101 BASIC Computer Games

Digital Equipment Corporation
Maynard, Massachusetts
Additional copies of 101 BASIC Computer Games are available for $7.50 plus 50 cents postage and handling from:

Software Distribution Center
Digital Equipment Corporation
Maynard, Massachusetts 01754

Write for discount schedule on quantities over 30.

Two supplemental guides are available for use with this book. They are:

Understanding Mathematics and Logic Using BASIC Computer Games, $4.50. Grades 7-12.


1st Printing -- July 1973
2nd Printing -- April 1974
3rd Printing -- March 1975

Copyright © 1975 by:

Digital Equipment Corporation
Maynard, Massachusetts 01754
## Contents

<table>
<thead>
<tr>
<th>Game</th>
<th>Brief Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEDU</td>
<td>Play acey-ducey with the computer</td>
<td>13</td>
</tr>
<tr>
<td>AMAZIN</td>
<td>Computer constructs a maze</td>
<td>15</td>
</tr>
<tr>
<td>ANIMAL</td>
<td>Computer guesses animals and learns new ones from you</td>
<td>17</td>
</tr>
<tr>
<td>AWARI</td>
<td>Ancient game of rotating beans in pits</td>
<td>19</td>
</tr>
<tr>
<td>BAGLES</td>
<td>Guess a mystery 3-digit number by logic</td>
<td>22</td>
</tr>
<tr>
<td>BANNER</td>
<td>Prints any message on a large banner</td>
<td>24</td>
</tr>
<tr>
<td>BASBAL</td>
<td>Baseball game</td>
<td>26</td>
</tr>
<tr>
<td>BASKET</td>
<td>Basketball game</td>
<td>29</td>
</tr>
<tr>
<td>BATNUM</td>
<td>Match wits in a battle of numbers vs. the computer</td>
<td>32</td>
</tr>
<tr>
<td>BATTLE</td>
<td>Decode a matrix to locate enemy battleship</td>
<td>34</td>
</tr>
<tr>
<td>BINGO</td>
<td>Computer prints your card and calls the numbers</td>
<td>36</td>
</tr>
<tr>
<td>BLKJAC</td>
<td>Blackjack (very comprehensive), Las Vegas rules</td>
<td>39</td>
</tr>
<tr>
<td>BLKJAK</td>
<td>Blackjack (standard game)</td>
<td>42</td>
</tr>
<tr>
<td>BOAT</td>
<td>Destroy a gunboat from your submarine</td>
<td>43</td>
</tr>
<tr>
<td>BOMBER</td>
<td>Fly World War II bombing missions</td>
<td>45</td>
</tr>
<tr>
<td>BOUNCE</td>
<td>Plot a bouncing ball</td>
<td>47</td>
</tr>
<tr>
<td>BOWL</td>
<td>Bowling at the neighborhood lanes</td>
<td>48</td>
</tr>
<tr>
<td>BOXING</td>
<td>3-round Olympic boxing match</td>
<td>50</td>
</tr>
<tr>
<td>BUG</td>
<td>Roll dice vs. the computer to draw a bug</td>
<td>52</td>
</tr>
<tr>
<td>BULCOW</td>
<td>Guess a mystery 5-digit number vs. the computer</td>
<td>55</td>
</tr>
<tr>
<td>BULEYE</td>
<td>Throw darts</td>
<td>57</td>
</tr>
<tr>
<td>BULL</td>
<td>You're the matador in a championship bullfight</td>
<td>59</td>
</tr>
<tr>
<td>BUNNY</td>
<td>Computer drawing of the Playboy bunny</td>
<td>62</td>
</tr>
<tr>
<td>BUZZWD</td>
<td>Compose your speeches with the latest buzzwords</td>
<td>63</td>
</tr>
<tr>
<td>CALNDR</td>
<td>Calendar for any year</td>
<td>65</td>
</tr>
<tr>
<td>CAN-AM</td>
<td>Drive a Group 7 car in a Can-Am road race</td>
<td>67</td>
</tr>
<tr>
<td>CHANGE</td>
<td>Computer imitates a cashier</td>
<td>72</td>
</tr>
<tr>
<td>CHECKR</td>
<td>Game of checkers</td>
<td>73</td>
</tr>
<tr>
<td>CHEMST</td>
<td>Dilute kryptofuranic acid to make it harmless</td>
