maximum value here again is 200. (In fact, 200 is the maximum allowed for all attribute values that are to be set for both the player and all objects.) The higher the number, the more the object protects you. This value is subtracted from a creature's strength when it attacks, reducing the amount of damage inflicted on you. Finally, **WHT** is short for weight. By setting a weight for each possessable object, you can restrict the number of objects the adventurer can carry. You can change all numbers by moving the bar on top of them, pressing the fire button, moving the joystick up or down, and pressing the fire button again.

Inventing a Creature

Several items appear in the middle of the screen when you select the *creature* type. The number of **HIT** points allotted determines the life of the creature. Each time the creature is hit by the player, points are subtracted from this number. When the number reaches zero, the creature is dead. Fierce creatures, then, should be given more hit points than weak ones. Giving a creature zero hit points to start with, however, will make

that creature invincible, and no damage can be inflicted upon it.

STR, short for strength, is a measure of how much damage the creature can do to the player. When the player is hit, a random number from zero to half the *STR* value will be generated. That number is subtracted from the player's hit points. The same thing happens in reverse when the player hits a creature.

SKILL is expressed as a percentage. The closer this number is to 100, the more likely it is that the creature will hit the player when it attacks.

MOVE refers to the creature's type of movement. There are seven different types of movement:

NONE	Creature remains stationary.
RANDOM	Creature follows no pattern.
HOSTILE	Same as RANDOM, except whenever the creature is next to the player, it will attack.
CHASE	Creature homes in on the player.
HUNT	Same as CHASE, but the creature will attack if it catches up with the player.
HORIZ ALIGN	Creature stays along a straight, horizontal path, but always tries to line itself up with the player.
VERT ALIGN	Similar to HORIZ ALIGN, except the creature stays on a straight, vertical path.

Creatures cannot move from the rooms into which they have been placed. Also, like the player, they cannot move through obstacles.

Conditions

When you're editing special objects, possessable objects, and creatures, two IF clauses will be displayed at the bottom of the screen. These two statements are the key to making your creatures act. Each IF is followed by a condition. In Graphic Adventure Kit, eight different conditions can be tested. Whenever a condition becomes true, the action on the next line will be performed. In addition, there is the option of printing a message when the action is performed.

The eight conditions and their descriptions are found in Table 1. To select a condition, move the selection bar to the desired IF and press the fire button until the condition you want appears. Table 2 lists the actions that can be performed. Actions are selected in the same way as conditions.

Table 1. Conditions

PLR TOUCHES IT	This condition becomes true whenever the player attempts to move onto an object.
PLR ATTACKS IT	Use this condition to make a creature do something when the player attacks it. The action will be taken whether or not the player hits the object.
PLR TAKES IT	Works only with possessable objects; becomes true when the player takes the object.
PLR DROPS IT	Also works only with possessable objects; becomes true when the object is dropped.
PLR USES IT	If the adventurer uses a possessable object that tests for this condition, the action following this condition will be done.
PLR HAS	This condition is tested only when the player attempts to walk onto the object. If the player has the designated object or amount of wealth, the action following it will occur. The object to check for is set to the right of the condition. If you select WEALTH for the object, you must also specify the amount. To edit the amount, just move the selection bar as far to the right as it will go.
PLR LACKS	Similar to PLAYER HAS, except the action is performed when the player lacks the given object or has less than the specified amount of wealth.
PLR GIVES	Works only with creatures. This condition allows a creature to perform an action when the player gives a certain object or amount of wealth to the creature. The object and amount of wealth can be set in the same way as for the above two conditions.

On the third line of each IF statement you'll see the words NO MESSAGE. If you want to display a short piece of text on the screen when an action is performed, move the selector to that line and press the fire button. The words EDIT MESSAGE will appear to the right. Move the bar to the right and press the fire button. A composing area and cursor will appear, and

Table 2. Actions

DO NOTHING	Prints a message when a certain condition becomes true with nothing happening.
SUMMON ALL	This action is followed by an object. When it is performed, all instances of the object in the room will become visible.
DISMISS ALL	Also followed by an object. When this action is executed, all occurrences of the object in the room will be made invisible. Invisible objects are ignored by Graphic Adventure Kit's play routines.
HEAL PLAYER	Gives the player his or her maximum number of hit points.
KILL PLAYER	Immediately kills the player and displays the losing screen.
GIVE	Followed by an object or amount of wealth. This action adds that object or amount of wealth to the player's inventory, if the inventory is not full.
TAKE	Takes the designated object or amount of wealth from the player's inventory if the player possesses it.
LET PLR PASS	Lets the player walk on an object that would normally not be passable. (This action is useful for locked doors: Define the door as an obstacle, and set up an IF to let the player pass if he or she has the key.)
TELEPORT PLAYER	Sends the player to another room. The player's position in the new room will be the same as in the original room.
GAME IS WON	The winning screen will be displayed, and the game will be terminated.
PLR HIT + PLR HIT - PLR STR + PLR STR - PLR SKILL + PLR SKILL -	These actions can be used to raise or lower the player's hit points, strength, or skill by a certain number of points.
FLASH	Causes the screen to flash white once (a useful effect when a spell is cast).
DISAPPEAR	The object will become invisible when it performs this action. An object can disappear from a room only, not from the player's inventory.
MOVEMENT =	Allows a creature to change its type of movement. The new type of movement is set to the right of the condition.

you will be able to write or edit your message. You can use the normal editing keys, including all cursor keys and the CLR/HOME key, which clears the entire message. When you have finished editing, press the fire button. An adventure can contain up to 255 messages. When that many messages have been added, you will not be able to change NO MESSAGE to MESSAGE.

The last line of each IF allows you to specify whether you want the action to be performed only once or more than once each time the game is played. Move the selection bar to that line and press the fire button to toggle between the two options.

The Rooms Editor

With the Rooms Editor, you can place objects designed with the Things Editor into the various rooms, or scenes, of your adventure game. The first step in designing a room is to fill the entire room with a general terrain object. For example, an outdoor scene may be filled with grass or water. An indoor room could be filled with whatever object you want to use for floors. To select the fill object, move the selector up as far as it will go so that it turns into a flashing box. Then, press the fire button and move the joystick up or down to cycle through the available terrain objects. When the one you want appears, press the fire button again. Finally, select FILL TERRAIN, and the room will be filled.

The next step is to add the rest of the terrain. Start by deciding where the exits in your room will be. Then position obstacles to prevent the player from exiting anywhere else. Finally, fill in minor terrain, such as trees and other decorations.

To edit the terrain in a room, select the object that you want to use in the same way that you selected the fill object. Then, move the selector to EDIT TERRAIN and press the fire button. A flashing box will appear in the picture of the room at the left of the screen. Move the box to the position where you want the selected object to be and press the fire button to set it there. The name and number of the terrain object under the flashing box will appear at the bottom of the screen. When you have finished editing, move the box out of the room in any direction.

Although Graphic Adventure Kit lets you have up to 255 different objects, only 32 different images can be displayed in

a room at one time. The reason is that images are really sets of four multicolor characters. The VIC chip limits the number of different characters to 256, and 128 of those characters are used for the alphabet, numbers, punctuation, and so on. That leaves room for only 128 extra characters, or 32 images. If the objects you put into a room require more than 32 images, some objects will not be displayed correctly.

Once all terrain is in place, you can add special objects, possessable objects, and creatures. To do so, select the EDIT OTHERS option. Move the box to the position where you want the object and press the fire button. A small menu will appear at the bottom of the screen. Move the selector to ADD THING and press the fire button. A line of text will appear under the name of the terrain object:

```
#0    TERR  VIS  DEL
```

The selection bar will be flashing over the #0. Press the fire button and move the joystick up or down to select the object you want (other than terrain). Press the fire button again.

VIS means that the object is visible at the start of a game. Only a visible object can perform actions, move, or block the player. You can toggle *VIS* to *INV* (invisible) by moving the selector on top of it and pressing the fire button. An invisible object is made visible only when it is summoned. When a creature is killed, it becomes invisible, but it will be made visible again when the game is played again or when you edit the adventure. Editing an adventure always cancels any game that was in progress.

DEL (delete) completely erases the object from the room. You can put two different objects (besides terrain) into a space in a room. However, only the first object, if it is visible, is recognized. If it is not visible, the second object has priority. If both objects are visible, only the first object's IF statements will be checked when the player attempts to walk there. You can put no more than 20 nonterrain objects inside a room.

When an object has *TELEPORT* as one of its actions, you will have to specify where to send the player. On the line for the object, you'll see the word *TELEP* followed by a number. The number is the room to which the player will be sent. You can change it in the same way that you edit a creature's hit points or strength.

Moving to Another Room

When you've put all the objects you want into a room, you'll need to set the room connections. (Rooms are numbered from 1 through 255.) The Rooms Editor screen displays the four directions, each followed by a number indicating the room that the player will enter if he or she exits in that direction. Initially, all directions are set at zero. For example, if the north exit leads to room 23, the number next to the word *NORTH* should be changed to 23. It's useful to map out all the rooms of your adventure first so that you don't confuse the room connections. The number 0 left next to one of the directions means there is no exit in that direction.

When you have finished editing a room and want to move to another room, move the selector to the number next to *ROOM* and change it to the number of the next room that you want to edit. You'll then be transferred to that room. Another way to change rooms is to move the selector on top of one of the directions and press the fire button. This puts you into the room whose number is next to that direction—which is handy for testing room connections.

The *CLEAR* option erases the entire room, including the room connections. It completely nullifies the existence of the room.

The Player Editor

Use the Player Editor to set the adventurer's image, color, hit points, strength, skill, and so on. Most of the options available are also found in other editors and will be familiar to you; however, some parameters need clarification.

MAX HIT refers to the maximum number of hit points that the player can have. When the player is healed, he or she gets this number of hit points. Like all the other attributes, the maximum number of hit points is 200.

WEALTH is the amount of money (in whatever currency you choose) given the player at the start of the game.

MAX WHT is the maximum weight that the player can carry. When the total weight of objects in the player's inventory approaches this value, the adventurer will not be allowed to acquire anything else.

EDIT POSITION is used to set the player's initial position in the starting room (the number next to the word

ROOM.) A picture of the room will appear, with a flashing box around the image of the player. Simply move the player to the desired position and press the fire button to return to the editor.

Completing the Adventure

You can add the finishing touches to your adventure games by adding a colorful title screen, which will be displayed every time your game is played. In addition, you can design an introduction that will be shown whenever a player begins a new game. You can even create screens to be displayed when the adventurer wins or is killed. The screen editors let you mix text and graphics to get the best visual effects.

To edit one of those screens, simply select TITLE SCREEN, INTRODUCTION, WINNING SCREEN, or LOSING SCREEN from the main editing menu. A cursor will appear at the top of the screen. You can type normally and use the cursor keys to enter text. All of these screens are optional; however, they can add considerably to your game by letting the player know what type of adventure to expect. It's especially important to give necessary information in the introductory screen. Even if you feel that no other information is necessary, at least add a line to the introduction saying that the fire button must be pressed to begin play.

You can select the character color by holding down the CTRL key and pressing any of the color keys. You can enter reverse-video mode by pressing CTRL-RVS ON and exit by pressing CTRL-RVS OFF. To clear the entire screen, use the CLR/HOME key. Unlike the 64's normal screen editor, the screen cannot be scrolled, and the INST/DEL key acts only as a backspace. To return to the main editing menu, press the fire button. Your screen will be saved in memory, and you will be able to return to it at any time.

Pressing F1 puts you into the Image mode. A larger cursor will appear, and you will be able to use the joystick to move the cursor around the screen. Use F5 and F7 to select the image you want to use. Then press CTRL and one of the color keys to give the image the color you want. To stamp that image into place under the cursor, press the fire button. (The 32-image limit also applies to this editor.) To exit the image mode, press F1 again. To return to the main editing menu, press the fire button.

Saving the Adventure

There are three options for saving your adventure, available from the main editing menu. Any changes that you have made to your adventure since you loaded it are recorded on the disk. Choose the RETURN option if you want to save your work and come back to the main editing menu. Use MAIN MENU to save and go back to the main menu. This is useful when you want to try out your adventure, since the PLAY ADVENTURE feature is accessed from that menu. If you want to exit Graphic Adventure Kit entirely after saving it, choose QUIT. In any case, be sure that you have saved your work before turning off the computer.

Playing the Adventure

You can play your adventure as long as you have at least one room and have set the player's characteristics. From the main menu, use the selection bar to choose PLAY ADVENTURE. Insert the disk of the adventure that you want to play and press the fire button. There will be a short pause before the title screen is displayed (if one has been created) while information is retrieved from the disk. If a game has not been saved in progress, the introduction will be displayed, and the computer will wait for you to press the fire button. Next, you will be asked to enter the name of your player character. After you have done so, press the fire button or RETURN.

Finally, the game screen will be shown, along with the starting room. In the top-right corner of the screen, you will see your hit points, strength, and skill displayed. Below these statistics are the actions you can take, such as listing your inventory or taking an object.

Moving is simple. Just push the joystick in the direction you want to go; you'll take a step if you're not blocked. You must push the joystick and release it for each step you take. You can move to another room by stepping off the screen in the desired direction, if there are no obstacles in the way. There will be a brief pause while the next room is loaded from the disk. As you travel through the adventure, be sure to read any messages that are printed at the bottom of the screen. To hear what—if anything—a creature has to say, you'll sometimes find it useful to "bump into" the creature.

If you find yourself blocked in a room so that you can't

move in any direction, you'll need to start another game. Choose the **SAVE & QUIT** option, and hold down the space bar until the title screen appears. Otherwise, you'll keep being returned to the same blocked position. (If you want to alter a room so that the player is less likely to be blocked, you can use the Rooms Editor to change the room's configuration.)

Press the fire button when you want to take one of the actions listed on the right of the screen. A flashing bar will appear. Move it to the action you have chosen and press the fire button.

ATTACK lets you engage in combat with an enemy. When you select this command, you'll be asked in which direction to attack. If, for example, there is an enemy to your east, push the joystick right. You will either hit the enemy or miss it. If you hit it, the amount of damage inflicted (the number subtracted from the enemy's hit points) will be shown, along with the creature's status, which may be unhurt, a bit hurt, wounded, dying, or dead. Each time you want to try to hit the enemy, you must use **ATTACK**.

You can run from battle at any time by moving normally. For attack to take place, the enemy must be adjacent: You cannot attack over distances, nor can any enemy. Whenever you are hit, your hit points will flash to show that damage has been done. Your weapons and armor are always taken into account during a battle.

INVENTORY simply displays the objects that you are carrying and your wealth. Also, the number next to the word **WEAPON** is added to your strength when you attack. This number reflects the weapon or weapons that you are carrying. The **ARMOR** value depends on how much protection you are carrying and is subtracted from a creature's strength when it attacks you. Press the fire button to return to game play.

TAKE allows you to pick up an item that you see in a room. You must be next to an item in order to take it. When you're asked for a direction, push the joystick toward the item that you want to pick up. If your inventory is not full, you will be allowed to take it.

DROP is used to get rid of unneeded items in your inventory. To select an item you want to drop from your inventory, move the selection bar on top of it and press the fire button. When you drop something, the object will remain where you

dropped it for the duration of your game or until you pick it up again.

GIVE lets you give an object or wealth to a creature that is directly adjacent to you. After you have selected this command, press the joystick up to give an item and down to give wealth. If you choose to give an item, you must select it from your inventory and then press the fire button. If you want to give wealth, push the joystick up or down to select the amount. When prompted for a direction, push the joystick in the direction of the creature to whom you want to give it. Once you have given an object or wealth, there is no way to get it back unless the creature gives it to you. In addition, you must give the correct amount of wealth, and all at once; you cannot give part of it and then come back with the rest.

USE is the command that you should try whenever you are asked to cast a spell, rub a magic lamp, open a door with a key, and so on. Select the object to use from your inventory and press the fire button. If something is intended to happen, it will.

Ending a Game

You don't have to finish a game in one sitting. At any time, you can choose the **SAVE & QUIT** command, which will save your progress on the adventure disk. When you play the adventure again, you will resume where you left off. You can cancel a game in progress by holding down the space bar until the title screen appears.

If you win the game or if your adventurer is killed, the winning or losing screen will be shown. Graphic Adventure Kit will then wait for you to press the fire button, so it's a good idea to include a "press fire button" message in those screens. Winning or losing also ends the game. The next time you choose to play the adventure, you will have to create a new player character and start again.

Program 1. Graphic Adventure Kit

For instructions on entering this listing, please refer to the "MLX" article, Appendix D.

```
0801:0B 08 0A 00 9E 32 30 36 0E  
0809:31 00 00 00 78 A9 C1 8D 0D  
0811:18 03 A9 80 8D 8A 02 A9 0D  
0819:00 8D 20 D0 8D 21 D0 8D 0D  
0821:10 D0 8D 9E 08 8D A1 08 0A  
0829:8D 1B D0 85 03 85 18 85 1D
```

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0831:1D 85 0B 85 2C 85 1C 85 20
0839:2E 85 37 20 90 FF A5 01 7B
0841:29 FA 85 01 A2 00 BD 00 F5
0849:D0 9D 00 C0 49 FF 9D 00 BA
0851:C2 BD 00 D1 9D 00 C1 49 09
0859:FF 9D 00 C3 E8 D0 E7 A5 0D
0861:01 09 04 85 01 A9 C8 8D DA
0869:88 02 20 15 2A A9 08 20 EB
0871:D2 FF AD 00 DD 29 FC 8D EB
0879:00 DD A9 20 8D 18 D0 A9 50
0881:18 8D 16 D0 A9 2A 8D 14 F5
0889:03 A9 2A 8D 15 03 A9 B6 62
0891:8D 9F 08 A9 B9 8D A2 08 3D
0899:A0 01 A2 00 8C 00 B6 8E EE
08A1:00 B9 EE 9E 08 D0 06 EE 66
08A9:9F 08 EE A2 08 EE A1 08 DA
08B1:E8 8A D9 86 2E D0 E5 C8 C5
08B9:C0 24 D0 DE A9 0A 85 02 ED
08C1:58 A9 0F A2 08 A0 0F 20 75
08C9:BA FF A9 00 20 BD FF 20 84
08D1:C0 FF A9 C8 85 24 A9 29 3D
08D9:85 23 A2 00 A0 0B A5 23 69
08E1:9D 00 CE A5 24 9D 80 CE 5C
08E9:E6 23 E6 23 E8 88 10 EE ED
08F1:A5 23 18 69 38 85 23 90 F5
08F9:02 E6 24 E0 6C 90 DD A9 62
0901:8F 8D 18 D4 A9 FF 8D 0F 06
0909:D4 A9 80 8D 12 D4 A2 00 02
0911:8A 9D C0 E0 E8 D0 FA A2 19
0919:BF BD CC 2E 9D FF DF CA 6E
0921:D0 F7 A2 80 8A 9D 78 CB 7D
0929:A9 4D 9D 81 CF E8 E0 88 9B
0931:D0 F2 A9 FF 8D C0 E0 8D 5C
0939:C1 E0 8D ED E0 8D EE E0 F0
0941:8D 00 E1 8D 01 E1 8D 15 EE
0949:E1 8D 16 E1 A2 03 A9 C0 C5
0951:9D C0 E0 A9 03 9D C1 E0 0C
0959:E8 E8 E8 E0 2D D0 EF A2 74
0961:03 A9 C0 9D 00 E1 A9 03 2F
0969:9D 01 E1 E8 E8 E8 E0 15 17
0971:D0 EF A9 01 8D 25 D0 A9 79
0979:04 8D 26 D0 A9 D8 8D 00 8E
0981:D0 A9 A2 8D 02 D0 A9 6C A6
0989:8D 04 D0 A9 FF 8D 1C D0 57
0991:A9 01 8D 2A D0 8D 2B D0 F0
0999:20 9B 2C F9 F1 8C B5 47 3C
09A1:52 41 50 48 49 43 20 41 94
09A9:44 56 45 4E 54 55 52 45 E2
09B1:20 4B 49 54 F7 8F B8 D5 5A
09B9:50 4C 41 59 20 41 44 56 A9

09C1:45 4E 54 55 52 45 8F BA 6B
09C9:D6 45 44 49 54 20 41 44 9F
09D1:56 45 4E 54 55 52 45 8F 7D
09D9:BC D5 4E 45 57 20 41 44 DF
09E1:56 45 4E 54 55 52 45 01 FE
09E9:A9 07 8D 17 D0 8D 1D D0 7D
09F1:8D 15 D0 8D 1C D0 A2 F0 5D
09F9:A9 60 9D 77 C8 A9 06 9D BA
0A01:77 D8 CA D0 F3 20 86 2B C5
0A09:00 03 0D 8E 0E 55 30 0D 9B
0A11:90 0E 0A 0D 0D 92 0E 0F E0
0A19:0C 4C AC 2A A9 00 85 16 EC
0A21:A9 40 85 17 A2 20 A0 00 13
0A29:98 91 16 C8 D0 FB E6 17 98
0A31:CA D0 F3 60 A9 00 85 16 D1
0A39:A9 5F 85 17 A2 1F A0 FF EE
0A41:B1 16 D0 0A 88 C0 FF D0 86
0A49:F7 C6 17 CA D0 F0 E8 E6 9D
0A51:17 60 20 15 2A 20 35 0A A4
0A59:8E 12 B1 A5 2D F0 14 A9 C8
0A61:00 85 2D 85 16 A9 40 85 32
0A69:17 AD 12 B1 A2 20 A0 02 AA
0A71:20 88 2D A5 33 F0 26 A9 0B
0A79:00 85 16 A9 60 85 17 20 B3
0A81:DC 0A A2 00 A0 02 20 88 B0
0A89:2D A9 00 85 33 85 16 A9 7C
0A91:80 85 17 20 D6 0A A2 40 90
0A99:A0 02 20 88 2D A2 03 B5 BA
0AA1:4B F0 1B 86 45 20 11 17 47
0AA9:BD A2 15 AA A9 08 A0 02 43
0AB1:20 88 2D A6 45 A9 00 95 6E
0AB9:4B A9 01 9D 16 B1 CA 10 F4
0AC1:DE 20 4D 25 A9 00 85 16 B7
0AC9:A9 B1 85 17 A9 05 A2 70 58
0AD1:A0 02 4C 88 2D AD 10 B1 BA
0AD9:4A 10 03 AD 10 B1 4A 4A 78
0AE1:4A 18 69 01 60 20 15 2A 36
0AE9:20 29 24 AD 23 B1 C5 3C 5F
0AF1:F0 0B 20 4D 25 AD 23 B1 F1
0AF9:85 3C 20 20 27 20 3C 24 3C
0B01:20 7F 23 20 9E 27 20 B8 F7
0B09:27 AD 38 B1 85 3F AD 39 FD
0B11:B1 85 40 20 B6 26 20 93 8D
0B19:26 B0 EE F0 1C A5 3F 8D DE
0B21:38 B1 8D 2B B1 A5 40 8D 56
0B29:39 B1 8D 2C B1 20 7F 23 EC
0B31:20 9E 27 20 B8 27 20 4A D2
0B39:2B 20 74 2E F0 D8 20 87 11
0B41:2A 4C 04 13 20 9B 2C 82 7B
0B49:BF 4C 49 42 52 41 52 59 35

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ØB51:2Ø 4E 41 4D 45 3A D8 Ø1 CD
ØB59:A9 ØØ 85 16 A9 BE 85 17 CØ
ØB61:A9 ØF 85 Ø4 A9 56 85 Ø5 B7
ØB69:A9 CB 85 Ø6 2Ø 8C 2F CØ AA
ØB71:ØØ DØ Ø5 68 68 4C 1F 2A BF
ØB79:98 A2 ØØ AØ BE 2Ø BD FF 8Ø
ØB81:2Ø 9B 2C FA F1 82 BF 49 26
ØB89:4E 53 45 52 54 2Ø 59 4F 8E
ØB91:55 52 2Ø 4C 49 42 52 41 E8
ØB99:52 59 2Ø 44 49 53 4B 2Ø C5
ØBA1:41 4E 44 82 CØ ØØ 4C 37 72
ØBA9:12 2Ø 45 ØB A9 Ø1 A2 Ø8 C8
ØBB1:AØ FF 2Ø BA FF A6 1E 2Ø BE
ØBB9:B7 ØF A9 ØØ 85 35 A9 4Ø 39
ØBC1:85 36 2Ø CA 2D 2Ø 2A 3Ø 47
ØBC9:2Ø 35 ØA A9 35 A6 16 A4 2E
ØBD1:17 2Ø D8 FF 2Ø DC 2D 2Ø 85
ØBD9:Ø8 12 2Ø 1F 2A A9 Ø3 85 F1
ØBE1:ØD 6Ø 2Ø 45 ØB A9 Ø1 A2 92
ØBE9:Ø8 AØ ØØ 2Ø BA FF 2Ø CA ØF
ØBF1:2D 2Ø 2A 3Ø 2Ø 1D ØA A9 22
ØBF9:ØØ A2 ØØ AØ 4Ø 2Ø D5 FF FØ
ØCØ1:2Ø DC 2D 2Ø D8 ØB A9 Ø1 4F
ØCØ9:85 1E 85 2D 4C 7E 11 2Ø 8D
ØC11:9B 2C F9 82 F1 BF 49 4E D8
ØC19:53 45 52 54 2Ø 41 2Ø 42 44
ØC21:4C 41 4E 4B 2Ø 4F 52 2Ø 31
ØC29:53 43 52 41 54 43 48 2Ø 7A
ØC31:44 49 53 4B 2E 2Ø 2Ø 41 5Ø
ØC39:4C 4C 82 CØ 44 41 54 41 F7
ØC41:2Ø 4F 4E 2Ø 54 48 45 2Ø 77
ØC49:44 49 53 4B 2Ø 57 49 4C 32
ØC51:4C 2Ø 42 45 2Ø 45 52 41 3Ø
ØC59:53 45 44 2E 82 C1 5Ø 52 E5
ØC61:45 53 53 2Ø 3C 46 31 3E F8
ØC69:2Ø 54 4F 2Ø 5Ø 52 4F 43 4Ø
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1A69:A5 26 85 17 20 8C 2F 98 46
1A71:A0 00 91 25 A9 01 85 33 0A
1A79:A5 31 C5 32 D0 0F AD 10 D6
1A81:B1 18 69 01 C9 FF D0 02 C3
1A89:A9 FE 8D 10 B1 AC 10 B1 17
1A91:C8 C0 FF D0 01 88 84 32 CC
1A99:60 20 9B 2C 89 AC 00 A5 E0
1AA1:31 20 DB 0F A6 31 20 14 31
1AA9:1B A5 16 85 25 A5 17 85 63
1AB1:26 AD 10 B1 C5 31 B0 1A EF
1AB9:A0 20 A9 00 99 FF CC 88 6A
1AC1:D0 FA 91 25 A9 01 8D 0C 1A
1AC9:CD 8D 0D CD 8D 12 CD 8D A4
1AD1:13 CD 20 9B 2C 89 AD 00 A3
1AD9:20 E2 1A 20 32 1A 4C 61 10

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1AE1:1B A9 D3 20 EC 2B A0 00 DF
1AE9:B1 16 F0 0D C8 85 38 B1 E9
1AF1:16 20 EC 2B C8 C6 38 D0 2C
1AF9:F6 4C FF 0F A6 31 A5 2F 22
1B01:9D 00 B3 A5 30 9D 00 B4 83
1B09:A0 1F B9 00 CD 91 23 88 12
1B11:10 F8 60 86 23 A9 00 85 47
1B19:24 A0 05 06 23 26 24 88 0D
1B21:D0 F9 A5 24 69 60 85 24 31
1B29:BD 00 B3 85 2F BD 00 B4 32
1B31:85 30 A0 1F B1 23 99 00 89
1B39:CD 88 10 F8 86 16 A9 00 E9
1B41:85 17 A0 04 06 16 26 17 40
1B49:88 D0 F9 A5 17 69 80 85 76
1B51:17 60 20 75 1A AD 00 CD DB
1B59:18 69 01 29 03 8D 00 CD C4
1B61:20 9B 2C 89 AF D2 00 A0 16
1B69:23 20 9C 1B 88 C0 05 D0 A0
1B71:F8 AD 00 CD AA BD 83 1B DA
1B79:48 BD 7F 1B 48 60 86 AD 63
1B81:0B 38 1B 1B 1C 1D 20 9B 91
1B89:2C 54 45 52 52 41 49 4E 31
1B91:01 20 BF 1B A2 15 A0 0D B1
1B99:4C D7 16 B9 00 B0 09 80 9F
1BA1:99 00 B0 60 B9 00 B0 29 19
1BA9:7F 99 00 B0 60 20 9B 2C F7
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1BB9:20 BF 1B 4C 7C 1D 20 9B 4C
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1BC9:3A 91 E0 01 A2 0C A0 08 3C
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1BD9:4C E7 1B 20 75 1A AD 08 0D
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1BE9:2C 89 B1 00 AD 08 CD D0 C8
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1BF9:41 42 4C 45 00 60 20 9B 9C
1C01:2C 4F 42 53 54 41 43 4C 1B
1C09:45 00 60 20 9B 2C 50 4F 6F
1C11:53 53 45 53 53 41 42 4C 16
1C19:45 82 B1 57 45 41 50 3A 4A
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1C29:2B 53 54 52 45 4E 47 54 C1
1C31:48 20 57 48 45 4E 20 4F F7
1C39:57 4E 45 44 29 82 B2 41 97
1C41:52 4D 4F 52 3A 8C E4 20 F2
1C49:20 20 20 28 2D 44 41 4D 6A
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1C59:20 4F 57 4E 45 44 29 82 55
1C61:B4 57 48 54 3A 20 20 8C 37
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1C89:14 B0 0D A6 1A 9D 00 CD 19
1C91:A4 18 20 9C 1C 4C 7B 1C 15
1C99:4C 75 1A 84 1A B9 B1 1C 18
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1CA9:2B 98 38 E9 06 AA BD 00 99
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1CE1:07 CD B9 F5 1C 85 12 B9 7C
1CE9:FC 1C 85 13 A9 D2 20 EC 4F
1CF1:2B 4C 81 2C 03 08 0F 17 33
1CF9:1D 22 2D 1D 1D 1D 1D 1D 75
1D01:1D 1D 4E 4F 4E 45 01 52 AB
1D09:41 4E 44 4F 4D 01 48 4F 43
1D11:53 54 49 4C 45 01 43 48 F4
1D19:41 53 45 01 48 55 4E 54 0A
1D21:01 56 45 52 54 20 41 4C 31
1D29:49 47 4E 01 48 4F 52 49 21
1D31:5A 20 41 4C 49 47 4E 01 92
1D39:20 9B 2C 43 52 45 41 54 A2
1D41:55 52 45 82 B1 48 49 54 21
1D49:3A 20 20 8C D8 9D 53 54 AD
1D51:52 3A 20 20 20 82 B2 53 0D
1D59:4B 49 4C 4C 3A 8C E4 82 2A
1D61:B4 4D 4F 56 45 3A 20 00 EB
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1D71:C8 C0 0D D0 F5 20 A5 1B 85
1D79:20 DA 1C 20 9B 2C 82 B7 4A
1D81:49 46 82 BC 49 46 00 A0 12
1D89:0E 20 A5 1B C8 C0 16 D0 7F
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1DA9:63 21 A2 01 20 63 21 A2 B5
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1DB9:21 A2 00 2C A2 01 20 75 BE
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1DC9:07 9D 0A CD BD CD 1E 20 8E
1DD1:EC 2B 20 9B 2C 89 D5 00 3E
1DD9:BC 0A CD B9 28 20 85 12 29
1DE1:B9 30 20 85 13 20 81 2C A9
1DE9:BD 0A CD C9 05 B0 14 BC AB
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1DF9:20 9C 1B 20 9B 2C 98 FB 8B

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1E11:D9 1E BD 0C CD F0 05 20 96
1E19:9C 1B D0 03 20 A5 1B BC 3F
1E21:0C CD BD 0E CD 84 1B 85 AB
1E29:1A 20 9B 2C 98 FB 00 A5 0B
1E31:1B F0 1A A9 23 20 EC 2B B3
1E39:A5 1B 20 DB 0F 20 9B 2C 2D
1E41:9C 20 00 A5 1B 85 16 20 69
1E49:3F 1B 4C E2 1A 20 9B 2C 58
1E51:57 45 41 4C 54 48 20 9F 1B
1E59:FB 00 A5 1A 20 DB 0F 20 98
1E61:9B 2C A2 FB CE 01 60 A2 68
1E69:00 2C A2 01 20 75 1A BD DD
1E71:0C CD 20 F7 19 B0 EF 9D B3
1E79:0C CD 20 04 1E 4C 70 1E 94
1E81:A2 00 2C A2 01 20 75 1A 4C
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1E91:9D 0E CD 20 04 1E 4C 89 96
1E99:1E A2 00 2C A2 01 20 75 1F
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1EA9:22 9D 12 CD 20 A5 20 4C A1
1EB1:A2 1E A2 00 2C A2 01 20 29
1EB9:75 1A BD 14 CD 20 12 14 57
1EC1:B0 09 9D 14 CD 20 A5 20 E7
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1EF9:44 49 53 4D 49 53 53 20 48
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1F29:50 41 53 53 01 54 45 4C AF
1F31:45 50 4F 52 54 20 50 4C 45
1F39:52 01 47 41 4D 45 20 49 E6
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1F61:52 20 2B 01 50 4C 52 20 BE
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1F79:2B 01 50 4C 52 20 53 4B 61
1F81:49 4C 4C 20 2D 01 46 4C 49
1F89:41 53 48 01 44 49 53 41 85

1F91:50 50 45 41 52 01 4D 4F 49
 1F99:56 45 4D 45 4E 54 20 3D 93
 1FA1:01 50 4C 52 20 54 4F 55 69
 1FA9:43 48 45 53 20 49 54 01 49
 1FB1:50 4C 52 20 41 54 54 41 BC
 1FB9:43 4B 53 20 49 54 01 50 C6
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 1FC9:20 49 54 01 50 4C 52 20 7D
 1FD1:44 52 4F 50 53 20 49 54 B7
 1FD9:01 50 4C 52 20 55 53 45 9D
 1FE1:53 20 49 54 01 50 4C 52 74
 1FE9:20 48 41 53 01 50 4C 52 DB
 1FF1:20 4C 41 43 4B 53 01 50 A9
 1FF9:4C 52 20 47 49 56 45 53 EC
 2001:01 E3 EE F9 05 0E 17 1C E2
 2009:21 2E 3B 47 51 5B 65 6F 73
 2011:7B 87 8D 97 1E 1E 1E 1F E0
 2019:1F 1F 1F 1F 1F 1F 1F 1F 59
 2021:1F 1F 1F 1F 1F 1F 1F A2 E4
 2029:B1 C0 CD DA E6 EE F8 1F DD
 2031:1F 1F 1F 1F 1F 1F 1F 00 52
 2039:01 01 00 00 01 01 00 00 46
 2041:00 03 03 03 03 03 03 00 FC
 2049:00 02 A2 00 2C A2 01 20 6C
 2051:75 1A BD 10 CD 18 69 01 2E
 2059:C9 13 90 02 A9 00 9D 10 0E
 2061:CD 20 E6 21 20 9B 2C 89 D0
 2069:D3 00 BC 10 CD B9 38 20 12
 2071:48 B9 02 20 85 12 B9 15 83
 2079:20 85 13 20 81 2C BC D7 9D
 2081:1E 20 9C 1B BC DF 1E 20 DF
 2089:9C 1B BC E1 1E 20 9C 1B 5A
 2091:BC DB 1E 20 9C 1B 68 D0 DF
 2099:07 20 9B 2C 98 D8 01 60 26
 20A1:C9 01 D0 22 BC D7 1E 20 E4
 20A9:A5 1B 20 E6 21 BC DB 1E C7
 20B1:BD 12 CD D0 05 20 A5 1B 2B
 20B9:D0 03 20 9C 1B BC 12 CD AE
 20C1:BD 14 CD 4C 26 1E C9 02 A3
 20C9:D0 1E BC DF 1E 20 A5 1B 67
 20D1:20 E6 21 20 9B 2C 98 FB BC
 20D9:00 BD 18 CD A8 20 E3 1C 13
 20E1:20 9B 2C A3 FB CD 01 60 52
 20E9:BC E1 1E 20 A5 1B 20 E6 87
 20F1:21 20 9B 2C 98 FB 00 BD 73
 20F9:16 CD 20 DB 0F 20 9B 2C D6
 2101:9B FB D5 01 60 A2 00 2C 94
 2109:A2 01 20 75 1A BD 18 CD FD
 2111:20 C4 1C 9D 18 CD 4C CB 4E
 2119:20 A2 00 2C A2 01 20 75 A5

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2121:1A BD 16 CD 20 12 14 B0 A1
2129:DB 9D 16 CD 20 E9 20 4C 95
2131:22 21 A2 00 2C A2 01 20 2F
2139:75 1A BD 1A CD F0 0B A8 07
2141:A9 00 99 00 B5 9D 1A CD B1
2149:F0 18 A0 FF B9 00 B5 F0 48
2151:04 88 D0 F8 60 A9 80 99 A5
2159:00 B5 98 9D 1A CD A9 00 51
2161:85 34 BD D1 1E 20 EC 2B BE
2169:BD 1A CD D0 18 20 9B 2C 7C
2171:89 4E 4F 20 4D 45 53 53 71
2179:41 47 45 96 FB DB 01 BC 4E
2181:DD 1E 4C 9C 1B 20 9B 2C 4A
2189:89 D1 4D 45 53 53 41 47 B4
2191:45 98 FB 45 44 49 54 20 80
2199:4D 45 53 53 41 47 45 00 25
21A1:BC DD 1E 4C A5 1B A2 00 21
21A9:2C A2 01 20 75 1A BD 1C 78
21B1:CD 49 01 9D 1C CD BD D3 8E
21B9:1E 20 EC 2B BD 1C CD D0 2E
21C1:10 20 9B 2C 89 D6 4F 4E DE
21C9:4C 59 20 4F 4E 43 45 01 8C
21D1:60 20 9B 2C 89 4D 4F 52 F4
21D9:45 20 54 48 41 4E 20 4F A8
21E1:4E 43 45 00 60 BD CF 1E 7C
21E9:4C EC 2B A2 00 2C A2 01 14
21F1:BD 7C 22 85 35 85 16 BD 78
21F9:7E 22 85 36 18 69 10 85 24
2201:17 A0 00 A9 03 91 16 A9 C7
2209:20 91 35 C8 C0 A0 D0 F3 13
2211:BC 1A CD C4 34 F0 19 A0 78
2219:A0 A9 20 99 FF BB 88 D0 86
2221:FA BC 1A CD 84 34 B9 00 9A
2229:B5 29 01 F0 03 20 84 22 85
2231:A0 00 B9 00 BC 91 35 C8 5C
2239:C0 A0 D0 F6 A9 03 85 2B 1F
2241:BC 82 22 BD 80 22 AA A9 30
2249:08 20 C5 15 48 A0 00 B1 1A
2251:35 99 00 BC A9 20 91 35 88
2259:C8 C0 A0 D0 F2 68 F0 18 86
2261:A4 34 A9 81 99 00 B5 A9 34
2269:00 85 16 A9 BC 85 17 A9 40
2271:01 A6 34 A0 00 20 86 2D 2B
2279:4C 61 1B 08 D0 CA CA 0D 74
2281:12 10 15 8A 48 A9 00 85 8C
2289:16 A9 BC 85 17 A9 01 A6 3B
2291:34 A0 00 20 52 2D 68 AA DC
2299:60 BD 00 CC 30 08 AA A9 EA
22A1:01 9D 00 3F D0 4F 86 07 99
22A9:A2 1F BD 00 3F F0 04 CA 4F

22B1:10 F8 60 BC 20 3F A9 FF 65
22B9:99 00 CC FE 00 3F A4 07 A1
22C1:98 9D 20 3F 8A 99 00 CC 39
22C9:A9 00 85 17 85 26 86 16 EC
22D1:84 25 A0 05 06 16 26 17 F1
22D9:06 25 26 26 88 D0 F5 A5 AA
22E1:17 18 69 C4 85 17 A5 26 2B
22E9:69 40 85 26 A0 1F B1 25 10
22F1:91 16 88 10 F9 8A 0A 0A AE
22F9:09 80 60 BD 00 CE 85 09 1A
2301:85 0E BD 80 CE 85 0A 18 06
2309:69 10 85 0F 60 20 2A 23 A4
2311:A0 06 B1 16 99 00 BE 88 93
2319:10 F8 60 20 2A 23 A0 06 D8
2321:B9 00 BE 91 16 88 10 F8 21
2329:60 BD 34 23 85 16 A9 BD 5D
2331:85 17 60 74 7B 82 89 90 DC
2339:97 9E A5 AC B3 BA C1 C8 47
2341:CF D6 DD E4 EB F2 F9 AD FB
2349:03 BE 10 11 8A 48 AD 02 A6
2351:BE 20 10 24 A8 AD 00 BE FD
2359:99 80 CD 68 AA 60 20 68 4C
2361:23 A9 00 85 51 F0 46 A2 79
2369:6B BD 00 BD 9D 80 CD CA 06
2371:10 F7 60 A0 1F A9 00 99 0D
2379:00 3F 88 10 FA 60 A9 01 4F
2381:2C A9 00 85 51 20 68 23 9F
2389:A9 01 85 12 A2 00 EC 71 17
2391:BD F0 12 20 0E 23 AD 03 92
2399:BE 29 03 C5 12 D0 03 20 40
23A1:48 23 E8 D0 E9 E6 12 A5 B3
23A9:12 C9 04 D0 DF 20 74 23 84
23B1:A2 6B 86 11 BC 80 CD B9 43
23B9:00 B3 A8 B9 00 CC 30 06 37
23C1:A8 A9 01 99 00 3F CA 10 23
23C9:EB AE 38 B1 AC 39 B1 20 A1
23D1:1A 24 85 3B A6 11 20 FC 49
23D9:22 A5 51 F0 0E E4 3B D0 1F
23E1:0A AD 21 B1 48 AE 20 B1 C6
23E9:4C F6 23 BC 80 CD B9 00 F2
23F1:B4 48 BE 00 B3 20 9A 22 F1
23F9:AA 20 82 0F 68 20 98 0F E2
2401:C6 11 10 D0 60 98 0A 0A 83
2409:0A 0A 86 13 05 13 60 48 58
2411:29 0F AA 68 4A 4A 4A 4A E7
2419:A8 8A 18 79 20 24 60 00 45
2421:0C 18 24 30 3C 48 54 60 09
2429:A0 00 A9 FF 99 00 CC C8 26
2431:D0 FA A0 1F 99 20 3F 88 FA
2439:10 FA 60 20 9B 2C F9 F6 CE

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2441:82 BD F8 E1 82 AA F8 E1 0A
2449:01 A2 BC 8A 20 EC 2B 20 26
2451:9B 2C 82 F6 F8 20 9B 20 D1
2459:F3 00 CA E0 AA D0 EC 60 D5
2461:20 29 24 20 3C 24 20 9B D8
2469:2C F3 A0 AC 23 A0 AD 54 EE
2471:45 52 52 41 49 4E A1 AF C5
2479:28 52 4F 4F 4D 29 9D B1 45
2481:45 44 49 54 20 54 45 52 1B
2489:52 41 49 4E 9D B2 45 44 DF
2491:49 54 20 4F 54 48 45 52 2D
2499:53 9D B4 46 49 4C 4C 20 22
24A1:54 45 52 52 41 49 4E 9D 3E
24A9:B5 43 4C 45 41 52 9D B7 C1
24B1:4E 4F 52 54 48 9D B8 53 02
24B9:4F 55 54 48 9D B9 45 41 AD
24C1:53 54 9D BA 57 45 53 54 F2
24C9:9D BC 45 58 49 54 00 A9 83
24D1:6B 85 09 A9 C8 85 0A 20 7D
24D9:80 0F 20 70 25 A2 03 20 0B
24E1:A7 25 CA 10 FA 20 82 23 22
24E9:20 86 2B 08 0F 1B 02 FF B2
24F1:5B 26 1B 85 03 22 26 1B 35
24F9:07 0C E1 26 1B 88 0B C7 40
2501:28 1B 0A 0C 13 26 1B 8B 1B
2509:05 3B 25 1B 8D 05 49 26 34
2511:1B 8E 05 49 26 1B 8F 04 82
2519:49 26 1B 90 04 49 26 22 B1
2521:0D 03 B8 25 22 0E 03 B8 24
2529:25 22 0F 03 B8 25 22 10 4F
2531:03 B8 25 1B 92 04 BA 0D A8
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2541:27 27 A4 3C A9 00 99 00 C1
2549:B2 4C DB 24 A6 3C A5 3E 6D
2551:F0 1C A9 01 9D 00 B2 A9 5C
2559:00 85 3E A9 00 85 16 A9 53
2561:BD 85 17 A9 01 A0 01 20 16
2569:88 2D A9 03 85 0D 60 20 E9
2571:9B 2C 9D AF 00 A5 3C 20 72
2579:DB 0F 20 9B 2C 9D AB 00 62
2581:A6 3D 20 14 1B 20 E2 1A EC
2589:A6 2F 20 A9 0F A9 6B 85 0D
2591:0E A9 D8 85 0F A5 30 20 50
2599:98 0F 20 9B 2C A1 AC 00 F2
25A1:A6 3D 8A 4C DB 0F A9 A4 B7
25A9:20 EC 2B 8A 18 69 B7 20 43
25B1:EC 2B BD 6C BD 4C DB 0F A1
25B9:A5 18 85 3E 38 E9 0A AA 99
25C1:BD 6C BD 20 06 14 B0 09 AA
25C9:9D 6C BD 20 A7 25 4C C1 E3

