

Includes barcode for easy software entry.

HEWLETT-PACKARD

HP-41

USERS' LIBRARY SOLUTIONS

Games II

NOTICE

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INTRODUCTION

This HP-41C Solutions book was written to help you get the most from your calculator. The programs were chosen to provide useful calculations for many of the common problems encountered.

They will provide you with immediate capabilities in your everyday calculations and you will find them useful as guides to programming techniques for writing your own customized software. The comments on each program listing describe the approach used to reach the solution and help you follow the programmer's logic as you become and expert on your HP calculator.

KEYING A PROGRAM INTO THE HP-41C

There are several things that you should keep in mind while you are keying in programs from the program listings provided in this book. The output from the HP 82143A printer provides a convenient way of listing and an easily understood method of keying in programs without showing every keystroke. This type of output is what appears in this handbook. Once you understand the procedure for keying programs in from the printed listings, you will find this method simple and fast. Here is the procedure:

- At the end of each program listing is a listing of status information required to properly execute that program. Included is the SIZE allocation required. Before you begin keying in the program, press **XEQ** **ALPHA** **SIZE** **ALPHA** and specify the allocation (three digits; e.g., 10 should be specified as 010).
Also included in the status information is the display format and status of flags important to the program. To ensure proper execution, check to see that the display status of the HP-41C is set as specified and check to see that all applicable flags are set or clear as specified.
- Set the HP-41C to PRGM mode (press the **PRGM** key) and press **■** **GTO** **•** **•** to prepare the calculator for the new program.
- Begin keying in the program. Following is a list of hints that will help you when you key in your programs from the program listings in this handbook.
 - When you see " (quote marks) around a character or group of characters in the program listing, those characters are ALPHA. To key them in, simply press **ALPHA**, key in the characters, then press **ALPHA** again. So "SAMPLE" would be keyed in as **ALPHA** "SAMPLE" **ALPHA**.
 - The diamond in front of each LBL instruction is only a visual aid to help you locate labels in the program listings. When you key in a program, ignore the diamond.
 - The printer indication of divide sign is /. When you see / in the program listing, press **÷**.
 - The printer indication of the multiply sign is *. When you see * in the program listing, press **×**.
 - The T-character in the program listing is an indication of the **APPEND** function. When you see T, press **■** **APPEND** in ALPHA mode (press **■** and the K key).
 - All operations requiring register addresses accept those addresses in these forms:

nn (a two-digit number)

IND nn (INDIRECT: **■**, followed by a two-digit number)

X, Y, Z, T, or L (a STACK address: **•** followed by X, Y, Z, T, or L)

IND X, Y, Z, T or L (INDIRECT stack: **■** **•** followed by X, Y, Z, T, or L)

Indirect addresses are specified by pressing **■** and then the indirect address. Stack addresses are specified by pressing **•** followed by X, Y, Z, T, or L. Indirect stack addresses are specified by pressing **■** **•** and X, Y, Z, T, or L.

Printer Listing

```
01 ♦ LBL "SAM
PLE"
02 "THIS IS
A "
03 "T-SAMPLE
"
04 AVIEW
05 6
06 ENTER↑
07 -2
08 /
09 ABS
10 STO IND
L
11 "R3="
12 ARCL 03
13 AVIEW
14 RTN
```

Keystrokes

```
■ LBL ALPHA SAMPLE ALPHA
ALPHA THIS IS A ALPHA
ALPHA ■ APPEND SAMPLE
■ AVIEW ALPHA
6
ENTER↑
2 CHS
÷
XEQ ALPHA ABS ALPHA
STO ■ • L
ALPHA R3= ■ ARCL 03
■ AVIEW
ALPHA
■ RTN
```

Display

```
01 LBLT SAMPLE
02T THIS IS A
03T T-SAMPLE
04 AVIEW
05 6
06 ENTER ↑
07 -2
08 /
09 ABS
10 STO IND L
11T R3=
12 ARCL 03
13 AVIEW
14 RTN
```

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	The HP-41 is a tough opponent in this fast-moving adaptation of 8 X 8 chess.		
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	Become a "pinball wizard" without depositing a single quarter!		
*4.	TRUCK	by Kenneth Sharp	55
	Breaker-Breaker! Deliver your shipment within 10 hours or pay a penalty. Put pedal to the metal, but watch out for smokies and road hazards!		
*5.	FLIPO	by Dr. Robert Swanson	71
	Try to both outwit and "out-flip" the HP-41.		
6.	CODE CRACK	by Edward Hume	91
	How many guesses will it take you to "crack" the hidden HP-41 code?		
*+7.	ADVENTURE	by Layne Johnson	98
	Use your intuition to survive a harrowing adventure, and then custom-design your own adventure with this "do-it-yourself" program.		

- * Requires three memory modules
- ** Requires four memory modules
- + Requires card reader

PROGRAM DESCRIPTION

THE CAVES

By James Surber

Welcome to the "THE CAVES". The Caves is an adventure game in which the player (a wizard) moves about a series of 67 caves to pick up nine items of considerable value (for a total 1200 points) without dying from the hazards. The construction of the caves is a single stranded helix with interconnecting tunnels. The even numbered caves have tunnels going up to seven caves, while the odd numbered caves have tunnels going down to seven caves. These tunnels, and the tunnels going to the two intermediate caves on either side, make each cave connected to the three adjacent caves.

Upon entering the caves, you will be in cave number 0 which will always be empty and "SAFE". Five pieces of equipment will be given to you before starting through the caves, and three more pieces may be picked up while going through the game. These are to help you to get through the hazards and pick up the valuables. You will be given at the start of the game the following:

Keys, Water, Knife, Gloves, and a Lamp.

Only these five original pieces of equipment can be "SNATCHED" (taken) by the bats. Possession of these items is indicated in the display by setting flags 0-4; each number representing a different piece of equipment. (When set, these flag numbers appear along the bottom of the display.) The three pieces that are picked up along the way are immune to the bats due to a magical spell they have over them. These pieces are:

Wand, Magic Word, and a Cape.