<td>76</td>
</tr>
<tr>
<td>CHIEF</td>
<td>Silly arithmetic drill</td>
<td>77</td>
</tr>
<tr>
<td>CHOMP</td>
<td>Eat a cookie avoiding the poison piece (2 or more players)</td>
<td>78</td>
</tr>
<tr>
<td>CIVILW</td>
<td>Fight the Civil War</td>
<td>80</td>
</tr>
<tr>
<td>CRAPS</td>
<td>Play craps (dice), Las Vegas style</td>
<td>83</td>
</tr>
<tr>
<td>CUBE</td>
<td>Negotiate a 3-D cube avoiding hidden landmines</td>
<td>85</td>
</tr>
<tr>
<td>DIAMND</td>
<td>Prints 1-page diamond patterns</td>
<td>87</td>
</tr>
<tr>
<td>DICE</td>
<td>Summarizes dice rolls</td>
<td>89</td>
</tr>
<tr>
<td>DIGITS</td>
<td>Computer tries to guess digits you select at random</td>
<td>91</td>
</tr>
<tr>
<td>DOGS</td>
<td>Penny arcade dog race</td>
<td>93</td>
</tr>
<tr>
<td>EVEN</td>
<td>Take objects from a pile--try to end with an even number</td>
<td>96</td>
</tr>
<tr>
<td>EVEN1</td>
<td>Same as EVEN--computer improves its play</td>
<td>98</td>
</tr>
<tr>
<td>FIPPOP</td>
<td>Solitaire logic game--change a row of Xs to Os</td>
<td>99</td>
</tr>
<tr>
<td>Game</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>SPLAT</td>
<td>Open a parachute at the last possible moment</td>
<td>205</td>
</tr>
<tr>
<td>STARS</td>
<td>Guess a mystery number--stars give you clues</td>
<td>207</td>
</tr>
<tr>
<td>STOCK</td>
<td>Stock market simulation</td>
<td>209</td>
</tr>
<tr>
<td>SYNONM</td>
<td>Word synonym drill</td>
<td>212</td>
</tr>
<tr>
<td>TARGET</td>
<td>Destroy a target in 3-D space--very tricky</td>
<td>214</td>
</tr>
<tr>
<td>3D PLOT</td>
<td>Plots families of curves--looks 3-dimensional</td>
<td>216</td>
</tr>
<tr>
<td>TICTAC</td>
<td>Tic-tac-toe</td>
<td>218</td>
</tr>
<tr>
<td>TOWER</td>
<td>Towers of Hanoi puzzle</td>
<td>221</td>
</tr>
<tr>
<td>TRAIN</td>
<td>Time-speed-distance quiz</td>
<td>223</td>
</tr>
<tr>
<td>TRAP</td>
<td>Trap a mystery number--computer gives you clues</td>
<td>224</td>
</tr>
<tr>
<td>23MTCH</td>
<td>Game of 23 matches--try not to take the last one</td>
<td>226</td>
</tr>
<tr>
<td>UGLY</td>
<td>Silly profile plot of an ugly woman</td>
<td>228</td>
</tr>
<tr>
<td>WAR</td>
<td>Card game of war</td>
<td>230</td>
</tr>
<tr>
<td>WAR-2</td>
<td>Troop tactics in war</td>
<td>232</td>
</tr>
<tr>
<td>WEKDAY</td>
<td>Facts about your birthday</td>
<td>234</td>
</tr>
<tr>
<td>WORD</td>
<td>Word guessing game</td>
<td>236</td>
</tr>
<tr>
<td>YAHTZE</td>
<td>Dice game of Yahtzee</td>
<td>238</td>
</tr>
<tr>
<td>ZOOP</td>
<td>BASIC programmer's nightmare</td>
<td>243</td>
</tr>
</tbody>
</table>

Appendices

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Families of Games</td>
<td>247</td>
</tr>
<tr>
<td>B</td>
<td>Game Diagrams</td>
<td>248</td>
</tr>
<tr>
<td>C</td>
<td>Instructions to Game Authors</td>
<td>249</td>
</tr>
</tbody>
</table>
Preface

This is not the first collection of computer games and simulations nor will it by any means be the last. However, in many ways it is unique. It is the first collection of games all in BASIC. It is also the only collection that contains both a complete listing and a sample run of each game along with a descriptive write-up.