25D1:25 60 AE 72 BD 8E 71 BD 8C
25D9:CA 30 37 20 0E 23 20 E7 A3
25E1:25 20 1C 23 30 F2 AD 06 2B
25E9:BE 8D 02 BE 86 29 AE 00 59
25F1:BE 20 14 1B A6 29 AD 07 14
25F9:CD 8D 04 BE AD 04 CD 8D A1
2601:05 BE AD 03 BE 29 40 85 06
2609:07 0A 05 07 0D 00 CD 8D FD
2611:03 BE 60 A0 6B A5 3D 99 AA
2619:00 BD 88 10 FA 84 3E 4C 99
2621:82 23 A5 3C 48 A5 3C 20 61
2629:E3 10 B0 08 85 3C 20 70 CF
2631:25 4C 26 26 68 C5 3C D0 ED
2639:03 4C AC 2A AA 20 4F 25 EB
2641:20 20 27 20 1F 2A 4C DB A2
2649:24 A5 18 38 E9 06 AA A4 F8
2651:3C BD 6C BD F0 E3 85 3C F2
2659:98 D0 DA A6 3D 20 3E 11 E3
2661:B0 2F C0 01 D0 14 EC 10 BA
2669:B1 F0 0B E8 20 14 1B AD EF
2671:00 CD D0 F2 F0 13 A2 00 93
2679:F0 0F E0 00 D0 02 A6 32 2C
2681:CA 20 14 1B AD 00 CD D0 49
2689:F1 86 3D 20 70 25 4C 5C 27
2691:26 60 20 26 11 C0 00 D0 CB
2699:06 E0 00 D0 02 18 60 98 F7
26A1:18 65 40 85 40 8A 18 65 75
26A9:3F 85 3F C9 0C B0 27 A5 92
26B1:40 C9 09 B0 21 A5 3F 0A E4
26B9:0A 0A 0A 69 20 8D 06 D0 79
26C1:A5 40 0A 0A 0A 0A 69 3A 58
26C9:8D 07 D0 A9 FF 85 04 20 91
26D1:80 2A A9 01 18 60 38 60 41
26D9:A9 00 85 3F 85 40 4C B6 1C
26E1:26 20 D9 26 20 5F 23 20 CB
26E9:9E 27 20 93 26 B0 27 F0 BF
26F1:09 20 9E 27 20 4A 2B 20 B1
26F9:47 2B 20 74 2E F0 EB A6 B3
2701:3F A4 40 20 1A 24 A8 A5 7A
2709:3D 99 00 BD 20 80 2A A9 39
2711:01 85 3E 4C E5 26 20 87 5D
2719:2A 20 1F 2A 4C 82 23 A6 64
2721:3C BD 00 B2 D0 0A A0 00 18
2729:98 99 00 BD C8 D0 FA 60 E5
2731:A9 00 85 16 A9 BD 85 17 CC
2739:A9 01 A0 01 20 54 2D A9 17
2741:03 85 0D 20 1F 2A 4C D3 24
2749:25 85 1B A9 82 20 81 28 49
2751:8A 48 A9 23 20 EC 2B A6 10
2759:1B 8A 20 DB 0F 20 9B 2C F5

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2761:86 20 00 20 14 1B 68 AA 85
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2771:00 AC 00 CD B9 96 27 85 C3
2779:12 B9 9A 27 85 13 4C 81 97
2781:2C 54 45 52 52 00 53 50 52
2789:45 43 00 50 4F 53 53 00 BE
2791:43 52 45 41 00 82 87 8C 78
2799:91 27 27 27 27 A6 3F A4 C8
27A1:40 20 1A 24 A8 B9 00 BD 87
27A9:F0 05 A2 00 4C 4A 27 20 FF
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27B9:48 A0 07 20 9C 1B 88 10 A9
27C1:FA A6 3F A4 40 20 06 24 1C
27C9:85 45 A9 00 85 44 A2 FF E3
27D1:E8 EC 71 BD 90 03 4C 5F 62
27D9:28 20 0E 23 AD 02 BE C5 F0
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27E9:44 95 41 BC BF 28 20 A5 38
27F1:1B BC C1 28 20 A5 1B BC 42
27F9:C3 28 20 A5 1B AD 00 BE E0
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2819:22 28 20 9B 2C 49 4E 56 BB
2821:00 20 9B 2C A7 FB 44 45 AA
2829:4C 00 AD 00 CD F0 0E AD 51
2831:10 CD C9 08 F0 10 AD 11 EA
2839:CD C9 08 F0 09 20 9B 2C 1F
2841:9D D0 01 4C 5A 28 20 9B C8
2849:2C 9D 54 45 4C 45 50 00 0E
2851:20 76 28 BC C5 28 20 A5 D4
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2919:74 2E F0 EB D0 09 20 87 80
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2D99:B6 18 6D 65 B9 20 D2 FF 4D

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 2FF9:20 F0 F5 C8 C6 0B 60 98 AB
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 3009:8A C9 1D B0 0E 0A 0A 0A 86
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 3031:A5 37 D0 20 20 9B 2C FA 11
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 3051:49 53 4B 00 60 20 E6 0C F1
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 30B9:F3 85 C1 59 4F 55 52 20 D7

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3171:38 B1 85 3F AD 39 B1 85 3C
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31D9:C9 04 D0 20 AD 02 BE 20 51
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31E9:25 37 D0 10 98 38 ED 39 82
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3659:B1 88 10 F3 60 20 CC 32 51
3661:BD 0C CD F0 0A 86 2B 20 59
3669:0E 36 A6 2B 4C C0 32 AD 69
3671:36 B1 DD 0E CD 60 22 13 49
3679:13 23 23 26 2F 32 32 32 D7
3681:32 32 32 32 20 3C 24 A2 D9
3689:AA 8A 20 EC 2B 20 9B 2C FD
3691:F6 A9 F8 20 00 E8 E0 B9 24
3699:90 EF 20 9B 2C 9C AA F8 2A
36A1:D4 9C AC F8 D4 9C B0 F8 38
36A9:D4 9C B8 F8 D4 9C F3 AD FC
36B1:48 49 54 3A 9C AE 53 54 5D
36B9:52 3A 9C AF 53 4B 49 4C 13
36C1:4C 3A 9C B1 41 54 54 41 D6
36C9:43 4B 9C B2 49 4E 56 45 DE
36D1:4E 54 4F 52 59 9C B3 54 82
36D9:41 4B 45 9C B4 44 52 4F D6
36E1:50 9C B5 47 49 56 45 9C 93
36E9:B6 55 53 45 9C B7 53 41 71

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36F1:56 45 20 26 20 51 55 49 7B
36F9:54 00 AD 3D B1 4A A8 B9 DB
3701:F8 34 20 EC 2B A9 AB 20 43
3709:EC 2B A0 00 B9 3E B1 20 17
3711:EC 2B C8 CC 3D B1 D0 F4 ED
3719:20 0C 35 20 CC 32 20 7F 32
3721:23 4C C0 32 C9 FF F0 06 A5
3729:C9 00 F0 02 C9 01 60 AE 7C
3731:00 BE 20 14 1B 20 C2 3B AE
3739:CD 06 CD B0 F1 A9 F6 8D 86
3741:0D D4 A9 32 8D 08 D4 A0 9A
3749:81 8C 0B D4 88 8C 0B D4 AB
3751:AD 05 CD 38 ED 5B B1 B0 06
3759:02 A9 00 20 CC 3B 20 76 3F
3761:34 4C FF 34 AE 51 B1 86 E4
3769:19 CA 30 42 8A 48 29 01 0A
3771:A8 B9 B4 37 9D 00 B0 18 13
3779:69 82 20 EC 2B 8A 4A 18 40
3781:69 04 9D 28 B0 69 AA 20 7C
3789:EC 2B 20 B4 35 AE 00 BE AB
3791:20 14 1B 20 E2 1A 68 AA 75
3799:A9 80 9D C8 B3 A9 95 9D 4A
37A1:78 B0 A9 38 9D A0 B0 A9 AB
37A9:0C 9D 50 B0 D0 BB A9 00 63
37B1:85 18 60 04 18 20 9B 2C D9
37B9:F9 F4 82 AB F8 EF 92 49 63
37C1:4E 56 45 4E 54 4F 52 59 58
37C9:F3 86 C1 57 45 41 4C 54 9D
37D1:48 3A 86 C0 57 45 41 50 72
37D9:4F 4E 3A 9A 41 52 4D 4F B1
37E1:52 3A 00 20 65 37 20 9B ED
37E9:2C 8E C1 00 AD 36 B1 20 14
37F1:DB 0F 20 9B 2C 8E C0 00 EC
37F9:AD 5A B1 20 DB 0F 20 9B 05
3801:2C A2 C0 00 AD 5B B1 20 A6
3809:DB 0F 20 6E 2E 4C F8 30 DA
3811:20 86 2B 02 07 1A 87 06 6E
3819:0D 3C 1A 88 09 B5 37 1A 92
3821:89 04 C1 39 1A 8A 04 98 BE
3829:38 1A 8B 04 0F 3A 1A 8C 10
3831:03 40 39 1A 8D 0B 7A 3B C4
3839:20 AF 37 20 1F 2A 4C AC 75
3841:2A 20 9B 2C 82 BF 44 49 E9
3849:52 45 43 54 49 4F 4E 3F 45
3851:00 20 26 11 E0 00 D0 04 4C
3859:C0 00 F0 F5 86 52 84 53 81
3861:8A 18 6D 38 B1 C9 0C B0 CB
3869:0B AA 98 18 6D 39 B1 C9 1C
3871:09 B0 01 A8 60 20 15 2A 15
3879:20 65 37 20 9B 2C F7 82 3C

3881:AB F8 EF 8D 53 45 4C 45 6A
3889:43 54 20 49 54 45 4D 20 BB
3891:54 4F 20 00 60 A6 18 60 32
3899:AD 71 BD C9 14 90 35 20 FE
38A1:9B 2C 82 BF 54 48 45 52 D7
38A9:45 20 49 53 20 4E 4F 20 1C
38B1:52 4F 4F 4D 20 48 45 52 DC
38B9:45 20 54 4F 20 44 52 4F 5A
38C1:50 20 41 4E 59 54 48 49 65
38C9:4E 47 2E 00 E6 03 20 87 04
38D1:2A 4C B9 31 AD 51 B1 D0 9B
38D9:0F 20 25 39 20 9B 2C 44 1E
38E1:52 4F 50 2E 00 4C CD 38 41
38E9:20 76 38 20 9B 2C 44 52 79
38F1:4F 50 F3 00 20 AC 2A 20 C4
38F9:B4 35 20 28 36 AE 38 B1 27
3901:AC 39 B1 20 06 24 8D 02 2E
3909:BE AD 03 BE 09 80 8D 03 FA
3911:BE AE 71 BD 86 2D 20 1C DD
3919:23 EE 71 BD 20 85 36 A2 09
3921:03 4C 6F 39 20 9B 2C FA 6C
3929:82 BF 59 4F 55 20 48 41 E9
3931:56 45 20 4E 4F 54 48 49 AE
3939:4E 47 20 54 4F 20 00 60 49
3941:AD 51 B1 D0 0E 20 25 39 96
3949:20 9B 2C 55 53 45 2E 00 99
3951:4C CD 38 20 76 38 20 9B D6
3959:2C 55 53 45 F3 00 20 AC 82
3961:2A 86 2D 20 B4 35 20 85 72
3969:36 A2 04 A9 01 2C A9 00 C6
3971:48 86 21 A2 00 20 70 3B 94
3979:BD 0A CD C5 21 D0 03 20 D5
3981:D8 32 E8 E0 02 D0 EE A6 EF
3989:2D 68 20 91 39 4C B9 31 69
3991:D0 03 4C 1C 23 4C C2 35 7D
3999:20 9B 2C FA 82 BF 54 48 3C
39A1:45 52 45 20 49 53 20 4E 1C
39A9:4F 54 48 49 4E 47 20 54 9A
39B1:4F 20 54 41 4B 45 20 54 76
39B9:48 45 52 45 2E 00 4C CD 18
39C1:38 20 42 38 B0 D2 20 06 3B
39C9:24 85 08 20 1F 2A A2 02 9B
39D1:20 8A 3B 90 C3 86 22 20 04
39D9:D0 35 90 06 20 87 33 4C 46
39E1:CD 38 A6 22 EC 72 BD B0 9D
39E9:0D AD 03 BE 29 7F 8D 03 FF
39F1:BE 20 1C 23 30 09 20 CC 34
39F9:32 20 AE 3B 20 C0 32 E6 66
3A01:03 20 87 2A A2 02 AC 51 5A

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3A09:B1 88 84 2D 4C 6C 39 20 82
3A11:9B 2C 82 BF 50 55 53 48 71
3A19:20 4A 4F 59 53 54 49 43 71
3A21:4B 20 55 50 20 54 4F 20 04
3A29:47 49 56 45 20 41 4E 20 75
3A31:49 54 45 4D 90 C0 44 4F 3C
3A39:57 4E 20 54 4F 20 47 49 09
3A41:56 45 20 57 45 41 4C 54 C7
3A49:48 00 20 3E 11 98 48 20 65
3A51:26 11 C0 00 D0 F9 68 30 A4
3A59:67 20 9B 2C FA 82 BF 53 74
3A61:45 4C 45 43 54 20 41 4D 5B
3A69:4F 55 4E 54 3A 20 00 A9 E5
3A71:00 85 31 20 9B 2C 91 BF DF
3A79:00 A5 31 20 DB 0F A5 31 17
3A81:20 12 14 B0 04 85 31 90 41
3A89:EA AD 36 B1 C5 31 B0 23 38
3A91:20 9B 2C FA 82 BF 59 4F 47
3A99:55 20 44 4F 4E 27 54 20 16
3AA1:48 41 56 45 20 54 48 41 CD
3AA9:54 20 4D 55 43 48 21 00 CC
3AB1:4C CD 38 20 D5 3A 20 1F BF
3AB9:2A A9 00 85 18 4C 34 3B 9B
3AC1:AD 51 B1 D0 4A 20 25 39 FA
3AC9:20 9B 2C 47 49 56 45 2E 8B
3AD1:00 4C CD 38 20 1F 2A 20 88
3AD9:42 38 90 22 20 9B 2C FA 74
3AE1:82 BF 54 48 45 52 45 20 B4
3AE9:49 53 20 4E 4F 20 4F 4E A8
3AF1:45 20 54 48 45 52 45 2E 4C
3AF9:00 68 68 4C CD 38 20 06 EF
3B01:24 85 08 A2 03 20 8A 3B FE
3B09:90 D2 86 3F 4C CC 32 20 5B
3B11:D5 3A 20 76 38 20 9B 2C 12
3B19:47 49 56 45 F3 00 20 AC 31
3B21:2A 20 28 36 AD 00 BE 85 8D
3B29:18 20 C0 32 A9 00 85 31 78
3B31:20 85 36 E6 03 20 87 2A 20
3B39:A2 00 20 70 3B BD 0A CD BE
3B41:C9 07 D0 1E BD 0C CD D0 E4
3B49:12 A5 31 DD 0E CD 90 12 11
3B51:AD 36 B1 38 E5 31 8D 36 2B
3B59:B1 B0 04 C5 18 D0 03 20 DB
3B61:D8 32 E8 E0 02 D0 D3 A6 9D
3B69:3F 20 1C 23 4C CD 38 8A D1
3B71:48 AE 00 BE 20 14 1B 68 93
3B79:AA 60 20 15 2A AE 30 B1 D0
3B81:20 5C 25 20 C5 0A 4C 74 29
3B89:35 86 22 A2 FF E8 EC 71 99
3B91:BD B0 16 20 0E 23 AD 03 33

3B99:BE 10 F2 29 03 C5 22 D0 A8
3BA1:EC AD 02 BE C5 08 D0 E5 FB
3BA9:60 18 A6 22 60 E8 EC 71 3F
3BB1:BD B0 0A 20 0E 23 CA 20 29
3BB9:1C 23 E8 D0 F0 CE 71 BD 94
3BC1:60 AD 1B D4 29 7F C9 65 C4
3BC9:B0 F7 60 4A 85 07 AD 1B 06
3BD1:D4 29 3F A8 E6 45 A5 45 4C
3BD9:C5 07 90 04 A9 00 85 45 E4
3BE1:88 10 F1 60 20 9B 2C FA A7
3BE9:82 BF 54 48 45 52 45 27 C5
3BF1:53 20 4E 4F 42 4F 44 59 0A
3BF9:20 54 4F 20 41 54 54 41 C6
3C01:43 4B 20 54 48 45 52 45 78
3C09:21 00 4C CD 38 20 42 38 77
3C11:B0 D2 20 06 24 85 08 20 62
3C19:1F 2A A2 03 20 8A 3B 90 62
3C21:C3 86 2D 20 C2 3B CD 35 98
3C29:B1 90 1E 20 9B 2C 82 BF B6
3C31:59 4F 55 20 4D 49 53 53 60
3C39:45 44 20 54 48 45 20 00 46
3C41:20 70 3B 20 E2 1A 4C 18 7F
3C49:3D 20 9B 2C 82 BF 59 4F B3
3C51:55 20 48 49 54 20 54 48 2E
3C59:45 20 00 20 70 3B 20 E2 12
3C61:1A 20 9B 2C C0 44 41 4D 0C
3C69:41 47 45 20 3D 20 00 AD 17
3C71:04 CD F0 12 AD 34 B1 18 58
3C79:6D 5A B1 B0 04 C9 C9 90 EB
3C81:02 A9 C8 20 CC 3B 85 45 24
3C89:20 DB 0F A9 F6 85 54 8D 89
3C91:06 D4 A9 32 8D 01 D4 A0 55
3C99:81 8C 04 D4 88 8C 04 D4 17
3CA1:20 9B 2C C1 49 54 20 49 D7
3CA9:53 20 00 AD 05 BE 38 E5 28
3CB1:45 8D 05 BE B0 19 20 9B 82
3CB9:2C 44 45 41 44 21 00 AD 6A
3CC1:03 BE 29 7F 8D 03 BE A6 25
3CC9:2D 20 1C 23 4C CD 38 AD 4E
3CD1:04 CD 38 ED 05 BE C9 0A 66
3CD9:B0 0D 20 9B 2C 55 4E 48 47
3CE1:55 52 54 00 4C 18 3D C9 2B
3CE9:19 B0 11 20 9B 2C 41 20 6F
3CF1:42 49 54 20 48 55 52 54 FA
3CF9:00 4C 18 3D C9 28 B0 0E BA
3D01:20 9B 2C 57 4F 55 4E 44 1E
3D09:45 44 00 4C 18 3D 20 9B 8D
3D11:2C 44 59 49 4E 47 00 E6 E8
3D19:03 20 87 2A A2 01 4C 6F D1
3D21:39 00 00 00 00 00 00 00 38

Program 2. Image Library

For instructions on entering this listing, please refer to the "MLX" article, Appendix D.

4000:00 00 00 00 00 00 00 00 80
4008:00 00 00 00 00 00 00 00 88
4010:00 00 00 00 00 00 00 00 90
4018:00 00 00 00 00 00 00 00 98
4020:C0 00 00 00 00 0C 00 00 31
4028:03 00 C0 00 00 00 0C 00 5A
4030:C0 00 03 00 00 30 00 00 32
4038:00 00 00 00 00 03 00 00 30 01
4040:FC FC FC 00 3F 3F 3F 00 93
4048:FC FC FC 00 3F 3F 3F 00 9B
4050:FC FC FC 00 3F 3F 3F 00 A3
4058:FC FC FC 00 3F 3F 3F 00 AB
4060:3F 37 3F 0D 02 3F CF CF 83
4068:F0 70 F0 C0 00 F0 CC CC D1
4070:CF 45 0A 08 08 08 08 14 70
4078:CC 44 80 80 80 80 80 50 DF
4080:0F F0 00 00 0F F0 00 00 01
4088:0F F0 00 00 0F F0 00 00 09
4090:0F F0 00 00 0F F0 00 00 11
4098:0F F0 00 00 0F F0 00 00 19
40A0:03 03 0F FC FC 0F 03 03 42
40A8:C0 C0 F0 3F 3F F0 C0 C0 CB
40B0:03 03 03 03 0F 03 03 03 91
40B8:C0 C0 C0 C0 F0 C0 C0 C0 BA
40C0:00 00 00 00 00 3F FF FC 3B
40C8:00 00 00 00 00 FC FF 3F 7C
40D0:00 FC FF FF FF FF FF FF 90
40D8:00 3F FF FF FF FF FF FF 29
40E0:00 30 EC FC 30 30 33 FF 83
40E8:00 0C 3B 3F 0C 0C CC FF F1
40F0:FF EA EB EF EC EC EC FC 9A
40F8:FF AB EB FB 3B 3B 3B 3F 1E
4100:00 00 00 00 00 00 00 00 82
4108:00 00 00 00 00 00 00 00 8A
4110:0F 3C CC FF 30 30 30 30 95
4118:FF 03 0F F3 33 33 30 30 73
4120:00 00 00 00 03 03 0F 0F F3
4128:00 20 E0 E0 E0 E0 E0 E0 0A
4130:3F 00 00 55 66 55 15 05 5F
4138:E0 20 20 55 65 55 54 50 06
4140:3C 0C 3F 37 3F 0F 03 FF 7B
4148:F0 C0 F0 70 F0 C0 00 FC 20
4150:CF CF CF 0F 0C 0C 0C 3C 7E
4158:CC CC CC C0 C0 C0 C0 F0 95
4160:01 01 01 05 05 05 0F 3F AD
4168:40 40 40 50 50 50 F0 FC CA

4170:3F 3F 3F FF FF FF FF FF 4A
4178:FC FC FC FF FF FF FF FF 58
4180:00 00 03 0F 3B EB EB FB B1
4188:00 00 00 C0 B0 AC AC BC 65
4190:3B FF 00 00 00 00 00 00 B0
4198:B0 FC 00 00 00 00 00 00 B2
41A0:03 0C 33 3C 0F 33 0F 15 4A
41A8:30 CC F0 CC 3C FC 30 54 EB
41B0:01 01 01 01 01 01 01 01 33
41B8:40 40 40 40 40 40 40 40 3B
41C0:30 FC 30 00 0C 3F 0C 00 16
41C8:30 FC 30 00 0C 3F 0C 00 1E
41D0:C0 F3 C0 00 30 FC 30 00 9E
41D8:C0 F3 C0 00 30 FC 30 00 A6
41E0:00 FF FF FF FF FF FF FF 63
41E8:00 FF FF FF FF FF FF FF 6B
41F0:03 03 03 03 03 03 03 03 73
41F8:C0 C0 C0 C0 C0 C0 C0 C0 7B

Sleuth

Paul D. Farquhar

This intriguing game challenges your problem-solving abilities. A crime has been committed, and you must question suspects to discover who's responsible. What makes things difficult is that one of the suspects has problems telling the truth. And what gives the game added appeal is that it's different every time you play.

When you were invited to a small house party at Lord Crumbly's secluded mansion, you never thought you'd be accused of murder. Besides yourself, there are three other guests and two servants. You knew his lordship was not a well-liked man, but you were certainly not expecting murder.

Late that evening, while you are alone in the library, a shot breaks the silence. You rush to Lord Crumbly's room and discover his lifeless body. A moment later, the others arrive to see you bending over the dead man. The police are summoned, but have not yet arrived. As the prime suspect, you must quickly discover the murderer or risk being accused of the crime.

You can solve the murder by questioning the suspects and keeping track of who said what about whom. But, to complicate matters, you know that one of them is a compulsive liar.

Sifting Through the Evidence

Three questions must be answered affirmatively before you make an accusation. First, did the suspect have a motive—a reason to dislike Lord Crumbly? Second, did the suspect have access to a gun? Third, where was he or she when the shot was fired—with someone else, near Crumbly's room, or somewhere unknown?

Your task is to narrow down the list of suspects until you find someone who had a motive, a weapon, and an opportunity. Obviously, if Professor Bard had no gun, he must be innocent. You may find more than one person who had motive or opportunity, but only one will fit all three categories.

Four of the five will always tell the truth, while one will

always fib. The liar is not necessarily the murderer, although that is possible. How do you distinguish between the true and false statements?

At first, you don't know who is trustworthy, so don't believe anyone. Just write down what each person says. It may help to use four sheets of paper (a four-page notebook is included in the program—details are given below). Write *Motive* at the top of one sheet, *Weapon* on the second, and *Opportunity* on the third. On the fourth, draw a grid with *Motive*, *Weapon*, and *Opportunity* across the top and the names of the five suspects down the side: Maid Whiggins, Sir Chauncy, Madam Larue, Butler Snipe, and Professor Bard.

When someone says something, write it down on one of your first three sheets. For example, if Snipe says Larue was being blackmailed by Lord Crumbly, write it under *Motive*. If Bard says Chauncy was with someone when the shots were fired, write it under *Opportunity* (Bard says Chauncy had no opportunity). At the beginning, you don't know who's telling the truth, so keep track of who made the statement, but don't fill in the grid yet.

Paring Down the List

There are two ways of finding who is lying or who is telling the truth. If Snipe tells you that Whiggins did not have a gun, and Larue says the same thing, you can conclude that both Snipe and Larue are truth tellers. There's only one liar, so if Snipe or Larue is a liar, the other would have to be telling the truth, and they would say opposite things. But since they said the same thing, they must both be telling the truth. Once you know they're okay, you know that everything they have said (and everything they may say in the future) will be correct. Now you can fill in part of the grid. In this case, you could write NO in the Whiggins/Weapon block.

By similar logic, if two suspects say contradictory things, you know one of them is lying. Bard says Snipe hated Lord Crumbly (a motive), but Chauncy says Snipe had no motive. Either Chauncy or Bard is not telling the truth, and since there's only one liar, Whiggins, Larue, and Snipe must all be truth tellers. Now you can fill in the grid with statements made by those three.

As you enter data into the grid, look for someone who had motive, weapon, and opportunity. As soon as you find a

suspect with all three, you can solve the case. Another way to nail the murderer is to find four people who have at least one "no" across from their name. If Whiggins had no gun, Snipe no motive, Chauncy no motive, and Bard no opportunity, that leaves a single possibility: Larue.

After uncovering the answer to the mystery, you'll see how many clues you were given (you can usually finish with about ten clues). You'll then be asked if you want to play again.

Basic Program Operation

This program should fascinate fans of logic puzzles as well as devotees of murder mysteries. It offers an endless series of computer-generated brain teasers.

Type in and save the program, using "The Automatic Proofreader," found in Appendix C. Be sure to save a copy of the program before you run it.

Immediately after dimensioning the "truth" matrix (a table) and defining some strings, the program enters an introductory subroutine beginning in line 415. This subroutine involves some simple graphics and sound.

Lines 40-75 provide a brief introduction to the dilemma.

In line 95, the liar and the murderer are randomly selected. Note that they may or may not be the same individual.

The elements of the truth matrix are assigned in lines 100-150. Each element is randomly assigned a value of 0 or 1, indicating whether a particular suspect did or did not have motive (or weapon or opportunity). For example, if the value of A(1,1) equals 1, then Sir Chauncy had a motive to commit the murder.

The main body of the program consists of lines 155-315. Here, witnesses are randomly chosen to offer random testimony based on the truth matrix. After each clue, you have the option of making an accusation or receiving another clue.

After an accusation has been made, the results of the investigation are determined and printed. Finally, the option of another case is offered. All this involves lines 330-405.

Some Ideas for Modifications

If you have the inclination to tinker with the program, you can make some additions and modifications. Different scenarios

The Notepad Feature and Page Flipping

Kevin Mykytyn

"Sleuth" provides a four-page notepad to help you keep track of the clues. When the choice to grill suspects or to make an accusation appears, you can look at your notebook by pressing one of the function keys. The f1 key is the first page, f3 is the second, f5 is page 3, and f7 is page 4. You may find it convenient to split up motive, weapon, and opportunity between three pages, and use the fourth for your conclusions. After selecting a page, type in the message you want—"Larue says Bard just bought a gun," for example. You can also flip between the pages of the notebook by pressing the other function keys. To get back to the game, press the back-arrow key (the upper-left character on the keyboard).

Page Flipping

The electronic notebook is created by using *page flipping*, which means the screen display is relocated to a different section of memory. This technique is often used for animation on the Apple and Atari. While one screen is displayed, the computer draws the next picture on an alternate (invisible) screen. Then, a few POKES cause the screen to change to the next frame. You don't need to know how it works to play Sleuth, but if you'd like to use page flipping in your own programs, here's a brief explanation.

Location 53272 controls several things, including the video matrix base address (in plain English, where the screen starts). The upper four bits of this location point to the start of the screen. Normally, the bit pattern is 0001, meaning that the screen starts at $1 * 1024$. If you want to change the location of the screen, you must be careful not to disturb the remainder of this byte. You can do this by using the following statement:

```
POKE 53272,PEEK(53272)AND15 OR S*16
```

The variable S holds the number of the 1K block where the screen starts. It must be a number from 0 to 15, because the video chip can access such information as screen memory, sprite definitions, and character definitions from only one of four 16K blocks. So, to change the start of screen memory to 12288 ($12 * 1024$), enter

```
POKE 53272,PEEK(53272)AND15 OR 12*16
```

But POKING to 53272 is not enough. There are a couple of problems that must be overcome. Even though the computer is now displaying screen memory from a new location, the BASIC editor is still printing to the old screen.

Location 648 tells the operating system where to find the screen if it needs to print something. It contains the start of

screen memory divided by 256. Since the screen normally starts at 1024, this location is normally 4 ($4 * 256$ is 1024). To change the start of screen memory to 12288, enter

POKE 648,48

Even after telling the computer where to start its screen display memory and telling the editor where to print, you'll still have a problem. Locations 217–242 hold a screen line-link table necessary for proper formatting of anything printed to the screen. If you type more than 40 characters on a line, the computer uses the line links to find out where to start the next line. After pages have been flipped, this table will still be set to work with the old screen. The line-link table must be rebuilt to work with the new screen. BASIC has a routine that will do all this for you: the clear-screen routine. Once the screen has been cleared, all the line links are set for the new screen. But in Sleuth, it's necessary that the screen not clear when the pages are flipped. The machine language routine at the start of the program does the relinking without clearing the screen and sets the color RAM to blue.

It's possible to flip screen memory pages, but there is only one location for color memory (starting at 55296). This makes it necessary to set the color memory when a page is flipped. Otherwise, the characters could be on the new screen, but might be the same color as the screen, and so would not be visible. A second method is to save the color RAM in another portion of memory and move it back when the page is displayed.

Finally, the new screens that you create should be protected from BASIC by POKEing location 56 and doing a CLR. Also, when you're typing on an alternate screen and press RUN/STOP-RESTORE, location 53272 is reset, but location 648 is not. Display memory is now at 1024, but your typing is still being printed on the other screen. You can fix this by typing POKE 648,4 and pressing RETURN (even though you can't see what's being typed).

If you don't want to write your own page-flipping routine, you can use the one in Sleuth. Include lines 1–9, 36, 320, and 485–540 in your program (you can renumber them, of course). Line 1 protects the new screens from BASIC and reads the machine language routine, from lines 2 through 9, into memory. This should be done at the start of the program.

Line 36 calls line 540, which clears all the alternate screens. Then the position array is set to zero. This array, labeled C, keeps track of which row the cursor is on when a page is flipped and returns the cursor to that row when the page is restored. This routine should also go at the beginning of the program. Line 320 checks for the press of the function keys. It should be included as part of your key input routine. Lines 485–535 are the main page-flipping routine and can be placed anywhere in the program.

will not affect the difficulty of the puzzle, but some modifications can. A simple way to increase the difficulty is to add more suspects, but this lessens the impact of the liar. A countermeasure, which drastically increases the challenge of the puzzle, is to add more liars. Then, if two suspects say the same thing, you won't know whether they are both truth tellers or both liars.

Sleuth

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```

AH 1 POKE56,40:CLR:FORA=679TO729:READB:POKEA,B:NEX
    T
FQ 2 DATA 173,136,2,9,128,168
AH 3 DATA 169,0,170,148,217,24
EJ 4 DATA 105,40,144,1,200,232
FA 5 DATA 224,26,208,243,169,255
QE 6 DATA 149,217,169,0,133,251
KK 7 DATA 169,216,133,252,162,3
GH 8 DATA 160,0,169,6,145,251
CJ 9 DATA 200,208,251,230,252,202,16,242,96
SH 10 GOSUB540
DH 15 Z=20:Z1=53281:Z2=6:Z3=1:Z4=54296:Z5=54280:S2
    =54273:Z6=53280:G1=54276
JH 20 G2=54283:S3=54272:FORA=54272TO54296:POKEA,0:
    NEXT:POKE54277,25:POKE54284,29
HP 25 PRINT"{CLR}":DIMA(5,4):GOTO80
FK 30 GOSUB415
HX 35 CL=0:FORJ=0TO3:FORI=0TO4:A(I,J)=0:NEXT:NEXT:
    POKEZ1,Z3
BS 36 GOSUB 540:FORA=0TO4:C(A)=0:NEXT
CR 40 PRINT"{CLR}{BLU}{DOWN}ONE EVENING, WHILE ON
    {SPACE}HOLIDAY AT LORD
DE 45 PRINT"CRUMBLY'S MANSION YOU HEAR A SHOT AND
MK 50 PRINT"FIND LORD CRUMBLY DEAD"
AX 55 PRINT"{DOWN}THE OTHER PEOPLE HERE ARE{DOWN}"
CS 60 FORI=0TO4:PRINTTAB(5)A$(I):NEXTI
FP 65 PRINT:PRINT"HOW QUICKLY CAN YOU SOLVE THE MU
    RDER?"
SS 70 PRINT"WHO HAD MOTIVE,WEAPON AND OPPORTUNITY?
    ":POKE198,0
XP 75 PRINT"{DOWN}HIT ANY KEY";:WAIT198,1:POKE198,
    0:PRINT"{CLR}":GOTO95
MX 80 PRINT"{CLR}":A$(0)="{RED}{RVS}MAID WHIGGINS
    {OFF}{BLU}":A$(1)="{BLK}{RVS}SIR CHAUNCY
    {OFF}{BLU}"
JC 85 A$(2)="{PUR}{RVS}MADAM LARUE{OFF}{BLU}":A$(3
    )="{GRN}{RVS}BUTLER SNIPE{OFF}{BLU}"

```

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```
JH 90 A$(4)="{BLU}{RVS}PROFESSOR BARD{OFF}{BLU}":A
      $(5)="{CYN}{RVS}LORD CRUMBLY{OFF}{BLU}":GOTO
      30
JE 95 I=INT(RND(1)*5):LR(I)=1:I=INT(RND(1)*5)
QS 100 FORJ=0TO3:A(I,J)=1:NEXT
PR 105 FORJ=0TO2:C=0
AQ 110 FORI=0TO4
CE 115 IFA(I,3)=1THEN145
CM 120 IFC=2THEN145
CQ 125 IFJ=0THEN135
SJ 130 K=J-1:IFA(I,K)=1THEN145
MB 135 IFRND(1)>.5THENA(I,J)=1
AB 140 IFA(I,J)=1THENC=C+1
EX 145 NEXTI
EX 150 NEXTJ
GG 155 CL=CL+1:W=INT(RND(1)*5):Y=INT(RND(1)*3):UV=
      INT(RND(1)*3)+1
RX 160 VV=INT(RND(1)*3)+1:X=INT(RND(1)*5):IFX=WTHE
      N160
HG 165 POKE204,1:PRINT"{CLR}{RVS}ONE OF THE SUSPEC
      TS IS A COMPULSIVE LIAR{OFF}"
KF 170 PRINT:PRINT"DURING QUESTIONING:":PRINT
DX 175 PRINTA$(W)" SAYS:":PRINT
JE 180 ONY+1GOTO185,225,265
EP 185 IFA(X,Y)=0THEN215
QX 190 IFLR(W)=1THEN220
MB 195 ONUVGOTO200,205,210
HK 200 PRINTA$(5):PRINT"WAS BLACKMAILING":PRINTA$(
      X):GOTO305
BK 205 PRINTA$(X):PRINT" HATED":PRINTA$(5):GOTO305
CD 210 PRINTA$(5):PRINT"SECRETLY KILLED":PRINTA$(X
      );"S LOVER":GOTO305
JK 215 IFLR(W)=1THEN195
GH 220 PRINTA$(X):PRINT"HAD NO MOTIVE ":GOTO305
DQ 225 IFA(X,Y)=0THEN255
JB 230 IFLR(W)=1THEN260
CD 235 ONUVGOTO240,245,250
JD 240 PRINTA$(X):PRINT"CARRIES A GUN":GOTO305
CR 245 PRINT"A GUN WAS KEPT IN":PRINTA$(X);"S ROO
      M":GOTO305
DA 250 PRINTA$(X):PRINT"JUST BOUGHT A GUN":GOTO305
DM 255 IFLR(W)=1THEN235
EX 260 PRINTA$(X):PRINT"HAD NO ACCESS TO A GUN":GO
      TO305
JF 265 IFA(X,Y)=0THEN295
DC 270 IFLR(W)=1THEN300
HD 275 ONVVGOTO280,285,290
AB 280 PRINTA$(X):PRINT"WENT TO BED VERY EARLY":GO
      TO305
```

```

CG 285 PRINTA$(X):PRINT"HAD NOT BEEN SEEN SINCE DI
      NNER":GOTO305
CJ 290 PRINTA$(X):PRINT" WAS BY":PRINTA$(5);"'S RO
      OM JUST BEFORE THE SHOT":GOTO305
ED 295 IFLR(W)=1THEN275
JX 300 PRINTA$(X):PRINT"WAS WITH SOMEONE WHEN THE
      {SPACE}SHOT WAS FIRED":GOTO305
RB 305 PRINT"{3 DOWN}{BLU}{RVS}YOUR OPTIONS ARE:":
      PRINT:PRINT"(1)GRILL SUSPECTS"
FB 310 PRINT"(2)MAKE ACCUSATION"
QG 315 GETA$:IFA$="1"THEN155
DC 320 IFA$>CHR$(132)ANDA$<CHR$(137)THEN485
SM 325 IFA$<>"2"THEN315
EH 330 PRINT"{CLR}{DOWN}WHO DID IT?":PRINT
GJ 335 FORI=0TO4:PRINTI"{LEFT}) ";A$(I):PRINT:NEXT
      :POKE198,0
QX 337 GETK$:IFASC(K$+CHR$(0))<48ORASC(K$+CHR$(0))
      >52THEN337
CM 340 K=VAL(K$):IFA(K,3)=1THEN380
SE 345 PRINT"{CLR}{DOWN}AFTER"CL"CLUES YOU":PRINT"
      HAVE ACCUSED THE WRONG PERSON"
QR 350 PRINT"{DOWN}BEFORE YOU CAN CORRECT YOUR MIS
      TAKE, YOU ARE FRAMED FOR THE MURDER"
GD 355 POKES2+3,15:FORI=0TO60:POKES2+2,128:NEXT:PO
      KES2+2,0
PE 360 PRINT:FORI=0TO4:IFA(I,3)<>1THEN370
KE 365 PRINTA$(I):A(I,3)=0
KK 370 NEXT
CM 375 PRINT"WAS THE MURDERER!":GOTO390
HD 380 PRINT"{CLR}{DOWN}"A$(K)" DID IT!":PRINT"
      {DOWN}YOU CAUGHT THE KILLER AFTER";CL;"CLUE
      S."
MB 385 A(K,3)=0:POKES2+3,15:N=195:FORJ=1TO4:N=N+10
AE 390 FORI=0TO4:IFLR(I)<>1THEN400
AF 395 PRINT:PRINTA$(I):PRINT"WAS THE LIAR.":LR(I)
      =0
JM 400 NEXT
HE 405 INPUT"{DOWN}ANOTHER CASE (Y/N)";Q$:IFQ$="Y"
      THEN35
EX 410 END
GE 415 PRINT"{CLR}{BLK}{7 DOWN}"SPC(Z-6)"S L E U T
      H":POKEZ1,Z2:POKEZ4,15:POKEZ6,0
HR 420 PRINT"{2 DOWN}"SPC(Z-10);:FORQ=1TO4:READN,P
      :POKES2,N:POKES3,P:POKEG1,32:POKEG1,33
SA 425 FORI=1TO800:NEXT:NEXT:A$="{WHT}{2 DOWN}U[ES]
      [A]DI{DOWN}{5 LEFT}J[X][Z]FK"
KG 430 READN,P:POKES2,N:POKES3,P:POKEG1,32:POKEG1,
      33:FORI=1TO1300:NEXT:FORQ=1TO4
DF 435 READN,P:POKES2,N:POKES3,P:POKEG1,32:POKEG1,
      33:FORI=1TO300:NEXT:NEXT:N=185