If you lose any of the five original pieces of equipment the Wand will magically "PRESTO" return all lost pieces in one wand usage. The Wand will work only twice after each visit to the Wand Cave (not accumulative). The Magic Word "ABRAKADABRA" will take you out of the game at any time or place you wish to use it. The Cape will render you invisible to any dragon you may find in the cave. If the Cape is lost along the way, it may be reacquired by returning to the Cape Cave.

You will be given warnings of some of the hazards in the adjacent caves after you enter a new cave and have encountered any hazards present. These warnings appear after the word "SAFE" and do not have tones associated with them. Below is a list of the warnings and their hazards.

"FEEL DRAFT" a bottomless pit - end of the game. (no score)
"YYEEEEIIII THE PITS"

"SMELL DRAGON" if no cape, the dragon will eat you - end of the
game. (no score) "CHOMP"

"HEAR SPLASH" cave is full of water and you will drown - end of the game. (no score) "ALL WASHED UP"

"DARK CAVE" if no lamp is present, you will fall into a bottomless pit - end of the game. (no score) "OOPS NO LAMP"
"YEEEEIIII THE PITS"

"HEAR SQUEEKS" bats will "SNATCH" one piece of your equipment.
"SNATCH" "BATS TOOK ()"

"HEAR VOICE" a wizard will tell you all that occupies the six closest caves (usually the three on either side). He does not see stairs or forks.

"SEE LIGHT" a tunnel out of the caves will take you out - end of the game. (with score) "END GAME" "SCORE = ()"

There will be other surprises lurking in "The Caves" without warning. These will be inconvenient or lethal only if equipment has been "SNATCHED".

There are caves with stairs and forks in them. The stairs will display "UP OR DOWN?". This will randomly place you either above (higher number) or below (lower number) the cave that the stairs are currently in. The fork will randomly select two caves and display them with no warnings. You must then choose between them. Once you are placed in a new cave (in both the stairs and fork cases), you must suffer any hazards there and will be given new warnings and adjacent caves. At each re-entry into a cave with stairs or forks, you will be given new random caves. You never know what you might find at the end of your tunnel.

At anytime you may go "BACK" and return to the last cave you were in. This function will also work with stairs and forks.

A list of all valuables and their points is given below. After you have placed a valuable "IN PACK" it is removed from the cave and that cave will be empty upon re-entry. When all the valuables are found the HP-41 will "beep" so you'll know when you have finished.

DIAMONDS	100
IVORY	100
MING VASE	100
PEARLS	100
CRYSTAL (in one of the two "small caves")	100
RUBIES (locked in a chest)	150
SILK (locked in a chest)	150
AG (silver - too hot, use gloves)	200
AU (gold - too cold, use gloves)	200

OPERATING LIMITS AND WARNINGS AND OPTIONS

The space requirement for this program is 319 registers.

The initialization of this program is done during the time the display is showing "THE CAVES". This process takes time to randomize the caves for your game. Please be patient while the HP-41 is "thinking". The same seed will generate the same game each time you play.

Flag 11 is used at one brief point in the program. If the calculator is shut off during the running of the program flag 11 may be set, therefore, the game will automatically start when it is turned back on. As long as you turn the calculator off at a prompt for a move this will not occur.

If the optional printer is used all warnings and the wizards' wise words will be printed in lower case letters.

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STATUS

SIZE: 076
FIX: 0
USER MODE: ON
TOTAL PROGRAM BYTES: 1703

DATA REGISTERS

00-67	CAVES
68-70	ADJACENT CAVES
71	LAST CAVE
72	POINTS TOTAL
73	POSITION
74	SEED
75	LOOP CONTROLS

FLAGS USED

0	Set: KEYS PRESENT
	Clear: KEYS SNATCHED
1	Set: LAMP PRESENT
	Clear: LAMP SNATCHED
2	Set: WATER PRESENT
	Clear: WATER SNATCHED
3	Set: KNIFE PRESENT
	Clear: KNIFE SNATCHED
4	Set: GLOVES PRESENT
	Clear: GLOVES SNATCHED
5	Set: WAND PRESENT
	Clear: WAND ABSENT
6	Set: WORD PRESENT
	Clear: WORD ABSENT
7	Set: CAPE PRESENT
	Clear: CAPE ABSENT

FLAGS USED cont.

8	Set: DISPLAY WARNINGS, CAVE CONTENTS
	Clear: DISPLAY "NO WARNING"
9	Set: BATS TOOK NOTHING
	Clear: BATS TOOK ()
10	Set: 1 ST WAND USAGE
	Clear: WAND USAGE USED
11	Set: CHEST WITH SILK
	Clear: CHEST WITH RUBIES
13	Set: TEST WARNINGS
	Clear: XEQ HAZARD
25	Set: NORMAL WARNING
	Clear: FORK WARNINGS
27	Set: USER MODE ON
	Clear: USER MODE OFF
29	Set: DECIMAL POINT
	Clear: NO DECIMAL POINT

SAMPLE PROBLEM

Once upon a time, there was a wizard who set out to make his name in the wonderful world of wizardry and to earn a fabulous fortune. The titillating trail that awaited him was the awesome task of travelling through "THE CAVES". As he traveled through this magically made maze he increased his strength to a new and higher order by receiving magical powers (the Wand, the Magic Word, and the cape). His fortune was found by placing the nine valuables of the caves in his pack. These powers and valuables could make him the world's wealthiest wizard. To start his journey he planted a magical seed (a fractional number) to form his puzzle. At this time he was given his equipment (keys, water, knife, gloves and lamp). The number he chose was 0.741. The following tells of the treacherous trek he took.

Note: The last line of the display after moving to a new cave is in the format: #*, #, #, #. The first number (with the asterisk) is the cave you are in, the other three are the adjacent caves.