Educational Value of Games

Educators have widely different opinions as to the educational value of games. There tends to be agreement that games are highly motivational and frequently very addictive. Most educators agree that games generally foster learning by discovery—i.e., the player doesn't sit down at the terminal with the purpose of learning a principle of logic but after playing BAGLES three or four times he most assuredly has learned something about logic. Newton's second law is probably the furthest thing from the mind of a person sitting down to play ROCKET. However, when the player finally lands his LEM successfully on the moon, the chances are very good that he has discovered something about gravity varying inversely with the mass of the LEM and the distance from the moon.

The main objection to games as a learning tool seems to be the fact that it's largely unguided learning and potentially wasteful of computer time. Art Leuhrmann of Dartmouth joked that some computer center directors might be willing to pay to not have the book sold on campus because of the computer time that would be burned up by playing the games; however, the educational value of games can be enormous—not only in their playing but in their creation.

The majority of games submitted tend to simulate a sport, card or board game, a game of chance or something which already exists. Only a few games begin to use the logical and computational capabilities of the computer to come up with something new and truly unique. Some that do are STARES, BULCOW, ROCKET, and LIFE-2.

Certain games are, of course, more popular with game authors that others. There were no less than ten versions of NIM submitted, nine versions each of HORSES (Horse Race) and TICTAC (Tic-Tac-Toe), and eight versions of CRAPS. Other popular ones were simulations of baseball, basketball, football, blackjack, and hangman.
Families of Games

A word about the title of the book. The astute, quantitatively-oriented reader might notice that there seem to be more than 101 games in the book. In fact, there are 108 individual games; 7 are different versions of another game. There are 101 separate write-ups; thus, the title of the book.

Perhaps it is a disease of using the computer or perhaps it is just a compulsion of man that he must categorize things. The games in this book could be categorized by level of difficulty as is often the case in collections of puzzles. They could also be categorized in an educational sense, for example, those that could be used to teach logic principles, those that foster learning by discovery, those that require the user to solve an algebra problem, etc.

In the first two groups, Number or Letter Guessing and Piles of Objects, you will probably get more enjoyment if you play the games in the numbered order as there is a definite sequential nature to their difficulty. In the other fourteen categories, the games may be played in any order; one does not generally build upon another except in a few cases. In particular, you should play:

- BAGLES before BULCOW
- HI-Q before 1CHECK
- BATTLE before SALVO
- GUNNER before SUNER1
- ROCKET before ROCKT2
- HMRABI before KING

Equipment to Play, Computer and Otherwise

Most of the games in this book require no special knowledge, tools or equipment to play, except, of course, a BASIC-speaking computer. Four of the matrix games will probably be more enjoyable if you use a grid or quadrille paper to play. Unless you have a photographic memory, QUBIC almost certainly requires a diagram. There is a page included as Appendix B which contains some supplemental diagrams; you may wish to reproduce it if you become addicted to the games on it.

With few exceptions, the games all run in "standard" BASIC. Any exceptions are noted in the write-ups under the heading, "Computer Limitations." The major difference between various computer systems appears to be in the handling of alphabetic strings. On Digital systems a subscripted string variable, for example, A$(8) or C1$(15), refers to a variable in an array or matrix. Other BASIC compilers may not have string arrays.
On some systems, in particular, Digital's Edusystems 20, 25, and 50, strings are limited to 6 characters. Several strings may, or course, be combined in an array to permit longer than 6-letter words to be used.