```

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```
QR 440 FORJ=1TO4:READN,P:POKES2,N:POKES3,P:POKEG1,
      32:POKEG1,33
KJ 445 PRINTA$;:IFJ=2THENPRINT"{6 UP}";
AC 450 FORK=1TO800:NEXT:NEXT
MD 455 POKES2,0:POKEZ5,220:POKEG2,128:POKEG2,129:L
      =16
FF 460 IFL=0THEN470
RS 465 L=L-1:POKEZ4,L:FORI=1TO30:NEXT:GOTO460
SJ 470 POKEZ5,0:RETURN
SS 475 DATA4,48,4,251,6,71,8,97,6,167,6,71,5,152,4
      ,251,4,180,4,48
CF 480 DATA 4,251,6,71,8,97
FP 485 S=ASC(A$)-121:GOSUB530
RQ 490 POKE214,C(S-12):PRINTCHR$(13){UP}";
QD 495 POKE204,0:WAIT198,255:GETA$
XH 500 IFA$="<"THEN520
AH 505 IFA$>CHR$(132)ANDA$<CHR$(137)THEN535
SM 510 POKE205,3:WAIT207,1:PRINTA$;:IFPEEK(214)=24
      THENPRINT"{UP}";
PP 515 GOTO495
JD 520 C(S-12)=PEEK(214):WAIT205,3:WAIT207,1:POKE2
      04,1:S=1:POKE648,4:PRINT"{CLR}"
JK 525 GOSUB530:GOTO165
BS 530 POKE53272,PEEK(53272)AND15ORS*16:POKE648,S*
      4:SYS679:RETURN
JX 535 WAIT205,3:WAIT207,1:POKE204,1:C(S-12)=PEEK(
      214):GOTO485
SA 540 FORS=12TO15:GOSUB530:PRINT"{CLR}":NEXT:S=1:
      GOSUB530:PRINT"{CLR}":RETURN
```

Vampyre Hunter

Marc Sugiyama

Game Concept by Gregg Keizer and Randy Fosner

This excellent adventure game combines text and graphics to create a world in which you hunt down a dangerous vampire terrorizing a small village. Your goal is to corner the monster and destroy it.

You stand at the outskirts of a small village, high in the mountains of eastern Europe. The townspeople have fled, for a vampire has taken up residence in the old castle nearby. Before they took flight, they managed to get a message to you. You're well-known in certain circles for your knowledge and expertise concerning esoteric lore. Only you can find and destroy the vampire. If you succeed, the villagers will be grateful. You find the mere existence of such evil repugnant; you *will* dispatch the vampire, you tell yourself.

The world of this adventure game may seem familiar (who hasn't seen one of the countless vampire movies?), but you'll delight in exploring it all the same. And even though you may *think* you know how to destroy a vampire, seeing the task through is not easy. Brute strength will do little good. Patience, careful investigation, and the right tools are needed.

"Vampyre Hunter" isn't a run-of-the-mill text adventure game. Not only do you talk to the computer through the keyboard, reading and typing in messages, but you'll also explore a mazelike castle, searching for the vampire's hiding place. As you provide directions and actions for your character, you'll see the castle graphically displayed on the screen, complete with rats, trap doors, dead-end passages, and thieving bats. Vampyre Hunter combines the best of both text and graphic adventures to give you a unique world in which to participate.

Typing Instructions

Vampyre Hunter is a very long game. It will take some time to type it in. Be assured, however, that the final product will be worth your time. The game is long simply because it's a text adventure game. If you look at Program 1, the BASIC section

of the game, you'll see that much of it is DATA statements. There's just no way around this; in order for the program to talk to the player, the vocabulary and dialogue have to be included.

Before you begin entering Program 1, review Appendix B, "How to Type In Programs," for details on entering underlined letters and characters in [<brackets>] and {braces}. It's also a good idea to use "The Automatic Proofreader," Appendix C. Pay close attention to the DATA statements and make sure that the spacing and spelling are exactly as listed. Note that several DATA lines have one or more commas in a row.

Program 2 is the machine language routine that creates the castle rooms, moves the creatures inside the castle, handles the text input, and controls the formatting of the text. You'll need a copy of "MLX," the machine language entry program found in Appendix D, to enter this program. Load and run MLX and provide the following two addresses:

Starting Address: C000

Ending Address: CA97

Save Program 2 under the name "CHROUT.OBJ". If you use any other name, you'll have to change line 1 of Program 1 so that it loads the proper program.

Once you've got both programs saved on tape or disk, you're ready to play the game. Load Program 1 as you would any other BASIC program. Type RUN, and the game begins. The first line in Program 1 loads the machine language portion of Vampyre Hunter. Tape users should change the number 8 at the end of line 1 to a 1 (LOAD "CHROUT.OBJ",1,1).

Issuing Commands

The screen first cycles through different colors. This is part of the machine language initialization routine and lasts about 90 seconds. When the screen stops changing colors, the BASIC initialization begins. The entire process may take up to two minutes, so be patient.

As long as you're outside the castle where the vampire resides, Vampyre Hunter is an all-text adventure. You start out south of the village. Communicating with the program is easy; as in most other text adventures, you simply type on the keyboard. You may use multiword commands to talk to the computer. Compound objects and sentences such as "Take the

lamp and the food and go east" are permitted. The text parser is written entirely in BASIC, so if you issue long commands, be patient while the computer figures out what you said. Remember, though, that the computer has a limited vocabulary—if a phrase does not work, try something else. Only the first four letters of each word are significant (*knif* is considered to be the same word as *knife*, for example). You needn't include articles, such as *a* and *the*, as they are ignored. In addition, try to avoid the use of adjectives; they may confuse the parser.

The input routine, which is part of the machine language routine, will not accept capital letters or commas, so you should avoid their use. It also rejects leading spaces and more than one space in a row.

If you've played text adventures, you'll be pleased to know that all of the normal abbreviations are available to you. For example, you can use the first letter of a direction, such as *n* for *north*. There are two other abbreviations; *l* stands for *look* and *i* for *inventory*. You can also use the *examine* command to look more closely at objects in the castle or the village, but be aware that this works only in certain locations.

Although figuring out how to communicate with the computer is part of the fun of playing an adventure game, there are some commands that need some explanation. For instance, the command *feed the fish* is invalid because you haven't said *what* to feed the fish. Likewise, the command *throw book* is invalid because you haven't said *what* to throw the book at. In addition, a command like *throw the book and the glass at the vampire and the dog* is invalid because there are multiple objects.

Only one command is specific: *Drive the stake into the vampire*. You must use this word order, or the command will not be understood.

In the Vampire's Lair

Eventually, you'll find your way inside the castle. At this point, the game changes and becomes more like a graphic adventure game. The upper portion of the screen shows your position within the castle's interlocking rooms. Below the map is a text window where you'll issue commands and receive messages.

The castle has four levels. You enter on the top floor and work your way down. The vampire's coffin is on one of the

lower levels. You'll need the lamp to travel safely through the castle. If you don't have the lantern, or if its fuel runs out, you'll be in complete darkness, and the screen display will disappear. Finding your way out is almost impossible in the dark.

Your character is represented by a figure in the center of the screen. The other figures are bats, rats, stairways, the coffin, and the vampire. Don't leave things in the castle; they'll be scooped up by bats. Six items may be encountered inside the castle. There are hidden trapdoors throughout the upper levels of the castle. You won't always fall through them, as there's no way of knowing if one is ahead.

The vampire tends to wander throughout the castle during the night; it's safer if you avoid the castle during that time. If you do stay inside the castle during the night, hope that you have enough wards and weapons to keep the vampire from coming after you.

To make it easier to maneuver your character, you can specify more than one move at a time. If you want the figure to move five spaces north, for instance, type *n 5* (make sure there's a space between the two). You can move a maximum of nine spaces using this syntax.

The Importance of Mapping

As you meander through the village, you may want to keep track of your movements by sketching out a map. Don't be in too big a hurry to enter the castle; there are several items you'll need to obtain before you can confront the vampire. If you fail in your first attempt, at least you'll have a map and some idea of where you need to move in the next game.

One of the challenges of an adventure game is figuring out which items are important and where they are. Thus, no more clues about how to win are provided. You'll have to do it yourself.

Additional Options

There are certain system commands that you can use to change the game's format. The *color* command allows you to change the color of the screen, border, and characters. The *verbose* and *brief* commands control the length of the descriptions you receive when you move from one place to another. The *time* command tells you the time and the day. If you want

to clear the screen and have it redrawn (for whatever reason), use the *clear* command.

If you should reset the computer during game play (by hitting RUN/STOP-RESTORE), you'll find that the screen is not behaving as it should. Press SHIFT-CLR/HOME, type POKE 648,4 (you won't see the characters; you'll have to type blindly), and press RETURN. This should return the normal screen. If you want to exit the game, type *quit*.

Program Pieces

Here's a breakdown of the BASIC portion of Vampire Hunter, Program 1.

Line Numbers	Description
10-205	Initialization
215-365	Sentence parser
375	Clear command
385-420	Drive stake
430-495	Lamp control
505-510	Winning
520-525	Losing
535-545	Nonsense commands
555-565	Color command
575-595	Time command
605-755	Give command
765-770	Brief/verbose commands
780-790	Refuel lamp command
800-1000	Overhead
850	Handle the sun
880	Move wolves
905	Move vampires
925	Let wolves attack
940	Handle the lamp
970	Let vampire attack
980	Let animals attack
1010-1280	Go command
1290-1410	Take command
1420-1425	Quit command
1435-1540	Drop command
1550-1585	Inventory command
1595-1635	Return following noun numbers
1645-1705	Is noun here or held?
1715-1725	Next word all?
1735-1745	Next word but?
1755-1790	Return how long
1800-1965	Look command
1975-2110	Examine command
2120-2240	Make command
2250-2275	Chop command
2285-2405	Kill command

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Line Numbers	Description
2415-2490	Read command
2500-2640	Eat command
2650-2655	Drink (falls into Eat)
2665-2705	Sleep command
2715-2740	Wait command
2750	Help
2760-2765	Input routine
2775	Return character in maze
2785-4055	DATA
2785	Constants/single variables
2815	Direction offsets
2820	Can't go that way messages
2840	Directions
2845	Times
2850	Verbs
2870	Nouns
2965	Multi-location noun data
2980	Foods
2985	Eating messages
2995	Places
3200	Signs
3205	Book
3250	Noun descriptions
3475	Place descriptions
4005	Miscellaneous numeric data
4020	Color commands
4045	Common error messages
4055	Places where sleep possible

The machine language section, Program 2, has this organization:

Memory Usage	Description
A000-BFFF	Castle storage
C000-CAB5	Machine language subroutines:
C000	Vectors
C012	Initialization
C0CF	Create castle
C20D	Create creatures
C241	Move creatures
C37F	Move the vampire
C435	CHROUT wedge
C50B	Input routine
C585	Copy maze to screen
C5DA	Miscellaneous subroutines
C976	Data
CC00-CFFF	Text screen
F800-FFBF	Character data
FFC0-FFFF	Sprite data

Program 1. Vampyre Hunter—BASIC Portion

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```

AE 1 IF A=0 THEN A=1:LOAD "CHROUT.OBJ",8,1
FH 10 REM VAMPYRE HUNTER V8; 6/11/84
XR 15 IFPEEK(49152)<>18THENPRINT"ML?":STOP
RA 20 SP=53269:BO=53280:SC=53281:PRINT"{CLR}":POKE
BO,2:POKESC,2
MB 25 DEFFNA(I)=PEEK(I)+256*PEEK(I+1):DEFFND(I)=IN
T(RND(1)*I)
PK 30 I=49152:IZ=FNA(I):MV=FNA(I+2):WK=FNA(I+4):BP
=FNA(I+6):CS=FNA(I+8)
JX 35 MT=FNA(I+10):MB=FNA(I+12):MR=FNA(I+14):EV=FN
A(I+16)
GA 40 SYSIZ:PRINT"{CLR}{H}{3 DOWN}[3]"TAB(13)"VAMP
YRE HUNTER"
HK 45 SYSCS:SYSMT:POKEBO,2:POKESC,2
MR 50 S8$="{F}{HOME}{RVS}{40 SPACES}{HOME}"
XX 55 DL$="{F}{38 SPACES}{B}"
DM 60 S1$=" ":S4$="{4 SPACES}":READNT,MW,SL,MS,Q,X
,Z,W,PE,AR,DR,D1$,DN$,DR,TN,VE,NO
SG 65 READSO,FO,LF,PL,RS,MC,BC,NE,DE,WV,IO,SV,WS,A
L$,BU$,CD$,DY,TT,XS,YS,LS
DA 70 READBH,RH,DH,CH,TH,OS,SH,WC,VR,NG,AF,NU,VH,S
E
ED 75 CD=LEN(CD$)-X:DIMCD$(CD),DR$(DR),TN$(TN),TN(
TN),VE$(VE),NO$(NO),NP$(NO)
EM 80 DIMNW$(NO),NS$(NO),ND$(NO),SH?$(NO),NE$(NO+X)
,MS$(MS),SO$(SO),SO$(SO)
GR 85 DIMFO$(FO),NU$(FO),FD$(FO),PN$(PL),PD$(PL+X)
,PP$(PL),PS$(PL),PV$(PL)
ER 90 DIMRD$(RS),BC$(MC+X),BC$(BC),NE$(NE),DE$(DE)
,WV$(WV),IO$(NO),SV$(SV)
GP 95 DIMWS$(NO),WO$(SL),ND$(SL),NC$(SL),DD$(2,5)
,CC$(2),CC(2),ER$(8),SE$(SE)
QF 100 FORI=0TO2:FORJ=0TO5:READDD$(I,J):NEXT:NEXT
RQ 105 FORI=0TOCD:READCD$(I):NEX?T:FORI=0TODR:READD
R$(I):NEXT:FORI=0TOTN
CR 110 READTN$(I),TN(I):NEXT:FORI=0TOVE:READVE$(I)
:NEXT:FORI=0TOMS:MS$(I)=-2:NEXT
CS 115 FORI=0TONO:READNO$(I),NP$(I),NW$(I),ND$(I)
,NS$(I):NEXT
GC 120 FORI=0TOSO:READSO$(I),SO$(I):NEXT:FORI=0TOS
O:SH$(SO$(I))=I+X:NEXT
BM 125 FORI=0TOFO:READFO$(I),NU$(I):NEXT
CS 130 FORI=0TOFO:READFD$(I):NEXT:FORI=0TOPL:READP
N$(I),PP$(I),PS$(I):NEXT
BM 135 FORI=0TORS:READRD$(I):NEXT:J=0:FORI=0TOBC
AB 140 READBC$(I):IFBC$(I)=Z$THENJ=J+X:BC$(J)=I:GO
TO140
    
```

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```
DH 145 NEXT:BC%(J+X)=BC+X:J=0:FORI=0TONE
KM 150 READNE$(I):IFNE$(I)=Z$THENJ=J+X:NE%(J)=I:GO
    TO150
EM 155 NEXT:NE%(J+X)=NE+X:J=0:FORI=0TODE
CB 160 READDE$(I):IFDE$(I)=Z$THENJ=J+X:PD%(J)=I:GO
    TO160
JC 165 NEXT:PD%(J+X)=DE+X:NW%(6)=NS%(6)*2
ER 170 FORI=0TOWV:READWV%(I):NEXT:FORI=0TOIO:READJ
    :IO%(J)=Q:NEXT
GE 175 FORI=0TOSV:READSV%(I):NEXT:FORI=0TOWS:READN
    ,J:WS%(N)=J:NEXT
EC 180 FORI=0TO2:READCC$(I),CC(I):NEXT:FORI=0TO8:R
    EADER$(I):NEXT
EB 185 I=53248:POKEI+23,0:POKEI+29,0:POKEI+27,0:PO
    KEI+28,0:POKEI+16,0:POKEI,184
HR 190 POKEI+21,0:POKEI+1,114:K=65472:FORI=0TO47:R
    EADJ:POKEI+K,J:NEXT
PA 195 FORI=48TO63:POKEI+K,0:NEXT:POKE53240,255:FO
    RI=0TOSE:READSE$(I):NEXT
QB 200 S2=Q:POKENG,0:SYSEV:PRINT"{CLR}"{2 DOWN}WELC
    OME! TO VAMPYRE HUNTER{4 DOWN}":GOSUB830
XP 205 GOSUB1865:PV%(0)=Q:T3=TT:T4=TT
QR 210 :
SK 215 PRINT:IFICTHENPOKE214,20:PRINT:PRINTDL$DL$:
    POKE214,20:PRINT
MC 220 PRINT"? "":GOSUB2760:IFNOTICTHEN235
EM 225 PRINT"{CLR}":IFLNTHENSYSMV
FG 230 POKE214,17:PRINT
MJ 235 IFHV>5THENPRINT"I NEED SOME REST.
QF 240 IFNU<30THENPRINT"I'M HUNGRY.
HS 245 IFHV>9THENGOSUB575:PRINT"YOU DIED OF EXHAUS
    TION AT"T1-T;T$PE$:GOTO520
MQ 250 IFNU<-10THENPRINT"YOU HAVE STARVED TO DEATH
    ON DAY"DY"{LEFT}."":GOTO520
HC 255 IFIN$="AGAIN"THENIN$=J$:PRINT("J$")
EC 260 J$=IN$
RC 265 IFZL=QTHENPRINT"COME AGAIN?":GOTO215
PK 270 IN$=IN$+S1$:FORI=0TOSL:WO$(I)=PE$:NEXT:WN=0
    :J=X
AD 275 IFMID$(IN$,J,X)<>S1$THEN295
CH 280 WO$(WN)=LEFT$(LEFT$(IN$,J-X)+S4$,4):IN$=MID
    $(IN$,J+X):J=0
KR 285 FORI=1TOLEN(AR$)STEP4:IFWO$(WN)=MID$(AR$,I,
    4)THENWO$(WN)=PE$:GOTO295
MH 290 NEXT:WN=WN+X
FE 295 J=J+X:IFNOTJ>LEN(IN$)THEN275
XX 300 NW=0
KA 305 IN$=WO$(NW):IFIN$=PE$THEN215
DK 310 GOSUB800:IFNOT(VF>0ANDNP%(VR)<>67ANDNOTNT)T
    HEN320
```

```
KJ 315 PRINT"THE VAMPIRE LOOKS UP INTO THE SUN AND
      MELTS AWAY.":GOTO505
QR 320 FORI=1TOLEN(DR$)STEP4
KG 325 IFIN$=MID$(DR$,I,4)THENV=0:GOTO350
KG 330 NEXT
MB 335 NW=NW+X:FORI=0TOVE:FORJ=1TOLEN(VE$(I))STEP4
GS 340 IFIN$=MID$(VE$(I),J,4)THENV=I:V1=(J-X)/4:GO
      TO350
KQ 345 NEXT:NEXT:PRINTER$(0):GOTO215
FB 350 ONV+XGOSUB1010,1010,1290,1420,1435,1550,180
      0,2415,2750,1975
CE 355 IFV>9THENONV-9GOSUB2120,2250,2500,2650,2665
      ,2715,535,540,765,770,545
RQ 360 IFV>20THENONV-20GOSUB2285,595,605,555,430,4
      75,490,385,780,375
DQ 365 GOTO305
JJ 370 :
XJ 375 PRINT"{CLR}":GOTO820
EK 380 :
XM 385 GOSUB1595:IFNOTNC=XORNOTNC%(0)=19ORNOTNC%(1
      )=40THENPRINTER$(0):RETURN
RE 390 N=19:GOSUB1645:IFNOTNL=QTHENPRINTER$(1)ND$(
      19)PE$:RETURN
AM 395 IFNOTNP%(8)=QTHENPRINT"I MUST HAVE THE MALL
      ET.":RETURN
SB 400 TX=CX:TY=CY:TL=CL:GOSUB2775
MJ 405 IFWH=VHORNTTHENPRINT"THE VAMPIRE MUST BE AS
      LEEP.":RETURN
AD 410 IFNOTWH=CHTHENPRINTER$(2)"COFFIN HERE.":RET
      URN
XX 415 IFHV>5THENPRINT"YOU ARE TOO TIRED TO DO THI
      S DEED.":RETURN
JG 420 PRINT"YOU HAVE DRIVEN A WOODEN STAKE INTO T
      HE VAMPIRE.":GOTO505
PQ 425 :
RP 430 IN$=WO$(NW):NW=NW+X
CD 435 IFNOTAF>0THENPRINT"THERE IS NO FUEL.":RETUR
      N
MX 440 N=5:GOSUB1645:IFNL=QTHEN460
MC 445 IFNL=ZTHENPRINTER$(2)ND$(N)" HERE.":RETURN
JR 450 PR=Q:GOSUB1385:GOSUB1645
FH 455 IFNOTNL=QTHENPRINTER$(1)ND$(N)PE$:RETURN
DH 460 IFIN$="ON{2 SPACES}"THENTT=TT+3:LN=Q:PRINTN
      D$(N)" IS NOW ON.":RETURN
AQ 465 IFIN$="OFF"THENTT=TT+2:LN=Z:PRINTND$(N)" I
      S NOW OFF.":RETURN
PH 470 NW=NW-X:PRINTER$(0):RETURN
XK 475 GOSUB1595:IFNOTNC=0THENPRINTER$(0):RETURN
EE 480 IFNOTNC%(0)=5THENPRINT"YOU CAN NOT LIGHT TH
      E"ND$(NC%(0))PE$:RETURN
```

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```
RF 485 IN$="ON{2 SPACES}":GOTO435
XA 490 GOSUB1595:IFNOTNC=0ORNOTNC%(0)=5THENPRINTER
      $(0):RETURN
AX 495 IN$="OFF ":GOTO435
FA 500 :
QA 505 GOSUB575:PRINT"THE VAMPIRE WAS KILLED ON DA
      Y"DY"{LEFT}, AT"T1-T;T$". ";
CP 510 PRINT"CONGRATULATIONS, YOU ARE NOW THE CHAM
      PION VAMPIRE HUNTER!"
FC 515 :
ES 520 POKESP,0:PRINT"PLAY AGAIN? ";:GOSUB2760:IFL
      EFT$(IN$,1)="Y"THENRUN
PG 525 PRINT"{CLR}{TOP}":END
BC 530 :
CD 535 PRINT"WEEEE!!":RETURN
SC 540 PRINT"AGHHHH!!!":RETURN
PK 545 PRINT"HELLO!":RETURN
KD 550 :
RG 555 FORIP=0TO2:PRINTCC$(IP);:GOSUB2760
EH 560 IFIN$>"ANDVI">=0ANDVI<16THENPOKECC(IP),VI
RS 565 NEXT:RETURN
BF 570 :
MC 575 T$="A":T=0:IFTT>719THENT$="P":T=12
HB 580 T1=INT(TT/60):T$="{LEFT}:"+RIGHT$("0"+MID$(
      STR$(INT((TT/60-T1)*60)),2),2)+T$
JP 585 IFT1=0THENT1=12
AP 590 RETURN
GQ 595 GOSUB575:PRINT"I'S"T1-T;T$" OF DAY"DY"
      {LEFT}." :RETURN
CG 600 :
CB 605 GOSUB1595:IFNOTNC=1THENPRINTER$(0):RETURN
RJ 610 IN=NC%(Z):DN=NC%(1):IFNOT(IN=5ANDDN=9)THEN6
      35
GR 615 N=DN:GOSUB1645:IFNOTNL=QTHENPRINTER$(1)ND$(
      N)PE$:RETURN
AS 620 N=IN:GOSUB1645:IFNOTNL=QTHENPRINTER$(1)ND$(
      N)PE$:RETURN
FB 625 IFAF>500THENPRINT"THERE IS STILL TOO MUCH F
      UEL IN THE "ND$(N)PE$:RETURN
BG 630 AF=AF+600:NP%(DN)=-2:PRINT"THE LAMP IS REFU
      ELED." :RETURN
FK 635 IFNOTIO%(IN)THENIN=NC%(1):DN=NC%(0)
GS 640 N=DN:GOSUB1645:IFNOTNL=QTHENPRINTER$(1)ND$(
      N)PE$:RETURN
GJ 645 N=IN:GOSUB1645:IFNL=0THENPRINTER$(2)ND$(N)"
      HERE." :RETURN
PM 650 TT=TT+5:IFNOTDN=6THENGOSUB1530:GOTO665
SS 655 IFNOTDN=6THENGOSUB1530:GOTO665
JS 660 N=DN:GOSUB2625
DA 665 IFNOTICTHEN695
```



```

AK 670 IFIN=40THEN685
AG 675 PRINTER$(7)ND$(DN)PE$:IFDN=6THENRETURN
EG 680 DN=LO:LO=80:GOSUB1535:LO=DN:RETURN
GC 685 FORI=0TOSV:IFNOTDN=SV%(I)THENNEXT:GOTO675
HF 690 GOTO735
AB 695 PRINTND$(DN)":GIVEN.":IFNOTIN=2THEN710
MX 700 IFDN=6THENDF=Q:PRINT"THE DOG IS FOLLOWING Y
OU NOW.":RETURN
EC 705 PRINTER$(5):RETURN
ER 710 IFNOTIN=3THEN725
EB 715 IFDN=6THENPRINT"THEY EAT HUNGRILY BUT STAY
{SPACE}FOR MORE.":DG=Q:RETURN
JC 720 PRINTER$(5):RETURN
AA 725 IFIN=38ORIN=39THENPRINTER$(5):RETURN
CF 730 FORI=0TOSV:IFNOTDN=SV%(I)THENNEXT:PRINTER$(
5):RETURN
HJ 735 IFNOT(DN=11ORDN=14ORDN=15ORDN=18)THEN745
FM 740 PRINT"THE VAMPIRE CHANGES INTO A BAT AND FL
IES AWAY.":GOTO915
KB 745 NS%(DN)=0:NW%(DN)=NW%(DN)/3:ND$(DN)="EMPTY
{SPACE}"+ND$(DN):IFDN<>13THEN740
GK 750 PRINT"THE VAMPIRE CLUTCHES WHERE THE HOLY W
ATER HIT HIM ";
KR 755 PRINT"AND LUNGES AT YOU IN RAGE.":VF=5+FND(
5):GOTO975
GB 760 :
RA 765 PRINT"BRIEF DESCRIPTIONS.":DL=0:RETURN
CG 770 PRINT"VERBOSE DESCRIPTIONS.":DL=Q:RETURN
GD 775 :
HE 780 GOSUB1595:IFNOTNC=ZTHENPRINTER$(0):RETURN
JF 785 IFNC%(Z)=5THENDN=9:IN=5:GOTO615
RD 790 PRINTER$(0):RETURN
SE 795 :
EA 800 FORZ1=1TO7:ONZ1GOSUB850,880,925,905,970,980
,940:NEXT:SYSMR:SYSMB:SYSEV
CK 805 IFHV>0THENHV=HV-.1
KH 810 IFHV<0THENHV=Q
SQ 815 NU=NU-(TT-T4)*.06:T4=TT
RD 820 IFNOTICOR(ICANDNOTLN)THENRETURN
JC 825 POKEXS,CX:POKEYS,CY:POKELS,CL:SYSMV:RETURN
HR 830 IFICTHENRETURN
HF 835 Z2=PEEK(214):PN$=PN$(LO):IFVAL(PN$)THENPN$=
PN$(VAL(PN$))
RQ 840 Z3=POS(0):GOSUB575:PRINTS8$PN$TAB(33)T1-T:T
$
CP 845 POKE214,Z2-1:PRINT:PRINTTAB(Z3)"{B}":;:RETUR
N
BB 850 W1=0:IFTT>1440THENTT=TT-1440:T4=T4-1440:T3=
T3-1440:DY=DY+1:S0=Z:S1=Z:S2=Z

```

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```
AB 855 IFNOTS1ANDTT>1260THENPRINT"SUNSET.":S1=Q:NT
      =Q:W1=Q:POKENG,1:GOTO870
BC 860 IFNOTS0ANDTT>1220THENPRINT"THE SUN IS SETTI
      NG.":S0=Q:W1=Q:GOTO870
DP 865 IFNOTS2ANDTT>300THENPRINT"SUNRISE.":S2=Q:NT
      =Z:W1=Q:POKENG,0
QQ 870 IFW1ANDWTTHENPRINT"KEEP WAITING? ";:GOSUB27
      60:WT=NOTLEFT$(IN$,1)="N"
MX 875 RETURN
FK 880 IFRND(1)>.4ORDGTHEN DG=Z:RETURN
GX 885 D$=PP$(NP$(WF)):I=INT(LEN(D$)/6*RND(1))*6+1
      :E$=MID$(D$,I,1)
DJ 890 IFE$="U"ORE$="D"THENRETURN
JG 895 D=VAL(MID$(D$,I+2,2)):FORI=0TOWV:IFWV$(I)=D
      THENNP$(WF)=D:RETURN
HC 900 NEXT:RETURN
JR 905 IFNOT(VF>0ORNT)THENNP$(VR)=67:RETURN
PG 910 VF=VF-1:IFVF>0THENNP$(VR)=LO:RETURN
DQ 915 D$=PP$(NP$(VR)):I=INT(LEN(D$)/6*RND(1))*6+1
      :NP$(VR)=VAL(MID$(D$,I+2,2))
XS 920 RETURN
XK 925 IFNOTNP$(WF)=LOORRND(1)>.6THENRETURN
XQ 930 PRINT"THE WOLVES ARE ATTACKING.":IFNOTDFTHE
      NHV=HV+2-NU/170:RETURN
RC 935 PRINT"THE DOG DEFENDS YOU.":RETURN
AM 940 IFNOTLN$THEN T3=TT:POKESP,Z:RETURN
FE 945 IFNOT(NP$(5)=LOORNP$(5)=Q)THENLN=0:RETURN
JA 950 IFICTHENPOKESP,X
HJ 955 AF=INT(AF-(TT-T3)):T3=TT:IFAF>60THENRETURN
XS 960 IFAF<0THENLN=Z:AF=Z:POKE53269,Z:PRINT"THE L
      AMP IS OUT OF FUEL.":RETURN
FM 965 PRINT"ONLY"AF"MORE MINUTES OF LAMP FUEL.":R
      ETURN
DM 970 IFNP$(VR)<>LOORRND(1)>.4ORNOTNTTHENRETURN
BM 975 PRINT"THE VAMPIRE IS ATTACKING.":HV=HV+3+(N
      P$(15)=QORNP$(11)=Q):RETURN
EP 980 IFNOTICTHENRETURN
XM 985 TX=CX:TY=CY:TL=CL:GOSUB2775
JP 990 IFWH=RHTHENPRINT"RATS ARE ATTACKING.":HV=HV
      +.3:RETURN
XP 995 IFWH=BHTHENPRINT"BATS ARE ATTACKING.":HV=HV
      +.2:RETURN
AX 1000 RETURN
DA 1005 :
DF 1010 IN$=WO$(NW):NW=NW+X:FORI=1TOLEN(DR$)STEP4
EB 1015 IFIN$=MID$(DR$,I,4)THEND$=LEFT$(IN$,X):GOT
      01025
CX 1020 NEXT:PRINTER$(0):RETURN
QC 1025 IFICTHEN1190
```

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AH 1030 FORI=1TOLEN(PP$(LO))STEP6:IFD$=MID$(PP$(LO
),I,X)THEN1055
GA 1035 NEXT:IFD$="U"ORD$="D"THENI=X:GOTO1050
SS 1040 FORI=1TOLEN(CD$):IFLEFT$(PS$(LO),X)=MID$(C
D$,I,X)THEN1050
QX 1045 NEXT:I=X
GC 1050 PRINTCD$(I-X):RETURN
XK 1055 P$=MID$(PP$(LO),I+X,X):IFP$="3"THENPRINT"T
HE WAY IS BLOCKED.":RETURN
AD 1060 IFNOTP$="4"THEN1090
MQ 1065 N=4:GOSUB1645:IFNOTNL=QTHEN1075
BX 1070 PRINT"(USING ROPE)":TT=TT+5:GOTO1090
AR 1075 IFNL=0THENPRINT"I NEED A ROPE.":RETURN
CM 1080 PR=Q:GOSUB1385:GOSUB1645:IFNL=QTHEN1070
KC 1085 PRINT"I NEED TO BE CARRYING THE ROPE.":RET
URN
BS 1090 T1=VAL(MID$(PP$(LO),I+4,2)):L1=VAL(MID$(PP
$(LO),I+2,2))
XE 1095 TT=TT+T1-T1/3*V+HV*5:HV=HV+T1/40*(V+1):IFN
OTNP$(WF)=L0THEN1110
MM 1100 FORI=0TOWV:IFWV$(I)=L1THENNP$(WF)=L1:GOTO1
110
MH 1105 NEXT
KS 1110 IFNP$(2)<>L0ORNOTDFTHEN1120
DR 1115 IFNOT(D$="U"ORD$="D")THENNP$(2)=L1
RH 1120 LO=L1:IFLO=67THEN1150
AC 1125 PN$=PN$(LO):IFVAL(PN$)THENPN$=PN$(VAL(PN$)
)
BQ 1130 PRINT"{DOWN}>"PN$PE$
JQ 1135 IFDLORNOTPV$(LO)THENGOSUB1880:GOTO1145
DC 1140 GOSUB1915
KS 1145 PV$(LO)=Q:RETURN
HP 1150 CL=3:CY=30:IFD$="S"THENCY=1
AB 1155 IFD$<>"E"THEN1170
JP 1160 CL=0:CY=15:TL=0:TY=CY:FORTX=62T01STEP-1:GO
SUB2775:IFWH<>32THENNEXT:STOP
EA 1165 GOTO1175
XR 1170 TL=3:TY=CY:FORTX=1T062:GOSUB2775:IFNOTWH=D
HTHENNEXT:STOP
HQ 1175 CX=TX:IC=Q:PRINT"{CLR}":POKESP,1:POKE53287
,PEEK(646)
FD 1180 IFNOTLNTHENPRINTER$(4)
KP 1185 GOTO820
EC 1190 D2$=D$:IK=0:MF=1:IFVAL(WO$(NW))>0THENMF=VA
L(WO$(NW)):NW=NW+X
PB 1195 IFNOTLNTHENPRINTER$(4)
XS 1200 IFMF>9THENPRINT"NO MORE THAN NINE TIMES.":
RETURN
AK 1205 D$=D2$:GOSUB1220:TT=TT+2+HV*2-V:IK=IK+1
EG 1210 IFMF<=IKORMS$=ER$(8)THENPRINTMS$:GOTO820

```

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```
AR 1215 GOSUB800:GOTO1205
DD 1220 MS$="":FORI=1TO6:IFNOTD$=MID$(D1$,I,1)THEN
NEXT:STOP
BH 1225 GOSUB2775:IFNOTWH=DHTHEN1235
JQ 1230 IF(CY=1ANDD$="N")OR(CY=30ANDD$="S")THENPRI
NT"{CLR}":IC=Z:POKESP,0:GOTO1030
HF 1235 IF(NOTWH=SH)AND(D$="U"ORD$="D")THENMS$=ER$
(8):RETURN
SX 1240 IF(D$="U"ANDTL=3)OR(D$="D"ANDTL=0)THENMS$=
ER$(8):RETURN
SP 1245 I=I-1:TX=CX+DD%(0,I):TY=CY+DD%(1,I):TL=CL+
DD%(2,I):GOSUB2775
RH 1250 IFNOT(WH=THANDRND(1)>.2)THEN1265
GQ 1255 PRINT"YOU HAVE FALLEN THROUGH A TRAP DOOR
{SPACE}AND ARE UNCONSCIOUS.
GP 1260 IK=MF-1:TM=10+FND(10):GOSUB2700:TL=TL-1:GO
TO1270
JC 1265 IFWH=WCTHENMS$=ER$(8):RETURN
FX 1270 CX=TX:CY=TY:CL=TL:GOSUB2775:IFWH=RHTHENMS$
="THERE ARE RATS HERE."
HQ 1275 IFWH=BHTHENMS$="THERE ARE BATS HERE."
CA 1280 RETURN
AD 1285 :
CR 1290 IN$=WO$(NW):IFIN$=PE$THENPRINTER$(0):RETUR
N
FA 1295 IFIN$="INVE"THENNW=NW+X:GOTO1550
QR 1300 GOSUB1715:IFNOTALTHEN1345
DC 1305 GOSUB1735:IFNOTBUTHEN1315
KC 1310 GOSUB1595:IFNC=QTHENPRINTER$(6):RETURN
DA 1315 J=0:FORN=0TONO:IFNOTBUTHEN1330
AX 1320 FORK=0TONC:IFN=NC%(K)THEN1335
FF 1325 NEXT
SK 1330 GOSUB1645:IFNL=XTHENJ=Q:GOSUB1360
DR 1335 NEXTN:IFNOTJTHENPRINT"NOTHING TAKEN."
QF 1340 RETURN
KE 1345 GOSUB1595
AB 1350 IFNC=QTHENPRINTER$(0):RETURN
HK 1355 FORI=0TONC:N=NC%(I):GOSUB1360:NEXT:RETURN
KD 1360 GOSUB1645
KJ 1365 IFNL=QTHENPRINT"YOU ARE ALREADY CARRYING T
HE "ND$(N)PE$:RETURN
CX 1370 IFNOTNL=XTHENPRINTER$(2)ND$(N)" HERE.":RET
URN
JD 1375 IFN=WFTHENPRINT"THE WOLVES GROWL.":RETURN
FB 1380 IFNW%(N)=ZTHENPRINTND$(N)":ARE YOU KIDDING
?":RETURN
FP 1385 IFMW<NW%(N)+PWTHENPRINTND$(N)":I MUST DROP
SOMETHING FIRST.":RETURN
XM 1390 PW=PW+NW%(N):TT=TT+2
XJ 1395 IFWO=QTHENNP%(N)=Q:GOTO1405
```

```

DS 1400 MS%(WO)=Q
MH 1405 ND$=ND$(N)+" :TAKEN":IFPRTHENND$="("+ND$+"
":PR=0
MR 1410 PRINTND$:RETURN
BM 1415 :
BM 1420 PRINT"QUIT? ";:GOSUB2760:IFLEFT$(IN$,1)="Y
"THENPRINT"{CLR}{TOP}":END
PP 1425 RETURN
CM 1430 :
JE 1435 IN$=WO$(NW):IFIN$=PE$THENPRINTER$(0?):RETUR
N
JP 1440 GOSUB1715:IFNOTALTHEN1485
RA 1445 GOSUB1735:IFNOTBUTHEN1455
GK 1450 GOSUB1595:IFNC=QTHENPRINTER$(6):RETURN
MH 1455 J=0:FORN=0TONO:IFNOTBUTHEN1470
GX 1460 FORK=0TONC:IFNC%(K)=NTHEN1475
PX 1465 NEXT
HP 1470 IFNP%(N)=QTHENGOSUB1525:J=Q
PF 1475 NEXTN:IFNOTJTHENPRINT"YOU LEFT NOTHING."
GX 1480 RETURN
HX 1485 GOSUB1595
KJ 1490 IFNC=QTHENPRINTER$(0):RETURN
XP 1495 FORI=0TONC:N=NC%(I):GOSUB1500:NEXT:RETURN
PP 1500 GOSUB1645
SD 1505 IFNOTNL=QTHENPRINTER$(1)ND$(N)PE$:RETURN
AB 1510 IFNOTICTHEN1525
RQ 1515 PRINTER$(7)ND$(N)".
MP 1520 NL=LO:LO=80:GOSUB1530:LO=NL:RETURN
QA 1525 PRINTND$(N)" LEFT."
GH 1530 PW=PW-NW%(N):TT=TT+X
FA 1535 IFWO=QTHENNP%(N)=LO:RETURN
FJ 1540 MS%(WO)=LO:RETURN
XD 1545 :
DB 1550 IFICTHENPRINT"{CLR}":POKESP,0
DH 1555 J=0:FORN=0TONO:GOSUB1645
DB 1560 IFNOTNL=QTHEN1575
SQ 1565 IFNOTJTHENJ=Q:PRINT"YOU ARE CARRYING:"
XH 1570 PRINTND$(N)
MJ 1575 NEXT:IFNOTJTHENPRINT"YOU ARE EMPTY HANDED.
AF 1580 IFICTHENPRINT"{DOWN}PRESS RETURN TO CONTIN
UE: ";:J=USR(0):PRINT"{CLR}":POKESP,1
DF 1585 GOTO820
HF 1590 :
SC 1595 NC=Q:FORI=0TOSL:NC%(I)=Q:NEXT
QF 1600 IFWO$(NW)=PE$THENRETURN
FB 1605 FORI=0TONO:IN$=NO$(I):K=X
AF 1610 IFK>LEN(IN$)THEN1630
SD 1615 FORL=0TOVAL(MID$(IN$,K,X))-X:IFWO$(NW+L)<>
MID$(IN$,K+X+L*4,4)THEN1625
EC 1620 NEXTL:GOTO1635

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```
RE 1625 K=K+VAL(MID$(IN$,K,X))*4+X:GOTO1610
BJ 1630 NEXTI:RETURN
PF 1635 NC=NC+X:NC%(NC)=I:NW=NW+L:GOTO1600
MJ 1640 :
KX 1645 WO=Q:NL=0:IF(N=38ORN=39ORN=40)ANDLO=67THEN
    NL=X:RETURN
DG 1650 IFSH%(N)=ZTHEN1670
CK 1655 OB=SH%(N)-X:FORWO=1TOLEN(SO$(OB))STEP2
DK 1660 IFVAL(MID$(SO$(OB),WO,2))=LOTHENNL=X:WO=(W
    O-X)/2:RETURN
SG 1665 NEXT:RETURN
KK 1670 IFN<>19THEN1695
HX 1675 FORWO=0TOMS:IFMS%(WO)=QTHENNL=Q:RETURN
BR 1680 NEXT
KQ 1685 FORWO=0TOMS:IFMS%(WO)=LOTHENNL=X:RETURN
JH 1690 NEXT:RETURN
EP 1695 IFNP%(N)=QTHENNL=Q:RETURN
DC 1700 IFNP%(N)=LOTHENNL=X
AR 1705 RETURN
PQ 1710 :
DJ 1715 AL=0:FORI=1TOLEN(AL$)STEP4
CR 1720 IFMID$(AL$,I,4)=WO$(NW)THENNW=NW+X:AL=Q:RE
    TURN
QF 1725 NEXT:RETURN
FR 1730 :
HP 1735 BU=0:FORI=1TOLEN(BU$)STEP4
EJ 1740 IFMID$(BU$,I,4)=WO$(NW)THENNW=NW+X:BU=Q:RE
    TURN
MP 1745 NEXT:RETURN
XX 1750 :
QQ 1755 TM=Q:IFWO$(NW)="FOR"THENNW=NW+X
QK 1760 IFWO$(NW)="NIGH"THENTM=0:NW=NW+X:RETURN
EQ 1765 GOSUB1785:IFNOTT=QTHENTM=TN(T):RETURN
CK 1770 L=VAL(WO$(NW)):IFL=0THENRETURN
BR 1775 NW=NW+X:GOSUB1785:IFT=QTHENT=1
BF 1780 TM=L*TN(T):RETURN
SH 1785 T=Q:FORI=0TOTN:IFTN$(I)=WO$(NW)THENNW=NW+X
    :T=I:RETURN
CK 1790 NEXT:RETURN
KE 1795 :
QR 1800 IFNOTLNANDNTTHENPRINTER$(4):RETURN
FB 1805 GOSUB1595:IFNOTNC=QTHEN2045
EF 1810 GOSUB1715:IFALTHEN2000
CC 1815 IN$=WO$(NW):FORI=1TOLEN(DR$)STEP4
FD 1820 IFIN$=MID$(DR$,I,4)THENJ=(I-X)/8:D$=MID$(D
    R$,I,X):GOTO1830
FH 1825 NEXT:GOTO1865
PH 1830 TT=TT+2:NW=NW+X:FORI=1TOLEN(PP$(LO))STEP6:
    IFD$=MID$(PP$(LO),I,X)THEN1845
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JM 1835 IFICTHENPRINTER$(3):RETURN
FH 1840 NEXT:PRINTER$(3):RETURN
GB 1845 IFNOTMID$(PP$(LO),I+X,X)="0"THENPRINT"I CA
N'T SEE THAT WAY.":RETURN
RJ 1850 PRINT"I SEE THE ";I=VAL(MID$(PP$(LO),I+2,
2))
DJ 1855 PN$=PN$(I):IFVAL(PN$)THENPN$=PN$(VAL(PN$))
CD 1860? PRINTPN$PE$:RETURN
QS 1865 IFICTHENPRINT"I AM INSIDE THE MEDIEVAL CAS
TLE.":RETURN
JQ 1870 TT=TT+X:PN$=PN$(LO):IFVAL(PN$)THENPN$=PN$(
VAL(PN$))
GD 1875 PRINT"{DOWN}>"PN$PE$
EM 1880 IFNOTLNANDNTTHENPRINTER$(4):RETURN
XM 1885 J=LO:IFVAL(DE$(PD$(J)))THENJ=VAL(DE$(PD$(J
)))
SR 1890 FORI=PD$(J)TOPD$(J+X)-X:PRINTDE$(I) " ";:NE
XT
PH 1895 PRINT"{LEFT}."
RP 1900 PRINT"{DOWN}OBVIOUS EXITS TO:":FORI=1TOLEN
(PP$(LO))STEP6
CB 1905 FORJ=0TODR:IFMID$(PP$(LO),I,X)=LEFT$(DR$(J
),X)THENPRINTDR$(J) " ";
KM 1910 NEXT:NEXT:PRINT
AE 1915 IFNOTLNANDNTTHENPRINTER$(4):RETURN
CP 1920 J=0:FORN=0TONO
MM 1925 IFN=19AND(MS$(0)=LOORMS$(1)=LO)THEN1935
BA 1930 IFNOT(NP$(N)=LOADNS$(N)>Q)THEN1945
SB 1935 IFNOTJTHENPRINT"{DOWN}OBJECTS PRESENT: "
DK 1940 PRINTND$(N):J=Q
RQ 1945 NEXT:FORI=0TOSO:N=SO$(I):GOSUB1645
HP 1950 IFNOT(NL=XANDNS$(N)>Q)THENRETURN
JD 1955 IFNOTJTHENPRINT"{DOWN}OBJECTS PRESENT: "
BG 1960 J=Q:PRINTND$(N)
HX 1965 RETURN
GR 1970 :
GD 1975 IFNOTLNANDNTTHENPRINTER$(4):RETURN
MR 1980 GOSUB1715:IFNOTALTHEN2040
CR 1985 ND=Q:GOSUB1735:IFNOTBUTHEN2000
CG 1990 GOSUB1595:IFNC=QTHENPRINTER$(6):RETURN
AB 1995 FORI=0TONC:ND$(I)=NC$(I):NEXT:ND=NC
XJ 2000 NC=Q:FORI=0TOSL:NC$(I)=Q:NEXT
XH 2005 FORI=0TONO:N=I:GOSUB1645:IFNL=0THEN2030
SC 2010 IFND=QTHEN2025
GK 2015 FORJ=0TOND:IFI=ND$(J)THEN2030
KS 2020 NEXT
DM 2025 NC=NC+X:NC$(NC)=I
DS 2030 NEXTI:IFNC=QTHENPRINT"THERE IS NOTHING TO
{SPACE}EXAMINE.":RETURN