DISPLAY	INPUT	FUNCTION	COMMENTS
	Load Program [GT0] ..		
PACKING			
	[XEQ]"SIZE"076		
	[XEQ]"CAVES"		
SEED?	.741	[R/S]	Note flags
THE CAVES			
SAFE			
NO WARNING			
0* 1,3,5	1	[R/S]	
MOVING TO 1			
SMALL CAVE			
CRYSTAL			
CRYSTAL IN PACK			
SCORE = 100			
SAFE			
NO WARNING			
1* 0,2,0	2	[R/S]	
MOVING TO 2			
PEARLS			
PEARLS IN PACK			
SCORE = 200			
SAFE			
NO WARNING			
2* 1,3,9	3	[R/S]	
MOVING TO 3			
SAFE			
NO WARNING			

DISPLAY	INPUT	FUNCTION	COMMENTS
3* 2,4,0 MOVING TO 4 AU TOO COLD USE GLOVES IN PACK SCORE = 400 SAFE NO WARNING	4	[R/S]	
4* 3,5,11 MOVING TO 5 FORK	5	[R/S]	
5* LT/RT, 45, 10 MOVING TO 10 HEAR SQUEEKS SNATCH BATS TOOK KNIFE SAFE HEAR SPLASH		[XEQ] "I"	To go the cave on the right Note annunciator '3' no longer on
10* 9,11,17 MOVING TO 9 SAFE HEAR SQUEEKS	9	[R/S]	
9* 8,10,2 MOVING TO 8 SAFE SEE LIGHT	8	[R/S]	
8* 7,9,15 MOVING TO 15 SAFE SEE LIGHT	15	[R/S]	
15* 14,16,8 MOVING TO 16 SAFE HEAR SPLASH	16	[R/S]	
16* 15,17,23 MOVING TO 23 DIAMONDS DIAMONDS IN PACK SCORE = 500 SAFE NO WARNING	23	[R/S]	

DISPLAY	INPUT	FUNCTION	COMMENTS
23* 22,24,16 MOVING TO 24 WEB BATS TOOK KNIFE GO BACK	24	[R/S]	
	To go back	[XEQ] "J"	(You don't have a knife to cut through the web)
SAFE NO WARNING			
23* 22,24,16 MOVING TO 22 SAFE HEAR VOICE HEAR VOICE	22	[R/S]	
22* 21,23,29 MOVING TO 29 HEAR VOICE WIZARD CAVE 26 LOCKED DOOR CAVE 27 EMPTY CAVE 28 EMPTY CAVE 29 HEAR VOICE CAVE 30 MAGIC WORD CAVE 31 IVORY CAVE 32 DARK CAVE SAFE NO WARNING	29	[R/S]	
29* 28,30,22	(Review Equipment)	[XEQ] "E"	
BATS TOOK KNIFE SAFE NO WARNING			
29* 28,30,22	(Review Score)	[XEQ] "D"	
SCORE = 500			
29* 28,30,22 MOVING TO 30 MAGIC WORD SAFE HEAR VOICE	30	[R/S]	

DISPLAY	INPUT	FUNCTION	COMMENTS
30* 29,31,27 MOVING TO 37 MAGIC WAND SAFE HEAR VOICE	37	[R/S]	
37* 36,38,30 SAFE NO WARNING	36	[R/S]	
36* 35,37,43 MOVING TO 35 UGLY TROLL BATS TOOK KNIFE CHOMP	35	[R/S]	
<p>If the wizard had been wise he would have used his magic wand after he got it at cave 37. The knife would have protected him against the UGLY TROLL and he could have continued on to his fame and fortune. To reincarnate the wizard for another chance enter a seed at the prompt.</p>			

USER INSTRUCTIONS

SIZE: 076

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
	This program requires 243 program registers			
	and 76 data registers.			
1	Load program			
2	Initialize		[XEQ] "CAVES"	SEED?
3	Key in any fractional number	SEED	# [R/S]	THE CAVES
	(between 1 and 0)			
4	To move to a new cave (only one of those	# of cave		MOVING TO ()
	listed on the display)	[R/S]		(hazards or
				valuables)
				SAFE
				(warnings)
				(new adjacent
				caves)
				#, #, #, #
5	If "FORK" displayed and "#*, LT/RT, #, #"		[XEQ] "H"	Same as 4
			(left)	
			[XEQ] "I"	
			(right)	
6	If "STAIRS" displayed and "UP OR DOWN?"		[XEQ] "F"	Same as 4
			(up)	
			[XEQ] "G"	
			(down)	
7a	If after "MAGIC WORD" was found in a cave		[XEQ] "A"	ABRAKADABRA
	and you wish to exit "THE CAVES"		(abra)	END GAME
	with a score (partial or total score)			SCORE = ()
7b	If no "MAGIC WORD" was found			NO MAGIC
				(cave display)

USER INSTRUCTIONS

SIZE: 076

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
8a	If you have found the "WAND" and the bats		[XEQ] "B"	PRESTO
	have "SNATCHED" some of your equipment the		(wand)	SAFE
	WAND will return all equipment taken			(warnings)
				(cave display
				of old caves)
8b	If no "WAND" has been found or if the			NO WAND
	"WAND" has been used twice since last			SAFE
	"WAND CAVE" visit (visits not accumulative)			(warnings)
				(cave display
				of old caves)
9	At any time you wish to review the warnings		[XEQ] "C"	(warnings)
	for the adjacent caves (this will not		(warn)	(cave display
	function when a Fork or Stairs is displayed)			of old caves)
10	If you wish a review of the score to date		[XEQ] "D"	SCORE = ()
			(score)	(cave display
				of old caves)
11	If you wish a review of the equipment		[XEQ] "E"	BATS TOOK ()
	"SNATCHED" by the bats		(equip)	(hazards or
				valuables)
				SAFE
				(warnings)
				(cave display
				of old caves)
12	If you wish or were instructed to "GO BACK"		[XEQ] "J"	Same as 4
	to the last cave (this will function with		(back)	
	Forks and Stairs)			
13	If at anytime you stop midgame and turn		[XEQ] "C"	Same as 9

SEED?