Many programs use the RANDOMIZE command to start the random number generator at a random point. Some BASIC compilers do not recognize RANDOMIZE and it must be removed in order for the program to run.

Digital BASIC permits more than one statement on each program line. Statement separators on the line may be one of three characters -- / or : or $."
ROCKET

Description

ROCKET, known also as LUNAR, LEM, and APOLLO, is by far and away the single most popular computer game. It exists in versions that start you anywhere from 500 feet to 200 miles above the moon, or other planets, too. Some allow the control of directional stabilization rockets and/or the retro rocket. The three versions presented here appear to be the most popular of the many variations.

ROCKET. In this program, you set the burn rate of the retro rockets (pounds of fuel per second) every 10 seconds and attempt to achieve a soft landing on the moon. 200 lbs/sec really puts the brakes on, and 0 lbs/sec is free fall. Ignition occurs at 8 lbs/sec, so do not use burn rates between 1 and 7 lbs/sec. To make the landing more of a challenge, but more closely approximate the real Apollo LEM capsule, you should make the available fuel at the start (N) equal to 16,000 lbs, and the weight of the capsule (M) equal to 32,500 lbs in Statement 15.

Some computers object to the series expansion calculations in Statements 91 and 94 (as you near the lunar surface, these numbers get very small). If yours does, substitute the expanded form--for the expansion in Statement 91:

\[-Q^* (1 + Q^* (1/2 + Q^* (1/3 + Q^* (1/4 + Q^*/5))))\]

You should be able to figure the other one out yourself.

ROCKET1. In this version, you start 500 feet above the lunar surface and control the burn rate in 1-second bursts. Each unit of fuel slows your descent by 1 ft/sec. The maximum thrust of your engine is 30 ft/sec/sec.

ROCKET2. This is the most comprehensive of the three versions and permits you to control the time interval of firing, the thrust, and the attitude angle. It also allows you to work in the metric or English system of measurement. The instructions in the program dialog are very complete, so you shouldn't have any trouble.

In most versions of ROCKET, the temptation is to slow up too soon and then have no fuel left for the lower part of the journey. This, of course, is disasterous (as you will find out when you land your own capsule)!
Source

To put all the conflicting stories to rest, we can say with confidence that ROCKET was originally written in FOCAL by a Lexington High School student back in the mid 60's.

ROCKET:
Jim Storer
Lexington High School
Lexington, MA 02173

ROCKT1:
Eric Peters
Digital Equipment Corp.
Maynard, MA 01754

ROCKT2:
William Labaree II
621 Oakley Place
Alexandria, VA 22302
ROCKET PROGRAM LISTING