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```
HF 2035 GOTO2045
KB 2040 GOSUB1595:IFNC=QTHENPRINTER$(0):RETURN
MQ 2045 FORI=0TONC:N=NC%(I):GOSUB2050:NEXT:RETURN
RS 2050 TT=TT+4:GOSUB1645:IFNL=QTHEN2075
PP 2055 IFNOTNL=XTHENPRINTER$(2)ND$(N)" HERE.":RET
URN
JJ 2060 IFNW%(N)=0THEN2075
JE 2065 PR=Q:GOSUB1385:GOSUB1645
RG 2070 IFNOTNL=QTHENPRINTER$(1)ND$(N)PE$:RETURN
ES 2075 PRINTND$(N)":":;:IFN=6THENPRINTNS%(N)"DAY(S
) OF FOOD LEFT.":RETURN
PB 2080 K=N:NN$=NE$(NE%(N)):TT=TT+2
EM 2085 IFN=5THEN2100
EC 2087 IFNN$="N"THENPRINTER$(3):RETURN
PM 2090 IFVAL(NN$)THENK=VAL(NN$)
KC 2095 FORJ=NE%(K)TONE%(K+X)-X:PRINTNE$(J)" ";:NE
XT:PRINT"{LEFT}.{DOWN}":RETURN
JB 2100 PRINT"THE LANTERN IS ";
MS 2105 IFLNTHENPRINT"ON.":RETURN
MR 2110 PRINT"OFF.{DOWN}":RETURN
PG 2115 :
EK 2120 IFNOTLNANDNTTHENPRINTER$(4):RETURN
SJ 2125 GOSUB1595:I=0:IFNC=QTHENPRINTER$(0):RETURN
EQ 2130 N=NC%(I):I=I+X:IFN=QTHENRETURN
DG 2135 IFN=19THENGOSUB2150:GOTO2130
FR 2140 IFN=20THENGOSUB2220:GOTO2130
KD 2145 PRINTER$(0):RETURN
JM 2150 N=17:GOSUB1645:IFNOTNL=0THEN2165
AP 2155 N=20:GOSUB1645:IFNOTNL=0THEN2165
PP 2160 PRINT"I NEED LOOSE WOOD.":RETURN
RH 2165 KW=N:IFNP%(10)=QORNP%(16)=QTHEN2195
QE 2170 N=10:GOSUB1645:IFNL=0THEN2180
FR 2175 PR=Q:GOSUB1385:GOSUB1645:IFNL=QTHEN2195
AG 2180 N=16:GOSUB1645:IFNL=0THENPRINT"I NEED A TO
OL.":RETURN
QX 2185 PR=Q:GOSUB1385
RM 2190 IFNOTNP%(N)=QTHENPRINT"I NEED A TOOL.":RET
URN
AQ 2195 TT=TT+30:PRINT"STAKES MADE.":FORJ=0TOMS
RJ 2200 IFMS%(J)=-2THENMS%(J)=LO:GOTO2210
JE 2205 NEXT:STOP
SH 2210 N=KW:GOSUB1645:IFNL=QTHENPW=PW-NW%(N)
XQ 2215 NP%(N)=-2:RETURN
BC 2220 IFNOTNP%(0)=LOTHENPRINT"I NEED A SMALL TRE
E.":RETURN
BG 2225 N=10:GOSUB1645:IFNL=QTHEN2240
RD 2230 IFNL=0THENPRINT"I NEED AN AXE.":RETURN
KE 2235 PR=Q:GOSUB1385:IFNOTNP%(N)=QTHENPRINT"I NE
ED AN AXE.":RETURN
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GJ 2240 NP%(0)=-2:NP%(21)=LO:TT=TT+30:NP%(20)=LO:P
      RINT"TREE DOWNED.":RETURN
GS 2245 :
KB 2250 IFNOTLNANDNTTHENPRINTER$(4):RETURN
SB 2255 GOSUB1595:I=0:IFNC=QTHENPRINTER$(0):RETURN
HF 2260 N=NC%(I):I=I+X:IFN=QTHENRETURN
ME 2265 IFN=0THENGOSUB2220:GOTO2260
DF 2270 WP=10:GOSUB2350:IFNOTERTHEN2260
XE 2275 PRINTER$(0):RETURN
EA 2280 :
JR 2285 IFNOTLNANDNTTHENPRINTER$(4):RETURN
HM 2290 GOSUB1595:IFNOTNC=0THENPRINTER$(0):RETURN
QG 2295 VM=NC%(0):N=VM:GOSUB1645
JR 2300 IFNOTNL=XTHENPRINTER$(2)ND$(VM)"HERE.":RE
      TURN
GH 2305 IFNOTWO$(NW)="WITH"THEN2330
QM 2310 NW=NW+1:GOSUB1595:IFNOTNC=0THENPRINT"WITH
      {SPACE}WHAT?":RETURN
JP 2315 WP=NC%(0):IFWS$(WP)=0THENPRINT"THE "ND$(WP
      )"IS NOT A WEAPON.":RETURN
MK 2320 IFNP$(WP)=QTHEN2350
JP 2325 PRINTER$(1)ND$(WP)PE$:RETURN
HD 2330 WP=Q:FORI=0TONO:IFNOTNP%(I)=QORWS%(I)=0THE
      N2340
CR 2335 IFWS%(I)>WPTHENWP=I
EK 2340 NEXT:IFWP=QTHENPRINT"YOU HAVE NO WEAPON.":
      RETURN
HH 2345 PRINT"(WITH "ND$(WP)")"
ED 2350 IFVM=2THENPRINT"THE DOG YELPS AND DIES.":D
      F=0:ND$(2)="DEAD DOG":RETURN
XH 2355 IFNOTVM=3THEN2375
DB 2360 HV=HV+.2:IFNOTWS$(WP)>4THEN2370
XE 2365 PRINT"YOU INJURE ONE WOLF; THEY ALL RUN OF
      F.":GOTO885
JR 2370 PRINTER$(5):RETURN
JG 2375 TL=CL:TX=CX:TY=CY:GOSUB2775:IFNOTN=39THEN2
      395
AH 2380 IFNOTWH=BHORNOTICTHENPRINT"THERE ARE NO BA
      TS HERE.":RETURN
SC 2385 HV=HV+.1:IFWS$(WP)<6THENPRINTER$(5):RETURN
CM 2390 POKE40960+TX+TY*64+TL*2048,0:SYSMR:SYSMB:S
      YSEV
QS 2395 IFNOTN=38THENPRINTER$(0):ER=Q:RETURN
RR 2400 IFNOTWH=RHORNOTICTHENPRINT"THERE ARE NO RA
      TS HERE.":RETURN
EB 2405 GOTO2385
FH 2410 :
HF 2415 IFNOTLNANDNTTHENPRINTER$(4):RETURN

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SS 2420 GOSUB1715:IFALTHENNW=NW+X:PRINTER$(0):RETU
RN
PX 2425 GOSUB1595:I=0:IFNC=QTHENPRINTER$(0):RETURN
RC 2430 N=NC%(I):I=I+X:IFN=QTHENRETURN
MG 2435 IFN=22THENPRINTDN$:GOTO2430
EQ 2440 GOSUB1645:IFN=12THENGOSUB2465:GOTO2430
MB 2445 IFN=XTHENGOSUB2455:GOTO2430
GR 2450 PRINTER$(0):RETURN
KH 2455 IFNL=0THENPRINTER$(2)" SIGN HERE.":RETURN
KE 2460 TT=TT+5:PRINT"THE SIGN SAYS:'RD$(WO)".':
RETURN
MQ 2465 IFNL=0THENPRINTER$(2)" BOOK HERE.":RETURN
EG 2470 IFNL=XTHENPR=Q:GOSUB1385
RD 2475 GOSUB1645:IFNOTNL=QTHENPRINTER$(1)"BOOK.":
RETURN
JQ 2480 TT=TT+30:FORJ=BC%(CC)TOBC%(CC+X)-X:PRINTBC
$(J)" ";:NEXT:PRINT"{LEFT}."
AX 2485 CC=CC+X:IFCC>MCTHENCC=0
AQ 2490 RETURN
GX 2495 :
BD 2500 BF=0:GOSUB1715:IFNOTALTHEN2535
KK 2505 L=0:FORI=BFTOFO:N=FO%(I):GOSUB1645
CC 2510 IFNL=XORNL=QTHENL=Q:GOSUB2550
DB 2515 NEXT:IFLTHEN2530
CR 2520 IFBF=0THENPRINT"NOUTHING EDIBLE HERE.":GOTO
2530
QS 2525 PRINT"NOUTHING TO DRINK HERE."
CG 2530 TT=TT+2:RETURN
MJ 2535 GOSUB1595:IFNOTNC=QTHEN2545
KP 2540 PRINTER$(0):RETURN
QE 2545 FORI=0TONC:N=NC%(I):GOSUB2550:NEXT:RETURN
AJ 2550 IFNOTNU>170THEN2565
JC 2555 IFI<LFTHENPRINT"I'M NOT HUNGRY.":RETURN
CX 2560 PRINT"I'M NOT THIRSTY.":RETURN
RA 2565 FORJ=BFTOFO:IFFO%(J)=NTHEN2580
JH 2570 NEXT:TT=TT+X:IFBF=0THENPRINTND$(N)" NOT ED
IBLE.":RETURN
MH 2575 PRINT"I CAN'T DRINK THE "ND$(N)PE$:RETURN
MM 2580 IFNS%(N)=0THENPRINT"THERE'S NONE LEFT.":RE
TURN
QQ 2585 GOSUB1645:IFNL=XORNL=QTHEN2595
QS 2590 PRINTER$(2)ND$(N)" HERE.":TT=TT+2:RETURN
RR 2595 IFNL=XTHENPR=Q:GOSUB1385
JR 2600 GOSUB1645:IFNOTNL=QTHENPRINTER$(1)ND$(N)PE
$:RETURN
HQ 2605 PRINTFD$(J)
ER 2610 NU=NU+NU%(J):IFN=6THEN2625
ED 2615 NS%(N)=0:PW=PW-NW%(N):NW%(N)=NW%(N)/3:PW=P
W+NW%(N)
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RP 2620 ND$(N)="EMPTY "+ND$(N):RETURN
HC 2625 FD=NS%(N)-X:NS%(N)=FD:PW=PW-2:NW%(6)=FD*2
MM 2630 IFFD=0THENPRINT"NO MORE FOOD.":NP%(6)=-2
DX 2635 IFFD<3THENPRINT"ONLY";
DB 2640 PRINTFD"DAY(S) OF FOOD LEFT.":RETURN
JJ 2645 :
XE 2650 BF=LF:GOSUB1715:IFALTHEN2505
SS 2655 GOTO2535
PJ 2660 :
BQ 2665 GOSUB1755:FORK=0TOSE:IFSE%(K)=LOTHEN2675
JD 2670 NEXT:PRINT"I CAN NOT SLEEP HERE.":RETURN
BB 2675 IFNOT(TM=0ORTM=Q)THEN2695
FA 2680 PRINT"SLEEP FOR TEN HOURS? ";:GOSUB2760:IF
NOTLEFT$(IN$,X)="Y"THENRETURN
GB 2685 FORK=1TO30:HV=HV-.13:TT=TT+20:GOSUB800:GOS
UB830:NEXT
XP 2690 RETURN
MD 2695 IFTM>600THENPRINT"I CAN SLEEP ONLY FOR TEN
HOURS AT A TIME.":TM=600
KQ 2700 FORK=0TOTMSTEP20:TT=TT+20:HV=HV-.13:GOSUB8
00:GOSUB830:NEXT
FP 2705 RETURN
GM 2710 :
EC 2715 GOSUB1755:IFTM=0ORTM=QTHENTM=10
QC 2720 IFNOTTM>59THEN2740
BS 2725 PRINT"REALLY WAIT THAT LONG? ";:GOSUB2760
BH 2730 IFLEFT$(IN$,X)<>"Y"THENRETURN
KQ 2735 WT=Q:FORK=0TOTMSTEP5:HV=HV-.017:TT=TT+5:GO
SUB800:IFWTTHENNEXT:WT=0
AR 2740 RETURN
GS 2745 :
BG 2750 PRINT"I CAN OFFER NO HELP.":RETURN
FX 2755 :
RR 2760 GOSUB830:ZL=USR(0)-1:PRINT:IN$="":IFZL=QTH
ENRETURN
RA 2765 FORI=0TOZL:IN$=IN$+CHR$(PEEK(BP+I)):NEXT:I
I=VAL(IN$):RETURN
EX 2770 :
EM 2775 POKEXS,TX:POKEYS,TY:POKELS,TL:SYSWK:WH=PEE
K(OS):RETURN
JA 2780 :
CC 2785 DATA,50,21,1,-1,1,,3,.
JB 2790 DATAAND INTOEMPTA{3 SPACES}AN{2 SPACES}THE
TO{2 SPACES}AT{2 SPACES}SOME
RQ 2795 DATANORTN{3 SPACES}SOUTS{3 SPACES}EASTE
{3 SPACES}WESTW{3 SPACES}UP{2 SPACES}U
{3 SPACES}DOWND{3 SPACES},NSEWUD
CG 2800 DATA"VAMPYRE HUNTER"

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FH 2805 DATA5,2, 30,40,14,4,3,92,3,3,8,58,128,17,4
,5,6,ALL EVER

GF 2810 DATAEXCEBUT ,NWTB,1,1100,820,821,822,2,18,
4,3,20,831,19,160,40,600

KF 2815 DATA1020,80,22,5,,,1,-1,,, -1,1,,,,,,,1,-
1

BM 2820 DATA"I CAN'T GO THAT WAY.

MB 2825 DATA"THE WAY IS BLOCKED BY WATER.

MH 2830 DATA"THE TREES ARE TOO DENSE IN THAT DIREC
TION.

JJ 2835 DATA"THERE'S A WALL THERE.

MB 2840 DATANORTH,SOUTH,EAST,WEST,UP,DOWN

CE 2845 DATAHOUR,60,MINU,1,SECO,.017

RM 2850 DATAGO{2 SPACES}WALKCLIM,RUN ,TAKEGET GRAB
QUITEND ,DROPLEAV,I{3 SPACES}INVE,L
{3 SPACES}LOOK

MX 2855 DATAREAD,HELP,EXAM,MAKEBUIL,AXE CHOP,EAT ,
DRIN,SLEE,WAITREST,JUMP

EE 2860 DATASCREYELLSHOU,BRIE,VERB,HI{2 SPACES}HEL
L,KILLATTAFIGHSTAB,TIME,GIVEFEEDTHRO

BK 2865 DATACOLO,LAMP,LIGHIGNI,EXTISMUT,DRIV,REFU,
CLEA

PD 2870 DATA1TREE2SMALTREE,21,, SMALL TREE,,1SIGN,-
2,, SIGN,

RR 2875 DATA1DOG 2DEADDOG ,60,, DOG,,1WOLF1WOLV,85,
,WOLVES,,1ROPE,23,5,ROPE,

AQ 2880 DATA1LAMP1LANT,5,5,LANTERN,,1FOOD,3,, FOOD,
10,2VINEBOTT1VINE3BOTTOF{2 SPACES}VINE

EE 2885 DATA5,1,BOTTLE OF VINEGAR,1,1MALL2WOODMALL
,5,2,WOODEN MALLET,

SS 2890 DATA1FUEL1OIL 2LANTFUEL,23,1,LANTERN FUEL,
,1AXE ,29,10,AXE,

EF 2895 DATA1GARL3STRIOF{2 SPACES}GARL,22,1,STRING
OF GARLIC,,1BOOK,30,2,BOOK,

JG 2900 DATA2WATEBOTT1WATE2HOLYWATE4BOTTOF
{2 SPACES}HOLYWATE3BOTTOF{2 SPACES}WATE,19
,2

QQ 2905 DATABOTTLE OF HOLY WATER,1,1WAFE2HOLYWAFE4
TIN OF{2 SPACES}HOLYWAFE3TINOF{2 SPACES}WA
FE

MR 2910 DATA19,2,TIN OF HOLY WAFERS,1,1CRUC,18,2,C
RUCIFIX,

XP 2915 DATA1KNIF3SHORBLADKNIF,49,1,KNIFE,,1PALE2F
ENCEPALE,48,10

XP 2920 DATABROKEN FENCE PALES,,1MIRR3PIECEOF
{2 SPACES}MIRR,24,1,PIECE OF MIRROR,

BG 2925 DATA1STAK2WOODSTAK,-2,2,WOODEN STAKES,,1LO
GS1LOG 1WOOD,-2,, LOGS,

QF 2930 DATA1STUM,-2,,STUMP,,2CORNSTON1STON,64,,CO
RNER STONE,,1WELL,-2,,WELL,-1

GQ 2935 DATA1CHUR,-2,,CHURCH,-1,1INN,-2,,VILLAGE
{SPACE}INN,-1,1SHOP,-2,,VILLAGE SHOP,-1

JE 2940 DATA1HOUS,-2,,HOUSE,-1,1COTT,-2,,COTTAGE,-
1,1GATE2IRONGATE,-2,,IRON GATE

CS 2945 DATA-1,2GATEHOUS,-2,,GATE HOUSE,-1,1RIVE,-
2,,RIVER,-1,1SWAM,-2,,SWAMP,-1

SG 2950 DATA1FIEL,-2,,FIELD,-1,1CAST,-2,,CASTLE,-1
,1GARD,-2,,GARDEN,-1,1VILL,,

RK 2955 DATAVILLAGE,-1,1WALL,-2,,STONE WALL,-1,1RA
T 1RATS,-2,,RATS,

PM 2960 DATA1BAT 1BATS,-2,,BATS,,1VAMP,67,,VAMPIRE
,

XK 2965 DATA1,01163908,23,5813,24,1617,25,0102,26,
0809,27,272831321239464748

MS 2970 DATA28,272831321239464748,29,41519280,30,5
1419280,31,3775,32,3770717535

AG 2975 DATA33,726973687170,34,41925180,35,6160588
36664,37,6564668382

KX 2980 DATA6,100,11,20,14,15,7,5,13,5

SA 2985 DATA"THAT REALLY HITS THE SPOT.", "RAW GARL
IC, YÜCK!

EM 2990 DATA"WHY DID I EAT THE HOLY WAFERS?", "YICK
!", "THANKS, I WAS THIRSTY.

QH 2995 DATA"PATH APPROACHING VILLAGE",N00110,T,"P
ATH IN FRONT OF INN

GA 3000 DATAN00710E00203S00010,T,"WALKWAY TO INN",
E00303W00103,T

XE 3005 DATA"INN DINING ROOM",E20503W20206U20405,B
,BEDROOM,D20305,B

QD 3010 DATABACKROOM,W20306,B,PATH,N01505E00705,T,
6,E00810W00605S00110,T

DX 3015 DATA"PATH IN FRONT OF SHOP",N00903E01020W0
0710,T,"WALKWAY TO SHOP"

GM 3020 DATAN02303S00803,T,6,N01105W00820,T,6,N027
10S01005E01206,T

CS 3025 DATA"PATH IN FRONT OF HOUSES",E01312W01106
,T,WELL,W01212D41415,T

GJ 3030 DATAINSIDE THE WELL,U41320,N,6,N01610S0060
5,T

XS 3035 DATA"PATH IN FRONT OF CHURCH",N02010S01510
E02515W01703,T

CX 3040 DATA"WALKWAY TO CHURCH",E01603W01803,T,"CH
URCH SANCTUARY

AB 3045 DATAE21703S21910,B,"CHURCH ALCOVE",N21810,
B,6,N04010S01610E02105,T

EK 3050 DATA6,W02030E03405,T,ROOT CELLER,U22305,B,
SHOP,S20903U22405D22205,B

- PK 3055 DATABEDROOM OF SHOP,D22305,B,6,N03420E0261
3W01615,T,6,N03320E02707W02513,T
- EA 3060 DATA6,N03210S01110W02607E02804,T,WALKWAY T
O HOUSE,E02904W02704,T
- PQ 3065 DATADESERTED HOUSE,W22804,B,29,W23104,B,28
,W03204E03004,T
- SG 3070 DATA6,N04310S02710E03104W03314,T,FOREST,N2
4220S22620E23214W23426,T
- MK 3075 DATA33,N24120S22520E23326W22130,T,RIVER BA
NK,N27440E23720,W,SWAMP,N23720,W
- CX 3080 DATABROKEN BRIDGE,N07340S03620E03805W03520
,W,6,E03910W03705,T
- AD 3085 DATA6,E04010W03810N04704,T,6,E04115W03910S
02010,T,6
- CA 3090 DATAE04213W04015N05104S03420,T,6,S03320E04
307W04113,T,6
- XC 3095 DATAN05310S03210E04410W04207,T,6,E04510W04
310,T,6,W04410,T,FENCE,E04704,T
- GE 3100 DATAWALKWAY TO GROUNDSKEEPER'S HOUSE,N0490
4S03904E04804W04604,T,46
- PE 3105 DATAW04704,T,GROUNDSKEEPER'S HOUSE,N26820S
24704,B,WEST GATE HOUSE,E25104,B
- AH 3110 DATASOUTH GATE,N06705S04104E05204W05004,N,
EAST GATE HOUSE,W25104N26503,B
- SX 3115 DATA6,N06115S04310W06308E05420,N,GARDEN,N2
6030W25320E25520,T,54
- FB 3120 DATAN25830E25620W25420,T,54,W25520N25930,T
,14,U45820W26710,N
- JB 3125 DATA13,N08730S05530E05920W06010D45715,N,54
,N28830S25630W25820,T
- FK 3130 DATA6,N08630S05430E05810W06110,N,6,N08515S
05315E06010W06208,N
- AG 3135 DATA54,N28430S26330E26108W26606,N,54,N2623
0W26406E25308,T,WALL
- CK 3140 DATAN26630E26306W26520,T,64,E26420S25206,N
,64,N28330S26430E26206,N
- FE 3145 DATACASTLE,N28005S25105,B,SOUTH FIELD,N069
15S04920W07006,N,NORTH FIELD
- XR 3150 DATAN07710S06815W07106,N,SMALL DIKE,N27130
E26806W27312,W
- CP 3155 DATA70,S27030E26906W27212,W,36,N27520S2733
0E27110W27430,W,36
- QC 3160 DATAN27230S23740E27010W27420,W,36,N27215S2
3540E27320,W,35
- BJ 3165 DATAN27610S27220E27715,W,RIVER,S27510,W,6,
E07815S06910W07515,T,6
- KK 3170 DATAW07715E09215,T,50,E08004,B,NORTH GATE,
N09204S06705E08104W07904,N,52

- AE 3175 DATAW08004S08206,B,64,N28106E28320,N,64,S2
6630E28412W28220,N,54
- KK 3180 DATAS26230W28306E28508,T,6,N08915S06115E08
620W08412,N,54
- KX 3185 DATAS26030E28720W28520,T,54,S25830W28620E2
8820,T,54,W28730S25920,T
- RA 3190 DATA6,N09010W09107S08515,T,6,S08910,T,6,E0
8907W09213,T
- AD 3195 DATA6,E09113W07815S08004,T
- AB 3200 DATA"INN","THE VILLAGE CHURCH","GROUNDSKEE
PER","SHOP AND TRADING POST
- KK 3205 DATA"'SLAYING VAMPIRES'"(READ MORE)",
- CQ 3210 DATA"PART ONE:AN UNINTERESTING HISTORY OF
{SPACE}VAMPIRES",
- RK 3215 DATA"PART TWO:THE VAMPIRE FEARS MIRRORS, B
ECAUSE HE DOES NOT CAST
- BQ 3220 DATA"REFLECTIONS AND CAN BE IDENTIFIED. HO
LY WATER BURNS HIS SKIN AND
- CP 3225 DATA"HE FEARS THE CRUCIFIX. GARLIC IS ALSO
A GOOD DEFENSE.
- AC 3230 DATA"HE CAN CALL BATS, RATS AND WOLVES TO
{SPACE}HIS DEFENSE.",
- RQ 3235 DATA"PART THREE:THE VAMPIRE CAN BE KILLED
{SPACE}IN ONE OF TWO WAYS:
- RG 3240 DATABY DRIVING A WOODEN STAKE INTO HIS BOD
Y OR BY KEEPING HIM
- FF 3245 DATAOUT OF HIS CASKET UNTIL DAWN.
- HG 3250 DATAN,,AN OLD WOODEN SIGN WITH WORDS ENGRA
VED ON IT,,N,
- JE 3255 DATA"THIS PACK OF VICIOUS WOLVES SEEMS TO
{SPACE}BE EYEING ME HUNGRILY",
- FM 3260 DATA"A GOOD LENGTH OF STURDY HEMP ROPE STR
ONG ENOUGH TO SUPPORT
- JH 3265 DATATHE WEIGHT OF A HUMAN,,N,,N,
- PP 3270 DATA"THIS ANCIENT BOTTLE OF VINEGAR IS ALM
OST FULL",,N,,N,,N,
- KX 3275 DATA"A LONG STRING OF POTENT SMELLING GARL
IC",
- XK 3280 DATA"THIS DUSTY OLD BOOK MAY BE WORTH READ
ING",,N,,N,,N,
- SA 3285 DATA"A SHORT-BLADED WOOD HANDLED KNIFE WHI
CH LOOKS SOMETHING LIKE A
- EJ 3290 DATA"DAGGER. IT SEEMS TO HAVE BEEN USED FO
R MANY THINGS, BUT IT IS STILL
- GA 3295 DATA"IN VERY GOOD CONDITION DESPITE ITS AG
E",,N,,N,
- BQ 3300 DATA"THESE STAKES ARE CARVED WITH ONE SHAR
P END",

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DX 3305 DATA "A SHORT LOG FROM A RECENTLY DOWNED EL
M TREE",,N,
GF 3310 DATA "THIS CORNER STONE HAS A SHORT DEDICAT
ION ENGRAVED ON IT",
AM 3315 DATA "THE WELL IS CIRCULAR WITH AN OPENING
{SPACE}LARGE ENOUGH FOR A MAN
KB 3320 DATA "TO CLIMB DOWN. THERE IS A STRONG POST
TO TIE A ROPE TO NEARBY",
FQ 3325 DATA "THE CHURCH IS A STONE BUILDING IN GOO
D CONDITION FOR ITS AGE",
HF 3330 DATA "THE VILLAGE INN IS A DECAYING TWO STO
RY WOODEN BUILDING. IT APPEARS
DX 3335 DATA "TO BE THE ONLY INN IN THE VILLAGE",
DE 3340 DATA "THE VILLAGE SHOP LOOKS RECENTLY ABAND
ONED. IT IS WELL MAINTAINED,
XA 3345 DATA "BUT IS BEGINNING TO SHOW ITS AGE",
HQ 3350 DATA "THIS HOUSE, LIKE MANY OF THE OTHERS I
N THE VILLAGE, IS OLD, AND
PJ 3355 DATA "VERY SMALL. IT HAS ONLY ONE STORY AND
A SINGLE ROOM",,27,
SP 3360 DATA "THIS LARGE IRON GATE TO THE CASTLE IS
RUSTED AND WILL NOT MOVE.
GQ 3365 DATA "FORTUNATELY, IT HAS BEEN LEFT OPEN FO
R ANY WANDERING TRAVELER",
DB 3370 DATA "THIS STONE GATE HOUSE HOLDS ONE SIDE
{SPACE}OF THE IRON GATE",
DH 3375 DATA "THE RIVER FLOWS STEADILY AND IS FAIRL
Y DEEP",
RE 3380 DATA "THE SWAMP IS NOT TOO DANGEROUS, BUT I
T IS DIFFICULT TO TRAVEL
RS 3385 DATA "THROUGH IT. DIRECTIONS TEND TO GET CO
NFUSED IN THE SWAMP",
SE 3390 DATA "THIS FIELD WAS ONCE USED EXTENSIVELY
{SPACE}FOR FARMING, BUT NO LONGER. IT
SD 3395 DATA HAS NOT BEEN PLOUGHED FOR MANY YEARS,
HC 3400 DATA "THIS CASTLE COMES COMPLETE WITH A MOA
T AND DRAWBRIDGE. THE BRIDGE
ER 3405 DATA "IS DOWN AND SAFE FOR TRAVEL. THE OUTE
R WALL IS MADE OF STONE, BUT
CH 3410 DATA "THERE IS ONLY ONE ROW OF SMALL WINDOW
S. THE GATE SEEMS TO BE THE
BJ 3415 DATA "ONLY WAY INTO THE CASTLE",
JK 3420 DATA "THIS WAS ONCE A LOVELY GARDEN, BUT TH
ROUGH YEARS OF NEGLECT HAS
FQ 3425 DATA REVERTED TO FOREST LAND,
BB 3430 DATA "THE SMALL VILLAGE THAT LIES TO THE NO
RTH PROBABLY HAS A SMALL INN,
SH 3435 DATA "SHOP AND CHURCH. THERE ARE SOME HOUSE
S. I DO NOT SEE MANY PEOPLE

GG 344Ø DATA"ABOUT AND THEY ARE ALL VERY SHY. DON'
T EXPECT ANY CONVERSATIONS",
EK 3445 DATA"THE STONE WALLS ARE MADE UP OF MANY I
RREGULARLY SHAPED STONES, HELD
QD 345Ø DATA"TOGETHER WITH MORTAR. THERE ARE NO GA
PS BETWEEN THE
SD 3455 DATA"STONES. ODDLY, THERE IS ONLY ONE ROW
{SPACE}OF WINDOWS ON THE WALL",
HR 346Ø DATA"A BITE FROM ONE OF THESE LARGE RATS M
IGHT PROVE FATAL",
CQ 3465 DATA"THESE ARE LARGE VAMPIRE BATS. THEIR B
ITE IS INCAPACITATING",
PD 347Ø DATA"THE VAMPIRE HAS A LONG BLACK CAPE AND
SHARP FANGS
JG 3475 DATA"A SMALL VILLAGE LIES TO THE NORTH",
FJ 348Ø DATA"THE WALK TO AN INN LIES TO THE EAST O
F THIS NORTH-SOUTH PATH",
ED 3485 DATA"YOU ARE ON THE COBBLE STONE WALK OF T
HE INN",
KC 349Ø DATA"THE DINING HALL OF THE INN IS POORLY
{SPACE}LIT. IT AND A SMALL BACKROOM
CE 3495 DATA"OCCUPY THE ENTIRE DOWNSTAIRS OF THE C
RUMBLING
CJ 350Ø DATA"BUILDING. A STAIRWAY LEADS UP TO A VA
CANT BEDROOM",
DA 3505 DATA"THIS SMALL BEDROOM HAS SEEN MANY TRAV
ELERS. THERE IS A SMALL BED
KA 351Ø DATA"WHERE YOU CAN SLEEP COMFORTABLY. SOME
ITEMS LEFT BY OTHERS
RA 3515 DATA"ADORN THE ROOM, BUT THERE IS NOTHING
{SPACE}USEFUL",
KH 352Ø DATA"THE BACKROOM OF THE INN IS USED TO ST
ORE UNUSED ITEMS",
DH 3525 DATA"THE PATH TURNS HERE AND HEADS NORTH A
ND EAST",
AR 353Ø DATA"THIS EAST-WEST PATH CUTS THOUGH THE V
ILLAGE",
MF 3535 DATA"THE WALK TO THE VILLAGE SHOP LIES NOR
TH OF HERE",
QP 354Ø DATA"A DESERTED SHOP LIES TO THE NORTH. IT
IS OLD, BUT ONE OF THE
CH 3545 DATA"BETTER KEPT BUILDINGS IN THE VILLAGE"
,
FF 355Ø DATA"THE PATH TURNS HERE AND CONTINUES NOR
TH AND WEST",
KH 3555 DATA"THE PATH IS NORTH-SOUTH. TO THE EAST
{SPACE}ARE SOME OCCUPIED COTTAGES",
QD 356Ø DATA"SOME OCCUPIED HOUSES ARE SOUTH OF THI
S PATH",

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RA 3565 DATA "THE PATH ENDS AT A DRY WELL",
AJ 3570 DATA "THERE IS NO WAY OUT BUT UP",
AS 3575 DATA "THERE IS A SIGN TO THE NORTH WHICH IS
TOO SMALL
CE 3580 DATATO BE READ FROM THIS DISTANCE,
HG 3585 DATA "TO THE WEST LIES THE WALK TO THE ONLY
CHURCH IN THE VILLAGE",
PJ 3590 DATA "THE VILLAGE CHURCH LIES FURTHER TO TH
E WEST",
AB 3595 DATA "THIS PART OF THE CHURCH IS WELL MAINT
AINED, BUT LOOKS AS IF IT HAD
QK 3600 DATA "BEEN DAMAGED RECENTLY",
FF 3605 DATA "THIS ROOM IS SMALLER THAN THE ROOM TO
THE NORTH. THERE ARE
RP 3610 DATA "SOME USEFUL THINGS HERE",
BP 3615 DATA "THE ROAD DIVIDES TO THE NORTH. THERE
{SPACE} IS A SIGN AND A SMALL BUILDING
SQ 3620 DATA "TO THE SOUTH",
FC 3625 DATA "THE PATH BECOMES MORE LIKE A TRAIL AS
IT HEADS EAST INTO THE FOREST",
QR 3630 DATA "IT IS COOL AND DRY HERE. THERE ARE EM
PTY BASKETS ON THE SHELVES
DC 3635 DATA "WHICH LINE THE WALLS OF THIS ROOM",
GC 3640 DATA "THE GROUND FLOOR OF THE SHOP LOOKS RE
CENTLY ABANDONED. THERE ARE
PH 3645 DATA "STILL SOME SUPPLIES, BUT MOST ARE SCA
TTERED USELESSLY ABOUT.
CM 3650 DATA "STAIRWAYS LEAD UP AND DOWN FROM HERE"

KQ 3655 DATA "THIS APPEARS TO HAVE BEEN THE BEDROOM
OF THE SHOPKEEPER, ALTHOUGH
SM 3660 DATA "THERE ARE NO LONGER ANY SIGNS OF THE
{SPACE} PERSON WHO ONCE LIVED HERE",
KX 3665 DATA "TO THE SOUTH THERE IS THE REAR OF A T
WO STORY BUILDING,
DS 3670 DATA "BUT THERE IS NO WAY THERE FROM HERE",
EJ 3675 DATA "FAR TO THE EAST ARE SOME DESERTED HOU
SES",
GD 3680 DATA "THIS IS PART OF A LONG NORTH-SOUTH PA
SSAGE THROUGH A THICK FOREST",
FB 3685 DATA "A DESERTED HOUSE LIES TO THE EAST. TO
THE NORTH, THROUGH SOME TREES,
BP 3690 DATA "IS ANOTHER DESERTED HOUSE",
XJ 3695 DATA "THIS IS THE INSIDE OF A SMALL, ONE RO
OM COTTAGE. NOT MUCH REMAINS
PA 3700 DATA "OF THE BUILDING AND ITS LAST OCCUPANT
S, BUT THERE ARE MAY BE
KQ 3705 DATASOME USEFUL THINGS HERE, , 29,

- DR 3710 DATA "A DESERTED HOUSE LIES TO THE EAST. TO
THE SOUTH, BEYOND SOME TREES
- PR 3715 DATALIES ANOTHER HOUSE,,27,
- JP 3720 DATA "THE FOREST HERE IS VERY DENSE; LITTLE
CAN BE SEEN IN ANY DIRECTION",
- FH 3725 DATA33,, "THE RIVER HERE FLOWS STEADILY",
- PP 3730 DATA "THIS IS THE SOUTH END OF THE SWAMP",
- AQ 3735 DATA "THIS BRIDGE ONCE SPANNED THE WIDTH OF
THE RIVER",
- FE 3740 DATA "THERE IS A SIGN TO THE EAST WHICH IS
{SPACE} TOO SMALL TO BE READ FROM HERE",
- RE 3745 DATA "TO THE NORTH IS THE GROUNDKEEPER'S S
MALL COTTAGE",
- JF 3750 DATA "THE PATH TURNS HERE HEADING NORTH AND
EAST. A SMALLER PATH, LESS
- MJ 3755 DATA "RECENTLY USED, HEADS WEST. TO THE NOR
TH IS THE MOAT OF
- MR 3760 DATA THE OLD MEDIEVAL CASTLE,
- ER 3765 DATA "TO THE NORTH IS THE GATE OF THE OLD M
EDIEVAL CASTLE. THE PATH
- CK 3770 DATA CONTINUES EAST-WEST,
- CK 3775 DATA "THE PATH CONTINUES EAST-WEST. TO THE
{SPACE} NORTH IS THE MOAT OF THE
- RX 3780 DATA OLD MEDIEVAL CASTLE,
- AJ 3785 DATA "TWO PATHS CROSS HERE, ONE EAST-WEST,
{SPACE} THE OTHER NORTH-SOUTH.
- EK 3790 DATA "BOTH WERE ONCE USED HEAVILY",
- CD 3795 DATA "THIS EAST-WEST PATH LEADS DEEPER INTO
THE FOREST",
- JC 3800 DATA "FURTHER TRAVEL EAST IS BLOCKED BY FAL
LEN TREES",
- XC 3805 DATA "THERE WAS ONCE A PICKET FENCE HERE, B
UT VERY LITTLE REMAINS",
- XJ 3810 DATA "THE COBBLE STONE WALK TO THE GROUNDSK
EOPER'S COTTAGE
- EC 3815 DATA "LOOKS LIKE IT WAS ONCE WELL MAINTAIN
D. NOW IT IS VERY MUCH
- DP 3820 DATA OVERGROWN,,46,
- FG 3825 DATA "THERE ARE FEW PERSONAL ITEMS HERE, BU
T SOME THINGS MAY BE USEFUL",
- PD 3830 DATA "THIS IS ONE OF TWO GATE HOUSES FOR TH
E SOUTH-GATE OF THE CASTLE",
- DQ 3835 DATA "THE LARGE IRON GATE HAS BEEN LEFT OPE
N; THE DRAWBRIDGE OVER THE MOAT
- SS 3840 DATA "HAS BEEN LEFT DOWN. ENTERING THE CAST
LE HERE WILL PUT YOU ON THE"
- EJ 3845 DATA "GROUND FLOOR OF THE CASTLE. THERE DO
{SPACE} NOT APPEAR TO BE ANY OTHER

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- KQ 3850 DATA ENTRANCES ON THIS FACE OF THE CASTLE,,
50,
- EB 3855 DATA "THIS NORTH-SOUTH PATH CUTS THROUGH AN
OVERGROWN GARDEN",,86,,86,,86,
- KH 3860 DATA "THERE IS ABOUT A FOOT OF WATER HERE.
{SPACE}STRANGE, THERE IS A SLIGHT
- XP 3865 DATA DRAFT COMING FROM THE WEST,
- FM 3870 DATA "THIS CIRCULAR PATH AROUND THE WELL SE
EMS RARELY USED",,86,
- DR 3875 DATA "THIS EAST-WEST PATH CUTS THROUGH AN O
VERGROWN GARDEN",
- BC 3880 DATA "THE PATH CONTINUES NORTH-SOUTH; THERE
IS A NEW PATH HEADING EAST",
- JJ 3885 DATA "THIS PART OF THE GARDEN LIES BETWEEN
{SPACE}A NORTH-SOUTH PATH AND
- AJ 3890 DATA THE EAST CASTLE WALL,,62,
- ER 3895 DATA "THIS IS THE SOUTH-EAST CORNER OF THE
{SPACE}STONE WALL OF THE CASTLE",
- FP 3900 DATA "THE ONLY ACCESSIBLE PORTION OF THE SOU
TH WALL OF THE CASTLE",
- AB 3905 DATA "THIS IS THE EAST WALL OF THE CASTLE.
{SPACE}THERE ARE NO ENTRANCES HERE",
- DA 3910 DATA " ,, "THIS LARGE FIELD WAS ONCE USED E
XTENSIVELY FOR FARMING",,68,
- HA 3915 DATA "A SMALL DIKE WAS CONSTRUCTED HERE TO
{SPACE}KEEP THE RIVER FROM FLOODING
- XA 3920 DATA THE FIELDS DURING THE SPRING RUNOFF,,7
0,
- SF 3925 DATA "THE EAST END OF THE SWAMP. DIRECTIONS
GET CONFUSED HERE",,72,
- HH 3930 DATA "THE WEST END OF THE SWAMP. THERE IS A
RIVER NEARBY",,35,
- SJ 3935 DATA "THE CURRENT IS STRONG, BUT NOT SO STR
ONG THAT I CAN'T KEEP MY
- FK 3940 DATA FOOTING,, "THE EAST-WEST PATH ENDS HERE
AND OPENS INTO A LARGE FIELD
- HM 3945 DATA TO THE SOUTH,, "THE PATH IS EAST-WEST F
ROM HERE",
- QP 3950 DATA "ONE OF THE TWO GATE HOUSES FOR THE NO
RTH GATE OF THE CASTLE",
- ES 3955 DATA "THERE IS A SMALL IRON GATE HERE. THIS
MAY HAVE BEEN SOME KIND OF
- DX 3960 DATA "SERVICE ENTRANCE. THE GATE HAS BEEN L
EFT OPEN, AND THE DRAWBRIDGE
- KP 3965 DATA DOWN OVER THE MOAT,,79,
- AH 3970 DATA "THE ONLY ACCESSIBLE PORTION OF THE NO
RTH WALL OF THE CASTLE",
- MB 3975 DATA "THE NORTH WEST CORNER OF THE CASTLE W
ALL",,62,,53,

QE 3980 DATA"THIS IS ONLY ONE PART OF AN OVERGROWN GARDEN",,86,,86,
 KH 3985 DATA"A NEW PATH HEADS WEST, WHILE THIS PATH CONTINUES NORTH",
 JE 3990 DATA"FURTHER TRAVEL NORTH IS BLOCK BY FALLEN TREES",
 XB 3995 DATA"PART OF A LONG EAST-WEST PATH",,"TO THE SOUTH IS THE NORTH GATE
 SS 4000 DATA"OF A MEDIEVAL STYLE CASTLE. THE EAST-WEST PATH CONTINUES
 PS 4005 DATA83,84,85,86,87,88,66,62,64,60,58,59,64,63,53,54,55,56
 RP 4010 DATA2,3,38,39,40, 7,11,13,14,15,18
 PG 4015 DATA4,2,5,1,8,3,10,7,16,6,17,4,19,5
 DE 4020 DATA"BORDER COLOR? ",53280,"SCREEN COLOR? {SPACE}",53281,"CHARACTER COLOR? ",646
 HR 4025 DATA"I DO NOT UNDERSTAND.",,"I AM NOT CARRYING THE ",,"I DO NOT SEE THE "
 QP 4030 DATA"I SEE NOTHING SPECIAL.",,"IT IS TOO DARK TO SEE.",,"NOTHING HAPPENS."
 MQ 4035 DATA"EVERYTHING EXCEPT WHAT?","A LARGE BAT CAME DOWN AND TOOK THE "
 DD 4040 DATA"YOU CAN NOT GO THAT WAY."
 RR 4045 DATA3,128,,7,192,,3,128,,1,,15,224,,31,240,,23,208,,19,144,,23,208,
 XR 4050 DATA23,208,,6,192,,6,192,,6,192,,6,192,,6,192,,14,224,
 AS 4055 DATA4,18,19,49,40,29

Program 2. Vampire Hunter—Machine Language Portion

For instructions on entering this listing, please refer to the "MLX" article, Appendix D.