[illegible]

PROGRAM LISTING

```

01 *LBL "CAV
ES"
02 CLRG
03 "SEED ?"      Seed
04 PROMPT
05 STO 74
06 "THE CAV
ES"
07 AVIEW          INITIALIZATION
08 CF 29          OF REGISTERS
09 SF 27          AND FLAGS
10 XEQ 59
11 FIX 0
12 1.026
13 STO 75
14 XEQ 97
15 18.026
16 STO 75
17 XEQ 97
18 24.026
19 STO 75
20 XEQ 97
21 TONE 9
22 *LBL 66
23 1
24 STO 68          STORE
25 3              ADJACENT CAVES
26 STO 69          TO 0
27 5
28 STO 70
29 GTO 55
30 *LBL 99
31 RCL 74
32 9821
33 *
34 .21137
35 +
36 FRC
37 STO 74
38 *
39 INT
40 RTN
41 *LBL 98
42 66
43 XEQ 99
44 X=0?
45 GTO 98
46 RCL IND
X
47 X=0?
48 GTO 98

```

```

49 RCL 75
50 INT
51 STO IND
Z
52 RTN          CONTROL LOOP
53 *LBL 97
54 XEQ 98
55 ISG 75
56 GTO 97
57 RTN
58 *LBL J        GO BACK
59 RCL 71
60 GTO 84
61 *LBL I        GO RIGHT
62 RCL 70
63 GTO "↑"
64 *LBL H        GO LEFT
65 RCL 69
66 *LBL "↑"      MOVING TO ( )
67 "MOVING
TO "
68 ARCL X
69 AVIEW
70 XEQ 56
71 *LBL 84
72 X<> 73
73 STO 71
74 RCL 73
75 X=0?
76 GTO 66
77 67
78 X=Y?
79 GTO 67
80 RCL 73
81 1
82 -
83 STO 68
84 2
85 +
86 STO 69
87 2
88 MOD
89 X=0?
90 GTO 68
91 RCL 73
92 7
93 -
94 0
95 X<Y?
96 X<>Y
97 STO 70

```

STORE LAST
CAVE

FIND ADJACENT
CAVES

ODD OR EVEN

ODD
LOWER CAVE

PROGRAM LISTING

```

98 GTO 55
99♦LBL 68
100 RCL 73
101 7
102 +
103 67
104 X>Y?
105 X<>Y
106 STO 70
107 GTO 55
108♦LBL 67
109 62
110 STO 68
111 64
112 STO 69
113 66
114 STO 70
115 GTO 55
116♦LBL 56
117 RCL 68
118 X=Y?
119 RTN
120 X<>Y
121 RCL 69
122 X=Y?
123 RTN
124 X<>Y
125 RCL 70
126 X=Y?
127 RTN
128 "ILLEGAL
CAVE"
129 XEQ 33
130 RCL 73
131 GTO 00
132♦LBL 55
133 RCL IND
73
134 GTO IND
X
135♦LBL 00
136 "SAFE"
137 XEQ 33
138♦LBL C
139 SF 13
140 RCL 68
141 XEQ 78
142 RCL 69
143 XEQ 78
144 RCL 70
145 XEQ 78

```

EVEN
UPPER CAVE

STORE
ADJACENT
CAVES TO 67

TEST
IF LEGAL MOVE

XEQ HAZARDS
& VALUABLES

SAFE

FIND WARNINGS

```

146 CF 13
147 "NO WARN
ING"
148 FC?C 08
149 AVIEW
150 PSE
151♦LBL 77
152 CLA
153 ARCL 73
154 "†* "
155 ARCL 68
156 "†, "
157 ARCL 69
158 "†, "
159 ARCL 70
160 PROMPT
161 GTO "†"
162♦LBL 78
163 SF 25
164 RCL IND
X
165 FC? 25
166 GTO 77
167 20
168 X>Y?
169 RTN
170 SF 08
171 XEQ IND
Y
172 RTN
173♦LBL 01
174 "MAGIC W
AND"
175 FS? 13
176 GTO 33
177 XEQ 32
178 SF 05
179 SF 10
180 GTO 00
181♦LBL B
182 FC? 05
183 "NO WAND
"
184 FS? 05
185 "PRESTO"
186 XEQ 32
187 FC? 05
188 GTO E
189 FC?C 10
190 CF 05
191 XEQ 58

```

NO WARNINGS

DISPLAY CAVES

DISPLAY
WARNINGS

MAGIC WAND

USE MAGIC
WAND

PROGRAM LISTING

192 GTO 00			
193♦LBL 59			
194 CF 13			
195 CF 10	INITIALIZE		
196 CF 08	&		
197 CF 07	RESET FLAGS		
198 CF 06			
199 CF 05			
200♦LBL 58			
201 SF 04	RESET FLAGS		
202 SF 03	FOR		
203 SF 02	WAND & GAME		
204 SF 01			
205 SF 00			
206 CF 09			
207 RTN			
208♦LBL 02			
209 "MAGIC W	MAGIC WORD		
ORD"			
210 FS? 13			
211 GTO 33			
212 XEQ 32			
213 SF 06			
214 GTO 00			
215♦LBL A			
216 FC? 06			
217 "NO MAGI	USE MAGIC		
C"	WORD		
218 FS? 06			
219 "ABRAKAD			
ABRA"			
220 XEQ 33			
221 FC? 06			
222 GTO 77			
223 GTO 57			
224♦LBL 03			
225 "CAPE"			
226 FS? 13	CAPE		
227 GTO 33			
228 XEQ 32			
229 "INVISIB			
LE TO"			
230 "F DRAGO			
N"			
231 XEQ 33			
232 SF 07			
233 GTO 00			
234♦LBL 04			
235 SF 11	SILK		
236♦LBL 05	RUBIES		
237 "LOCKED			
CHEST"			
238 XEQ 33	LOCKED CHEST		
239 FS? 13	ROUTINE		
240 CF 11			
241 FS? 13			
242 RTN			
243 SF 08			
244 XEQ 36			
245 CF 08			
246 FC? 00			
247 GTO 00			
248 FC? 11			
249 "RUBIES"			
250 FS?C 11			
251 "SILK"			
252 XEQ 33			
253 150			
254 GTO 34			
255♦LBL 06			
256 "AG"	AG (SILVER)		
257 XEQ 33			
258 FS? 13			
259 RTN			
260 "TOO HOT			
"			
261 GTO 35			
262♦LBL 07	AU (GOLD)		
263 "AU"			
264 XEQ 33			
265 FS? 13			
266 RTN			
267 "TOO COL			
D"			
268♦LBL 35			
269 XEQ 33			
270 FS? 04	USE GLOVES		
271 "USE "	ROUTINE		
272 FC? 04			
273 XEQ 43			
274 "FGLOVES			
"			
275 XEQ 33			
276 FC? 04			
277 GTO 00			
278 CLA			
279 200			
280 GTO 34	PEARLS		
281♦LBL 09			
282 "PEARLS"			
283 GTO 37			