ROCKET EDU-SYSTEM 90

2 PRINT "THIS IS A COMPUTER SIMULATION OF AN APOLLO LUNAR"
3 PRINT "LANDING CAPSULE"; PRINT "PRINT"
4 PRINT "THE ON-BORD COMPUTER HAS FAILED (IT WASN'T MADE BY"
5 PRINT "DIGITAL). SO YOU HAVE TO LAND THE CAPSULE MANUALLY";
6 PRINT "PRINT"
7 PRINT "SET BURN RATE OF METRO ROCKETS TO ANY VALUE BETWEEN"
8 PRINT "SET NEW BURN RATE EVERY 10 SECONDS."; PRINT "PRINT"
9 PRINT "CAPSULE WEIGHT 32.500 LBS. FUEL WEIGHT 16.500 LBS";
10 PRINT "PRINT"
11 PRINT "GOOD LUCK!!!"
12 INPUT N
13 PRINT "SEC", M + FT, "MPH", LB FUEL, "BURN RATE"; PRINT
14 INPUT N, M, FUEL, BURN RATE; PRINT
15 K = 128*(N/3)^2 + 388000 + 156000*G - (E - 2*E)/I*
16 M = 0.005*(N/3)^2 + 100000 + I + M; INPUT N + I
17 IF N > 100 THEN 41
18 IF J < 100 THEN 31 + I + J = 100
19 GOTO 31
20 GOTO 31
21 PRINT "FUEL OUT ALL SEC", 5 + V + 50 + (N/3)^2 + 2*V + 100000*G - (E - 2*E)/I*
22 PRINT "IMPACT VELOCITY"; PRINT "MPH"
23 IF M = 2 THEN 53
24 PRINT "PERFECT LANDING (LUCKY)"; GOTO 95
25 IF M = 2 THEN 56
26 PRINT "GOOD LANDING (COULD BE BETTER)"; GOTO 95
27 IF M = 2 THEN 58
28 PRINT "CAPSULE DAMAGED, YOU'RE STRANDED HERE UNTIL"
29 PRINT "A RESCUE PARTY ARRIVES. HOPE YOU HAVE ENOUGH OXYGEN!"; GOTO 95
30 PRINT "SORRY, BUT THERE WERE NO SURVIVORS... YOU BLEW IT!!"
31 PRINT "IN FACT, YOU BLASTED A NEW LUNAR CRATER!"; print "2777 FT DEEP"
32 GOTO 95
33 L = 1 + (K - 75)/(K - 75)*W + M
34 IF M = 2 THEN 53
35 PRINT "PERFECT LANDING (LUCKY)"; GOTO 95
36 IF M = 2 THEN 56
37 PRINT "GOOD LANDING (COULD BE BETTER)"; GOTO 95
38 IF M = 2 THEN 58
39 PRINT "CAPSULE DAMAGED, YOU'RE STRANDED HERE UNTIL"
40 PRINT "A RESCUE PARTY ARRIVES. HOPE YOU HAVE ENOUGH OXYGEN!"; GOTO 95
41 PRINT "SORRY, BUT THERE WERE NO SURVIVORS... YOU BLEW IT!!"
42 PRINT "IN FACT, YOU BLASTED A NEW LUNAR CRATER!"; print "2777 FT DEEP"
43 GOTO 95
44 PRINT "PRINT PRINT PRINT PRINT PRINT PRINT PRINT PRINT PRINT PRINT"
45 PRINT "TRY AGAIN!!!"; GOTO 6
46 PRINT "END"

SAMPLE RUN

ROCKET EDU-SYSTEM 90

THIS IS A COMPUTER SIMULATION OF AN APOLLO LUNAR
LANDING CAPSULE.

THE ON-BORD COMPUTER HAS FAILED (IT WASN'T MADE BY
DIGITAL), SO YOU HAVE TO LAND THE CAPSULE MANUALLY.

SET BURN RATE OF METRO ROCKETS TO ANY VALUE BETWEEN
0 (FREE FALL) AND 200 (MAXIMUM BURN) POUNDS PER SECOND
SET NEW BURN RATE EVERY 10 SECONDS.

CAPSULE WEIGHT 32.500 LBS. FUEL WEIGHT 16.500 LBS

GOOD LUCK!!!

SEC   MI + FT   MPH   LB FUEL   BURN RATE
10     1000     1000   15000     70
20     1000     1000   15000     70
30     9999     1000   15000     70
40     9999     1000   15000     70
50     9999     1000   15000     70
60     9999     1000   15000     70
70     9999     1000   15000     70
80     9999     1000   15000     70
90     9999     1000   15000     70
100    9999     1000   15000     70
110    9999     1000   15000     70
120    9999     1000   15000     70
130    9999     1000   15000     70
140    9999     1000   15000     70
150    9999     1000   15000     70
160    9999     1000   15000     70
170    9999     1000   15000     70
180    9999     1000   15000     70
190    9999     1000   15000     70
200    9999     1000   15000     70
210    9999     1000   15000     70
220    9999     1000   15000     70
230    9999     1000   15000     70
240    9999     1000   15000     70
250    9999     1000   15000     70
260    9999     1000   15000     70
270    9999     1000   15000     70
280    9999     1000   15000     70
290    9999     1000   15000     70
300    9999     1000   15000     70
ON MOON AT 233 LBD SEC - IMPACT VELOCITY 1 9042 MPH
GOOD LANDING (COULD BE BETTER)

TRY AGAIN!!

184