C000:12 C0 85 C5 60 C9 00 07 F8
 C008:CF C0 0D C2 41 C2 47 C2 D5
 C010:6F C3 A9 35 8D 26 03 A9 77
 C018:C4 8D 27 03 A9 00 85 FB C8
 C020:85 FE A0 00 98 8D 95 CA 29
 C028:8D B5 CA 8D D5 CA 8D EE F3
 C030:CA B9 95 CA 18 69 40 99 65
 C038:96 CA B9 B5 CA 69 00 99 DF
 C040:B6 CA C8 C0 1F D0 EA B9 C0
 C048:D5 CA 18 69 28 99 D6 CA 21
 C050:B9 EE CA 69 00 99 EF CA 6B
 C058:C8 C0 18 D0 EA A9 C5 8D 95
 C060:12 03 A9 0B 8D 11 03 A9 F1
 C068:CC 8D 88 02 A9 93 20 CA 8B
 C070:F1 A9 3F 8D 02 DD A9 14 05
 C078:8D 00 DD A9 3E 8D 18 D0 40

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C080:85 02 A9 00 8D 0E DC A9 82
C088:33 85 01 A2 00 86 03 86 F5
C090:05 A9 D8 85 04 A9 F8 85 B0
C098:06 A0 00 B1 03 91 05 C8 91
C0A0:D0 F9 E6 06 E6 04 E8 E0 40
C0A8:08 D0 EE A9 37 85 01 A9 56
C0B0:01 8D 0E DC A9 FF 8D 0F 1D
C0B8:D4 A9 80 8D 18 D4 A9 81 E0
C0C0:8D 12 D4 A0 A0 B9 75 C9 D2
C0C8:99 37 FB 88 D0 F7 60 A9 BD
C0D0:A0 85 04 A9 00 85 03 A8 E3
C0D8:A9 20 91 03 88 D0 FB E6 FF
C0E0:04 A6 04 E0 C0 D0 F3 A9 77
C0E8:03 8D 36 03 A9 00 8D 3D EB
C0F0:03 8D 3E 03 A9 3F 8D 3B EF
C0F8:03 A9 1F 8D 3C 03 20 A5 F6
C100:C6 A9 00 8D 3F 03 A9 0F 92
C108:85 FC A9 00 8D 3E 03 A9 D7
C110:1C 8D 3D 03 A9 24 8D 3B 11
C118:03 A9 1F 8D 3C 03 20 A5 18
C120:C6 20 5B C6 C6 FC 10 F9 2B
C128:CE 36 03 10 BF A9 03 8D 3A
C130:36 03 A9 01 AA A8 A9 66 86
C138:20 B6 C8 A2 3E A0 01 A9 DC
C140:66 20 B6 C8 CE 36 03 10 C7
C148:E9 A9 03 8D 36 03 20 B6 19
C150:C7 EE 20 D0 CE 36 03 10 E9
C158:F5 A9 03 8D 36 03 A9 01 8C
C160:8D 3A 03 20 22 C9 A9 1E 45
C168:8D 3A 03 20 22 C9 A9 02 31
C170:8D 36 03 A9 07 85 FC 20 AB
C178:F2 C1 EE 36 03 20 DA C5 3B
C180:CE 36 03 20 13 C9 C9 20 CE
C188:D0 ED A9 14 91 03 C6 FC 89
C190:D0 E5 CE 36 03 10 DC A9 EE
C198:03 85 FC A9 03 8D 36 03 F6
C1A0:20 F2 C1 20 DA C5 20 13 6C
C1A8:C9 C9 20 D0 EE CE 36 03 B6
C1B0:10 F1 A9 03 8D 36 03 20 89
C1B8:DA C5 A9 13 A0 00 91 03 AC
C1C0:CE 36 03 10 F2 C6 FC D0 18
C1C8:D2 AD 1B D4 29 03 C9 03 BD
C1D0:F0 F7 8D 36 03 20 F2 C1 20
C1D8:A9 03 91 03 20 F2 C1 AD 52
C1E0:39 03 8D 47 CB AD 3A 03 74
C1E8:8D 88 CB AD 36 03 8D 40 C2
C1F0:05 60 AD 1B D4 29 3F 8D CD
C1F8:39 03 AD 1B D4 29 1F 8D 58
C200:3A 03 20 DA C5 20 13 C9 B3

C208:C9 20 D0 E6 60 A2 3F AD BC
C210:1B D4 29 03 9D 00 05 8D 32
C218:36 03 AD 1B D4 29 01 9D CB
C220:00 04 20 F2 C1 AD 39 03 14
C228:9D 07 CB AD 3A 03 9D 48 F3
C230:CB BC 00 04 B9 3F C2 A0 FB
C238:00 91 03 CA 10 D1 60 12 C9
C240:02 A9 01 85 FD D0 04 A9 8E
C248:00 85 FD A9 3F 85 FC A6 3A
C250:FC BD 00 04 C5 FD F0 03 0F
C258:4C 17 C3 BD 07 CB 8D 39 D9
C260:03 BD 48 CB 8D 3A 03 BD B5
C268:00 05 8D 36 03 20 DA C5 58
C270:20 13 C9 48 A9 20 91 03 7C
C278:68 D0 0A A6 FC A9 FF 9D 3E
C280:07 CB 4C 17 C3 20 1F C3 18
C288:B0 6D C9 20 D0 23 A6 FC 5A
C290:AD 39 03 9D 07 CB AD 3A 72
C298:03 9D 48 CB AD 36 03 9D B6
C2A0:00 05 20 DA C5 A6 FD BD 9B
C2A8:3F C2 A0 00 91 03 4C 17 DA
C2B0:C3 C9 13 D0 2C AD 36 03 81
C2B8:F0 19 C9 03 F0 07 AD 1B 80
C2C0:D4 29 01 D0 0E CE 36 03 43
C2C8:20 1F C3 B0 2A C9 20 D0 33
C2D0:26 F0 BB EE 36 03 20 1F 29
C2D8:C3 B0 1C C9 20 D0 18 F0 F1
C2E0:AD A6 FC BD 00 04 D0 0F 23
C2E8:EE 36 03 20 DA C5 20 13 17
C2F0:C9 C9 20 D0 02 F0 97 A6 88
C2F8:FC BD 07 CB 8D 39 03 BD 1F
C300:48 CB 8D 3A 03 BD 00 05 08
C308:8D 36 03 20 DA C5 A6 FD 7F
C310:BD 3F C2 A0 00 91 03 C6 BB
C318:FC 30 03 4C 4F C2 60 A9 3F
C320:00 A0 03 99 00 07 88 10 07
C328:FA A0 03 B9 00 07 F0 05 54
C330:88 10 F8 38 60 AD 1B D4 67
C338:29 03 A8 B9 00 07 D0 F5 79
C340:A9 01 99 00 07 A6 FC BD 9A
C348:07 CB 18 79 7D CA 8D 39 4C
C350:03 BD 48 CB 18 79 79 CA F2
C358:8D 3A 03 20 DA C5 20 13 D8
C360:C9 C9 20 F0 08 C9 13 F0 D0
C368:04 C9 14 D0 BC 18 60 AD A8
C370:FC 03 D0 03 4C 09 C4 A0 32
C378:1F B9 59 CA 99 D8 FB 88 86
C380:10 F7 AD 47 CB 8D 39 03 42
C388:AD 88 CB 8D 3A 03 AD 40 D4

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C390:05 8D 36 03 20 DA C5 A0 8D
C398:00 A9 20 91 03 A9 40 85 6C
C3A0:FC 20 1F C3 B0 47 C9 14 19
C3A8:F0 43 C9 13 D0 2A AD 36 A4
C3B0:03 F0 19 C9 03 F0 07 AD 4D
C3B8:1B D4 29 01 D0 0E CE 36 CA
C3C0:03 20 1F C3 B0 27 C9 20 C7
C3C8:D0 23 F0 0C EE 36 03 20 D6
C3D0:1F C3 B0 19 C9 20 D0 15 06
C3D8:AD 36 03 8D 40 05 AD 39 A8
C3E0:03 8D 47 CB AD 3A 03 8D DC
C3E8:88 CB 4C FF C3 AD 47 CB 60
C3F0:8D 39 03 AD 88 CB 8D 3A 91
C3F8:03 AD 40 05 8D 36 03 20 31
C400:DA C5 A0 00 A9 16 91 03 48
C408:60 AD 40 05 8D 36 03 AD 7E
C410:47 CB 8D 39 03 AD 88 CB 21
C418:8D 3A 03 20 DA C5 20 13 9A
C420:C9 C9 16 D0 04 A9 20 91 69
C428:03 A0 1F B9 39 CA 99 D8 DB
C430:FB 88 10 F7 60 86 03 A6 25
C438:9A E0 03 F0 05 A6 03 4C CB
C440:CA F1 A6 03 C9 0F D0 06 E2
C448:A9 04 8D 88 02 00 C9 02 87
C450:D0 05 85 02 4C CA F1 C9 8F
C458:06 D0 09 48 A9 00 85 02 19
C460:68 4C CA F1 86 03 A6 02 39
C468:08 A6 03 28 F0 CF C9 0D E9
C470:D0 12 A5 D3 18 65 FB C9 F0
C478:28 90 03 20 C7 C4 20 A4 D2
C480:C4 4C C7 C4 C9 20 F0 10 85
C488:86 03 A6 FB 9D 00 07 E6 8C
C490:FB A6 03 A9 01 4C CA F1 7D
C498:A5 D3 18 65 FB C9 27 90 29
C4A0:03 20 C7 C4 8A 48 A2 00 B3
C4A8:86 FC E4 FB F0 12 BD 00 5C
C4B0:07 20 CA F1 E6 FC A6 FC B3
C4B8:E4 FB D0 F2 A9 00 85 FB 51
C4C0:68 AA A9 1D 4C CA F1 E6 88
C4C8:FE A5 FE C9 15 F0 05 A9 D7
C4D0:0D 4C CA F1 8A 48 A9 00 35
C4D8:85 FE A2 00 BD C0 CF 48 12
C4E0:BD 8D CA 9D C0 CF AD 86 07
C4E8:02 9D C0 DB E8 E0 08 D0 5C
C4F0:EB A9 00 85 C6 A5 C6 F0 7E
C4F8:FC A9 00 85 C6 A2 07 68 FA
C500:9D C0 CF CA 10 F9 68 AA 15
C508:4C CF C4 A9 00 85 03 85 82
C510:FE A2 00 BD 89 CA 20 CA 22

C518:F1 E8 E0 04 D0 F5 20 E4 B6
C520:FF C9 0D D0 1E A9 20 20 C4
C528:CA F1 A9 0D 20 CA F1 A6 52
C530:03 F0 09 BD FF 06 C9 20 42
C538:D0 02 C6 03 A9 00 A4 03 4F
C540:4C 91 B3 C9 14 D0 0C A6 0C
C548:03 F0 D3 C6 03 20 CA F1 98
C550:4C 1E C5 C9 20 D0 0D A6 E3
C558:03 F0 C3 BD FF 06 C9 20 C1
C560:F0 BC A9 20 C9 20 90 B6 71
C568:C9 22 F0 B2 C9 2C F0 AE 3A
C570:C9 60 B0 AA A6 03 E0 3C F8
C578:F0 A4 9D 00 07 E6 03 20 53
C580:CA F1 4C 11 C5 AD 35 03 DA
C588:38 E9 04 8D 3A 03 A9 00 35
C590:8D 38 03 AD 34 03 38 E9 34
C598:0A 8D 39 03 A9 00 8D 37 83
C5A0:03 AD 39 03 C9 40 B0 13 34
C5A8:AD 3A 03 C9 20 B0 0C 20 92
C5B0:DA C5 20 13 C9 20 F6 C5 D2
C5B8:4C BF C5 A9 A0 D0 F6 EE D2
C5C0:39 03 EE 37 03 AD 37 03 3B
C5C8:C9 14 D0 D5 EE 3A 03 EE 0B
C5D0:38 03 AD 38 03 C9 09 D0 94
C5D8:BA 60 AC 36 03 B9 81 CA 9F
C5E0:AC 3A 03 18 79 B5 CA 85 F0
C5E8:04 B9 95 CA 6D 39 03 85 20
C5F0:03 90 02 E6 04 60 48 AD B0
C5F8:38 03 0A A8 A9 CC 18 79 57
C600:EE CA 85 06 AD 37 03 0A 23
C608:18 79 D5 CA 85 05 90 02 CA
C610:E6 06 68 A2 06 DD 16 CA 68
C618:F0 05 CA 10 F8 30 1E 8A 09
C620:0A 0A 18 69 03 8D 00 07 24
C628:A2 03 AC 00 07 B9 1D CA 81
C630:BC 85 CA 91 05 CE 00 07 5A
C638:CA 10 EF 30 0A A2 03 BC CD
C640:85 CA 91 05 CA 10 F8 A5 F3
C648:06 49 14 85 06 AD 86 02 FB
C650:A2 03 BC 85 CA 91 05 CA 51
C658:10 F8 60 EA AD 1B D4 CD 38
C660:3F 03 B0 F8 A8 B9 00 06 26
C668:8D 3B 03 20 AE C8 CD 3B 5D
C670:03 F0 F8 90 07 AE 3B 03 50
C678:8D 3B 03 8A EA 8D 3D 03 AF
C680:AD 1B D4 CD 3F 03 B0 F8 83
C688:A8 B9 00 07 8D 3C 03 20 CC
C690:AE C8 29 1F CD 3C 03 F0 15
C698:F6 90 07 AE 3C 03 8D 3C D6

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C6A0:03 8A 8D 3E 03 20 05 C7 52
C6A8:A9 00 8D 39 03 AD 3E 03 9E
C6B0:8D 3A 03 20 DA C5 A5 03 32
C6B8:85 05 A5 04 85 06 AD 3C 1B
C6C0:03 8D 3A 03 20 DA C5 AC 4F
C6C8:3D 03 A9 A0 91 03 91 05 B5
C6D0:C8 CC 3B 03 D0 F6 AE 3E 8B
C6D8:03 EE 3C 03 8E 3A 03 20 DE
C6E0:DA C5 A9 A0 AC 3B 03 A9 8E
C6E8:A0 91 03 AC 3D 03 91 03 72
C6F0:E8 EC 3C 03 D0 E6 60 AD 76
C6F8:1B D4 C9 0A 08 A9 A0 28 73
C700:B0 02 A9 20 60 AC 3F 03 D6
C708:AD 3B 03 99 00 06 AD 3C E6
C710:03 99 00 07 C8 AD 3D 03 72
C718:99 00 06 AD 3E 03 99 00 41
C720:07 C8 8C 3F 03 60 EE 3F A1
C728:03 EE 3F 03 38 60 AD 1B C6
C730:D4 29 3F F0 F9 C9 3F F0 D1
C738:F5 8D 39 03 AD 1B D4 29 2A
C740:1F F0 EB C9 1F F0 E7 8D CF
C748:3A 03 20 DA C5 20 13 C9 06
C750:C9 A0 D0 DA AD 39 03 8D 9A
C758:3B 03 AD 3A 03 8D 3C 03 69
C760:EE 39 03 20 DA C5 20 13 59
C768:C9 C9 20 D0 10 CE 39 03 91
C770:CE 39 03 20 DA C5 20 13 59
C778:C9 C9 20 F0 23 AD 3B 03 BB
C780:8D 39 03 EE 3A 03 20 DA 6D
C788:C5 20 13 C9 C9 20 D0 9E 11
C790:CE 3A 03 CE 3A 03 20 DA 5C
C798:C5 20 13 C9 C9 20 D0 8E 11
C7A0:AD 3B 03 8D 39 03 AD 3C 7C
C7A8:03 8D 3A 03 20 DA C5 A9 36
C7B0:20 A0 00 91 03 60 A9 1E 9C
C7B8:85 FC 20 2E C7 C6 FC 10 94
C7C0:F9 A9 02 8D 3A 03 AD 1B 25
C7C8:D4 29 3F F0 F4 C9 3F F0 42
C7D0:F0 8D 39 03 20 DA C5 20 AB
C7D8:13 C9 C9 20 D0 E3 AE 39 4C
C7E0:03 8E 3B 03 A0 02 A9 1F AC
C7E8:20 B6 C8 A9 1F 8D 3A 03 90
C7F0:EE 21 D0 A9 3D 8D 39 03 8A
C7F8:20 DA C5 A0 01 20 15 C9 8E
C800:C9 A0 F0 0C CE 39 03 D0 AF
C808:EF CE 3A 03 D0 E5 F0 35 F1
C810:20 13 C9 C9 20 F0 0F C9 F8
C818:1F D0 E9 A0 02 20 15 C9 39
C820:C9 20 F0 0B D0 DE A0 02 B2

C828:20 15 C9 C9 1F D0 D5 A9 76
C830:20 A0 01 91 03 AE 3B 03 7F
C838:A0 02 A9 20 20 B6 C8 AE ED
C840:3B 03 4C E4 C7 AE 3B 03 7A
C848:A0 02 A9 1F 20 B6 C8 A9 E8
C850:1D 8D 3A 03 EE 21 D0 A9 92
C858:3F 8D 39 03 20 DA C5 A0 DC
C860:40 20 15 C9 C9 A0 F0 14 20
C868:CE 39 03 D0 EF CE 3A 03 4F
C870:D0 E5 A9 20 A0 02 AE 3B C0
C878:03 4C B6 C8 20 13 C9 C9 AC
C880:20 F0 0F C9 1F D0 E1 A0 7D
C888:80 20 15 C9 C9 20 F0 0B 5D
C890:D0 D6 A0 80 20 15 C9 C9 0F
C898:1F D0 CD A9 20 A0 40 91 D7
C8A0:03 AE 3B 03 A0 02 A9 20 77
C8A8:20 B6 C8 4C 45 C8 AD 1B 99
C8B0:D4 29 3C F0 F9 60 85 FD E7
C8B8:8E 00 04 8C 00 05 A9 00 42
C8C0:85 06 A9 01 85 05 A2 03 64
C8C8:BD 79 CA A4 06 18 79 00 BE
C8D0:05 8D 3A 03 C9 1F B0 2F 1B
C8D8:BD 7D CA 79 00 04 8D 39 FD
C8E0:03 C9 3F B0 22 20 DA C5 66
C8E8:20 13 C9 C9 A0 F0 18 C5 E3
C8F0:FD F0 14 A5 FD 91 03 A4 7B
C8F8:05 AD 39 03 99 00 04 AD 52
C900:3A 03 99 00 05 E6 05 CA 3D
C908:10 BE E6 06 A6 05 E4 06 A9
C910:D0 B4 60 A0 00 A9 36 85 E7
C918:01 B1 03 48 A9 37 85 01 B3
C920:68 60 AD 1B D4 29 3F F0 22
C928:F9 8D 39 03 20 DA C5 20 8B
C930:13 C9 C9 20 D0 EC CE 3A 0D
C938:03 20 DA C5 EE 3A 03 20 93
C940:13 C9 C9 A0 F0 10 EE 3A F2
C948:03 20 DA C5 CE 3A 03 20 A2
C950:13 C9 C9 A0 D0 CC 20 DA F7
C958:C5 A9 04 A0 00 91 03 60 70
C960:AD 34 03 8D 39 03 AD 35 77
C968:03 8D 3A 03 20 DA C5 20 70
C970:13 C9 8D 3F 03 60 00 00 3F
C978:00 00 00 03 03 03 21 3F E1
C980:3E 3C 70 E0 80 80 07 0C 7E
C988:7C 38 30 30 A0 E0 E0 F0 AC
C990:70 70 00 00 00 00 0F 1F B5
C998:3F 7F F9 FE FF FF FF DC B7
C9A0:CC C7 40 40 20 1F 80 C0 D7
C9A8:E0 F0 F8 FC 7E 7F 7F 67 30

Chapter 3

C9B0:23 10 00 08 30 C0 03 03 E7
C9B8:03 01 0E 0E 37 33 67 67 6D
C9C0:E6 F6 F6 76 36 06 80 80 17
C9C8:80 00 E0 F0 78 78 BC BC A3
C9D0:DE DE DE DC D8 C0 00 00 FE
C9D8:00 00 00 00 00 03 01 01 7B
C9E0:1F 0C 0C FE 60 60 00 0F 0C
C9E8:06 06 7F 30 30 F8 80 80 DA
C9F0:C0 00 00 00 00 00 0F 1A 1D
C9F8:22 42 A2 92 8A 86 82 FE 1E
CA00:82 86 8A 92 A2 FF F0 58 42
CA08:44 42 45 49 51 61 41 7F 9F
CA10:41 61 51 49 45 FF 02 12 9D
CA18:16 13 04 14 03 67 68 69 2F
CA20:6A 6B 6C 6D 6E 6F 70 71 AD
CA28:72 73 74 75 76 77 78 79 B5
CA30:7A 20 20 20 20 7B 7C 7D 76
CA38:7E 00 00 00 00 7F 10 FF 2B
CA40:7F 7F 3F 0F 3F FF 00 00 48
CA48:00 00 00 00 00 FE 08 FF E9
CA50:FE FE FC F0 FC FF 00 00 BB
CA58:00 00 7F 7F 7F 7F 10 FF EF
CA60:7F 7F 3F 0F 3F FF 00 00 68
CA68:00 00 FE FE FE FE 08 FF D1
CA70:FE FE FC F0 FC FF 00 00 DB
CA78:00 FF 01 00 00 00 00 FF 2E
CA80:01 A0 A8 B0 B8 00 28 01 F5
CA88:29 12 20 92 9D 2D 20 4D 93
CA90:4F 52 45 20 2D 00 00 00 76

4

Strategy and Thinking Games



Laser Strike

Barbara Schulak

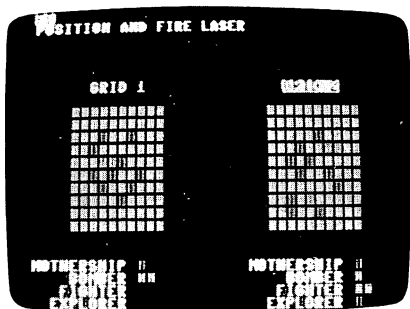
In this strategy game for one or two players, your mission is to locate and vaporize your opponent's hidden space force before your force suffers the same fate. A joystick is required.

"Laser Strike" is a strategy game based on several popular board games (of which Battleship is probably the most famous). However, unlike the board games, Laser Strike is set in outer space. Two players secretly deploy their spaceships around the galaxy and then try to locate the opponent's ships by firing laser strikes on the two-dimensional galaxy grid. The first player to find and destroy all the opponent's ships is the winner.

Playing the Game

Type in Laser Strike and save a copy, using "The Automatic Proofreader," found in Appendix C. To run it, just load the program and type RUN.

Laser Strike begins by asking each player to enter his or her name. If you wish to play against the computer, press RETURN without typing anything at the first name prompt. If you press RETURN at both name prompts, the computer plays the entire game by itself.



"Laser Strike" is an interesting strategy game for one or two players.

The program then displays two grids, one for each player. In the first stage of the game, each player decides where to locate the ships within his or her grid. The deployment must be

secret, so the second player must look away from the screen while the first player deploys ships, and vice versa.

To deploy a ship, simply move the cursor to the desired location on the screen and press the joystick fire button. After choosing the location, you must also decide whether to deploy the ship horizontally or vertically. You cannot place a ship so that it overlaps the border. If you attempt to place a ship illegally, the program warns you and gives you another chance.

After both players' ships have been placed, the contest begins. The players alternate firing laser shots on each other's grids. To fire a shot, use the joystick to move to the desired location; then press the fire button. If you hit a ship, that square is marked in the color of the ship you hit. If you miss, the square is marked in a neutral color. The game continues until one player has found and eliminated all of the other player's ships. A tally of which ships have been hit is kept at the bottom of the screen. When one player has lost all ships, you can exit the program or play a new game.

Laser Strike requires at least one joystick. If the game is played by two people, either one or two joysticks may be used. When using only one joystick, plug the stick into port 2.

Laser Strike

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
MF 10 :REM OPENING
HH 20 POKE53281,0:POKE53280,0:PRINTCHR$(142)" {CLR}
    {10 DOWN}";
PS 30 S=54272:FORI=0TO24:POKEI+S,0:NEXT
XS 40 C$="{WHT}{RED}{CYN}{PUR}{GRN}{BLU}{YEL}{1}
    {2}{3}{6}{7}":D$="LASER STRIKE"
KD 50 POKES+6,240:POKES,100:POKES+1,100:POKES+4,12
    9
GS 60 FORI=1TO12:POKES+24,I
BG 70 PRINT"{UP}"TAB(14)LEFT$(C$,I);LEFT$(D$,I):PO
    KE53280,I
JD 80 FORJ=1TO100:NEXTJ,I:POKES+4,0:POKE53280,0
QJ 90 :REM SET-UP
FE 100 DIMG(1,9,9),NH(1,5),XH(1,5),YH(1,5),DX(1,5)
    ,DY(1,5),TA(1,5)
MQ 110 GB(0)=55620:GB(1)=55641:JS=56320:NJ=0:GOSUB
    900
QB 120 B$="{39 SPACES}"
DB 130 A$="{RVS}LLLLLLLLLLLL"
ED 140 FORI=2TO5:READS$(I):NEXT
```



```

DC 150 FORI=0TO6:READC(I):NEXT
XJ 160 PRINT"{3 DOWN}{WHT}"
CX 170 FORI=0TO1:PRINT"PLAYER"STR$(I+1);:INPUTP$(I
)
AP 180 IFP$(I)="THENC P(I)=1:P$(I)="COMPUTER"
PA 190 PX(I)=0:PY(I)=0:NEXT:IFCP(0)=1ORCP(1)=1THEN
240
JG 200 PRINT"NUMBER OF JOYSTICKS (1/2)?"
CR 210 GETK$:IFK$<>"1"ANDK$<>"2"THEN210
AB 220 NJ=VAL(K$)-1
SQ 230 :REM DRAW SCREEN
BP 240 PRINT"{CLR}{6 DOWN}{WHT}"TAB(6)"GRID 1"SPC(
15)"GRID 2"
EF 250 GOSUB950
MK 260 PRINT:PRINT"{WHT}"

CH 270 FORN=5TO2STEP-1:L=10-LEN(S$(N))
BR 280 PRINTSPC(L)S$(N)SPC(13+L)S$(N):NEXT
HA 290 :REM DEPLOY SHIPS
BS 300 FORPP=0TO1:P=ABS(PP-1):FORN=5TO2STEP-1
MH 310 PRINT"{HOME}{WHT}{RVS}"P$(PP)
RP 320 PRINT"DEPLOY YOUR "S$(N);
SC 330 POKE646,C(N):PRINTLEFT$(A$,N+1)
XH 340 IFCP(PP)=0THENGOSUB1000:GOSUB1090:GOTO360
CP 350 X=INT(RND(0)*(10-N)):Y=INT(RND(0)*(10-N)):J
V=2+INT(RND(0)*2)*6:GOSUB1110
DX 360 IFER=1THEN310
ER 370 GOSUB1270:NEXT:GOSUB950:NEXT:FORI=0TO1:PX(I
)=0:PY(I)=0:NEXT
AE 380 :REM MAIN LOOP
XP 390 PRINT"{HOME}{WHT}{RVS}"P$(P):PP=P
DP 400 PRINT"POSITION AND FIRE LASER":PRINT"
{3 DOWN}"
QS 410 IFP=0THENPRINTSPC(6)"{RVS}GRID 1{OFF}"SPC(1
5)"GRID 2"
GX 420 IFP=1THENPRINTSPC(6)"GRID 1"SPC(15)"{RVS}GR
ID 2"
DK 430 PRINT"{5 UP}":IFCP(P)=0THENGOSUB1000:GOTO45
0
FQ 440 GOSUB630
XQ 450 GOSUB1290:GOSUB1420:GOSUB980:GOSUB1270
QM 460 IFTH(P)=14THEN490
JS 470 P=ABS(P-1):GOTO390
PP 480 :REM END GAME
ER 490 PRINT"{CLR}{CYN}"
CR 500 PRINTSPC(14)"O[9 Y]P"
GC 510 PRINTSPC(14)"[H]{YEL}GAME OVER{CYN}[N]"
MM 520 PRINTSPC(14)"L[9 P]@"
FC 530 PRINT"{2 DOWN}{WHT}"TAB(20-LEN(P$(P))/2)P$(
P)

```

Chapter 4

```
KK 540 PRINTSPC(9)"HAS FREED THE GALAXY!"
CK 550 PRINT"{3 DOWN}"SPC(12)"PLAY AGAIN [Y/N]"
BX 560 GETK$
FR 570 PRINT"{HOME}{2 DOWN}"SPC(15)"{YEL}GAME OVER
":FORI=1TO200:NEXT
HG 580 PRINT"{HOME}{2 DOWN}"SPC(15)"[4]GAME OVER":
FORI=1TO200:NEXT
BD 590 IFK$="Y"THENRUN
SK 600 IFK$="N"THENPRINT"{CLR}":END
XQ 610 GOTO560
RG 620 :COMPUTER STRIKE
CA 630 H=0:FORN=2TO5:IFNH(P,N)>0ANDNH(P,N)<NTHENSH
=N:H=1
ER 640 NEXT:IFH=0THEN830
JM 650 X=XH(P,SH):Y=YH(P,SH):IFNH(P,SH)>1THEN760
PS 660 FORI=0TO3:PR(I)=0:NEXT
QB 670 R=INT(RND(0)*4):IFPR(R)=1THEN670
DG 680 DX(P,SH)=0:DY(P,SH)=0:ER=0:PR(R)=1:GOSUB168
0
XJ 690 IFR=0THENDX(P,SH)=1:IFTX<SHORXP<XNTHENER=1
DE 700 IFR=1THENDX(P,SH)=-1:IFTX<SHORXN<XPTHENER=1
PA 710 IFR=2THENDY(P,SH)=1:IFTY<SHORYP<YNTHENER=1
KC 720 IFR=3THENDY(P,SH)=-1:IFTY<SHORYN<YPTHENER=1
QX 730 X=X+DX(P,SH):Y=Y+DY(P,SH)
XQ 740 GOSUB1640:IFER=0THENIFG(P,X,Y)<>1THEN870
ER 750 X=X-DX(P,SH):Y=Y-DY(P,SH):GOTO670
AR 760 X=X+DX(P,SH):Y=Y+DY(P,SH)
XP 770 ER=0:GOSUB1640:IFER=1THENGOSUB810:GOTO760
SM 780 IFG(P,X,Y)=1THENGOSUB810:GOTO760
AS 790 IFG(P,X,Y)=0THENGOSUB810
XJ 800 GOTO870
PQ 810 IFTA(P,SH)=0THENDX(P,SH)=-DX(P,SH):DY(P,SH)
=-DY(P,SH):TA(P,SH)=1
MJ 820 RETURN
KH 830 X=INT(RND(0)*10):Y=INT(RND(0)*10)
BJ 840 IF((X+Y)AND1)=0THEN830
KP 850 IFG(P,X,Y)=1THEN830
XJ 860 GOSUB1680:IFTX<LS(P)ANDTY<LS(P)THEN830
BX 870 CO=7:GOSUB980
CX 880 RETURN
JP 890 :INIT ARRAYS
QF 900 FORI=0TO1:FORJ=0TO9:FORK=0TO9:G(I,J,K)=0:NE
XTK,J,I
JC 910 FORI=0TO1:TH(I)=0:CP(I)=0:LS(I)=5
QJ 920 FORJ=0TO5:NH(I,J)=0:TA(I,J)=0:NEXTJ,I
MB 930 RETURN
DK 940 :DRAW GRID
DC 950 PRINT"{HOME}{7 DOWN}[7]"
```

```

GX 960 FORI=1TO10:PRINTTAB(4)A$SPC(11)A$:NEXT:RETU
RN
QK 970 :PUT GRID PT ON SCREEN
KH 980 AD=GB(P)+40*Y+X:PC=PEEK(AD)AND15:POKEAD,CO:
RETURN
QA 990 :CURSOR AROUND GRID UNTIL FIRE
KB 1000 X=PX(P):Y=PY(P):X1=X:Y1=Y:CO=7:GOSUB980
HS 1010 JV=15-PEEK(JS+PP*NJ)AND15
RG 1020 IF(PEEK(JS+PP*NJ)AND16)=0THENPX(P)=X:PY(P)
=Y:RETURN
GK 1030 IFJV=1THENIFY1>0THENY1=Y1-1
XX 1040 IFJV=2THENIFY1<9THENY1=Y1+1
AJ 1050 IFJV=4THENIFX1>0THENX1=X1-1
XA 1060 IFJV=8THENIFX1<9THENX1=X1+1
SQ 1070 CO=PC:GOSUB980:X=X1:Y=Y1:CO=C(6):GOSUB980:
GOTO1010
QA 1080 :DRAW SHIP
AM 1090 PRINT"{WHT}HORIZONTAL [RIGHT] OR VERTICAL
{SPACE}[DOWN]"
JC 1100 JV=15-PEEK(JS+PP*NJ)AND15:IFJV<>2ANDJV<>8T
HEN1100
RJ 1110 IFJV=8ANDX+N-1>9THEN1220
QM 1120 IFJV=2ANDY+N-1>9THEN1220
FE 1130 ER=0:X1=X:Y1=Y:IFJV=8THEN1180
AC 1140 FORI=YTOY+N-1:IFG(P,X,I)<>0THENER=1
MB 1150 NEXT:IFER=1THEN1220
KS 1160 FORY=Y1TOY1+N-1:G(P,X,Y)=N:IFCP(PP)=0THENC
O=C(N):GOSUB980
CB 1170 NEXT:RETURN
PJ 1180 FORI=XTOX+N-1:IFG(P,I,Y)<>0THENER=1
SQ 1190 NEXT:IFER=1THEN1220
BS 1200 FORX=X1TOX1+N-1:G(P,X,Y)=N:IFCP(PP)=0THENC
O=C(N):GOSUB980
MH 1210 NEXT:RETURN
KB 1220 ER=1:IFCP(PP)=0THENPRINT"INVALID CHOICE":C
O=PC:GOSUB980:GOSUB1250
QG 1230 GOSUB1270:RETURN
MK 1240 :DELAY
DE 1250 FORI=1TO1500:NEXT:RETURN
FS 1260 :ERASE TOP OF SCREEN
ED 1270 PRINT"{HOME}";:FORI=1TO5:PRINTB$:NEXT:RETU
RN
MK 1280 :LASER SOUND
DC 1290 FORI=0TO24:POKEI+S,0:NEXT
RM 1300 POKES+24,15:POKES+6,240
BA 1310 FORI=15TO1STEP-1
GD 1320 POKES+24,I:POKES+4,17:POKES,75:POKES+1,34
BQ 1330 FORJ=1TO25:NEXT:POKES+4,16
XP 1340 NEXT:POKES+24,0:RETURN

```

Chapter 4

```
MP 1350 :WAVE SOUND
AJ 1360 FORI=0TO6:POKEI+S,0:NEXT
HC 1370 POKES+3,8:POKES+6,240:POKES+4,129:POKE5427
      3,75
XF 1380 FORI=1TO10STEP.15:POKES+24,I:NEXT
GQ 1390 FORI=10TO1STEP-.02:POKES+24,I:NEXT
MM 1400 POKES+4,128:POKES+24,0:RETURN
GF 1410 :CHECK LASER STRIKE
RR 1420 N=G(P,X,Y)
ME 1430 IFN=0THENPRINT"MISS!":GOSUB1250:CO=C(1):G(
      P,X,Y)=1:RETURN
AG 1440 IFN=1THENPRINT"ALREADY HIT":GOSUB1250:CO=P
      C:RETURN
PC 1450 PRINT"{GRN}DIRECT HIT!"
EK 1460 FORI=0TO24:POKES+I,0:NEXT
KQ 1470 POKES+24,15:POKES+8,1:POKES+7,0:POKES+12,2
      1:POKES+13,250:POKES+11,129
DJ 1480 FORI=1TO11:POKE53280,I:FORJ=1TO25:NEXTJ,I:
      POKES+11,128:POKE53280,0
QC 1490 NH(P,N)=NH(P,N)+1:TH(P)=TH(P)+1
FP 1500 G(P,X,Y)=1:PRINT"{HOME}{18 DOWN}"
JD 1510 FORI=0TO5-N:PRINT:NEXT
KC 1520 IFP=0THENPRINTSPC(11);
CG 1530 IFP=1THENPRINTSPC(34);
XC 1540 CO=C(N):POKE646,CO:PRINTLEFT$(A$,NH(P,N)+1
      )
KQ 1550 IFN<>NH(P,N)THENXH(P,N)=X:YH(P,N)=Y:GOTO16
      20
DP 1560 FORI=2TO5:IFNH(P,I)=0THENLS(P)=I
EC 1570 NEXT:GOSUB1360:PRINT"{HOME}{3 DOWN}{CYN}"
KE 1580 FORI=1TO10
SD 1590 PRINT"{UP}"TAB(20-LEN(S$(N))/2)S$(N)
HJ 1600 PRINTSPC(15)"DESTROYED!":FORJ=1TO50:NEXT
KQ 1610 PRINT"{2 UP}"TAB(20-LEN(S$(N))/2)"{RVS}"S$
      (N):FORJ=1TO50:NEXTJ,I
AH 1620 FORI=1TO500:NEXT:RETURN
CA 1630 :CHECK X AND Y
XS 1640 IFX<0ORX>9THENER=1
XJ 1650 IFY<0ORY>9THENER=1
DJ 1660 RETURN
EK 1670 :CHECK X SIZE OF SPACE
BR 1680 X1=X
FG 1690 X1=X1+1:IFX1<=9THENIFG(P,X1,Y)<>1THEN1690
AS 1700 XP=X1-X:X1=X
HP 1710 X1=X1-1:IFX1>=0THENIFG(P,X1,Y)<>1THEN1710
KB 1720 XN=X-X1:TX=XN+XP-1:Y1=Y
```

AK 1730 Y1=Y1+1:IFY1<=9THENIFG(P,X,Y1)<>1THEN1730
JB 1740 YP=Y1-Y:Y1=Y
FK 1750 Y1=Y1-1:IFY1>=0THENIFG(P,X,Y1)<>1THEN1750
CH 1760 YN=Y-Y1:TY=YN+YP-1:RETURN
SB 1770 DATA EXPLORER,FIGHTER,BOMBER,MOTHERSHIP
JX 1780 DATA 14,11,8,4,5,2,7

The Farm Game

Daniel M. Seurer

What's it like to manage a farm? How are your decisions affected by an ever-changing market? When is the best time to sell? How much of your crop should you store? This educational and entertaining simulation puts you in the shoes of the American farmer.

You're the owner of a 200-acre farm in the Midwest. You have \$20,000 to invest and must make sound decisions if you're to survive—what and when to plant, how much insecticide and herbicide to use, when to store or sell crops, and so on.

"The Farm Game" is more than a game; it's a simulation based on real decisions facing the farmer. Along the way you'll learn that making money at farming isn't easy. The program was written using research on crop market prices, the futures market, and the factors that affect crop prices and yields. My father-in-law, a farmer, also provided valuable firsthand experience to help make this simulation realistic.

You own five fields, each 40 acres, to be planted with wheat, corn, or soybeans. Inflation affects the cost of everything, and the prices paid for your crops will vary with the changing market conditions. If crop prices at harvest time are not high enough to cover your expenses, or if you just want to gamble for higher prices, you can store your crops and sell them at a later time on the futures market.

Getting Started

The Farm Game is written entirely in BASIC. As an aid in entering the program correctly, use "The Automatic Proofreader," found in Appendix C. Then save the program and type RUN. You should see the title screen within seconds. It might be helpful to have a pencil and pad on hand to take notes before you begin—it's probably too difficult to keep track of all the numbers in your head as the game develops.

Plant and Harvest

The program is divided into two parts: Planting Time and Harvest Time. You are first asked how long you want to manage the farm. The answer should be given as a number of years. You can type in any number, but you might want to start with five years until you become more familiar with the program. Next the Planting Season menu is displayed. You have four choices, each selection made by pressing one of the function keys:

Planting Season

f1...Market news

f3...Your financial status

f5...Planting

f7...Sell crops on futures

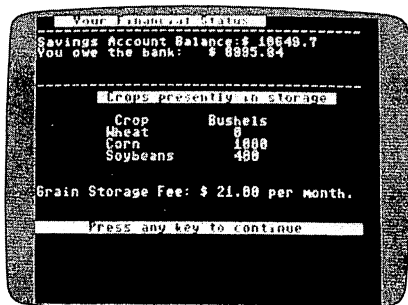
Market news (f1) contains essential information for playing the game. You should always consult this item first. You'll see:

- Yearly inflation rate (which affects all costs and can vary from 0 to 5 percent)
- Fuel cost per gallon
- Herbicide and insecticide costs per unit
- Overhead costs (which include expenses for machinery, repairs, and so forth)
- Basic cost per acre (which includes such items as taxes and land improvements)
- Cost per bushel of grain seed (wheat, corn, and soybeans)
- Futures market price for each of the three crops

This last item is very important later in the game when it comes time to sell your stored crops. Press any key to return to the planting menu.

To review your current financial status, press f3. The screen displays the money currently in your bank account, the amount you owe the bank, the number of bushels of grain (wheat, corn, and soybeans) you have in storage, and your monthly grain-storage fees (1½ cents per month for each bushel). Again, pressing any key returns you to the planting menu.

Planting (f5) puts you into the main part of the game, which we'll look at a bit later. To sell crops, press f7. The going price was noted in the futures market item displayed in market



Although the money situation is tight, the farmer has grain to sell later.

news (f1). On your first year of play, you'll have no grain in storage and therefore none to sell. When you do have grain to sell later in the game, this screen will display the number of bushels of each of the three crops you have in storage as well as the current futures market prices for each of the crops.

You'll then be asked if you want to sell wheat (f1), corn (f3), soybeans (f5), or nothing (f7). If your response is nothing (f7), you're returned to the planting menu. Otherwise, select the crop to be sold. You're then prompted to enter the number of bushels you wish to sell (up to the total you have in storage). You can sell any amount. If you suddenly decide not to sell at this point, enter 0. After you've entered the amount of grain you wish to sell, you're asked if you want to sell more. Press Y if you do; otherwise, N returns you to the planting menu.

Planting Crops

The main part of the game is Planting (f5). Unlike the other menu options above, Planting doesn't allow you to return to the menu once you're committed to it. If you want to look at your financial status, the market news, or sell crops on the futures market, do so before planting.

After you've selected Planting, a message appears explaining that you have five fields of 40 acres each and that fields 1, 2, and 3 are average or slightly above average in yield, while fields 4 and 5 are slightly less than average producers.

For each of the five fields, you choose which of the three crops to plant. For field 1, enter 1 for wheat, 2 for corn, or 3 for soybeans. Then repeat the process until all five fields have been planted. (It takes 1.5 bushels of seed to plant an acre of either wheat or soybeans and 0.334 bushels of seed to plant an acre of corn.)

NEWS REPORT	
Yearly Inflation Rate:	2%
Fuel cost (per gallon):	\$ 1.35
Herbicide cost per unit:	\$ 1.37
Insecticide cost per unit:	\$ 1.47
Overhead costs:	\$ 2856.63
Cost per acre:	\$ 183.48

Seed Prices	
Grain seed cost per bushel:	
Wheat:	\$ 9.31
Corn:	\$ 87.19
Soybeans:	\$ 9.69

Futures Market Price	
Wheat:	\$ 3.26
Corn:	\$ 3.25
Soybeans:	\$ 6.38

Press any key to continue

Based on the futures market, planting wheat looks like the smartest move.

Next, the total acreage planted in the three crops is displayed, and you're asked how many units per acre of insecticide and herbicide you wish to apply. Not applying enough herbicide and/or insecticide can drastically reduce your yields, but applying these chemicals beyond a certain level will not result in further benefits. The proper amount lies somewhere between 15 and 35 units per acre, but it's left to you to determine the optimal amount. Even with the correct amount applied, there's still a slim chance that weeds, insects, or inadequate rainfall will reduce your yield.

After crops have been planted and the chemicals applied, the planting costs (seed, chemicals, and so on) are automatically deducted from your bank balance. If your balance drops below zero, you'll have to borrow money from the bank. The bank will let you have up to \$50,000 at a yearly interest rate of 12 percent. The minimum loan payment, due at harvest time, amounts to one-third of the loan balance. If you need to borrow over the \$50,000 limit, you are considered bankrupt, thus ending the game.

Reaping What You've Sown

After planting has been done, the game moves directly into harvest time. At this point, you can sell or store your crop harvest, pay bills, and receive your futures crop check—if any.

A lot of important information appears on the screen at this time:

- Selling price of each crop, per bushel, at the current market rate, and the yield of each crop planted
- Your bank balance after planting expenses have been deducted

- The amount of money you received from the sale of any stored crops on the futures market
- The value of this year's harvest if all crops were sold at the current market prices
- The minimum loan payment due
- Harvesting costs
- Fuel expense
- Cost per acre charges
- Overhead expenses
- Crop storage fees

Also displayed are your total assets (bank balance + futures crop check + this year's harvest if sold at the current market rate) and your total debits (loan payment due + harvest costs + fuel expense + overhead expense + basic cost per acre + crop storage fees).

Take special note of this information (again, writing it down can be the key to making careful decisions). Then press any key to begin selling or storing your crops. You may sell all, none, or any portion of your total yield. You're asked how many bushels of each grain you wish to sell at the current market price. You may enter any number up to the total yield of that crop. Next, you're told how much money you would receive for that much grain. To change the amount, press f1 and reenter the number of bushels of grain to be sold. If the amount you first entered is okay, press f3. The unsold crop balance (if any) is automatically put into storage.

After all the grain has been sold or stored, you are asked to make at least a minimum payment on your loan (if you owe the bank any money). If, after selling or storing your crops and deducting all expenses, your bank balance dips below zero, you will again need to borrow money. The minimum amount you need to borrow is also displayed. Provided you're still solvent, the program cycles back to the Planting menu and the game continues into the next year.

After you've played for the number of years selected at the beginning, the final screen appears. The display includes your current bank balance; the number of bushels in storage, along with their cash value; and the amount of money you owe the bank. These figures determine your ending bank balance. If the final balance is at or above the \$20,000 you started

Harvest Time on the Farm		
Crop	Selling price	Yield
Wheat	3.78	1285
Corn	2.34	1618
Soybeans	7.34	1618

It is now time to pay your bills and to sell your crops.

Current Bank Balance	77.98
Futures Crop Check	2092.88
Total Yield	5876.83
Loan Payment Due	5598.42
Harvesting Costs	5368.51
Cost for 200 Acres	2836.88
Fuel Expense	1448.88
Overhead Expense	2858.88
Crop Storage Fees	145.88

Total Assets	68748.79
Total Debts	48885.39

Press any key to continue

Several crucial decisions must be made at harvest time.

with, you've managed to make money—or at least to break even—and can be considered a good farmer. If your balance is below \$20,000, you were not successful.

Playing Strategies

Those who play-tested this simulation during its developmental stages commented that this game is too much like real life—it's hard to make any money. True, it's not easy to win, but it's not impossible, either. With some thoughtful planning and good decision making (and maybe a little luck), you can make some money and win. Here are some suggestions that will help you succeed.

The amounts of herbicide and insecticide applied are crucial in determining your crop's success. As mentioned earlier, you should apply somewhere between 15 and 35 units per acre to get the best yield. The data in the table will help you decide if you've been applying enough of these chemicals. In the harvest cycle, the yield (in bushels per acre) of each crop planted is displayed. The table shows what the average yields of each of the three crops should be. Other factors can affect crop yields, but if you're getting consistently poor results, check to see whether you've been applying enough insecticide and/or herbicide.

Your decision to sell or store your crops will depend on the price being paid for your crops at harvest time. If it's below the base prices for the crops shown in the table, or if you just want to gamble on even higher prices, you may want to store some or all of your harvest. But storing too much grain over a period of years can easily lead to bankruptcy, so be careful. Even though you sell your crops on the futures market

at planting time, you won't receive payment until harvest time. So if your planting expenses push you over the \$50,000 limit, you'll be bankrupt and the game will end.

Crop Yields

Crop	Base Price per Bushel	Base Yield Bushels/Acre	Fuel Costs Gallons/Acre
Wheat	\$2.80	62	50
Corn	\$2.33	100	85
Soybeans	\$6.30	31	60

Each of the three crops has its own special characteristics which you may want to consider at planting and selling times. Wheat and soybeans are the least expensive crops to plant, while corn is by far the most expensive. However, your chances for a bumper crop (and therefore greater profit) are best with a judicious corn planting. Soybeans tend to be a steady producer, but the prices can vary greatly. The prices paid for wheat and corn tend to be the most steady.

Sometimes it will be necessary to store most, if not all, of your harvest and hope for a better price on the futures market in order to turn a profit. In this case, it may be necessary to go into debt temporarily to make money in the long run. Waiting for higher prices on the futures market can be a good way to earn a handsome profit, but if prices remain depressed for several years in a row, it can be very costly (with high crop-storage fees and the interest on your bank loan). Playing the futures market can either make a lot of money or result in bankruptcy.

The Farm Game

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
JJ 1Ø BO=7:BG=9:CH=1:GOSUB31ØØ:POKE53272,23
SC 2Ø CLR:GOSUB311Ø:FG=Ø:PRINT"{4 DOWN}HOW LONG WI
LL YOU MANAGE YOUR FARM";
HK 3Ø INPUTQQ$:QQ=VAL(QQ$):IFQQ=ØTHENGOSUB293Ø
HA 4Ø IFFG<>ØTHEN2Ø
PA 5Ø FORZZ=1TOQQ:GOSUB211Ø:GOSUB215Ø:IFZZ=1THENGO
SUB219Ø
JD 6Ø BO=7:BG=6:CH=1:GOSUB31ØØ
AM 7Ø PRINT"{CLR}{RVS} YEAR:{OFF}";ZZ:PRINT"{RVS}
{SPACE}PLANTING SEASON SELECTION: {OFF}"
DK 8Ø PRINTTAB(5)"{2 DOWN}F1 KEY...MARKET NEWS
JD 9Ø PRINTTAB(5)"F3 KEY...YOUR FINANCIAL STATUS
AA 1ØØ PRINTTAB(5)"F5 KEY...PLANTING
```

```

FP 110 PRINTTAB(5)"F7 KEY...SELL CROPS ON FUTURES
SP 120 PRINTTAB(8)"{2 DOWN}WHAT IS YOUR SELECTION?
PD 130 GOSUB2950
QB 140 IFASC(A$)<133ORASC(A$)>136THEN130
JP 150 AA=ASC(A$)-132:ONAAGOSUB1150,1370,1520,1890
GX 160 IFAA=3THEN180
RA 170 GOTO60
BK 180 BO=7:BG=7:CH=6:GOSUB3100
MQ 190 PRINT"{CLR}":PRINTTAB(10)"YOUR CROP
S ARE GROWING.
EC 200 FX=0:FORJ=1TO3:FX=FX+(TS(J)*INT((BP(J)*FP(J)
))*100+.5)/100):NEXT
SE 210 FX=INT(FX*100+.5)/100:SB=0
MF 220 FORJ=1TO3:SB=SR(J)+SB:NEXT
JA 230 FORJ=1TO3:SR(J)=SR(J)-TS(J):NEXT
EH 240 GOSUB2200:GOSUB2360
PG 250 GT=0:FORJ=1TO3:GT=GT+(TY(J)*INT(YP(J)*100+.
5)/100):NEXT
DA 260 PT=0:FORJ=1TO3:PT=(FU(J)*TA(J))+PT:NEXT:PT=
INT(PT*GA*100+.5)/100
SC 270 BO=2:BG=2:CH=1:GOSUB3100
RS 280 PRINT"{CLR}":PRINTTAB(5)"{RVS}{3 SPACES}HAR
VEST TIME ON THE FARM{3 SPACES}{OFF}
QD 290 GOSUB3020:PRINT"{RVS}CROP{OFF}{5 SPACES}
{RVS}SELLING PRICE{OFF}{4 SPACES}{RVS}YIELD
{OFF}
HH 300 FORJ=1TO3:RR=TA(J):IFRR=0THENRR=1
MQ 310 TM=YP(J):GOSUB3030:YP$=TM$:YP(J)=VAL(TM$)
QM 320 TM=TY(J):GOSUB3030:TY$=TM$:TY(J)=VAL(TM$)
BK 330 PRINTN$(J);TAB(13)YP$;TAB(33-LEN(TY$))INT(T
Y(J)):NEXT
JG 340 PRINT"{DOWN}IT IS NOW TIME TO PAY YOUR BILL
S AND TO SELL YOUR CROPS.":GOSUB3010
FM 350 PRINT"CURRENT BANK BALANCE";:TM=BA:GOSUB303
0:BA$=TM$:BA=VAL(TM$)
PJ 360 PRINTTAB(33-LEN(BA$))BA$
FA 370 PRINT"FUTURES CROP CHECK";:TM=FX:GOSUB3030:
FX$=TM$:PRINTTAB(33-LEN(FX$))FX$
PR 380 PRINT"TOTAL YIELD";:TM=GT:GOSUB3030:GT$=TM$
:GT=VAL(TM$)
MD 390 PRINTTAB(33-LEN(GT$))GT$
CG 400 PRINT"LOAN PAYMENT DUE";:TM=INT((LO/3)*100+
.5)/100:GOSUB3030
JJ 410 PRINTTAB(33-LEN(TM$))TM$:LP=INT(VAL(TM$)*10
0+.5)/100
AP 420 PRINT"HARVESTING COSTS";:TM=HV:GOSUB3030:HV
$=TM$:PRINTTAB(33-LEN(HV$))HV$
PR 430 HV=INT(VAL(TM$)*100+.5)/100