PROGRAM LISTING

```

284♦LBL 10
285 "MING VA SE"      MING VASE
286 GTO 37
287♦LBL 11
288 "IVORY"
289 GTO 37      IVORY
290♦LBL 12      DIAMONDS
291 "DIAMOND S"
292♦LBL 37      DISPLAY
293 XEQ 33      VALUABLES
294 FS? 13
295 RTN
296 100
297♦LBL 34      IN PACK
298 "F IN PA CK"
299 XEQ 33
300 ST+ 72
301 RCL 72
302 1200
303 X=Y?      BEEP IF
304 BEEP      1200 POINTS
305 XEQ 48
306 0
307 STO IND 73      REMOVE VALUABLE
FROM CAVE
308 GTO 00
309♦LBL 31
310 TONE 5
311 TONE 3      BAD
312 TONE 0      TONES
313 GTO 33
314♦LBL 32
315 TONE 1      GOOD TONES
316 TONE 3
317 TONE 5
318♦LBL 33
319 AVIEW      AVIEW
320 PSE
321 RTN
322♦LBL 13
323 "UGLY TR OLL"      UGLY TROLL
324 FS? 13
325 GTO 33
326 XEQ 31
327 XEQ 44
328 FS? 03
329 GTO 00

```

```

330 GTO 42
331♦LBL 14
332 "WEB"      WEB
333 FS? 13
334 GTO 33
335 XEQ 31
336 XEQ 44
337 FS? 03
338 GTO 00
339 GTO 46
340♦LBL 15
341 "FIRE"
342 FS? 13
343 GTO 33      FIRE
344 XEQ 31
345 FS? 02
346 "USE "
347 FC? 02
348 XEQ 43
349 "FWATER"
350 XEQ 33
351 FS? 02
352 GTO 00
353 GTO 46
354♦LBL 16
355 "LOCKED DOOR"      LOCKED
DOOR
356 FS? 13
357 GTO 33
358 XEQ 31
359♦LBL 36
360 FS? 00
361 "USE "      USE KEY
362 FC? 00      ROUTINE
363 XEQ 43
364 "FKEY"
365 XEQ 33
366 FS? 00
367 RTN
368 FS? 00
369 GTO 00
370♦LBL 46
371 "GO BACK "      PROMPT FOR
GO BACK
372 PROMPT
373 GTO J
374♦LBL 08      CRYSTAL
375 SF 08
376♦LBL 17
377 "SMALL C AVE"      SMALL CAVES

```


PROGRAM LISTING

```

378 XEQ 33
379 FS? 13
380 CF 08
381 FS? 13
382 RTN
383 "DROP BI      DROP BIG CAPE
G CAPE"
384 FS?C 07
385 XEQ 31
386 FC?C 08
387 GTO 00
388 "CRYSTAL
"
389 GTO 37
390♦LBL 18
391 FS? 13
392 RTN
393 "STAIRS"      STAIRS
394 XEQ 33
395 "UP OR D
OWN ?"
396 PROMPT
397 GTO 18
398♦LBL F        UP
399 RCL 73
400 67
401 XEQ 99
402 X<Y?
403 GTO F
404 GTO 84
405♦LBL G        DOWN
406 RCL 73
407 67
408 XEQ 99
409 X>Y?
410 GTO G
411 GTO 84
412♦LBL 19
413 FS? 13
414 RTN
415 "FORK"        FORK
416 XEQ 33
417 67
418 XEQ 99
419 STO 69
420 67
421 XEQ 99        FIND & STORE
422 STO 70        THE CAVES FOR
423 "LT/RT"       FORK
424 ASTO 68
425 GTO 77

```

```

426♦LBL 20
427 "SEE LIG      SEE LIGHT
HT"
428 FS? 13
429 GTO 33
430 XEQ 32
431♦LBL 57
432 "END GAM      END GAME
E"
433 XEQ 33
434 XEQ 48
435 PROMPT
436 GTO 45
437♦LBL D
438 XEQ 48
439 GTO 77
440♦LBL 48
441 "SCORE =      SCORE = ( )
"
442 ARCL 72
443 XEQ 32
444 RTN
445♦LBL 21
446 "DARK CA
VE"
447 FS? 13
448 GTO 33
449 XEQ 33
450 CLA
451 XEQ 31
452 PSE
453 "USE LAM
P"
454 FS? 01
455 XEQ 33
456 FS? 01
457 GTO 00
458 "OOPS NO      NO LAMP
LAMP"
459 XEQ 33
460♦LBL 22
461 "FEEL DR
AFT"
462 FS? 13
463 GTO 33
464 XEQ 31
465 "YEEEEII
II"
466 "F THE P      PITS
ITS"
467 GTO 45