```

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```
XK 440 PRINT "COST FOR 200 ACRES";:TM=INT(CE*100+.5
)/100*200:GOSUB3030:CE$=TM$
HH 450 PRINTTAB(33-LEN(CE$))CE$
HK 460 PRINT "FUEL EXPENSE";:TM=PT:GOSUB3030:PT$=TM
$:PT=INT(VAL(TM$)*100+.5)/100
SB 470 PRINTTAB(33-LEN(PT$))PT$
XX 480 PRINT "OVERHEAD EXPENSE";:TM=OV:GOSUB3030:OV
$=TM$:PRINTTAB(33-LEN(OV$))OV$
QH 490 OV=INT(VAL(TM$)*100+.5)/100
SB 500 PRINT "CROP STORAGE FEES";:TM=(12*SB*0.015):
GOSUB3030:SB$=TM$
SM 510 SB=INT(VAL(TM$)*100+.5)/100
PA 520 PRINTTAB(33-LEN(SB$))SB$:GOSUB3010
RG 530 PRINT "{RVS} TOTAL ASSETS={OFF}";:TM=BA+FX+GT
:GOSUB3030:AA$=TM$
FD 540 PRINTTAB(33-LEN(AA$))AA$
QS 550 PRINT "{RVS} TOTAL DEBITS={OFF}";
MG 560 TM=LP+HV+OV+PT+SB+(CE*200):GOSUB3030:DT$=TM
$:DT=VAL(TM$)
CM 570 PRINTTAB(33-LEN(DT$))DT$:GOSUB2940
DD 580 FORJ=1TO3:IFTY(J)=0THEN730
EK 590 PRINT "{CLR}HOW MANY BUSHEL OF ";N$(J);" DO
YOU WISH":PRINT"TO SELL?
EX 600 PRINT"YOU HAVE A MAXIMUM OF ";TY(J);" TO SE
LL.
DE 610 FG=0:X$="":INPUTX$:IFX$=""THEN590
GP 620 X=VAL(X$)
ME 630 IFX>TY(J)THENPRINT"YOU DON'T HAVE ";X;"BUSH
ELS!":GOSUB3000:GOTO590
GF 640 PRINTX;"BUSHEL OF ";N$(J);" WOULD SELL":PR
INT"FOR $";:TM=X*YP(J):GOSUB3030
QX 650 PRINTTM$:GOSUB3020
XC 660 PRINT"IS ";X;"BUSHEL OF ";N$(J);" OKAY?
PQ 670 PRINT"PRESS {RVS}F1{OFF} TO CHANGE, {RVS}F3
{OFF} TO SELL
JE 680 GOSUB2950
CE 690 IFA$=CHR$(133)THEN590
CM 700 IFA$<>CHR$(134)THEN680
CF 710 BA=BA+(INT(X*YP(J)*100+.5)/100)
RB 720 SR(J)=INT(TY(J)-X+SR(J))
SX 730 NEXT
PB 740 BA=INT((BA+FX)*100+.5)/100
DQ 750 IFLO=0THEN850
XX 760 PRINT "{CLR}HOW MUCH OF YOUR LOAN DO YOU
JH 770 PRINT"WISH TO PAY OFF {2 SPACES}MINIMUM PAY
MENT
SF 780 PRINT"IS $";:TM=INT((LO/3)*100+.5)/100:GOSU
B3030:PRINTTM$
DE 790 PRINT "{DOWN}YOU OWE A TOTAL OF $";:LO=INT(L
O*100+.5)/100:PRINTLO
```

Strategy and Thinking Games

```

QA 800 FG=0:INPUTA
CP 810 IFA<TMTHENGOTO760
SR 820 IFA>LOTHENA=LO
MX 830 BA=INT((BA-A)*100+.5)/100:LO=(LO-A)*1.12::L
      O=INT(LO*100+.5)/100
RX 840 IFLO<0THENLO=0
AS 850 BA=BA-INT(CE*200*100+.5)/100
RR 860 BA=BA-INT(OV*100+.5)/100
PG 870 BA=BA-INT(HV*100+.5)/100
FQ 880 BA=BA-INT(PT*100+.5)/100
SS 890 BA=BA-INT(SB*100+.5)/100
PJ 900 IFBA<0THENGOSUB2620
JC 910 FORJ=1TO3:TY(J)=0:NEXT
XB 920 FORJ=1TO3:TS(J)=0:NEXT:NEXT
MG 930 PRINT"{CLR}":PRINTTAB(5)"{RVS}{4 SPACES}END
      OF GAME TALLY{3 SPACES}{OFF}
FX 940 PRINT"{2 DOWN}CURRENT BANK BALANCE = $";:TM
      =BA:GOSUB3030:PRINTTM$:BA=VAL(TM$)
SX 950 GOSUB3010
JR 960 PRINT"CROPS IN STORAGE:
XM 970 PRINT"{DOWN}{RV$}{CROP {OFF} {RVS} BUSHELS
      {SPACE}IN STORAGE {OFF}
KS 980 XX=0
CR 990 FORJ=1TO3:IFSR(J)<0THENSR(J)=0
DD 1000 PRINTN$(J);:TM=SR(J):GOSUB3030
BA 1010 PRINTTAB(22-LEN(TM$));INT(SR(J)):XX=XX+SR(
      J)*YP(J):NEXT
GG 1020 PRINT"{DOWN}STORED CROP CASH VALUE:";:TM=X
      X:GOSUB3030
SA 1030 PRINTTAB(35-LEN(TM$));"$"TM$:XX=VAL(TM$):B
      A=BA+XX
JM 1040 PRINT"AMOUNT OWED TO BANK:";:TM=LO:GOSUB30
      30:PRINTTAB(35-LEN(TM$));"$"TM$
XP 1050 LO=VAL(TM$):BA=BA-INT(LO*100+.5)/100
FQ 1060 IFBA>=20000THENZZ=1
XP 1070 IFBA<20000THENZZ=2
GD 1080 PRINT"GRAND TOTAL IN BANK:";:TM=BA:GOSUB30
      30:BA=VAL(TM$)
XH 1090 PRINTTAB(35-LEN(TM$));"$"TM$:PRINT
CG 1100 ONZZGOSUB2780,2820
CA 1110 PRINT"WOULD YOU LIKE TO TRY AGAIN?
KS 1120 GOSUB2950:IFA$="Y"THEN10
BR 1130 IFA$<>"N"THEN1120
HG 1140 END
QX 1150 PRINT"{CLR}":BO=1:BG=1:CH=0:GOSUB3100
HS 1160 PRINTTAB(8)"{RVS}{6 SPACES}NEWS RELEASE
      {5 SPACES}":GOSUB3020
DR 1170 IR$=STR$(INT((IR-1)*100))
PX 1180 PRINT"YEARLY INFLATION RATE: ";TAB(33)IR$;
      "§

```

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```
SB 1190 TM=GA:GOSUB3030:GA$=TM$:GA=VAL(TM$)
HH 1200 PRINT"FUEL COST (PER GALLON) :";TAB(33-P)"
      $"GA$
KK 1210 TM=HS:GOSUB3030:HS$=TM$:HS=VAL(TM$)
PB 1220 PRINT"HERBICIDE COST PER UNIT:";TAB(33-P)"
      $"HS$
FH 1230 TM=IS:GOSUB3030:IS$=TM$:IS=VAL(TM$)
BB 1240 PRINT"INSECTICIDE COST PER UNIT:";TAB(33-P)
      )"IS$
GB 1250 TM=OV:GOSUB3030:OV$=TM$:OV=VAL(TM$)
AG 1260 PRINT"OVERHEAD COSTS:";TAB(33-P)"$OV$
DX 1270 TM=CE:GOSUB3030:CE$=TM$
QK 1280 PRINT"COST PER ACRE:";TAB(33-P)"$CE$:GOSU
      B3010
SM 1290 PRINTTAB(13)"{RVS}{2 SPACES}SEED PRICES
QS 1300 PRINT"{DOWN}GRAIN SEED COST PER BUSHEL
QX 1310 FORJ=1TO3:PRINTN$(J);":":TM=BS(J):GOSUB30
      30:BS(J)=VAL(TM$)
CH 1320 PRINTTAB(33-P)"$TM$:NEXT:PRINT:GOSUB3010
KQ 1330 PRINTTAB(10)"{RVS} FUTURES MARKET PRICE ":
      PRINT
XR 1340 FORJ=1TO3:PRINTN$(J);":":TM=BP(J)*FP(J):G
      OSUB3030
BB 1350 PRINTTAB(33-P)"$TM$:NEXT:PRINT
RC 1360 GOSUB2940:RETURN
ED 1370 BO=2:BG=0:CH=1:GOSUB3100
CE 1380 PRINT"{CLR}{2 SPACES}{RVS}{2 SPACES}YOUR F
      INANCIAL STATUS{2 SPACES}":GOSUB3010
SR 1390 TM=BA:GOSUB3030:BA=VAL(TM$)
PP 1400 PRINT"SAVINGS ACCOUNT BALANCE:";TAB(25-P)"
      $"BA
DX 1410 TM=LO:GOSUB3030:LO=VAL(TM$)
XQ 1420 PRINT"YOU OWE THE BANK: ";
SH 1430 IFLO=0THENPRINTTAB(28)"-----":GOTO1450
PG 1440 PRINTTAB(25-P)"$TM$
HQ 1450 PRINT"{DOWNROPS PRESENTLY IN STORAGE ":PRINT:X
      =0
XC 1460 PRINTTAB(9)"CROP";TAB(20)"BSHELS
BR 1470 FORJ=1TO3:IFSR(J)<1.0THENSR(J)=0
HP 1480 PRINTTAB(8)N$(J);TAB(22)SR(J):X=X+SR(J):NE
      XT
SB 1490 PRINT"{2 DOWN}GRAIN STORAGE FEE: $";TM=IN
      T(X*.015):GOSUB3030
DK 1500 PRINTTM$" PER MONTH.{2 DOWN}
CM 1510 GOSUB2940:RETURN
XF 1520 BO=5:BG=5:CH=1:GOSUB3100
QK 1530 PRINT"{CLR"}";TAB(5)"{RVS}{2 SPACES}PLANTIN
      G TIME ON THE FARM{2 SPACES}
```


Strategy and Thinking Games

```
QB 1540 PRINT "{DOWN}YOU HAVE 200 ACRES TO PLANT, DI  
VIDED INTO";  
JS 1550 PRINT "5 FIELDS OF 40 ACRES EACH.  
RK 1560 PRINT "{DOWN}FIELDS 1-3 ARE AVERAGE OR SLIG  
HTLY ABOVE AVERAGE YIELDERS.  
DH 1570 PRINT "{DOWN}FIELDS 4 AND 5 ARE SLIGHTLY LE  
SS THAN {3 SPACES} AVERAGE PRODUCERS.  
SG 1580 GOSUB 3010  
HD 1590 PRINT TAB(34) "CROP  
PF 1600 FORJ=1 TO 5: PRINT "CROP TO BE PLANTED IN FIEL  
D {RVS}"; J  
JS 1610 PRINT "{RVS}1=WHEAT{OFF} {3 SPACES} {RVS}2=CO  
RN{OFF} {2 SPACES} {RVS}3=SOYBEANS{OFF}  
MA 1620 GOSUB 2950  
RP 1630 IF ASC(A$) < 49 OR ASC(A$) > 51 THEN GOSUB 2980: GOTO  
1620  
FC 1640 FL(J)=VAL(A$): PRINT "{2 UP}"; TAB(33) FL(J): N  
EXT  
AB 1650 PRINT "{CLR}ALL YOUR FIELDS ARE READY FOR P  
LANTING.  
XF 1660 PRINT "THE TOTALS ARE:": FORJ=1 TO 3: X=X+0: FORJ  
=1 TO 5  
SB 1670 IFFL(JJ)=J THEN X=X+40  
BP 1680 NEXT: TA(J)=X: PRINT X; " ACRES OF "; N$(J); " P  
LANTED.": NEXT  
DJ 1690 TM=0: FORJ=1 TO 3: TM=TM+(TA(J)*BS(J)*BB(J)): N  
EXT: TM=INT((TM+.005)*100)/100  
QK 1700 PRINT "{DOWN}SEED COSTS: "; GOSUB 3030: TM=VA  
L(TM$): PRINT TAB(30-LEN(TM$)) "$" TM$  
QG 1710 BH=BA: PRINT "{DOWN}BANK BALANCE: $"; BA=BA-  
TM: TM=BA: GOSUB 3030  
MB 1720 PRINT TAB(30-LEN(TM$)) "$" TM$  
PC 1730 PRINT "{DOWN}IS THIS OKAY? (Y/N)  
RA 1740 GOSUB 2950: IFA$="N" THEN BA=BH: GOTO 1530  
KP 1750 IFA$ <> "Y" THEN 1740  
AM 1760 PRINT "{UP}HOW MANY UNITS PER ACRE? OF INSECT  
ICIDE {2 SPACES} DO YOU WISH TO APPLY  
AK 1770 X$="": INPUT X$: IFX$="": THEN 1760  
DD 1780 IF ASC(X$) < 48 OR ASC(X$) > 57 THEN GOSUB 2930: GOTO  
1760  
FE 1790 X=VAL(X$)  
AQ 1800 BA=BA-(X*200*IS): IN=((SQR(X)-5)/5)+1  
QP 1810 PRINT "HOW MANY UNITS PER ACRE OF HERBICIDE  
DO YOU WISH TO APPLY?"  
RE 1820 X$="": INPUT X$: IFX$="": THEN 1810  
CK 1830 IF ASC(X$) < 48 OR ASC(X$) > 57 THEN GOSUB 2930: GOTO  
1810  
CG 1840 X=VAL(X$)  
AQ 1850 BA=BA-(X*200*HS): HE=((SQR(X)-4.4)/5)+1
```

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```
JB 1860 PRINT "{DOWN}PRESENT BANK BALANCE: $";:TM=B
      A:GOSUB3030:PRINTTM$:GOSUB3000
HR 1870 IFBA<0THEN2620
QG 1880 RETURN
CK 1890 PRINT "{CLR}{RVS}{3 SPACES}GRAIN FUTURES MA
      RKET SALES{3 SPACES}"
JC 1900 PRINT "{2 DOWN}YOU HAVE THE FOLLOWING AMOUN
      TS OF"
FM 1910 PRINT "GRAIN PRESENTLY IN STORAGE:":PRINT
EX 1920 FORJ=1TO3:IFSR(J)<0THENSR(J)=0
XJ 1930 PRINTN$(J),INT(SR(J));"BUSHEL$":NEXT:GOSUB
      3010
QD 1940 PRINT "GRAIN MARKET FUTURES PRICES"
XR 1950 FORJ=1TO3:PRINTN$(J),"$";:TM=BP(J)*FP(J):G
      OSUB3030:PRINTTM$:NEXT
AQ 1960 PRINT "WHICH GRAIN WOULD YOU LIKE TO SELL?"
EM 1970 PRINT "{RVS}F1{OFF} WHEAT{2 SPACES}{RVS}F3
      {OFF}=CORN{2 SPACES}{RVS}F5{OFF}=SSOYBEANS
      {2 SPACES}{RVS}F7{OFF}=NONE"
RB 1980 GOSUB2950:IFASC(A$)<133ORASC(A$)>136THEN19
      80
PX 1990 J=ASC(A$)-132::IFJ=4THENRETURN
PC 2000 IFSR(J)=0THENPRINT "YOU DON'T HAVE ANY ";N$
      (J);"!":GOTO1960
JF 2010 PRINT "HOW MANY BUSHEL$ OF ";N$(J);" DO YOU
ED 2020 PRINT "WANT TO SELL (UP TO ";SR(J);" BUSHEL
      S)?"
DQ 2030 INPUTK
GJ 2040 IFK>SR(J)THENPRINT "YOU DON'T HAVE THAT MUC
      H GRAIN!":GOTO2010
XF 2050 SR(J)=SR(J)-K:IFSR(J)<0THENSR(J)=0
CB 2060 TS(J)=K
XP 2070 PRINT "WOULD YOU LIKE TO SELL MORE GRAIN?"
JC 2080 GOSUB2960:IFA$="Y"THEN1890
QA 2090 IFA$<"N"THEN2080
MC 2100 RETURN
KH 2110 X=INT((RND(.)*7+1)/100)
RR 2120 IFX>.05THEN2140
BE 2130 IR=1+X:GOTO2150
JQ 2140 IR=1
MM 2150 FORJ=1TO3:BS(J)=INT(BS(J)*IR*100)/100:NEXT
CM 2160 GA=INT(GA*IR*100+.5)/100:IS=IS*(IR+.01):HS
      =HS*IR:OV=OV*(IR+.01):HV=HV*IR
JP 2170 CE=INT(CE*(IR+.01)*100+.5)/100
JK 2180 FORJ=1TO3:BP(J)=BP(J)*(IR-.01):NEXT:RETURN
KK 2190 FORJ=1TO3:FP(J)=1.05:NEXT:RETURN
XB 2200 X=RND(.)*(0.99-.01)+.01
FH 2210 IFX<.45THENXX=1.0+X:GOTO2250
RM 2220 IFX>.80THENXX=X:GOTO2250
EB 2230 IFX>.45ANDX<.5THENXX=1.03:GOTO2250
```

```

SD 2240 XX=1.0
QQ 2250 X=RND(.)*( .99-.01)+.01
XP 2260 IFX<.1THENXX=XX+1+X:GOTO2300
EX 2270 IFX>.75THENXX=XX+X:GOTO2300
XS 2280 IFX>.4ANDX<.5THENXX=XX+1.02:GOTO2300
RB 2290 XX=XX+1
BD 2300 XX=XX/2
QP 2310 IFX<.2THENIN=IN/2:HE=HE/2
BE 2320 SF=IN:IFIN>1.1THENSF=1.1
SF 2330 HF=HE:IFHF>1.1THENHF=1.1
JQ 2340 FORJ=1TO3:TY(J)=0:NEXT
HQ 2350 FORJ=1TO5:K=FL(J):TY(K)=INT(40*FF(J)*BY(K)
      *XX*HF*SF+TY(K)):NEXT:RETURN
SX 2360 FORJ=1TO3:GOSUB2580:DM(J)=XX:GOSUB2580:DC(
      J)=XX:GOSUB2580:EM(J)=XX
DK 2370 GOSUB2580:FC(J)=XX:NEXT
RQ 2380 X=0
QJ 2390 X=0:FORJ=1TO3:X=DM(J)+X:X=X+DC(J):X=X+EM(J)
      ):X=X+FC(J):FA(J)=X/4:X=0:NEXT
GR 2400 FORJ=1TO3:YP(J)=FA(J)*BP(J):NEXT
QB 2410 X=0:FORJ=1TO3
MA 2420 IFDC(J)>1.05THENXX=.95:GOTO2450
QH 2430 IFDC(J)<.9THENXX=1.1:GOTO2450
PG 2440 XX=1
BS 2450 X=X+XX
EG 2460 IFEM(J)>1.05THENXX=.95:GOTO2490
RX 2470 IFEM(J)<.95THENXX=1.12:GOTO2490
XP 2480 XX=1
ED 2490 X=X+XX
JP 2500 IFFC(J)>1.1THENXX=.8:GOTO2530
QK 2510 IFFC(J)<.97THENXX=1.09:GOTO2530
HR 2520 XX=1
AK 2530 X=X+XX:X=X/3
CA 2540 IFX=1THENX=1.03
JC 2550 FP(J)=X
EG 2560 X=0
DC 2570 NEXT
EK 2580 X=RND(.)*( .99-.01)+.01
HQ 2590 IFX<.45THENXX=X+1:RETURN
XH 2600 IFX>.70THENXX=X:RETURN
SJ 2610 XX=1:RETURN
AE 2620 PRINT"{CLR}{RVS}YOU NEED TO BORROW MONEY T
      O KEEP FARMING
QE 2630 PRINT"{2 DOWN}YOUR BALANCE IN THE BANK HAS
AP 2640 PRINT"DROPPED BELOW $0.{2 SPACES}TO MEET Y
      OUR PAYMENTS
QG 2650 PRINT"{UP}YOU WILL NEED TO BORROW SOME MON
      EY FROM THE BANK (UP TO $50,000).

```

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```
XA 2660 PRINT"MINIMUM LOAN PAYMENTS ARE ONE-THIRD
      {SPACE}OF{2 SPACES}LOAN DUE AT 12% INTERES
      T.
XF 2670 IF0-BA+LO>50000THEN2860
AG 2680 PRINT"{2 DOWN}YOU WILL NEED TO BORROW AT L
      EAST: ".PRINT"$";0-(INT(BA*100+.5)/100)
SP 2690 PRINT"YOU CAN BORROW UP TO $";50000-INT(LO
      *100+.5)/100
EJ 2700 PRINT"{DOWN}YOU OWE A GRAND TOTAL OF $";IN
      T(LO*100+.5)/100
KG 2710 PRINT"{2 DOWN}HOW MUCH DO YOU WISH TO BORR
      OW?
BF 2720 INPUTX$:X=VAL(X$):IFVAL(X$)=0THEN2720
RM 2730 IFLO+X>50000THENPRINT"SORRY, YOUR CREDIT LI
      NE IS $50,000":GOTO2710
SA 2740 IFX<INT(0-BA+.005)THENPRINT"THAT WILL NOT
      {SPACE}BE ENOUGH, TRY AGAIN":GOTO2710
KS 2760 LO=LO+X:BA=INT((BA+X)*100+.5)/100:IFLO<0TH
      ENLO=0
HH 2770 LO=LO*1.12:RETURN
GE 2780 BO=7:BG=4:CH=0:GOSUB3100
ES 2790 PRINT"{DOWN}CONGRATULATIONS!!{2 SPACES}YOU
      HAVE MANAGED THE
DC 2800 PRINT"NEARLY IMPOSSIBLE TASK OF MAKING MON
      EY
GM 2810 PRINT"AT FARMING.{2 SPACES}THE BANK CONSID
      ERS YOU A":PRINT"GOOD RISK.":RETURN
MA 2820 BO=6:BG=6:CH=1:GOSUB3100
CX 2830 PRINT"YOU HAVE PROVEN YOURSELF A VERY POOR
XP 2840 PRINT"FARMER! YOU LOST MONEY, AND NOW YOUR
HK 2850 PRINT"FARM MUST BE SOLD TO PAY YOUR CREDIT
      ORS!":RETURN
KA 2860 GOSUB3000:GOSUB3000:PRINT"{CLR}{RVS}
      {5 SPACES}SORRY, YOU ARE BANKRUPT.
      {11 SPACES}{OFF}
GJ 2870 PRINT"{2 DOWN}YOU HAVE MANAGED TO RUN YOUR
      CREDIT
AF 2880 PRINT"LINE TO THE LIMIT, AND NOW YOU ARE
RM 2890 PRINT"BROKE!!{2 SPACES}YOU OWE CONSIDERABLE
      BACK TAXES
SJ 2900 PRINT"AND YOUR FARM WILL BE SOLD AT A
CE 2910 PRINT"SHERIFF'S AUCTION TO PAY YOUR DEBTS.
KE 2920 PRINT"{3 DOWN}":GOTO1110
SX 2930 FG=1:PRINT"{DOWN}YOU MUST ENTER A NUMBER H
      ERE.{2 UP}":GOSUB3000:RETURN
MJ 2940 PRINT"{RVS}{6 SPACES}PRESS ANY KEY TO CONT
      INUE{7 SPACES}{OFF}":GOSUB2950:RETURN
DC 2950 POKE198,0
PB 2960 GETA$:IFA$=""THEN2960
GM 2970 RETURN
```

```

CE 2980 PRINT"YOU MUST ENTER 1,2, OR 3 HERE.":GOSU
      B3000:RETURN
DE 2990 PRINT"{UP}{32 SPACES}{UP}":RETURN
EG 3000 FORT=1TO2000:NEXT:RETURN
RE 3010 PRINT"-----
      --":RETURN
AA 3020 PRINT"*****
      **":RETURN
DM 3030 TM$=STR$(INT(TM*100+.5)/100)
DE 3040 P=0:FORA=1TOLEN(TM$)
EQ 3050 IFMID$(TM$,A,1)="."THENP=A-1
QD 3060 NEXT:IFP=0THENTM$=TM$+CHR$(46):P=1
XQ 3070 IFMID$(TM$,(LEN(TM$)-2),1)=CHR$(46)THEN309
      0
MM 3080 TM$=TM$+CHR$(48):GOTO3040
GD 3090 RETURN
SE 3100 POKE53280,BO:POKE53281,BG:POKE646,CH:RETUR
      N
JG 3110 PRINT"{CLR}{4 DOWN}";TAB(13)"{RVS} THE FAR
      M GAME
JA 3120 FORJ=1TO3:READN$(J):NEXT:FORJ=1TO3:READBP(
      J):NEXT:FORJ=1TO3:READFU(J):NEXT
AQ 3130 FORJ=1TO3:READBY(J):NEXT:FORJ=1TO3:READBB(
      J):NEXT:FORJ=1TO3:READBS(J):NEXT
PD 3140 READBA:READLO:READGA:READCE:FORJ=1TO3:SR(J
      )=0:NEXT:READIS:HS=IS
GH 3150 FORJ=1TO5:READFF(J):NEXT:FORJ=1TO3:READDF(
      J):NEXT:FORJ=1TO3:READCF(J):NEXT
RH 3160 FORJ=1TO3:READEF(J):NEXT:FORJ=1TO3:READOF(
      J):NEXT:READOV:HV=2*OV
FJ 3170 BA$=STR$(BA):RETURN
CB 3180 DATA"WHEAT","CORN","SOYBEANS",2.80,2.33,6.
      30,50,85,60
HK 3190 DATA62,100,31,1.5,.334,1.5,7,65,7.25,20000
      ,0,1,70
JJ 3200 DATA1,1.1,1.03,1,.98,.9,.8,1.1,.82,1,1.1,1
DQ 3210 DATA1,.5,1.1,.6,.25,1.12,2000

```

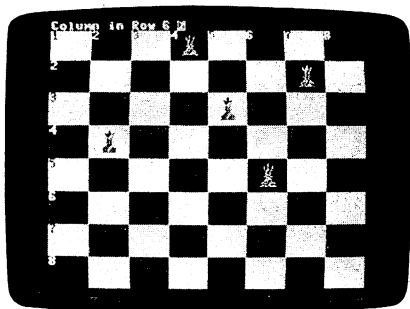
Queens' Quarrel

Barry L. Ives

Here's a brainteaser that's not as easy as it seems. You must place eight queens on a chessboard in a position where no queen is lined up with any other. If you can't do it, your 64 will show you an answer to the puzzle.

Eight haughty queens have quarreled, and now each one refuses to speak with any of the other seven. The question is, how do you place the queens on an 8×8 chessboard to give each queen sole possession of her row, column, and two diagonals?

Based on a puzzle originally devised in the mid-1800s by the great mathematician, Karl Friedrich Gauss, "Queens' Quarrel" invites you to place the eight queens on the chessboard so that no queen can capture any of the other seven. If you're familiar with the game of chess, you'll realize this means that no two queens on the board can be in line horizontally, vertically, or diagonally.



This player has three more queens to place to solve the puzzle.

Playing the Game

Queens' Quarrel is written in BASIC. If the puzzle sounds easy, type in the program and save it. Then load and run it, and try it yourself. (When typing in the program, be sure to use "The Automatic Proofreader," Appendix C.) As prompted,

enter the number of the column in which you would like to place a queen in the first row and press RETURN. You'll then be prompted to place a queen on the second row, and so on.

If you attempt to place one in a column or diagonal that is already occupied, a buzzer will sound and you'll be requested to try again, or to enter C, R, or E. Typing R causes the last-placed queen to be removed from the board, allowing you to place it in a different column. Any number of pieces can be removed by entering R as many times as necessary.

The E command ends the program, returning your screen to normal. The 64's power comes into play when C (Computer) is entered and your 64 takes over. Trying every possible position, based on what's already on the screen, the program places a queen on a likely square in the row following your last successful move. It then scans the next row for a safe square. If it finds none, the queen in the previous row is moved up one square. If no further safe squares are found in that row, the queen in the next previous row is moved up, and so on, until a solution is found. When you see the program in action, you can watch the computer thinking, patiently trying every move until it finds eight positions that work.

When either you or the computer finds a solution, it is announced with a gong and is displayed on the screen until you press the space bar to play again. Pressing any key while the computer is searching for a solution will clear the chessboard and return control to you. Don't try to type your moves in advance; keypresses aren't accepted until after the prompt has appeared.

How many solutions can you find? There's at least one solution to every attempt starting with a queen in each respective square of the first row, but I've only begun to list the number of combinations possible with each. I would suggest, however, that you don't make your first attempt by entering C with a queen in the first column of the first row. It takes the 64 a full eight minutes to solve that one. Instead, you might want to start with row 1, column 2 or 5. For future reference, it might also be a good idea to keep paper and a pencil handy to keep track of each solution you find.

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Queens' Quarrel

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
DE 10 SC=1063:CS=55336:SI=54272:TR=55296:CC=160:SR
    =53269:BC=53280:POKE SR,0
EH 20 PRINT "{CLR}"CHR$(14)CHR$(158):POKEBC,0:POKEB
    C+1,1
MH 30 MT$="{OFF}{5 SPACES}{RVS}[2]{5 SPACES}{OFF}
    {5 SPACES}{RVS}{5 SPACES}{OFF}{5 SPACES}
    {RVS}{5 SPACES}{OFF}{5 SPACES}{RVS}
    {SHIFT-SPACE}{3 SPACES}"
BE 40 TM$="{RVS}{5 SPACES}{OFF}{5 SPACES}{RVS}
    {5 SPACES}{OFF}{5 SPACES}{RVS}{5 SPACES}
    {OFF}{5 SPACES}{RVS}{5 SPACES}{OFF}
    {5 SPACES}"
HE 50 FORP=SITOSI+24:POKEP,0:NEXT:GOSUB610:GOSUB55
    0:GOTO280
HE 60 FORN=R+1TO8:IFBD(N,C)THENFL=1:RETURN
SH 70 NEXT:IFR=1THEN100
KX 80 FORN=1TOR-1:IFBD(N,C)THENFL=1:RETURN
HM 90 NEXT
SH 100 FORN=C+1TO8:IFBD(R,N)THENFL=1:RETURN
EA 110 NEXT:IFC=1THEN140
QQ 120 FORN=1TOC-1:IFBD(R,N)THENFL=1:RETURN
SK 130 NEXT
BC 140 J=-1:K=-1:GOSUB180:IFFLTHENRETURN
XH 150 J=1:K=1:GOSUB180:IFFLTHENRETURN
DG 160 J=-1:K=1:GOSUB180:IFFLTHENRETURN
EX 170 J=1:K=-1:GOSUB180:RETURN
FP 180 R1=R:C1=C
EH 190 R1=R1+J:C1=C1+K
RX 200 IFR1<0ORR1>8ORC1<0ORC1>8THENRETURN
DA 210 IFBD(R1,C1)THENFL=1:RETURN
RD 220 GOTO190
BH 230 FORTT=2040TO2047:POKETT,14:NEXT
JS 240 IFX>255THENPOKE53264,PEEK(53264)OR(2↑SP):X=
    X-255:GOTO260
EQ 250 POKE53264,PEEK(53264)ANDNOT(2↑SP)
GK 260 POKE53248+2*SP,X:POKE53249+2*SP,Y:POKESR,PE
    EK(SR)OR(2↑SP):RETURN
CA 270 POKESR,PEEK(SR)ANDNOT(2↑SP):RETURN
XE 280 PRINTCHR$(154):SR$=CHR$(19)+CHR$(18):FORR=1
    TO8
RC 290 GOSUB530:POKE198,0:IFR=0THENR=1
RG 300 PRINTSR$"{RVS}{BLK}COLUMN IN ROW"R"*
    {20 SPACES}":POKE19,1
SA 305 PRINT"{HOME}{16 RIGHT}";
BM 310 GET C2$:IFC2$=""THEN310
```


Strategy and Thinking Games

```
RQ 312 IFASC(C2$)=20 THEN 310
RJ 315 PRINTC2$
KG 320 C2$=LEFT$(C2$,1):C2=VAL(C2$):C3=ASC(C2$):PO
    KE19,0:IFC3=67THENC=1:GOTO450
SR 330 IFC3=69THENPOKE198,0:SYS198
BM 340 IFC3=82THENR=R-1:SP=R-1:FORN=1TO8:BD(R,N)=0
    :GOSUB270:NEXT:GOTO290
JE 350 IFC2>0ANDC2<9THENC=C2:FL=0:T2=0:BD(R,C)=1:G
    OTO370
SR 360 GOTO290
MG 370 GOSUB60
RS 380 IFFL=0THENSP=R-1:X=C*40-7:Y=R*24+33:GOSUB23
    0:GOSUB590:IFR=8THEN420
QR 390 IFFLTHENGOSUB530:PRINTSR$"SORRY! TRY AGAIN,
    OR HIT C, R, OR E"
QC 400 IFFLTHENBD(R,C)=0:GOSUB570:FORTT=1TO300:NEX
    T:GOTO290
BD 410 NEXTR
HX 420 GOSUB530:PRINTSR$"SOLUTION! PLAY AGAIN <Y/N
    >{SHIFT-SPACE}?" :GOSUB550
GH 430 GETA$:IFA$=""THEN430
JR 435 IF A$="N" THEN POKE SR,0:PRINTCHR$(142)CHR$
    (147):END
KB 440 GOSUB540:GOTO280
JX 450 GOSUB530:PRINTSR$"WORKING ON A SOLUTION..."
BP 460 GOSUB60
EH 470 IF (FL=0) AND (T2) THEN T2=0:FLAG=1:BD(R,C)=0:S
    P=R-1:GOSUB270:GOSUB590
HE 480 IFFL=0THENSP=R-1:X=C*40-7:Y=R*24+33:GOSUB23
    0:GOSUB590:IFR=8THEN420
CX 490 IFFL=0THENBD(R,C)=1:R=R+1:C=1
JE 500 IFFLTHENC=C+1:FL=0:IFC=9THENC=1:R=R-1:T2=1:
    IFR=0THENR=1:T2=0
HD 510 GETA$:IFA$<>""THENGOSUB540:GOTO280
AF 520 GOTO460
KQ 530 FORN=1039TO1063:POKEN,160:NEXT:RETURN
DC 540 FORNN=1TO8:FORN=1TO8:BD(NN,N)=0:NEXT:NEXT:P
    OKESR,0:RETURN
FD 550 POKESI+1,100:POKESI+5,27:POKESI+15,28:POKES
    I+24,15:POKESI+6,69
CQ 560 POKESI+4,21:FORP=1TO700:NEXT:POKESI+4,20:RE
    TURN
MB 570 POKESI+1,10:POKESI+6,240:POKESI+5,0:FORPP=1
    TO30:POKESI+4,17:FORP=1TO10:NEXT
MB 580 POKESI+4,16:FORP=1TO10:NEXT:NEXT:FORP=1TO10
    00:NEXT:RETURN
FR 590 POKESI+1,45:POKESI+5,132:POKESI+6,132:POKES
    I+15,0
BA 600 POKESI+4,17:FORP=1TO200:NEXT:POKESI+4,16:RE
    TURN
```


Atom Shoot

George F. Clement

The rules are simple, but you can't win this challenging game of logic without some intelligent deductions—and maybe a little luck.

In this game, you're a physicist engaged in important research into subatomic particles. As part of the research, you must find 25 quarks within a superthin quartz crystal.

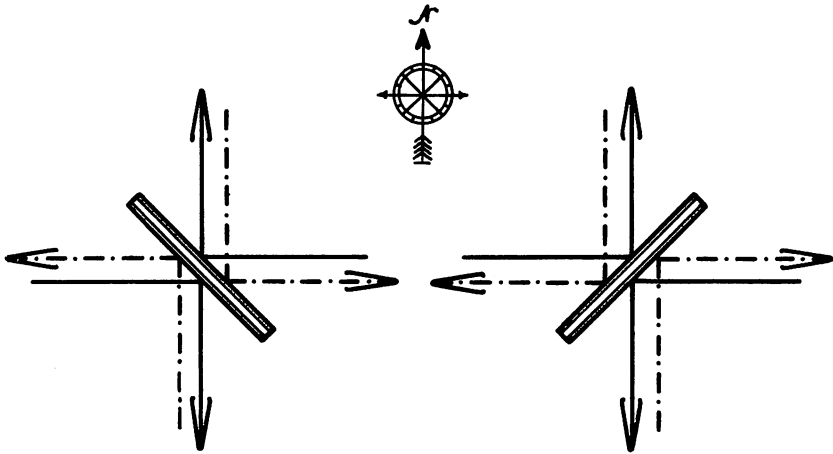
Type in the program, using "The Automatic Proofreader," found in Appendix C. Save a copy, and you'll be ready to play. Just load the program and type RUN.

The rules are fairly simple: You shoot atoms into the small crystal (which is only 15 atoms wide, 10 atoms deep). If there are no quarks blocking the path, the atom follows a straight path and comes out the other side. But if a quark is in the way, the atom bounces away at a right angle. And it's possible for atoms to ricochet off several quarks. They might even exit exactly opposite the entry point, making it look as if the atom followed a straight path.

If you think you've found a quark, you can take a guess about the quark's location and type. You gain points for a correct guess, but lose points if you're wrong. There are more points available at the beginning of the game, when fewer atoms have been used up. You have a supply of only 25 atoms, so they must be used wisely. When you've used them all, the game is over and you'll be shown any quarks you didn't find.

Two Types of Quarks

Atoms shot into the grid can be deflected by one of two kinds of quarks, left-handed or right-handed. If you shoot an atom upward (from south to north), a left-handed quark changes the atom's direction to the left (or west). A right-handed quark deflects the atom to the right. The quarks act like a two-sided mirror:



Left-Handed Quarks

Atom Shot From	New Direction
North	East
South	West
East	North
West	South

Right-Handed Quarks

Atom Shot From	New Direction
North	West
South	East
East	South
West	North

Shoot or Guess

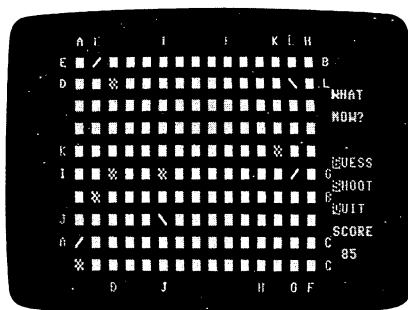
You have three options at the beginning of each round: shoot, guess, or quit. Press S, G, or Q accordingly. If you choose to shoot, a letter appears in the top-left corner. The letters start at A and end at Y. They represent the 25 atoms you have in supply. Use the greater-than (>) and less-than (<) keys to move the letter around the edge of the grid. When you've reached the spot you've chosen, press RETURN to shoot the atom.

The atom flies into the grid, bounces off quarks, and exits at another position, which will be marked with the same letter. The entry point will always be different from the exit.

After shooting an atom, you again have the option of shooting or guessing. Remember that the early guesses are worth more points. If you choose to guess, press G. The computer asks where you think the quark is—which column and which row. Next, a pointer appears in the corner. Use the < and > keys to position the pointer to the type of quark you

think you've found. If the guess is right, the quark appears on the grid. If not, a checkerboard shape is printed.

The Quit option ends the game, with an invitation to play again. The game also ends after you have shot the last atom (Y). Either way, the undiscovered quarks are printed to the screen in a different color.



Some quarks can be found easily—others are more elusive.

Strategies

At the beginning of the game, shoot along the edges. Quarks there are usually easier to find.

Don't waste atoms shooting from a known exit point. Exits and entries are symmetrical. (If you shoot from location A and the exit is at location B, then shooting from B will always end up at A.) Pathways are also unique; each entry point has a single exit point which no other entry point shares.

Pay attention to the time the atom takes between entry and exit. Longer pathways take more time.

It helps to keep track of which pathways have been "solved." Write down the letters A–Y and cross them out when you discover an explanation for each path. When more quarks are discovered, go back and see if you can trace through the unsolved pathways.

Although it's possible for an atom to bounce off eight (or more) quarks, assume that there are only one or two bounces, until you're proven wrong. Go for the simplest hypothesis, as it's often correct.

You may encounter a frustrating situation: All pathways seem to be explained, but you've discovered only 24 of the 25 quarks. In such a case, look for a path that crosses itself. There may be a quark at the intersection. When the atom reaches

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that point, it bounces the other way rather than traveling straight through.

It's not always possible to find every quark through logic alone. But with reason and a little luck, you can usually solve the grid.

Atom Shoot

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
EC 10 PRINT "{CLR}":POKE53281,0:POKE53280,0:KB=198:
    POKE650,128:CLR:ZZ=1700:REM 64 SPECIFIC
QX 20 DIMA%(15,10),B%(15,10),M(50),N(50):DN$="
    {HOME}{6 DOWN}":FORA=1TO33:DN$=DN$+"{RIGHT}"
    :NEXT
QH 30 NS=25:GOSUB460:FORA=1TO15:M(A)=A*2+1:N(A)=2:
    NEXT:FORA=16TO25:M(A)=32
DX 40 N(A)=(A-15)*2+1:NEXT:FORA=26TO40:M(A)=31-(A-
    26)*2:N(A)=22:NEXT
GA 50 FORA=41TO50:M(A)=2:N(A)=21-(A-41)*2:NEXT:FOR
    A=0TO3:READDX(A),DY(A):NEXT
JJ 60 FORA=1TO7:READMR(A):NEXT:DATA -1,0,1,0,0,-1,
    0,1,27,78,27,78,177,57,147
MM 70 FORA=1TO4:READMS(A):NEXT:DATA110,109,110,109
    :GOSUB420
PB 80 FORS=1TONS:S$=CHR$(64+S):PRINTDN$"{7}[OFF] W
    HAT{2 SPACES}{2 DOWN}{6 LEFT}NOW?{2 SPACES}"
    :GOSUB590
GD 90 GETA$:ON-(A$="G")-2*(A$="S")-3*(A$="Q")GOTO1
    00,270,330:GOTO90
KR 100 PRINT "{HOME}{3 RIGHT}{GRN}";:FORA=65TO79:PR
    INTCHR$(A) " ";:NEXT:POKEKB,0
RC 110 PRINTDN$"{7} WHICH{2 DOWN}{5 LEFT} COLUMN"
XB 120 GETA$:IFA$<"A"ORA$>"O"THEN120
CD 130 X1=ASC(A$)-64:GOSUB560
GF 140 PRINT "{HOME}{3 DOWN}{GRN}";:FORA=0TO9:PRINT
    RIGHT$(STR$(A),1);"{2 DOWN}{LEFT}";:NEXT:PO
    KEKB,0
EG 150 PRINTDN$"{7} WHICH{2 DOWN}{5 LEFT} ROW
    {2 SPACES}"
GJ 160 GETA$:IFA$<"0"ORA$>"9"THEN160
RJ 170 PRINT "{HOME}{3 DOWN}";:FORA=1TO20:PRINT"
    {DOWN}{LEFT}";:NEXT:Y1=VAL(A$)+1:W$="↑"
SR 180 PRINT "{HOME}{3 SPACES}";:FORA=1TO4:PRINTCHR
    $(MS(A)) " ";:NEXT:Z=4:T1=X1:T2=Y1:GOSUB490
AD 190 X1=T1:Y1=T2:GOSUB560:IFB%(X1,Y1)<>0ANDMR(X)
    =A%(X1,Y1)THENS=S-1:NEXT
FP 200 B=54-S*2:IFA%(X1,Y1)=MR(X)THENB%(X1,Y1)=1:G
    OTO230
```

```

BX 210 X1=X1*2+1:Y1=Y1*2+1:PRINT" [8] ";:N$=" [+ ]":GO
SUB410
GM 220 PRINTDN$ "[7] MISSED{ 2 DOWN}{6 LEFT}-"B/2"
{LEFT} ";:SC=SC-B/2:GOTO260
FX 230 SC=SC+B:GOSUB570:X1=X1*2+1:Y1=Y1*2+1:PRINT"
[8] ";:GOSUB410
PF 240 PRINTDN$ "[7]"B"{LEFT} PTS { 2 DOWN}{6 LEFT}
{ 6 SPACES}":G=G+1
DE 250 IFG=25THENSC=SC+200-S*5:PRINT"{HOME}{RVS}"S
PC(15)"YOU SOLVED IT!":GOSUB590:GOTO360
FF 260 FORTD=1TOZZ:NEXT:S=S-1:NEXT
HP 270 Z=50:W$=S$:GOSUB490
JP 280 N$=S$:M=INT((M(X)-1)/2)-(M(X)=2):N=INT(N(X)
/2)+(N(X)=22)
KM 290 GOSUB390:GOSUB400:X1=M:Y1=N:GOSUB390
XE 300 ND=3*4↑D:IFA$(X1,Y1)<>0THEND=((A$(X1,Y1)AND
ND)/(4↑D))
EM 310 X1=X1+DX(D):Y1=Y1+DY(D):IF(X1>0)AND(X1<16)A
ND(Y1>0)AND(Y1<11)THEN300
CM 320 M=X1+DX(D):N=Y1+DY(D):PRINT"{RED}";:GOSUB40
0:PRINT"{YEL}";:NEXT
PX 330 PRINT"[7]":FORX=1TO15:FORY=1TO10:X1=X:Y1=Y
MH 340 IFA$(X1,Y1)<>0ANDB$(X1,Y1)=0THENGOSUB570:X1
=X1*2+1:Y1=Y1*2+1:GOSUB410
RC 350 NEXTY,X
MA 360 PRINTDN$" PLAY { 2 DOWN}{5 LEFT}AGAIN?":POKE
KB,0
JD 370 GETA$:ON-(A$="Y")-2*(A$="N")GOTO10,380:GOTO
370
AC 380 POKE2025,0:PRINT"{CLR}":END
AF 390 D=-((X<=50)AND(X>=41))-2*((X>25)AND(X<41))-
3*((X>=1)AND(X<=15)):RETURN
DS 400 X1=M*2-2*DX(D)+1:Y1=N*2-2*DY(D)+1:GOSUB410:
RETURN
SC 410 PRINT"{HOME}";:FORA=1TOY1:PRINT"{DOWN}";:NE
XT:PRINTSPC(X1)N$:;RETURN
DK 420 NM=25:FORA=1TONM:B=MR(INT(RND(1)*4)+1)
JJ 430 C=INT(RND(1)*15)+1:D=INT(RND(1)*10)+1
KF 440 IFA$(C,D)<>0THEN430
XB 450 A$(C,D)=B:NEXT:RETURN
XG 460 PRINT"{CLR}[8]":FORA=1TO10:PRINT:PRINT:PRIN
T"{ 2 RIGHT}";:FORB=1TO15:PRINT"{RVS}{OFF}
";
PA 470 NEXTB,A
AB 480 PRINT DN$ "{GRN}{6 DOWN}{RIGHT}{RVS}G{OFF}UE
SS{ 2 DOWN}{5 LEFT}{RVS}S{OFF}HOOT{ 2 DOWN}
{5 LEFT}{RVS}Q{OFF}UIT{ 2 DOWN}{4 LEFT}[7]SC
ORE":RETURN
KJ 490 PRINT"{YEL}":X=1

```

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```
GP 500 X1=M(X):Y1=N(X):N$=W$:GOSUB410
CE 510 GETA$:ON-(A$=",""-2*(A$=".")-3*(A$=CHR$(13)
)GOTO520,530,550:GOTO510
KF 520 X=X-1-Z*(X=1):GOTO540
SQ 530 X=X+1+Z*(X=Z)
EQ 540 N$=" ":GOSUB410:GOTO500
XM 550 N$=" ":GOSUB410:RETURN
HE 560 PRINT"{HOME}";:FORA=1TO40:PRINT" ";:NEXT:RE
TURN
AE 570 FORA=1TO4:IFMR(A)=A$(X1,Y1)THENP=A
KM 580 NEXT:N$=CHR$(MS(P)):RETURN
CE 590 POKEKB,0:X1=34:Y1=20:N$=" ":GOSUB410:PRINTSC
"{LEFT} ":RETURN
```




5

Classic Card and Board Games



Klondike

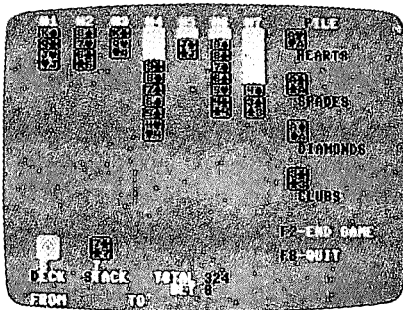
James E. Hosek

Imagine a game of solitaire at which you can't cheat. Then imagine you've got high stakes riding on the game. "Klondike" is a computerized card game with a betting system and other interesting features.

Once you start playing "Klondike," it's hard to stop. If you've lost a lot of points, you'll be anxious to recover them; if you've won, you'll want to ride out your good luck.

Klondike is similar to the traditional solitaire card game. There are seven rows of cards: the first has one card, the second has two cards, and so on. On the right there is a pile for each suit, and at the bottom there is a deck from which to draw cards and a stack upon which to discard.

You can draw cards from the stack or from the deck and place them on the rows in descending order, alternating colors. Or you can place them on the piles by suit in ascending order starting with the ace. The object of the game is to place as many cards on the piles as you can. However, since you probably won't be dealt all the aces at the beginning, you'll need to place cards in the rows until they can be placed on the piles.



At this time, the player's best move, probably, is to draw from the deck.

You can take cards from one pile and place them on another, as long as you keep them in descending order, alternating colors. If you move a card or set of cards from a row, the card beneath automatically turns over. If you move the last

card in a row, you can place a king (and any cards descending from it) in the newly empty row.

At the bottom of the screen are the words FROM and TO. To move a card from the stack to a row, press S and then the number of the row. To move a card from one row to another, press the number of the row from which you want to move a card and then the number of the row to which you wish to move it. To draw a card from the deck, press D. Finally, to move a card from a row to a pile, enter the number of the row and then press P or F.

A Helping Hand

The game has an Automove feature, which scans the cards before each move to see whether any cards can be moved onto the pile. If any can be moved, it automatically moves them for you, with some exceptions. A card won't be moved if another card that has not yet appeared can be played on it. For example, if the ace and two of clubs are the only cards on the pile, the three of clubs will not be moved up automatically since either the two of hearts or the two of diamonds can be played on it. Also, a card will not be moved automatically if a card that can be played on it is covered in a row. Even if a card is not moved automatically, though, you can still move it yourself.

When you've turned over all the cards in the deck, the round of play is over. Your score is calculated according to how many cards you have placed on the pile and how much you bet. Press f2, and the cards will be reshuffled for another round of play. Press f8 to quit.

Placing a Bet

At the beginning of the game, you have 500 points. For each round of play, the maximum amount you can bet is the number of points you have divided by 52 (9, at the beginning of play). You then earn five times your bet for each card you place onto a pile. In order to come out ahead, you must move at least 11 cards onto the pile. If you get all the cards on the piles, you get 1000 times your bet. But don't count on it—it's difficult enough just to break even.

Typing It In

Type in Klondike using the "Automatic Proofreader," found in Appendix C. If you're using tape, make the following changes: In line 120, eliminate GOSUB 1190. Then delete lines 1190-1230. Also, change line 1240 to read REM.

Once you've typed in the program, be sure to save it. Then, to play, just load it and type RUN. After you enter your name, the playing screen appears. Enter the same name each time, since the program saves your latest total. If you don't like the cards you've been given, you can reshuffle as many times as you like by pressing f7 before you place your bet.

Klondike

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```

EE 10 PRINT "{CLR}":POKE53280,5:POKE53281,5:IFPEEK(
    14850)<>24THENGOSUB2000
RP 20 DN$="{20 DOWN}":OV$="{29 RIGHT}"
PJ 30 BK$="{WHT}SQRT{DOWN}{4 LEFT}U[F][C]V":BL$="
    {4 SPACES}{DOWN}{4 LEFT}{4 SPACES}":POKE5327
    2,31
SF 40 B2$="{29 SPACES}"
EJ 50 DIM CD$(52):C$(0)="{RED}":C$(1)="{BLK}":C$(2
    )="{RED}":C$(3)="{BLK}":CD$(0)=BL$
HH 60 FORX=0TO3:FORY=1TO13
AS 70 CD$(X*13+Y)=C$(X)+"S"+CHR$(95+Y)+CHR$(109+X)
    +"T{DOWN}{4 LEFT}U"+CHR$(173+X)+CHR$(159+Y)+
    "v"
AH 80 NEXTY,X
JP 90 DIMDK(52),ST(24),LY(7,20),UC(7),TP(7):FORX=1
    TO52:DK(X)=X:NEXT
GC 100 DEFFNR(Z)=INT(52*RND(Z))+1
KS 110 DEFFNSU(X)=INT(X/13.1)+1:DEFFNVL(X)=X-13*(
    NSU(X)-1)
ME 120 DEFFNSC(X)=(X/2=INT(X/2)):GOSUB1190
GF 125 IFTT<=0THENTT=500
AF 130 BT=INT((TT+51)/52)
HB 140 GOSUB710:GOSUB720
CC 150 PRINT"{WHT}{CLR} #1{2 SPACES}#2{2 SPACES}#3
    {2 SPACES}#4{2 SPACES}#5{2 SPACES}#6
    {2 SPACES}#7{5 RIGHT}{BLK}P{WHT}ILE
    {17 DOWN}"
KJ 160 PRINTOV$"{BLK}F2{WHT}-END GAME":PRINTOV$"
    {BLK}F8{WHT}-QUIT{DOWN}"
QB 170 PRINT"{BLK}D{WHT}ECK{2 SPACES}{BLK}S{WHT}TA
    CK{3 SPACES}TOTAL":PRINT"{16 RIGHT}BET"

```

Chapter 5

```
DF 180 PRINT"FROM{7 SPACES}TO";
KJ 190 PRINT"{HOME}{2 RIGHT}{3 DOWN}"OV$"{RED}HEAR
      TS{4 DOWN}{6 LEFT}{BLK}SPADES{4 DOWN}
      {6 LEFT}{RED}DIAMONDS{4 DOWN}{8 LEFT}{BLK}"
      ;
HE 200 PRINT"CLUBS":NB=-1:GOSUB940:NB=0
GK 210 FORX=1TO7:PRINT"{HOME}"LEFT$(DN$,X)LEFT$(OV
      $,X*4-4);:FORY=XTO7:IFY=XTHEN230
CR 220 PRINTBK$"{UP}";:GOTO240
KR 230 PRINTCD$(LY(X,X))"{UP}";
BD 240 NEXTY:NEXTX
XS 250 PRINT"{HOME}"OV$"{DOWN}";:FORX=1TO4:PRINTBK
      $"{3 DOWN}{4 LEFT}";:NEXT:PRINT
EC 260 GOSUB740
BP 270 GOSUB760:IFQUTHEN1240
XK 280 PRINT"{5 UP}":FORX=1TO5:PRINTB2$:NEXT:TT=TT
      -52*BG:GOSUB940
HQ 290 REM *** MAIN LOOP
PJ 300 GW=0:GM=-1:M1=1
CK 310 ED=0:GOSUB960:IFEDTHENPRINT"{CLR}":GOTO125
MQ 320 IFQUTHEN1240
XR 330 IFGWTHEN1160
JF 340 GM=0:GOSUB350:GOTO310
KC 350 IFM1>-1THEN380
QD 360 IFDP=0THENRETURN
CE 370 SP=SP+1:ST(SP)=DK(DP):DP=DP-1:PRINT"{HOME}"
      DN$"{2 UP}";:GOSUB740:GM=-1:RETURN
FS 380 IFM1=0THENC1=ST(SP):C3=C1:GOTO400
QH 390 C1=LY(M1,UC(M1)+1):C3=LY(M1,TP(M1))
KQ 400 IFM2>-1THEN600
FG 410 IFC3=0THENRETURN
JQ 420 S3=FNSU(C3):V3=FNVL(C3):IFV3-1<>PL(S3)THENR
      ETURN
HH 430 IFNOTAMTHEN510
AJ 440 BM=0:FORX=1TO4:IFFNSC(X)=FNSC(S3)THEN460
FJ 450 IFV3>PL(X)+2THENBM=-1
SM 460 NEXT:IF(M1>0)OR(V3<3)THEN500
HJ 470 FORX=1TO7:C4=LY(X,UC(X)+1):V4=FNVL(C4):IFV4
      <>V3-1THEN490
QR 480 IFFNSC(S3)<>FNSC(FNSU(C4))THENBM=-1
HA 490 NEXT
XK 500 IFBMTHENRETURN
GD 510 IFM1=0THEN570
BX 520 C=M1:GOSUB1150:IFTP(M1)=1THENPRINTBL$:TP(M1)
      =0:GOTO580
RC 530 IFTP(M1)=1THENPRINTBL$:TP(M1)=0:GOTO560
EK 540 TP(M1)=TP(M1)-1:PRINTBL$"{4 LEFT}{2 UP}"CD$(
      LY(M1,TP(M1)));
BB 550 IFTP(M1)=UC(M1)THENUC(M1)=UC(M1)-1
```

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```

GM 560 GOTO580
RP 570 GOSUB1170
HJ 580 PRINT "{HOME}"OV$LEFT$(DN$,S3*4-3)CD$(C3):PL
(S3)=V3:TT=TT+5*BG:MU=-1
RR 590 GOSUB940:TQ=0:FORQ=1TO4:TQ=TQ+PL(Q):NEXT:GW
=(TQ=52):GM=-1:RETURN
JP 600 C2=LY(M2,TP(M2)):S1=FNSC(FNSU(C1)):S2=FNSC(
FNSU(C2))
XS 610 V1=FNVL(C1):V2=FNVL(C2):IF(V1=13)AND(V2=0)T
HEN630
MX 620 IF(S1=S2)OR(V1+1<>V2)THENRETURN
KM 630 IFM1>0THEN650
CP 640 GOSUB1170:LY(M2,TP(M2)+1)=C1:NC=1:GOTO690
MF 650 NC=TP(M1)-UC(M1):C=M1:PRINT "{HOME}"LEFT$(DN
$,UC(C)+1)LEFT$(OV$,C*4-4);
QA 660 FORX=1TONC:PRINTBL$"{4 LEFT}";:LY(M2,TP(M2)
+X)=LY(M1,UC(M1)+X):NEXT
RA 670 TP(M1)=UC(M1):UC(M1)=UC(M1)-1-(UC(M1)=0)
RF 680 IFTP(M1)>0THENGOSUB1150:PRINTCD$(LY(M1,TP(M
1)));
CX 690 C=M2:GOSUB1150:PRINT "{DOWN}";:FORX=1TONC:PR
INTCD$(LY(M2,TP(M2)+X))"{4 LEFT}";:NEXT
AQ 700 TP(M2)=TP(M2)+NC:GM=-1:RETURN
FM 710 FORX=1TO52:A=FNR(0):S=DK(A):DK(A)=DK(X):DK(
X)=S:NEXT:DP=52:RETURN
XH 720 FORX=1TO7:FORY=XTO7:LY(Y,X)=DK(DP):DP=DP-1:
NEXTY:TP(X)=X:UC(X)=X-1:NEXTX
PA 730 ST(1)=DK(DP):DP=DP-1:SP=1:FORX=1TO4:PL(X)=0
:NEXT:RETURN
BP 740 PRINT "{HOME}"DN$"{UP}"BK$"{UP}"{2 RIGHT}"CD$
(ST(SP))
DP 750 PRINT "{WHT}"DP"{LEFT} ";TAB(6)SP"{LEFT} ";:
RETURN
SS 760 PRINT "{WHT}{HOME}{10 DOWN} PLEASE ENTER YOU
R BET"
SM 770 PRINT " MAXIMUM BET ={BLK}"BT
AG 780 PRINT "{WHT} PRESS {BLK}F1{WHT} TO BET IT AL
L"
AF 790 PRINT " PRESS {BLK}F7{WHT} TO RE-SHUFFLE"
FF 800 PRINT " ->{8 SPACES}{7 LEFT}{BLK}{O}{LEFT}";
:N=0:BG=0:B$=""
KK 810 GETA$:IFA$=""THEN810
SD 820 IF(A$=CHR$(133))AND(N=0)THENBG=BT:RETURN
RM 830 IF(A$=CHR$(136))AND(N=0)THEN910
MG 840 IF(A$=CHR$(140))AND(N=0)THENQU=-1:RETURN
PB 850 IFA$<>CHR$(13)THEN880
KM 860 BG=VAL(B$):IFNOT((BG=0)OR(BG>BT))THENRETURN
BM 870 PRINT:PRINT "{UP}"{4 RIGHT}"{12 SPACES}":GOTO7
60

```

Chapter 5

```
QF 880 IF(A$<"")AND(A$>"/")AND(N<11)THENB$=B$+A$:
      N=N+1:PRINTA$"␣{LEFT}";:GOTO810
KG 890 IF(A$=CHR$(20))AND(N>0)THENN=N-1:PRINT"
      {2 LEFT}␣{LEFT}";:B$=MID$(B$,1,N)
SR 900 GOTO810
BB 910 PRINT"WORKING":GOSUB710:GOSUB720
HR 920 PRINT"{HOME}{DOWN}";:FORX=1TO7:PRINTCD$(LY(
      X,X));:NEXT
PP 930 PRINT:PRINT"{10 DOWN}{6 RIGHT}"CD$(ST(SP)):
      GOTO760
RD 940 PRINT"{HOME}{BLK}{2 DOWN}"DN$TAB(19)TT"
      {LEFT}":IFNBTHENRETURN
DS 950 PRINTTAB(19)BG:RETURN
JX 960 IFNOTGMTHEN1010
SC 970 AM=-1:M2=-1:IFM1>0THENMU=0:FORZ=1TO7:M1=Z:G
      OSUB350:NEXT
AA 980 M1=0:GOSUB350
KA 990 IFMUTHENM1=1:GOTO970
AC 1000 AM=0:IFGWTHENRETURN
AS 1010 PRINT"{HOME}{BLK}"DN$"{4 DOWN}{5 RIGHT}
      {5 SPACES}{4 RIGHT}{5 SPACES}{14 LEFT}";
JB 1020 GETA$:IFA$=""THEN1020
SM 1030 IF(A$>"0")AND(A$<"8")THENM1=VAL(A$):PRINTA
      $"{8 RIGHT}";:GOTO1090
MM 1040 IFA$=CHR$(137)THENED=-1:RETURN
HA 1050 IFA$="D"THENM1=-1:PRINT"DECK";:RETURN
PQ 1060 IFA$="S"THENM1=0:PRINT"STACK{4 RIGHT}";:GO
      TO1090
AA 1070 IFA$=CHR$(140)THENQU=-1:RETURN
HC 1080 GOTO1020
GB 1090 GETA$:IFA$=""THEN1090
SK 1100 IF(A$>"0")AND(A$<"8")THENM2=VAL(A$):PRINTA
      $;:RETURN
HB 1110 IF(A$="P")OR(A$="F")THENM2=-1:PRINT"PILE";
      :RETURN
JC 1120 GOTO1010
HJ 1150 PRINT"{HOME}"LEFT$(DN$,TP(C))LEFT$(OV$,C*4
      -4);:RETURN
QP 1160 TT=TT+740*BG:PRINT"{CLR}{3 DOWN}{10 RIGHT}
      YOU WON!":GOTO130
GQ 1170 SP=SP-1:IFSP=0ANDDP>0THENSP=1:ST(SP)=DK(DP
      ):DP=DP-1
JK 1180 GOSUB740:RETURN
GJ 1190 INPUT"{CLR}{BLK}{DOWN}{RIGHT}ENTER YOUR NA
      ME ";N$
RR 1200 F$="@0:"+N$+".MONEY,S,":OPEN2,8,2,F$+"R"
HP 1210 INPUT#2,TT:CLOSE2
HD 1220 OPEN2,8,2,F$+"W"
QD 1230 PRINT#2,0:CLOSE2:RETURN
```


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```
XK 1240 OPEN2,8,2,F$+"W":PRINT#2,TT:CLOSE2
SP 1250 PRINT "{CLR}{BLK}{DOWN}{RIGHT}GOODBYE..."
HS 1260 END
HF 2000 FORX=828TO885:READA:POKEX,A:NEXT:SYS828
DE 2010 FORX=0TO16:B=14848+X*8:C=15104+X*8:FORY=2T
O7:READA
QJ 2020 POKEB+Y,A:IFX>12THENA=A/2
JX 2030 POKEC+Y-1+(X>12),A:NEXTY
AJ 2040 POKEB,255:POKEC+7,255:POKEB+1,0:POKEC-6*(X
>12),0:NEXTX
QC 2050 FORX=14984TO15031:READA:POKEX,A:NEXT
DE 2060 FORX=15320TO15335:READA:POKEX,A:NEXT
XD 2070 RETURN
KB 2080 DATA169,0,141,14,220,169,51,133,1,169,0,13
3,251,133,253,169
SQ 2090 DATA208,133,252,169,56,133,254,160,0,177,2
51,145
QM 2100 DATA253,230,251,230,253,208,246,165,252,20
1,215,240,7,230,252,230
FD 2110 DATA254,76,85,3,169,55,133,1,169,129,141,1
4,220,96
JK 2120 DATA 24,60,102,126,102,0
JC 2130 DATA 60,102,12,48,126,0
KD 2140 DATA 60,102,12,102,60,0
AH 2150 DATA 102,102,126,6,6,0
XP 2160 DATA 126,96,124,6,124,0
SD 2170 DATA 60,96,124,102,60,0
HS 2180 DATA 126,6,12,24,24,0
JM 2190 DATA 60,102,60,102,60,0
DS 2200 DATA 60,102,62,6,60,0
QR 2210 DATA 126,24,24,24,24,0
QX 2220 DATA 30,12,12,108,56,0
JP 2230 DATA 60,102,102,60,14,0
JE 2240 DATA 102,108,120,108,102,0
KC 2250 DATA 108,254,254,124,56,16
QJ 2260 DATA 16,56,124,254,56,124
MS 2270 DATA 24,60,126,126,60,24
JA 2280 DATA 56,56,254,254,56,124
GG 2290 DATA 255,51,102,204,153,51,102,204
KH 2300 DATA 255,204,102,51,153,204,102,51
MX 2310 DATA 0,3,3,3,3,3,3,3
XC 2320 DATA 0,192,192,192,192,192,192,192
MJ 2330 DATA 3,3,3,3,3,3,3,0
GG 2340 DATA 192,192,192,192,192,192,192,0
XF 2350 DATA 204,102,51,153,204,102,51,255
JE 2360 DATA 51,102,204,153,51,102,204,255
```

Backgammon

Jeffrey Vavasour and Geoff Rideout

The classic game of backgammon combines equal parts of luck and strategy. This version observes all the regulations of standard backgammon.

In this version of backgammon, you play against the computer. By using a decision-making algorithm described later, the computer figures out its best possible moves. You'll find it quite a challenge to come up with a winning strategy. The only thing missing is the doubling cube, which is sometimes used for gambling in traditional backgammon.

When you've finished typing in the program, save it to tape or disk. Use "The Automatic Proofreader," found in Appendix C, to insure error-free program entry. Before you run the game, be sure that you're in uppercase/graphics mode (using the Commodore and SHIFT keys); otherwise, the board representation will not appear correctly.

If you're already familiar with the rules of backgammon, skip over the next section.

The Rules of Backgammon

If you're a newcomer to backgammon, we recommend that you ask someone who plays to teach you. Also, you can probably find books about backgammon at the local library. Here's an introduction to the basic rules.

The playing board contains 24 marks, called *points*. The points are in two vertical lines of 12 with a bar running horizontally through the middle, positioning six points from each line on either side of the bar. (Thus, in each quarter, or *table*, of the board, there are six points.) On the screen, the points are lettered from A through X, with A-F and S-X in the upper two tables. Players take turns moving their pieces around the board on the points. One player moves clockwise, the other counterclockwise. Your goal is first to move all of your pieces into your *inner table*, and then to move the pieces off

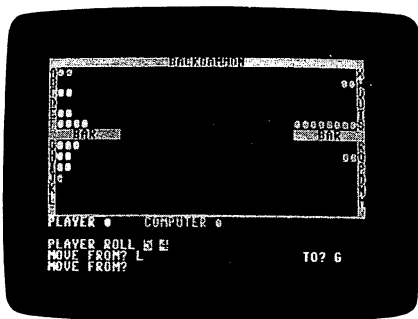
the board. The inner tables of the two players are directly opposite each other. On the screen, you move clockwise from X to A, toward your inner table in the upper-left corner (the positions labeled A–F). The computer moves counterclockwise, toward positions S–X. When it's your turn, you roll two dice. Say, for example, you get a 3 and a 5. You can move one piece three points and another five, you can move a single piece five and then three, or you can move a single piece three and then five. The last two moves total eight, but you must make the moves in two stages. Any piece can be moved from one position to another as long as the destination is not blocked. If your opponent has two or more pieces on a point, it's considered blocked; you can't move there. (This is why it's important to make the moves in two stages: a move of eight may put you on an open point, but the move of five or three may be blocked, preventing your move to the open point eight spaces away.)

If there's a single piece at your destination, you can *blot* it: Your piece takes over the position, and your opponent's blotted piece is moved to the bar. When one or more of your pieces are on the bar, you can't make any moves on the main field until the pieces move off the bar, back onto the board. You have to move your blotted piece to one of the points in your opponent's inner table, based on the roll of the dice. In this game, for example, if you have a piece on the bar and roll a 1 and a 5, you could move off the bar to position X (to use the 1) or position T (5), if they aren't blocked. Then, you'd use the other die to move a single piece.

Rolling doubles gives you double the moves. So, if you roll two 3's, you get four moves of three, instead of two.

Once you've moved all your pieces to your inner table (the six points labeled A–F), you can start to *bear off*. Rolling a 2 and a 3 would allow you to remove one piece from B and one from C. The first player to remove all of his or her pieces from the board wins the game.

A lot of the strategy in backgammon is in building safe positions—points containing two or more pieces. In general, you should not leave a single piece on a point where it can be blotted by the other player, although sometimes this is unavoidable. It also helps if you have an understanding of the odds for rolling certain combinations with the dice.



The computer may lose this game, but it's not over yet.

Basic Game Play

Throughout the game, a graphics representation of the backgammon board is displayed on the upper portion of the screen. Board positions consist of the letters A–X (representing the board locations starting in the upper-left corner and running counterclockwise), BAR, and OFF (representing the location where pieces moved off the board are placed). Board positions are printed next to their appropriate locations.

You're asked WILL I GO FIRST? when you run the program. If you want the computer to move first, respond with Y. Otherwise, press N. The computer will draw the board and place the game pieces in the starting position. (You start with five pieces in your inner table, two at the far end in the computer's inner table, and eight in between.) The computer has blue pieces, which move counterclockwise from A to X. The yellow pieces are yours. They move clockwise from X to A.

When it's your turn, the message PLAYER ROLL is displayed below the game board, followed by the result of the dice roll, which is based on a random throw. If you roll doubles, the number is printed four times to indicate that you have four moves. Below this you're presented with a MOVE FROM? prompt. Respond with the location you're moving from, by pressing the appropriate key (A–X). If the location you enter does not contain any yellow pieces or is not within the range of the board, ILLEGAL MOVE is displayed below the prompt and the cursor returns to the beginning of your input. If you have any pieces on the bar, MOVE FROM BAR is displayed and the computer automatically skips to the TO? prompt.

After you've responded to the FROM? prompt as necessary, TO? will appear at its right. Answer this with a letter (A-X) representing the destination on the board, or with OFF indicating you wish to take the piece off the board. If the move you indicated is not permissible, ILLEGAL MOVE is displayed below your input and the cursor returns to the FROM? prompt.

If you can't move, typing NO in response to the FROM? or TO? prompt will cause the computer to skip the remainder of your turn and proceed with rolling the dice for its turn. If the screen becomes partially or completely erased during the game by some erroneous input, type DRAW in response to the FROM? or TO? prompt to redraw it. You can also do this to display any die you've not yet used in a move.

In order for you to move off the board, all your remaining pieces must be contained on positions A-F, your inner table.

The Computer Responds

When it's the computer's turn to move, the input area below the board is cleared, and the computer's roll is displayed in the same form as yours.

While the computer is evaluating each of its moves, THINKING... is displayed. The message MOVE FROM *xxx* TO *yyy* follows after a few seconds, indicating the computer's decision.

Once the computer has exhausted all of its moves—after it has used all the dice or when it cannot move due to some block (in which case CAN NOT MOVE is displayed)—it will wait for a key to be pressed. At this time, THINKING... is not displayed. This gives you a chance to look at the move made by the computer. Press any key to proceed to your turn.

When the game is over, the computer displays a message indicating the winner and offers you a chance to play again.

How It Works

The pieces on the screen don't actually move from one position to another as you might think. There are always playing pieces on the points. To give the illusion of movement, the color of the appropriate screen position is POKEd with blue, yellow, or black. When a piece is removed, its color is changed to black with a POKE *x,0* statement. If a piece is to appear at a

location, either POKE $x,6$ (set to blue for the computer) or POKE $x,7$ (set to yellow for the player) is executed.

Because of this method of moving, the background should be black to prevent superfluous pieces appearing. If you wish to use a different background color, change the value in line 100 and replace every occurrence of POKE $x,0$ with the appropriate color.

The address of the pieces are calculated with the FNP(x) function. Before this formula can be used, CT must contain the address of the beginning of the color table, Y must contain the piece number within the location which must be moved, and x is the board position, from 1 through 24, representing locations A through X respectively.

The computer's strategy uses a process of evaluation and elimination. The program starts at the bar and scans the board through to location X using each of the die rolls. It then records the highest evaluation number (described below), highest evaluated move, and roll. If there is no evaluation number (it is 0), or if there are pieces on the bar and the evaluation is less than 128, the computer decides it cannot move. You are informed of this, and the computer's turn ends. Otherwise, this process is repeated until all rolls are used.

A particular move is evaluated by adding up various values reflecting the advantage of such a move. The computer evaluates a move off the bar as 128 (being of most importance) and off the board as 64. Protection of two exposed pieces by moving one on top of the other is given a value of 32. If the move does not result in any other pieces being exposed, either at the origin of the move or the destination, a value of 16 is added. If the opponent can be placed on the bar, the evaluation is 8. Movement on the outer table is counted as 4. Also, for moves in which another piece will cover the one being moved, the evaluation is 2. Legal moves are given a value of 1. This allows a method of determining whether any legal moves are found at the end of the evaluation process.

Any of these values may be combined to form a general evaluation of the move. For instance, a move off the bar that places the other player on the bar is given a value of 136 (128 and 8). Table 1 contains a list of move values and a brief description.

Table 1. Computer Evaluation Ranking

Rank	Description
128	Move computer piece off bar (line 450)
64	Move computer piece off board (line 460)
32	Move an exposed piece to a position also containing an exposed computer piece (line 470)
16	A move that does not expose any pieces (line 480)
8	A move that places the opponent on bar (line 490)
4	A move that is in the computer's outer table (line 500)
2	A move in which the piece will be covered by another piece in the same turn (line 545)
1	A legal move (line 520)

By changing these move values, you can change the computer's strategy, thereby increasing or decreasing the difficulty of play or just adding variation to the computer's judgment. If you wish to change a value, simply replace the number following the statement $E = E + \dots$ in the appropriate line. When you do this, it's best to leave moves off the bar unchanged because a value less than 128 will prevent the computer from being able to move off the bar.

Taking Risks

Expert players may find that they can beat the computer most of the time. Humans tend to take calculated risks that may eventually pay off. They may also look one or two moves ahead, something the computer doesn't do. The computer's process of evaluating every possible move makes it avoid risks if at all possible, which results in a fairly conservative game. If you're feeling ambitious, you might try to modify the algorithm to improve on the basic idea.

To further aid anyone interested in understanding the processes of this program, Table 2 is a list of variable functions.

Table 2. Variable Descriptions

Variable	Description
A\$	Used when waiting for a key at the end of the computer's turn.
B(x)	Board contents. B(0) is computer bar, B(1-24) represent board locations A-X, and B(25) is the number of pieces off the board. A positive number indicates computer pieces; a negative number indicates player's pieces.
CT	Pointer to start of color table.
E	Evaluation of current move being processed by the computer.
F\$	Input from player's FROM? prompt.
H	Highest evaluated move by computer.
HP	Computer's highest evaluated position (0-24) or player's FROM position (1-25).
HR	Computer's highest evaluated roll or how far player wishes to move.
L\$	39 spaces; used to clear input area.
LN	Die number (0-3) of lowest computer roll.
LR	Value of lowest computer roll, same as R(LN).
M	Maximum number of pieces which may be displayed at the current position (10 for board, 7 for bar).
MF\$	Indicates current turn. If string starts with N, it is the player's turn; otherwise, it is the computer's turn.
OB	Nonzero indicates computer may move off board. Also contains the number the player is using (HR usually equals R(OB)).
FNP(x)	Returns address in color table for a particular piece; x is the position from 1 to 24 and Y is the piece number within the position.
PB	Indicates the number of pieces the player has on bar (-2 means two pieces on bar).
PO	Indicates the number of pieces which the player has moved off bar.
R(x)	Contains the remaining rolls. Used dice are indicated by a 0; x must be from 0 through 3.
FNR(x)	Returns a random number between 1 and 6.
T\$	Input of player's TO? prompt.
X,Y,Z	Miscellaneous counters and pointers.
X\$,Z\$	Computer's FROM and TO respectively.

Backgammon

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```

XB 100 CT=55296:POKE 53280,0:POKE 53281,0
JB 110 L$="{39 SPACES}":A=RND(0)
FG 120 PRINT"{CLR}{CYN}{7 DOWN}"TAB(14)"BACKGAMMON
":PRINTTAB(14)"[10 T]"
QC 130 INPUT"{2 DOWN} WILL I GO FIRST{2 SPACES}Y
{3 LEFT}";MF$
SR 140 DIMB(25):DIMR(3):DEFFNR(X)=INT(RND(X)*6)+1
JF 150 DEFFNP(X)=CT-((X-(X>6))*40+Y)*(X<13)-((26-(
X+(X<19)))*40-Y-1)*(X>12)
MQ 160 DATA 2,0,0,0,0,-5,0,-3,0,0,0,5,-5,0,0,0,3,0
,5,0,0,0,0,-2
SK 170 FORX=1TO24:READB(X):NEXTX
MC 180 PRINT"{CLR}{RVS}{GRN}{15 SPACES}BACKGAMMON
{15 SPACES}";:FORX=1TO12
ER 190 PRINTCHR$(64+X);"{OFF}{BLK}QQQQQQQQQQQQQQQQQ
QQQQQQQQQQQQQQQQQQQQ{GRN}{RVS}";CHR$(89-X
);
FA 200 IFX=6THENPRINT"{3 SPACES}BAR{3 SPACES}{OFF}
{BLK}QQQQQQQQQQQQQQQQQQQQQQ{GRN}{RVS}
{3 SPACES}BAR{3 SPACES}";
RH 210 NEXTX:PRINT" {OFF}{38 P}{RVS} ";
CC 220 PRINT"{OFF}{YEL}PLAYER Q{4 SPACES}{BLU}COMP
UTER Q"
PJ 230 FORX=1TO24:IFB(X)=0THEN270
HF 240 Z=ABS(B(X)):IFZ>10THENZ=10
RP 250 FORY=1TOZ
SG 260 POKEFNP(X),86.5-SGN(B(X))/2:NEXTY
CC 270 NEXTX:X=1:Z=CT+310
PP 280 IFX<7ANDX<=B(0)THENPOKEZ,86:Z=Z-1:X=X+1:GOT
O280
MR 290 X=1:Z=CT+289
JJ 300 IFX<7ANDX<=-PBTHENPOKEZ,87:Z=Z+1:X=X+1:GOTO
300
JJ 310 GOSUB1180:GOSUB1150:PRINT"{CYN}";
AQ 320 IFLEFT$(MF$,1)="N"THENPRINT"PLAYER ";:GOTO3
40
PG 330 PRINT"COMPUTER ";
EB 340 PRINT"ROLL";:IF F$="DR"ORT$="DRAW"THEN360
SK 350 R(0)=FNR(X):R(1)=FNR(X):R(2)=0:R(3)=0:IFR(0
)=R(1)THENR(2)=R(1):R(3)=R(1)
XR 360 FORX=0TO3:IFR(X)>0THENPRINT" {RVS}";CHR$(R(
X)+48);"{OFF}";
MR 370 NEXTX:PRINT
GD 380 IFLEFT$(MF$,1)="N"THEN830
SE 390 PRINT"THINKING...{UP}"

```

Chapter 5

```
XE 400 OB=0:FORZ=0TO18:IFB(Z)>0THEN420
FR 410 NEXTZ:OB=1
HM 420 H=0:HP=0:HR=0:FORY=0TO3:X=0:IFR(Y)=0THEN580
PD 430 E=0
PR 440 IFB(X)<1ORR(Y)+X>25THEN570
AP 450 IFX=0ANDB(X)>0THENE=E+128
PX 460 IFX+R(Y)=25THENE=E+64
FF 470 IFB(X)=1ANDB(X+R(Y))=1THENE=E+32
KH 480 IFB(X)<>2ANDB(X+R(Y))>0THENE=E+16
AD 490 IFB(X+R(Y))=-1THENE=E+8
MP 500 IFX<19THENE=E+4
AC 510 IFB(X+R(Y))<-1OR(OB=0AND(X+R(Y))=25)THEN570
QB 520 E=E+1:IFY=3ORX+R(Y)=25ORB(X+R(Y))>0THEN560
PM 530 Z=Y+1
KR 540 QA=0:IFR(Z)>0ANDX+R(Y)-R(Z)>-1ANDX+R(Y)-R(Z)
    <25THEN QA=1
DK 545 IFQA=1THENIFB(X+R(Y)-R(Z))>0THENE=E+2:GOTO5
    60
BB 550 Z=Z+1:IFZ<4THEN540
FE 560 IFH<ETHENH=E:HR=R(Y):HP=X
HX 570 X=X+1:IFX<25THEN430
DC 580 NEXTY
AH 590 IFH<128ANDB(0)>0THEN680
XK 600 IFH>0THEN700
CG 610 LR=7:FORY=0TO3
JB 620 IF R(Y)<LRANDR(Y)>1THENLR=R(Y):LN=Y
HG 630 NEXTY:IFLR=7THEN680
RH 640 FORX=0TO25-LR:IFB(X)>0THEN680
GJ 650 NEXTX:X=26-LR
DE 660 IFB(X)>0THENR(LN)=25-X:GOTO400
CQ 670 X=X+1:IFX<25THEN660
GH 680 PRINT"{2 DOWN}{6 SPACES}{RVS}CAN NOT MOVE -
    PRESS A KEY{OFF}";MF$="N"
XP 690 GETA$:ON-(A$="")GOTO690:GOTO310
FE 700 FORX=0TO3:IFR(X)<>HRTHENNEXTX
MQ 710 R(X)=0
AE 720 IFB(HP)<11ANDHP>0THENY=B(HP):POKEFN?P(HP),0
GJ 730 B(HP)=B(HP)-1:Z$=CHR$(HP+HR+64):IFHP+HR>24T
    HENZ$="OFF"
XD 740 X$=CHR$(HP+64):IFHP=0THENX$="BAR"
DM 750 PRINT"MOVE FROM ";X$;" TO ";Z$
RP 760 IFB(HP+HR)=-1THENPB=PB-1:B(HP+HR)=0:IFPB>-7
    THENPOKECT+288-PB,87
QG 770 IFHP=0ANDB(0)<8THENPOKECT+310-B(0),0
GK 780 Y=B(HP+HR)+1:B(HP+HR)=Y
XM 790 IFHP+HR<25ANDY<11THENPOKEFNP(HP+HR),86:GOTO
    810
```

Classic Card and Board Games