```

PROGRAM LISTING

468♦LBL 23		514 "FKEY "	
469 "HEAR SF		515 FC? 01	
LASH"		516 "FLAMP "	EQUIPMENT
470 FS? 13		517 FC? 02	LIST
471 GTO 33	WATER	518 "FWATER	
472 XEQ 31		"	
473 "ALL WAS		519 FC? 03	
HED UP"		520 "FKNIFE	
474 GTO 45		"	
475♦LBL 24		521 FC? 04	
476 "SMELL D		522 "FGLOVES	
RAGON"		"	
477 FS? 13		523 FC? 09	
478 GTO 33	DRAGONS	524 "FNOTHIN	
479 XEQ 31		G"	
480 FS? 07		525 XEQ 33	
481 GTO 03		526 GTO 00	
482♦LBL 42		527♦LBL 43	BATS TOOK
483 "CHOMP"	CHOMP	528 "BATS TO	
484♦LBL 45		OK "	
485 XEQ 33		529 RTN	
486 TONE 1		530♦LBL 26	
487 TONE 0	END GAME TONES	531 "HEAR VO	
488 GTO "CAV		ICE"	
ES"		532 FS? 13	WIZARDS
489♦LBL 44		533 GTO 33	
490 FS? 03		534 XEQ 33	
491 "USE "		535 TONE 4	WIZ. TONES
492 FC? 03		536 TONE 5	
493 XEQ 43	KNIFE ROUTINE	537 TONE 6	
494 "FKNIFE"		538 "WIZARD"	
495 XEQ 33		539 XEQ 33	
496 RTN		540 SF 13	SET BOUNDS
497♦LBL 25		541 RCL 73	OF WIZARD
498 "HEAR SO		542 3	
UEEKS"		543 -	
499 XEQ 33	BATS	544 1	
500 FS? 13		545 X<Y?	
501 RTN		546 X<>Y	
502 TONE 9		547 STO 75	
503 TONE 9		548 6	
504 4		549 +	
505 XEQ 99		550 67	
506 CF IND X		551 X>Y?	
507 SF 09		552 X<>Y	
508 "SNATCH"		553 1000	
509 XEQ 33		554 /	
510♦LBL E	BATS TOOK ()	555 ST+ 75	
511 XEQ 43		556♦LBL 96	TEST CAVE
512♦LBL 47		557 "CAVE "	CONTENT
513 FC? 00		558 ARCL 75	

PROGRAM LISTING

```
559 RCL IND
75
560 0
561 XEQ 95
562 18
563 XEQ 95
564 19
565 XEQ 95
566 XEQ 33
567 X≠0?
568 XEQ IND
X
569 ISG 75
570 GTO 96
571 CF 13
572 GTO 00
573 LBL 95
574 X<>Y      DISPLAY
575 X=Y?      EMPTY
576 "F EMPTY
"
577 RTN
578 .END.      END
```

PROGRAM DESCRIPTION

5 X 5 CHESS

by Valentin Albillo

This program challenges the user to play chess against the HP-41. The game is played on a 5 x 5 board instead of the standard 8 x 8 board, however, all standard chess rules are implemented, including pawn promotion.

The program is printer compatible. If the printer is present, it will print the board, making extensive use of the graphic capabilities of the printer. The player has the option of having the board printed after every move or just after the calculator's move (the latter saves time and space).

An 8 x 8 version of the game was originally considered, however, it was found that:

- a) the 8 x 8 board could not be represented clearly if the player has an HP-82143A printer.
- b) an 8 x 8 game occupied the full memory of an HP-41, so, unless the user has an HP-41CV or a quad module, neither a printer nor a card reader can be plugged in, making it very difficult to load and run the game.
- c) an 8 x 8 game, using the same playing logic as the 5 x 5 version, took several hours per move and played a very weak game.

On the other hand the 5 x 5 version provides the following advantages:

- a) the board is printed using BLDSPEC special characters, so the player can clearly see the positions of the pieces without using an actual board. All handling of the board is automatic.
- b) though the board is 5 x 5, the standard chess pieces are used and are arranged in the same order: king, queen, bishop, knight, rook, and a row of pawns. All pieces have the same powers and restrictions as in standard chess.
- c) this 5 x 5 version fits in 3 memory modules, leaving a port free to plug in a card reader and a printer if desired. Also, due to the reduction in size, the game progresses faster than in the 8 x 8 version, taking an average of 20 moves per game (vs. 40 in the 8 x 8 case). Both armies get into battle early, and the game is more active.
- d) as the number of alterations for a given position is less than in the 8 x 8 version, the calculator's level of play is much better. The HP-41 plays a good, non-trivial game and will checkmate the player if he/she does not play well enough!!

All standard chess rules are implemented, with the following three exceptions:

- a) as the king is already in the corner, no castling is necessary.
- b) as there is only one empty row between the pawns, a pawn may advance just one position on its first move.
- c) no capture "en passant" is allowed.

The above exceptions are due mostly to the size of the board. All other rules are the same. Pawn promotion is allowed: if a pawn reaches the opposite side, it becomes any desired piece (except a king or a pawn). In the case of pawn promotion, the calculator always selects a queen.

If one of the calculator's moves results in a check being given to the opposing king, then the display shows CHECK after the move. There are two exceptions to this rule:

- a) if a pawn, promoted to a queen by the calculator, results in a check to the opposing king, this is not indicated.
- b) if the calculator moves a piece that, while not giving check by itself, leaves the opposing king under attack from another piece, the check is not indicated.

PROGRAM CHARACTERISTICS

This program is actually composed of 2 separate programs: MCHES and P (for print board). The main program, MCHES is independent of P and if the printer is not to be used then only MCHES needs to be loaded. However, if a printer exists in the user's system, the P routine should be loaded. The print board routine is separate from the main program so that a user without a printer need not waste memory space. The user can also create his/her own subroutine without having to change the main program.