```

EF 800 IFB(25)=15THENGOSUB1150:PRINT"I WIN.":GOTO
      {SPACE}1190
KG 810 FORX=0TO3:IFR(X)>0THEN390
AJ 820 NEXTX:PRINT"{HOME}{7 DOWN}"SPC(14){RVS}PRE
      SS A KEY":MF$="N":GOTO690
AG 830 F$="@":PRINT"MOVE FROM";:IFPB<0THENPRINT" B
      AR":HP=25:F$="Y":GOTO880
RM 840 INPUTF$:F$=LEFT$(F$,2):IFF$="NO"THENMF$="":
      GOTO310
GF 850 IFF$="DR"THEN180
BR 860 IFF$<"A"ORF$>"X"THEN1140
QA 870 HP=ASC(F$)-64:IFB(HP)>=0THEN1140
BX 880 T$="@":INPUT"{8 LEFT}TO";T$:HP=ASC(F$)-64:H
      R=ASC(F$)-ASC(T$)
QP 890 IFT$="NO"THENMF$="":GOTO310
CB 900 IFT$="DRAW"THEN180
SQ 910 X=0:IFT$="OFF"THENHR=HP
KQ 920 PRINTL$;"{UP}{RIGHT}";
KQ 930 FORX=0TO3:IFHR<>R(X)THENNEXTX:ON-(HR<>HP)GO
      TO1140
AS 940 OB=X:IFHR<>HPTHEN990
PQ 950 Z=HP+1:FOROB=0TO3:IFR(OB)=HPTHENZ=7:GOTO970
PE 960 IFR(OB)<HPTHENNEXTOB:GOTO1140
FX 970 FORX=ZTO24:IFB(X)<0THEN1140
EP 980 NEXTX
AQ 990 IFB(HP-HR)>1ANDHP<>HRTHEN1140
MF 1000 QA=0:IFB(HP-HR)>0ANDHP<>HRTHENB(HP-HR)=0:B
      (0)=B(0)+1:QA=1
CB 1010 IFQA=1ANDB(0)<7THENPOKECT+311-B(0),86
AP 1020 Y=-PB:M=7:Z=CT+288+Y:PB=PB+1
AR 1030 IFHP<25THENPB=PB-1:Y=-B(HP):B(HP)=B(HP)+1:
      Z=FNP(HP):M=11
XH 1040 IFY<MTHENPOKEZ,0
QA 1050 IFHP=HRTHEN1100
AA 1060 Y=B(HP-HR)-1:B(HP-HR)=Y:IFB(HP-HR)>10THEN1
      120
DP 1070 Y=-Y:Z=FNP(HP-HR)
QK 1080 IFY<11THENPOKEZ,87
SF 1090 GOTO 1120
AE 1100 PO=PO+1
HX 1110 IFPO=15THENGOSUB1150:PRINT"YOU WIN.":GOTO
      {SPACE}1190
FB 1120 R(OB)=0:FORX=0TO3:IFR(X)>0THEN830
MJ 1130 NEXTX:MF$="":GOTO310
GS 1140 PRINT"ILLEGAL MOVE{12 LEFT}{UP}";L$;"{UP}"
      :GOTO830

```

Chapter 5

```
GX 1150 POKE214,16:PRINT
QG 1160 FORX=1TO5:PRINTL$:NEXTX:PRINTL$;
XQ 1170 POKE214,16:PRINT:RETURN
GX 1180 PRINT"{HOME}{7 DOWN}"SPC(14)"{11 SPACES}":
      RETURN
KD 1190 INPUT"PLAY AGAIN (Y/N)";A$:IFLEFT$(A$,1)="
      Y"THENRUN
```

Power Poker

Jud Bleser

This addictive game adds a new dimension to the traditional game of poker. It's fun for one player alone or for competition with friends.

Poker is a game that's just as popular today as it was a century ago. Even though there's always a random element at play, careful thought and a knowledge of probability are usually needed. The variations created by the cards dealt and how players arrange them makes poker unpredictable. "Power Poker" adds a new twist to the game—rather, another dimension.

A Double Purpose

Think of this game as two-dimensional poker. You play on a 5×5 grid and try to make the hands that gain the most points. Each card serves two hands, so placement must be done carefully. (If you're new to poker, see the section called "Poker Hands below.")

After entering the program, save a copy and type RUN. Be sure to use "The Automatic Proofreader," Appendix C, to type in the program. If you're using a black-and-white TV, change the value of variable TV in line 100 from 1 to 0. To begin, you'll see a table of the number of points awarded for each kind of hand. After a pause of a few seconds, the game is ready to start play. A 5×5 grid is displayed, each position identified by a letter from A to Y.

The computer randomly selects a card and displays it. Place it in the grid by pressing the appropriate letter. After the card has been placed, a new one is chosen and displayed, and so on, until all 25 cards have been placed. Choose your moves carefully, and remember: There are 52 cards in the deck, but you'll have only 25 to play with.

Scoring Points

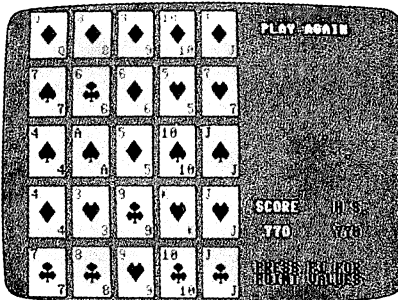
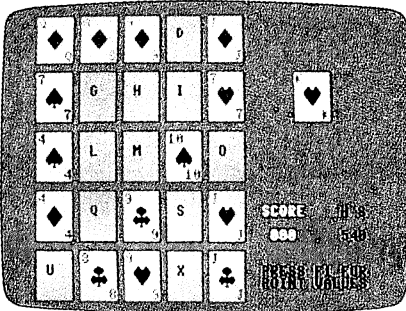
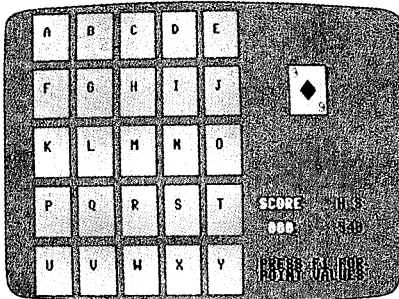
The goal is to make the most points possible. Scoring is based on the hands you build. After a column or row has been completed, points are totaled and added immediately to your score. (High score is displayed at all times on the screen.)

Here are the values for each hand:

Hand	Points
Royal flush	400
Straight flush	300
Four of a kind	160
Straight	120
Full house	100
Three of a kind	60
Flush	50
Two pair	30
One pair	10

Poker players may notice that some of the hands are out of order. Normally, a flush would be much higher on the list. But remember that you're drawing 25 cards and the odds for getting two or three flushes are very high. Higher point values have been given to hands that are less likely to occur. To be reminded of the value of each hand, you can press f1 at any time during the game to see the table of values. Press f1 again to resume play.

Hands do not need to be in sequential order. For example, 5,6,4,7,8 is a valid straight. However, roll-over or round-the-corner straights such as 3,2,A,K,Q are not allowed. Straights using an ace as low (A,2,3,4,5) or high (10,J,Q,K,A) are both acceptable.



Starting with an empty 5 × 5 grid, you're dealt a card, which is selected randomly by the computer. As the game progresses, you build poker hands both horizontally and vertically. In the middle photograph, note the top row, where a 10 of diamonds is needed to complete a straight flush. The third photograph shows several additional hands: the straight flush on top, two pair in the second row, a straight across the bottom row, two pair in the first column, one pair in the second column, three of a kind both in the third column and in the fourth, and, finally, four of a kind in the fifth.

Program Construction

If you're interested in programming, here's an outline of how Power Poker is constructed.

Line	Function
100-380	Initialization
390-420	Print high score
430-460	Print score
470-490	Call screen 2
500-550	Shuffle/grid setup
560-650	Game play routine
660-670	Test for completed row
680-690	Test for completed column
700-780	Game-end routine
790-890	Data collection—row
900-990	Data collection—column
1000-1120	Data evaluation
1130-1150	Print/flash poker hand
1160-1290	Data: redefined characters
1300-1310	Data: cards/suits
1320-1340	Data: screen location table
1350-1730	Data: machine language routines

Variables

A\$	"{16 DOWN}"
B\$	"{1 DOWN}{27 RIGHT}"
C\$	Poker hand scored
CA	Card (J1)
CK	Shuffle check
CO	Color
CS	Total value of row/column
E	Box used
H	Box selected
HS	High score
K	Same kind
L	Same suit
NH	New high score
P	Card to flash
R	Straight
SC	Score
SM	Screen memory
SU	Suit (J2)
TV	Color or b/w television

Machine Language Routines

- 49166 White background
- 49180 Clear card
- 49194 Grid setup
- 49297 Draw card
- 49396 Flash off
- 49422 Flash on
- 49449 Save color
- 49502 Restore color

Poker Hands

If you've never played poker, it's very easy to learn the fundamentals. There are 52 cards, divided into four sets (or *suits*) of 13. The suits are hearts, clubs, spades, and diamonds; each suit consists of cards numbered 2-10, plus a jack, queen, king, and ace. The object is to make one of the following hands (examples are in parentheses):

- Royal flush** 10,J,Q,K,A—all of the same suit
- Straight flush** A sequence of five of the same suit
(9,10,J,Q,K—all diamonds)
- Four of a kind** Four of the same value (2,2,2,2)
- Straight** Five in sequence (4,5,6,7,8)
- Full house** Three of a kind plus a pair (10,10,10,4,4)
- Three of a kind** Three of the same value (9,9,9)
- Flush** Five of the same suit (2,K,8,A,5—all clubs)
- Two pair** Two groups of two, each of the same value
(A,A,6,6)
- One pair** Two of the same value (10,10)

Power Poker

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
PP 100 PRINT "{CLR}"CHR$(8):TV=1:X=53280:REM ** SET
    TV TO 1 FOR COLOR TV
SA 110 IFTV=1THENPOKEX,5:POKEX+1,5:POKEX+2,13:POKE
    X+3,1:POKEX+4,5:GOTO130
ME 120 POKEX,12:POKEX+1,12:POKEX+2,15:POKEX+3,1:PO
    KEX+4,12
HK 130 DIMH1(35),H2(35),SM(30),E(29),CK(25,25),J1(
    25),J2(25),CA(14)
```

Chapter 5

```
DB 140 A$="{16 DOWN}":B$="{DOWN}{27 RIGHT}":HS=0
BJ 150 GOSUB470:PRINT"{CLR}"
GS 160 PRINTCHR$(144)SPC(8)"{2 DOWN}POKER HAND POI
    NT VALUES"
CQ 170 PRINTSPC(11)"{3 DOWN}ROYAL FLUSH...400":PRI
    NTSPC(11)"STR FLUSH....300"
XP 180 PRINTSPC(11)"4 OF A KIND...160":PRINTSPC(11
    )"STRAIGHT.....120"
HF 190 PRINTSPC(11)"FULL HOUSE....100":PRINTSPC(11
    )"3 OF A KIND....60"
PJ 200 PRINTSPC(11)"FLUSH.....50":PRINTSPC(11
    )"TWO PAIR.....30"
BB 210 PRINTSPC(11)"ONE PAIR.....10"
BX 220 PRINTCHR$(19)CHR$(5)A$SPC(13)"{2 DOWN}LOADI
    NG{2 SPACES}DATA"
JF 230 FORI=1TO573:READA:T=T+A:NEXT
MM 240 IFT<>113126THENPRINT"ERROR IN DATA STATEMEN
    TS.":STOP
BJ 250 RESTORE:POKE56334,PEEK(56334)AND254:POKE1,P
    EEK(1)AND251
FK 260 FORI=0TO511:POKEI+14336,PEEK(I+53248):NEXT
CR 270 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334)OR1
BH 280 FORX=14336TO14343:READA:POKEX,A:NEXT
XQ 290 FORX=14552TO14591:READA:POKEX,A:NEXT
BF 300 FORX=14640TO14703:READA:POKEX,A:NEXT
PG 310 FORX=14808TO14839:READA:POKEX,A:NEXT
DM 320 FORX=1TO4:READSU(X):READCO(X):NEXT
RF 330 FORX=2TO14:READCA(X):NEXT
DS 340 FORX=5TO30:READSM(X):MSB=INT(SM(X)/256):LSB
    =SM(X)-(MSB*256)
KF 350 POKE823+X,LSB:POKE850+X,MSB:NEXT
HJ 360 FORX=49152TO49533:READML:POKEX,ML:NEXT
QC 370 POKE53272,(PEEK(53272)AND240)OR14
FS 380 POKE53265,PEEK(53265)OR64:GOTO500
JX 390 D$=STR$(HS):PRINTCHR$(19)A$B$SPC(9)"H S"
EP 400 IFLEN(D$)=2THENPRINTB$SPC(10)D$"{3 LEFT}00"
    CHR$(5):RETURN
HA 410 IFLEN(D$)=3THENPRINTB$SPC(9)D$"{3 LEFT}0"CH
    R$(5):RETURN
PX 420 PRINTB$SPC(8)H$CHR$(5):RETURN
JB 430 D$=STR$(SC):PRINTCHR$(19)A$B$"SCORE"
PR 440 IFLEN(D$)=2THENPRINTB$SPC(2)D$"{3 LEFT}00":
    RETURN
AD 450 IFLEN(D$)=3THENPRINTB$SPC(1)D$"{3 LEFT}0":R
    ETURN
BK 460 PRINTB$SC:RETURN
GH 470 POKE53272,(PEEK(53272)AND15)OR240:POKE648,6
    0:RETURN
PD 480 GETI$:IFI$=""THEN480
```

Classic Card and Board Games

```
SS 490 POKE53272, (PEEK(53272)AND15)OR16:POKE648,4:
      RETURN
RX 500 PRINTCHR$(19)CHR$(5)A$SPC(13)"{2 DOWN}
      {2 SPACES}SHUFFLING{2 SPACES}{GRN}":FORX=1T
      O25
SR 510 J1(X)=INT(RND(.)*13)+2:J2(X)=INT(RND(0)*4)+
      1:IFCK(J1(X),J2(X))=1THEN510
HH 520 CK(J1(X),J2(X))=1:E(X+4)=0:NEXT
CG 530 SC=0:NH=0:PRINTCHR$(19)A$SPC(13)"{2 DOWN}
      {12 SPACES}":GOSUB490
MS 540 PRINTCHR$(147):SYS49194:PRINTCHR$(144):GOSU
      B390:GOSUB430
SD 550 PRINTB$CHR$(144)"{DOWN}PRESS F1 FOR":PRINTB
      ${UP}POINT VALUES"
RM 560 FORN=1TO25:POKE781,30:SYS49166
FR 570 POKE251,CA(J1(N)):POKE252,SU(J2(N)):POKE10,
      CO(J2(N)):POKE781,30:SYS49297
FR 580 POKE198,0
GF 590 GETI$:IFI$=""THEN590
PE 600 IFI$="{F1}"THENSYS49449:GOSUB470:GOSUB480:S
      YS49502:GOTO580
ES 610 H=ASC(I$)-60:IFH<5ORH>29THEN580
XH 620 IFE(H)=1THEN580
FP 630 E(H)=1:H1(H)=J1(N):POKE781,30:SYS49180
EF 640 POKE781,H:SYS49166:POKE883+H,CO(J2(N))
JX 650 POKE251,CA(J1(N)):POKE252,SU(J2(N)):POKE10,
      CO(J2(N)):POKE781,H:SYS49297
KX 660 ROW=INT(H/5)*5:A=ROW:B=A+4:BX=0:FORX=ATOB:I
      FE(X)=1THENBX=BX+1
CA 670 NEXT:IFBX=5THENGOSUB790
QP 680 A=(H-ROW)+5:B=A+20:BY=0:FORX=ATOBSTEP5:IFE(
      X)=1THENBY=BY+1
GP 690 NEXT:IFBY=5THENGOSUB900
QE 700 CK(J1(N),J2(N))=0:NEXTN:IFSC>HSTHENHS=SC:NH
      =1
RH 710 PRINTCHR$(19)B$"{DOWN} PLAY AGAIN":FORT=1TO
      300:NEXT
HM 720 IFNH=1THENPOKE646,PEEK(53281):GOSUB390
KD 730 PRINTCHR$(19)B$"{DOWN}{3 SPACES}Y OR N
      {3 SPACES}":FORT=1TO300:NEXT
SH 740 IFNH=1THENPRINTCHR$(144):GOSUB390
KF 750 GETI$:IFI$="Y"THENPRINTCHR$(147):SYS49449:G
      OSUB470:GOTO500
JF 760 IFI$="N"THEN780
AE 770 GOTO710
DH 780 POKE53265,27:POKE53272,21:PRINTCHR$(147)CHR
      $(144):END
DC 790 L=0:R=0:K=0:CS=0:P=1
```

Chapter 5

```
RS 800 FORX=ATOB:H2(X)=H1(X):CS=CS+H1(X):L=L+PEEK(
SM(X)+82):NEXT
KC 810 H2(B+1)=0:FORX=ATOB:FORXX=ATOB
AS 820 IFH2(XX)<H2(X)THENC=H2(X):H2(X)=H2(XX):H2(X
X)=C
EP 830 NEXT:NEXT:FORX=ATOB:POKE882+P,0:FORXX=ATOB
EE 840 IFH1(XX)=H1(X)THENK=K+1:IFXX<>XTHENPOKE882+
P,X
CA 850 NEXT:P=P+1:NEXT:H2(A-1)=0:FORX=ATOB:IFH2(X-
1)=1+H2(X)THENR=R+1
AM 860 NEXT:IFR=4THENGOSUB890
XK 870 IFL/5=PEEK(SM(B)+82)THENGOSUB890:GOTO1080
MJ 880 GOTO1000
JJ 890 SS=1-(B-A=20)*4:P=1:FORX=ATOBSTEPSS:POKE882
+P,X:P=P+1:NEXT:RETURN
BJ 900 L=0:R=0:K=0:CS=0:P=1
MG 910 FORX=ATOBSTEP5:H2(X)=H1(X):CS=CS+H1(X):L=L+
PEEK(SM(X)+82):NEXT
XX 920 H2(B+5)=0:FORX=ATOBSTEP5:FORXX=ATOBSTEP5
AH 930 IFH2(XX)<H2(X)THENC=H2(X):H2(X)=H2(XX):H2(X
X)=C
MR 940 NEXT:NEXT:FORX=ATOBSTEP5:POKE882+P,0:FORXX=
ATOBSTEP5
DD 950 IFH1(XX)=H1(X)THENK=K+1:IFXX<>XTHENPOKE882+
P,X
GM 960 NEXT:P=P+1:NEXT:H2(A-5)=0:FORX=ATOBSTEP5:IF
H2(X-5)=1+H2(X)THENR=R+1
AD 970 NEXT:IFR=4THENGOSUB890
QC 980 IFL/5=PEEK(SM(B)+82)THENGOSUB890:GOTO1080
MB 990 GOTO1000
HS 1000 IFR=4THENSC=SC+120:C$="{2 SPACES}STRAIGHT"
:GOTO1130
SP 1010 IFK=7THENSC=SC+10:C$="{2 SPACES}ONE PAIR":
GOTO1130
BR 1020 IFK=9THENSC=SC+30:C$="{2 SPACES}TWO PAIR":
GOTO1130
AQ 1030 IFK=11THENSC=SC+60:C$=" 3 OF A KIND":GOTO1
130
MC 1040 IFK=13THENSC=SC+100:C$="{2 SPACES}FULL HOU
SE":GOTO1130
RS 1050 IFK=17THENSC=SC+160:C$=" 4 OF A KIND":GOTO
1130
HS 1060 IFH2(A)=14ANDR=3ANDCS=28THENSC=SC+120:C$="
{2 SPACES}STRAIGHT":GOSUB890:GOTO1130
MC 1070 RETURN
DP 1080 IFR=4THEN1110
HM 1090 IFH2(A)=14ANDCS=28THENSC=SC+300:C$="
{2 SPACES}STR FLUSH":GOTO1130
KR 1100 SC=SC+50:C$="{3 SPACES}FLUSH":GOTO1130
```

Classic Card and Board Games

DH 1110 IFH2(A)=14THENSC=SC+400:C\$=" ROYAL FLUSH":
GOTO1130
BA 1120 SC=SC+300:C\$="{2 SPACES}STR FLUSH"
CH 1130 FORX=1TO8:PRINTCHR\$(19)CHR\$(144)"{DOWN}"B\$
C\$:SYS49396:FORT=1TO75:NEXT
GP 1140 PRINTCHR\$(19)CHR\$(5)"{DOWN}"B\$C\$:SYS49422:
FORT=1TO75:NEXT:NEXT
FX 1150 PRINTCHR\$(19)B\$"{DOWN}"{12 SPACES}":GOSUB43
0:RETURN
SR 1160 DATA255,255,255,255,255,255,255,0,1,3
CX 1170 DATA7,15,31,63,127,255,128,192,224,240
EH 1180 DATA248,252,254,255,127,63,31,15,7,3
FQ 1190 DATA1,0,254,252,248,240,224,192,128,0
AS 1200 DATA0,0,0,0,0,0,0,0,0,28
MM 1210 DATA62,127,255,255,255,127,0,56,124,254
MH 1220 DATA255,255,255,254,63,31,15,7,3,1
XF 1230 DATA0,0,252,248,240,224,192,128,0,0
FX 1240 DATA0,3,15,31,31,15,3,57,0,192
GB 1250 DATA240,248,248,240,192,156,127,255,255,12
7
RR 1260 DATA57,1,3,0,254,255,255,254,156,128
FX 1270 DATA192,0,0,1,3,7,15,31,63,127,0
KH 1280 DATA128,192,224,240,248,252,254,255,255,25
5,127
PJ 1290 DATA57,1,3,0,255,255,255,254,156,128,192,0
QP 1300 DATA155,2,166,2,170,0,187,0,178,179,180
FF 1310 DATA181,182,183,184,185,177,138,145,139,12
9
KK 1320 DATA1024,1029,1034,1039,1044,1224,1229,123
4
CQ 1330 DATA1239,1244,1424,1429,1434,1439,1444,162
4,1629
AA 1340 DATA1634,1639,1644,1824,1829,1834,1839,184
4,1254
CF 1350 DATA169,95,133,251,169,64,133,252,32,72
XC 1360 DATA192,76,99,192,169,159,133,251,169,128
PS 1370 DATA133,252,32,72,192,76,99,192,169,223
SJ 1380 DATA133,251,169,192,133,252,32,72,192,76
QM 1390 DATA99,192,169,0,133,10,162,30,202,134
EA 1400 DATA79,32,0,192,32,79,192,160,41,138
SK 1410 DATA105,60,145,253,32,225,192,224,5,208
FJ 1420 DATA233,96,169,0,133,2,76,83,192,169
GP 1430 DATA41,133,2,24,189,55,3,101,2,133
PS 1440 DATA253,189,82,3,105,0,133,254,96,160
KS 1450 DATA4,165,252,145,253,136,208,251,32,131
HA 1460 DATA192,162,4,160,4,165,251,145,253,136
FA 1470 DATA208,251,32,131,192,202,208,241,166,79
KE 1480 DATA96,24,165,253,105,40,133,253,165,254
KX 1490 DATA105,0,133,254,96,32,79,192,160,0

Chapter 5

FD 1500 DATA165,251,145,253,201,177,240,43,169,164
XJ 1510 DATA133,2,32,83,192,165,251,145,253,169
BH 1520 DATA82,133,2,32,83,192,160,0,165,252
RJ 1530 DATA145,253,105,1,200,145,253,105,1,160
JS 1540 DATA40,145,253,105,1,200,145,253,76,225
AB 1550 DATA192,200,169,176,145,253,169,162,133,2
AK 1560 DATA32,83,192,165,251,145,253,169,176,200
GE 1570 DATA145,253,76,169,192,134,79,32,72,192
RB 1580 DATA24,165,254,105,212,133,254,165,10,133
JF 1590 DATA251,76,108,192,160,5,190,114,3,224
SM 1600 DATA0,240,11,132,78,169,1,133,10,32
FC 1610 DATA227,192,164,78,136,192,0,208,233,96
HH 1620 DATA160,5,190,114,3,224,0,240,12,132
MP 1630 DATA78,189,115,3,133,10,32,227,192,164
AP 1640 DATA78,136,192,0,208,232,96,160,249,185
XA 1650 DATA0,216,153,0,128,185,250,216,153,250
CM 1660 DATA128,185,244,217,153,244,129,185,238,218
RM 1670 DATA153,238,130,136,192,255,208,227,160,249
KG 1680 DATA169,0,153,0,216,153,250,216,153,244
BP 1690 DATA217,153,238,218,136,192,255,208
MK 1700 DATA239,96,160,249,185,0,128,153,0,216
EA 1710 DATA185,250,128,153,250,216,185,244,129,153
DK 1720 DATA244,217,185,238,130,153,238,218,136,192
PQ 1730 DATA255,208,227,96

Appendices



Appendix A

Beginner's Guide to Typing In Programs

A computer cannot perform any task by itself. Like a car without gas, a computer has *potential*, but, without a program, it isn't going anywhere. Most of the programs published in this book are written in a computer language called BASIC. BASIC is easy to learn and is built into all Commodore 64s.

BASIC Programs

Computers can be picky. Unlike the English language, which is full of ambiguities, BASIC usually has only one right way of stating something. Every letter, character, and number is significant. A common mistake is substituting a letter such as *O* for the numeral 0, a lowercase *l* for the numeral 1, or an uppercase *B* for the numeral 8. Also, you must enter all punctuation marks, such as colons and commas, just as they appear in the book. Spacing can be important, too. To be safe, type in the listings exactly as they appear.

Braces and Special Characters

The exception to this typing rule is when you see braces—for example, {DOWN}. Anything within a set of braces is a special character or characters that cannot easily be listed on a printer. When you come across such a special statement, refer to Appendix B, "How to Type In Programs."

About DATA Statements

Some programs contain a section or sections of DATA statements. These lines provide information needed by the program. Some DATA statements contain actual programs (called machine language); others contain graphics codes. These lines are especially sensitive to errors.

If a single number in any one DATA statement is mistyped, your machine could lock up, or crash. The keyboard and RUN/STOP key may seem dead, and the screen may go blank. Don't panic—no damage has been done. To regain control, you'll have to turn off your computer and then turn it back on. This will erase whatever program was in memory, *so always save a copy of your program before running it*. If your computer crashes, you can load the program and look for your mistake.

Sometimes a mistyped DATA statement will cause an error message when the program is run. The error message may refer to the program line that READs the data. *The error is still in the DATA statements, though.*

Get to Know Your Machine

You should familiarize yourself with your computer before attempting to type in a program. Learn the statements you use to store and retrieve programs from tape or disk. You'll want to save a copy of the programs so that you won't have to type them in every time you want to use them.

Learn to use your machine's editing functions. How do you change a line if you make a mistake? You can always re-type the line, but you should at least know how to backspace. Do you know how to enter reverse-video, lowercase, and control characters? They're all explained in your computer's manuals.

A Quick Review

1. Type in each program a line at a time, in order. Press RETURN at the end of each line. Use the backspace or delete key to correct mistakes.
2. Check the line you've typed against the line in the book. You can check the entire program again if you get an error when you run the program.

Appendix B

How to Type In Programs

Many of the programs in this book contain special control characters (cursor controls, color keys, reverse video, and so on). To make it easy for you to know exactly what to type when you're entering one of these programs into your computer, we have established the following listing conventions.

Generally, program listings contain words within braces that spell out any special characters: For example, {DOWN} means to press the cursor-down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be *shifted* (the SHIFT key should be held down while you're pressing the other key), the key is underlined in our listings. For example, S means to press the S key while holding down the SHIFT key. This will appear on your screen as a heart symbol. If you find an underlined key enclosed within braces—for example, {10 N}—you should type the key as many times as indicated (in the example, you would enter ten shifted N's).

If a key is enclosed within special brackets, [<>], you should hold down the *Commodore key* while pressing the key inside the special brackets. (The Commodore key is the key in the lower left corner of the keyboard.) Again, if the key is preceded by a number, press the key as many times as necessary.

Rarely, you'll see a solitary letter of the alphabet enclosed within braces. You can enter these characters by holding down the CTRL key while typing the letter inside the braces. For example, {A} indicates that you should press CTRL-A.

Quote Mode

You know that you can move the cursor around the screen with the CRSR keys. Sometimes a programmer will want to move the cursor under program control. That's why you see all the {LEFT}'s, {HOME}'s, and {BLU}'s in our programs. The only way the computer can tell the difference between direct and programmed cursor control is quote mode.

Once you have pressed the quotation mark (the double quote, SHIFT-2), you are in quote mode. If you type something and then try to change it by moving the cursor left, you'll only get a bunch of reverse-video lines. These are the symbols for cursor left. The only editing key that isn't programmable is the INST/DEL key; you can still use INST/DEL to back up and edit the line. Once you type another quotation mark, you are out of quote mode.

You also go into quote mode when you insert spaces into a line. In any case, the easiest way to get out of quote mode is just to press RETURN. You'll then be out of quote mode, and you can cursor up to the mistyped line and fix it.

In order to insure accurate entry of each program line, we have included two aids to typing in programs. Please use "The Automatic Proofreader" (Appendix C) for entering BASIC programs, and "MLX" (Appendix D) for machine language programs.

Refer to the following table when you're entering cursor- and color-control keys.

Figure A-1. Keyboard Conventions

When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME		{ 1 }	COMMODORE 1	
{HOME}	CLR/HOME		{ 2 }	COMMODORE 2	
{UP}	SHIFT ↑ CRSR ↓		{ 3 }	COMMODORE 3	
{DOWN}	↑ CRSR ↓		{ 4 }	COMMODORE 4	
{LEFT}	SHIFT ← CRSR →		{ 5 }	COMMODORE 5	
{RIGHT}	← CRSR →		{ 6 }	COMMODORE 6	
{RVS}	CTRL 9		{ 7 }	COMMODORE 7	
{OFF}	CTRL 0		{ 8 }	COMMODORE 8	
{BLK}	CTRL 1		{ F1 }	f1	
{WHT}	CTRL 2		{ F2 }	SHIFT f1	
{RED}	CTRL 3		{ F3 }	f3	
{CYN}	CTRL 4		{ F4 }	SHIFT f3	
{PUR}	CTRL 5		{ F5 }	f5	
{GRN}	CTRL 6		{ F6 }	SHIFT f5	
{BLU}	CTRL 7		{ F7 }	f7	
{YEL}	CTRL 8		{ F8 }	SHIFT f7	
			←		
			↑	SHIFT	

Appendix C

The Automatic Proofreader

Philip I. Nelson

"The Automatic Proofreader" helps you type in program listings and prevents nearly every kind of typing mistake.

Type in the Proofreader *exactly* as it's listed. Since the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unfamiliar commands. After you've finished, save a copy or two on disk or tape before running it. This is important because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Next, type RUN and press RETURN. After announcing which computer it's running on, the Proofreader displays the message "Proofreader Active." Now you're ready to type in a BASIC program.

Using the Proofreader

Once the Proofreader is active, you can begin typing in a BASIC program as usual. Every time you finish typing a line and press RETURN, the Proofreader displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the corresponding line in the program listing. If the letters match, you can be almost certain the line has been typed correctly. If the letters don't match, check for your mistake and correct the line.

The Proofreader ignores spaces that aren't enclosed within quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. However, since

spaces inside quotation marks are almost always significant, the Proofreader pays attention to them. For example,

```
10 PRINT"THIS IS BASIC"
```

will generate a different checksum from the one generated by

```
10 PRINT"THIS ISBA SIC"
```

A common typing error is transposition—typing two successive characters in the wrong order, like PIRNT instead of PRINT or 64378 instead of 64738. The Proofreader is sensitive to the *position* of each character within the line and thus catches transposition errors.

The Proofreader does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line: LIST it after you've typed it in, move the cursor back to the line, and press RETURN. LISTing the line substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before you run another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing RUN/STOP-RESTORE. The simplest way to disable it is to turn the computer off and then on again. A gentler method is to **SYS 64738** to the computer's built-in reset routine. This reset routine erases any program in memory, so be sure to save the program you're typing in before entering the SYS command.

You may wonder whether the Proofreader works with other programming utilities like "MetaBASIC." The answer is generally yes, *if you activate the Proofreader after installing the other utility*. For example, first load and activate MetaBASIC; then load and run the Proofreader.

When using the Proofreader with another utility, you should disable *both* programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

Appendix C

The Automatic Proofreader

```
10 VEC=PEEK(772)+256*PEEK(773):LO=43:HI=44
20 PRINT "{CLR}{WHT}AUTOMATIC PROOFREADER FOR ";:IF
   VEC=42364 THEN PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VIC-20{BLU}"
40 IF VEC=35158 THEN WAIT CLR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=46:WAIT CLR:PRINT"12
   8{WHT}"
60 SA=(PEEK(LO)+256*PEEK(HI))+6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POKE ADR,BYT:ADR=ADR+1:
   CHK=CHK+BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*ERROR* CHECK TYPING
   {SPACE}IN DATA STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:RS=SA+RF:HB=INT(RS/2
   56):LB=RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+LF,LB:POKE SA+HF,HB:N
   EXT
110 IF CHK<>22054 THEN PRINT "*ERROR* RELOAD PROGR
   AM AND CHECK FINAL LINE":END
120 POKE SA+149,PEEK(772):POKE SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+14,22:POKE SA+18,23:
   POKESA+29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"PROOFREADER ACTIVE":
   SYS SA
150 POKE HI,PEEK(HI)+1:POKE (PEEK(LO)+256*PEEK(HI)
   )-1,0:NEW
160 DATA 120,169,73,141,4,3,169,3,141,5,3
170 DATA 88,96,165,20,133,167,165,21,133,168,169
180 DATA 0,141,0,255,162,31,181,199,157,227,3
190 DATA 202,16,248,169,19,32,210,255,169,18,32
200 DATA 210,255,160,0,132,180,132,176,136,230,180
210 DATA 200,185,0,2,240,46,201,34,208,8,72
220 DATA 165,176,73,255,133,176,104,72,201,32,208
230 DATA 7,165,176,208,3,104,208,226,104,166,180
240 DATA 24,165,167,121,0,2,133,167,165,168,105
250 DATA 0,133,168,202,208,239,240,202,165,167,69
260 DATA 168,72,41,15,168,185,211,3,32,210,255
270 DATA 104,74,74,74,74,168,185,211,3,32,210
280 DATA 255,162,31,189,227,3,149,199,202,16,248
290 DATA 169,146,32,210,255,76,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,116,117,151,128,129,
   167,136,137
```


Appendix D

MLX: Machine Language Entry Program

Ottis R. Cowper

"MLX" is a labor-saving utility that allows almost fail-safe entry of Commodore 64 machine language programs. When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing. The machine language programs in this book are "Graphic Adventure Kit," "Balloon Crazy," and Program 2 of "Vampyre Hunter."

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numbers 0–9 and the letters A–F. But don't worry—even if you know nothing about machine language or hex, you should have no trouble using MLX.

After you have entered the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, choose this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, enter the line number where you

stopped typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you won't be able to enter the data correctly. If you press E by mistake, you can return to the command menu by pressing RETURN alone when you're asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering a Listing

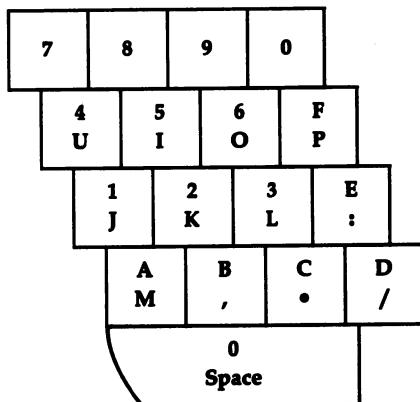
Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing.

When you have entered a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be re-displayed for you to edit.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* need to type spaces between the columns; MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you have typed the last digit.

Only the numbers 0-9 and the letters A-F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, a numeric keypad has been incorporated into the listing. The keypad is active only while you're entering data. Addresses must be entered with the normal letter and number keys. The figure shows the keypad configuration.

64 MLX Keypad

MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is, however, one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that add up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

Editing Features

To correct typing mistakes before you finish a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you have typed a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

More editing features are available when you're correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing; then move the cursor to the mistake and type the correct key. The

cursor-left and cursor-right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu will be redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750), so this should *not* be included when you enter the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only

a small amount of data from a long listing. When you're saving a partially completed listing, be sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages:

- **INCORRECT STARTING ADDRESS.** The file you're trying to load does not have the starting address you specified when you ran MLX.
- **LOAD ENDED AT *address*.** The file you're trying to load ends before the ending address you specified when you started MLX.
- **TRUNCATED AT ENDING ADDRESS.** The file you're trying to load extends beyond the ending address you specified when you started MLX.

If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP-RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the option for clearing the workspace.

The Finished Product

When you've finished typing all the data for an ML program and have saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD "*filename*",8 for disk or LOAD "*filename*" for tape, and then RUN. Such programs will usually have a starting address of 0801. Other programs must be reloaded to specific addresses with a command such as LOAD "*filename*",8,1 for disk or LOAD "*filename*",1,1 for tape, and then started

with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce of Prevention

By the time you have finished typing in the data for a long ML program, you may have invested several hours in the project. Don't take chances—use our "Automatic Proofreader" (Appendix C) to type MLX, and then test your copy *thoroughly* before using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to insure that you can recall your work from disk or tape. Don't let a simple typing error in MLX cost you several nights of hard work.

MLX

For mistake-proof program entry, be sure to read "The Automatic Proofreader," Appendix C.

```
SS 10 REM VERSION 1.1: LINES 830,950 MODIFIED, LINES
    ES 485-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,I,J,A,B,A$,B$,A(7),N
    $
DM 110 C4=48:C6=16:C7=7:Z2=2:Z4=254:Z5=255:Z6=256:
    Z7=127
CJ 120 FA=PEEK(45)+Z6*PEEK(46):BS=PEEK(55)+Z6*PEEK
    (56):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}":S$=" ":D$=CHR$(20):
    Z$=CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD+23:POKE I,0:NEXT:PO
    KE SD+24,15:POKE 788,52
FC 150 PRINT"{CLR}"CHR$(142)CHR$(8):POKE 53280,15:
    POKE 53281,15
EJ 160 PRINT T$"{RED}{RVS}{2 SPACES}{8 @}
    {2 SPACES}"SPC(28)"{2 SPACES}{OFF}{BLU} MLX
    II {RED}{RVS}{2 SPACES}"SPC(28)"
    {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}{3 SPACES}COMPUTE!'S MACHINE
    {SPACE}LANGUAGE EDITOR{3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADDRESS{4}";:GOSUB300:S
    A=AD:GOSUB1040:IF F THEN180
```

```

GF 190 PRINT "{BLK}{2 SPACES}ENDING ADDRESS[4]";:GO
SUB300:EA=AD:GOSUB1030:IF F THEN190
KR 200 INPUT "{3 DOWN}{BLK}CLEAR WORKSPACE [Y/N][4]
";A$:IF LEFT$(A$,1)<>"Y"THEN220
PG 210 PRINT "{2 DOWN}{BLU}WORKING...";:FORI=BS TO
{SPACE}BS+EA-SA+7:POKE I,0:NEXT:PRINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}{BLK}{RVS} MLX COMMAND
MENU {DOWN}[4]":PRINT T$"{RVS}E{OFF}NTER D
ATA"
BD 230 PRINT T$"{RVS}D{OFF}ISPLAY DATA":PRINT T$"
{RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE FILE":PRINT T$"
{RVS}Q{OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=MID$("EDLSQ",I,1)THE
N A=I:I=5
FD 270 NEXT:ON A GOTO420,610,690,700,280:GOSUB1060
:GOTO250
EJ 280 PRINT "{RVS} QUIT ":INPUT "{DOWN}[4]ARE YOU S
URE [Y/N]";A$:IF LEFT$(A$,1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IFLEN(IN$)<>4THEN RETUR
N
KF 310 B$=IN$:GOSUB320:AD=A:B$=MID$(IN$,3):GOSUB32
0:AD=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID$(B$,J,1):B=ASC(A$)-
C4+(A$>"0")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(H$,B+1,1);:B=A-B*C6:
PRINT MID$(H$,B+1,1);:RETURN
RR 360 A=INT(AD/Z6):GOSUB350:A=AD-A*Z6:GOSUB350:PR
INT":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*CK+Z5*(CK>Z7):GOTO39
0
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT "{DOWN}STARTING AT[4]";:GOSUB300:IF IN
$<>N$ THEN GOSUB1030:IF F THEN400
EX 410 RETURN
HD 420 PRINT "{RVS} ENTER DATA ":GOSUB400:IF IN$=N$
THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F THEN PRINT IN$:PRIN
T"{UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$=S$:FOR J=1 TO 2:IF
{SPACE}F THEN B$=MID$(IN$,I+J,1)
HA 460 PRINT "{RVS}"B$L$;:IF I<24THEN PRINT "{OFF}";
HD 470 GET A$:IF A$=N$ THEN470

```

Appendix D

```
FK 480 IF(A$>"/"ANDA$<":")OR(A$>"@"ANDA$<"G")THEN5
40
GS 485 A=- (A$="M")-2*(A$="," )-3*(A$=".")-4*(A$="/"
)-5*(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":")-9*(A$="U")-10*(A$
="I")-11*(A$="O")-12*(A$="P")
CM 487 A=A-13*(A$=S$):IF A THEN A$=MID$("ABCD123E4
56F0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J=1)OR F)THEN PRINT B
$;:J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRINT B$:J=2:NEXT:I=24:
NEXT:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF THENPRINT B$L$;:GOTO54
0
GK 520 IF A$<>L$ AND A$<>D$ OR((I=0)AND(J=1))THEN
{SPACE}GOSUB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;:J=2-J:IF J THEN PRI
NT L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT S$;
PM 550 NEXT I:PRINT:PRINT"{UP}{5 RIGHT}";:INPUT#3,
IN$:IF IN$=N$ THEN CLOSE3:GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=MID$(IN$,I):GOSUB320
:IF I<25 THEN GOSUB380:A(I/3)=A
PK 570 NEXT:IF A<>CK THEN GOSUB1060:PRINT"{BLK}
{RVS} ERROR: REENTER LINE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FOR I=0 TO 7:POKE B+I,
A(I):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN CLOSE3:PRINT"{DOWN}
{BLU}** END OF ENTRY **{BLK}{2 DOWN}":GOTO7
00
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS} DISPLAY DATA ":GOSUB
400:IF IN$=N$ THEN220
RJ 620 PRINT"{DOWN}{BLU}PRESS: {RVS}SPACE{OFF} TO
{SPACE}PAUSE, {RVS}RETURN{OFF} TO BREAK[4]
{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FORI=BTO B+7:A=PEEK(I):
GOSUB350:GOSUB380:PRINT S$;
CC 640 NEXT:PRINT"{RVS}";:A=CK:GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA THENPRINT"{DOWN}{BLU}*
* END OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GOSUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOSUB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD DATA ":OP=1:GOTO710
PC 700 PRINT"{DOWN}{RVS} SAVE FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILENAME[4]";IN$:IF IN$=
N$ THEN220
```



```
PR 720 F=0:PRINT"{DOWN}{BLK}{RVS}T{OFF}APE OR
      {RVS}D{OFF}ISK:[4]";
FP 730 GET A$:IF A$="T"THEN PRINT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8,15,"I0:":B=EA-SA:IN
      $="0:":+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":GOSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(AH*256):PRINT#1,CHR$(
      AL);CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CHR$(PEEK(BS+I));:IF S
      T THEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOTO940
GS 800 GOSUB1060:PRINT"{DOWN}{BLK}ERROR DURING SAV
      E:[4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":GOSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z$)+256*ASC(B$+Z$):IF
      AD<>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:POKE BS+I,ASC(A$+Z$):
      IF(I<>B)AND ST THEN F=2:AD=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F>0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN CLOSE1:CLOSE15:GOSU
      B1060:PRINT"{RVS}ERROR: "A$
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE187,PEEK(FA+3):POKE1
      88,PEEK(FA+4):IFOP=0THEN920
HJ 890 SYS 63466:IF(PEEK(783)AND1)THEN GOSUB1060:P
      RINT"{DOWN}{RVS} FILE NOT FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(830):IF AD<>SA THEN F
      =1:GOTO970
SC 910 A=PEEK(831)+256*PEEK(832)-1:F=F-2*(A<EA)-3*
      (A>EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:POKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOSUB1010:ON OP GOTO950
      :SYS 63591
AE 940 GOSUB1080:PRINT"{BLU}** SAVE COMPLETED **":
      GOTO220
XP 950 POKE147,0:SYS 63562:IF ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}** LOAD COMPLETED **":
      GOTO220
DP 970 GOSUB1060:PRINT"{BLK}{RVS}ERROR DURING LOAD
      :{DOWN}[4]":ON F GOSUB980,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTING ADDRESS (":GOSUB3
      60:PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:AD=SA+AD:GOSUB360:PR
      INT D$:RETURN
FD 1000 PRINT"TRUNCATED AT ENDING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH*256):POKE193,AL:POK
      E194,AH
```

Appendix D

```
FF 1020 AH=INT(B/256):AL=B-(AH*256):POKE174,AL:POK
E175,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN1050
HA 1040 IF(AD>511 AND AD<40960)OR(AD>49151 AND AD<
53248)THEN GOSUB1080:F=0:RETURN
HC 1050 GOSUB1060:PRINT"{RVS} INVALID ADDRESS
{DOWN}{BLK}":F=1:RETURN
AR 1060 POKE SD+5,31:POKE SD+6,208:POKE SD,240:POK
E SD+1,4:POKE SD+4,33
DX 1070 FOR S=1 TO 100:NEXT:GOTO1090
PF 1080 POKE SD+5,8:POKE SD+6,240:POKE SD,0:POKE S
D+1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:POKE SD+4,0:POKE SD,0:
POKE SD+1,0:RETURN
```

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