A separate data card is used that contains all BLDSPEC characters used by the P routine to print the pieces, as well as other useful constants. This card must be loaded at the beginning of every game. The following is a list of the contents of the card:

R18 = 1	R26 = -7	R34 = 20.023	R42 = black pawn
R19 = -1	R27 = -11	R35 = 16.023	R43 = dotted square
R20 = -10	R28 = 19	R36 = 16.023	R44 = white pawn
R21 = -8	R29 = 17	R37 = black king	R45 = id. rook
R22 = 10	R30 = 7	R38 = id. queen	R46 = id. knight
R23 = 8	R31 = 11	R39 = id. bishop	R47 = id. bishop
R24 = -19	R32 = 16.019	R40 = id. knight	R48 = id. queen
R25 = -17	R33 = 24.031	R41 = id. rook	R49 = id. king

Registers 18 through 36 contain numeric constants while registers 37 through 49 contain the alpha BLDSPEC characters used to represent the pieces. If a user without a printer were to create this card, he/she would have to load (any) alpha characters into registers 37-49 as the program requires these registers to be loaded with alpha data to run properly (whether it prints or not).

The BLDSPEC characters used to represent the characters in this game are:

R37=black king	= 0,96,122,127,122,96,0	R49=white one	= 112,95,69,64,69,95,112
R38= id. queen	= 0,96,114,127,114,96,0	R48= id.	= 112,95,77,64,77,95,112
R39= id. bishop	= 0,100,110,123,110,100,0	R47= id.	= 110,91,81,68,81,91,110
R40= id. knight	= 0,108,102,119,126,108,0	R46= id.	= 110,83,89,72,65,83,126
R41= id. rook	= 0,102,124,126,124,102,0	R45= id.	= 103,89,67,65,67,89,103
R42= id. pawn	= 0,96,102,126,102,96,0	R44= id.	= 96,95,89,65,89,95,96
R43 = 85,0,65,0,65,0,85			

The calculator's average "thinking" time is 5 minutes per move. This is an average for a non printer game; if a printer is used execution time will be slowed by approximately 52%. Actual time varies substantially with position, from a minimum of 15 seconds to a maximum of about 15 minutes. However, an entire game should last no more than 1-1/2 hours (without a printer).

GENERAL NOTES

Size MUST be set to exactly 97.

The initial positions of the pieces are as follows:

black (HP-41)	:	king	queen	bishop	knight	rook
		pawn	pawn	pawn	pawn	pawn
white (you)	:	pawn	pawn	pawn	pawn	pawn
		king	queen	bishop	knight	rook

The calculator will never make an illegal move, but the player's moves are not tested for legality (the player is assumed to play honestly). If the player's king is under check, and the player moves another piece, the HP-41 will actually take your king on its next move!

There are two versions of the print routine "P" because of the different buffer capacities of HP-82143A (old) and HP-82162A (new) printers. If the board is to be printed correctly, the user must be careful to load the appropriate routine.

Do not turn the calculator off while it is making its move as you may generate errors due to the change in status of some flags at power-on. You may, however, turn the calculator off when it is halted and resume the game later.

The playing time can be shortened by simplifying positions, changing pieces, avoiding open spaces, etc. The execution time depends quadratically on the number of options the calculator has and linearly on the number of the player's responses to each option.

STATUS

SIZE: 097
 FIX: 0
 USER MODE: OFF
 TOTAL PROGRAM BYTES: 972

P(82143A) 80 BYTES
 P(82162A) 82 BYTES

DATA REGISTERS

With "P" entered, TOT. REG. 247

Without "P" entered, TOT. REG. 236

00	}	scratch		
...				
15	}			
16 +9				
17 -9	}	Rook		King & Queen
18 +1				
19 -1				
20 -10				
21 -8	}	Bishop		
22 10				
23 8				
24 -19				
25 -17	}	Knight		move directions arrays
26 -7				
27 -11				
28 19				
29 17				
30 7				
31 11	}			
32 16.019 Rook				
33 24.031 Knight				
34 20.023 Bishop				
35 16.023 Queen	}			Directions arrays pointers
36 16.023 King				
37 Black King	}			BLDSPEC special characters
38 Id. Queen				
39 Id. Bishop				
40 Id. Knight				
41 Id. Rook				
42 Id. Pawn				
43 dot.sq.				

DATA REGISTERS Cont.

44	White Pawn	} BLDSPEC special characters
45	Id. Rook	
46	Id. Knight	
47	Id. Bishop	
48	Id. Queen	
49	Id. King	
37-96 } board (includes edges)		

NOTE: Board and BLDSPEC chars. overlap without trouble

FLAGS USED

00	Set: Board always print
	Clear: Prints after HP's
01	Set: White King or Knight tested
	Clear: Queen, Rook or Bishop tested
02	Set: Id. Pawn moves
	Clear: W. Pawn not moving
03	Set: Id. King moves
	Clear: W. King not moving
04	Set: Id. Pawn promotes
	Clear: W. Pawn not promoting
05	Set: B. King or Knight tested
	Clear: B. Queen, Rook or Bishop tested
06	Set: B. Pawn moves
	Clear: B. Pawn not moving
07	Set: B. King moves
	Clear: B. King not moving
08	Set: B. Pawn promotes
	Clear: B. Pawn not promoting
09	Set: B. Queen, Rook or Bishop can follow
	Clear: They can't
10	Set: W. Queen, Rook or Bishop can follow
	Clear: They can't
11	Set: Auto Start
	Clear: No Auto Start
12	Set: Double Wide Print
	Clear: Normal Width
25	Set: Non-edge location
	Clear: Edge location
55	Set: Print Board
	Clear: Do not print board
18	Set: Move is off board
	Clear: Move is valid
19	Set: Move is worse than first move tested
	Clear: Better move than last

SAMPLE PROBLEM

DISPLAY	INPUT	FUNCTION	COMMENTS
	Load P*	[GT0] ..	
PACKING	Load MCHES	[GT0] ..	
PACKING		[XEQ] SIZE 097	
		[XEQ] MCHES	
CARD	Load data card (2 tracks)		
If a printer exists in the system then the board will now be printed			
HP 1st?	N	[R/S]	
PRINT YOUR MOVE?*	Y	[R/S]	
FROM?	41	[R/S]	
TO?	31	[R/S]	
I MOVE FROM 22 to 31			
PRINT YOUR MOVE?*	Y*	[R/S]	
FROM?	43	[R/S]	
TO?	33	[R/S]	
I MOVE FROM 31 to 42 CHECK			
PRINT YOUR MOVE?*	Y*	[R/S]	
FROM?	51	[R/S]	
TO?	41	[R/S]	
I MOVE FROM 42 to 53 (Note: pawn promoted to queen)			
PRINT YOUR MOVE?*	Y*	[R/S]	
FROM:	33	[R/S]	
TO?	24	[R/S]	
I MOVE FROM 53 to 52 CHECK			
PRINT YOUR MOVE?*		[R/S]	
FROM	-1	[R/S]	
CHECKMATE I WON			

*Necessary only if a printer exists in the system. Remember, there are two versions of "P"--be careful to load the appropriate one.

**This prompt appears only if a printer is in the system.

SAMPLE GAME OUTPUT WITH PRINTER ATTACHED AND IN MANUAL MODE

Initial board
configuration

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ ♠ ♠ ♠ ♠
3  □ □ □ □ □
4  ♠ ♠ ♠ ♠ ♠
5  ♠ ♠ ♠ ♠ ♠

```

The player's move

The calculator's move

From
41 to 31

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ ♠ ♠ ♠ ♠
3  ♠ □ □ □ □
4  □ ♠ ♠ ♠ ♠
5  ♠ ♠ ♠ ♠ ♠

```

I MOVE
FROM 22 TO 31

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ □ ♠ ♠ ♠
3  ♠ □ □ □ □
4  □ ♠ ♠ ♠ ♠
5  ♠ ♠ ♠ ♠ ♠

```

From
43 to 33

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ □ ♠ ♠ ♠
3  ♠ □ ♠ □ □
4  □ ♠ □ ♠ ♠
5  ♠ ♠ ♠ ♠ ♠

```

I MOVE
FROM 31 TO 42, CHECK

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ □ ♠ ♠ ♠
3  □ □ ♠ □ □
4  □ ♠ □ ♠ ♠
5  ♠ ♠ ♠ ♠ ♠

```

From
51 to 41

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ □ ♠ ♠ ♠
3  □ □ ♠ □ □
4  ♠ ♠ □ ♠ ♠
5  □ ♠ ♠ ♠ ♠

```

I MOVE
FROM 42 TO 53

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ □ ♠ ♠ ♠
3  □ □ ♠ □ □
4  ♠ □ □ ♠ ♠
5  □ ♠ ♠ ♠ ♠

```

From
33 to 24

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ □ ♠ ♠ ♠
3  □ □ □ □ □
4  ♠ □ □ ♠ ♠
5  □ ♠ ♠ ♠ ♠

```

I MOVE
FROM 53 TO 52, CHECK

```

      1 2 3 4 5
1  ♠ ♠ ♠ ♠ ♠
2  ♠ □ ♠ ♠ ♠
3  □ □ □ □ □
4  ♠ □ □ ♠ ♠
5  □ ♠ □ ♠ ♠

```

USER INSTRUCTIONS

SIZE: 097

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	If you want to print the board, load the appropriate version of the "P" routine. (Printer in MAN mode) Load the MCHES program.		[GT0] .. [GT0] ..	PACKING PACKING
2	Start the program		[XEQ] "MCHES"	
	If size not properly set, will see "Set Size 097"		[XEQ] "SIZE 097"	SET SIZE 097
			[R/S]	CARD
	When size is properly set (97) will see			CARD
3	Load the data card (2 tracks)			
3a	(If desired, unplug the card reader and plug in the printer here)			HP 1st?
4	If the calculator is to move 1st		[R/S]	I MOVE
	If you want the 1st move	N	[R/S]	*PRINT YOUR
	(Note: The challenger is always white)			MOVE? or FROM
<u>IF YOU MOVE FIRST</u>				
5a	If a printer is in the system, will see:			PRINT YOUR
				MOVE?
	If you want to print after every move	Y	[R/S]	FROM?
	If you want to print only after the calculator moves		[R/S]	FROM?
6a	Enter the xy (row,column) coordinate for the piece you wish to move	XY	[R/S]	TO?
7	Enter the xy coordinate for where you want the piece moved	XY	[R/S]	I MOVE FROM
				TO or
				PIECE?

USER INSTRUCTIONS

SIZE: 097

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
8	If PIECE? appears, you just promoted a pawn & must enter the code for the selected piece. Codes are:			
	queen: 5.09 bishop: 4.03			I MOVE FROM
	knight:3.03 rook: 2.05	Code	[R/S]	__ TO __
9	If you cannot make a legal move, but are not under check - a stalemate	0	[R/S]	STALEMATE
10	If your king is under check, and you can't save it - checkmate	-1	[R/S]	CHECKMATE I WON
<u>IF THE CALCULATOR MOVES FIRST</u>				
	"I MOVE" shows in the display.			I MOVE
5b	After the move is completed, will see (CHECK is displayed if your king is now under check)			FROM __ TO __ (CHECK) PRINT YOUR MOVE?* or FROM?
6b	Refer to 5a - 10 for your move.			
11	If you checkmate the calculator		CHECKMATE I WON	
12	If the calculator cannot make a legal move, but is not under check			STALEMATE
13	If the HP-41's king is not under check, has no legal moves, but has some illegal moves, the display will show			CHECKMATE YOU WON
	However, this is actually a stalemate, so please, notice this and concede the tie.			
	Thank you.			

* This display appears only if there is a printer in the system.

PROGRAM LISTING

01♦LBL "MCH ESS"	Initialize	50 RCL IND	empty registers
02 CLRG		L	
03 FIX 0		51 X=0?	
04 CF 29		52 ASTO IND	
05 "SET SIZ E 97"		L	Next position
06 SF 25		53 ISG L	
07 RCL 96	Size <97?	54 GTO 01	Clear row between pawns
08 FC?C 25	Prompt to	55 ΣREG 74	
09 PROMPT	Set size 97	56 CLΣ	
10 SF 25		57 ASTO 79	If printer-print board
11 RCL 97		58 FS? 55	(Separate prog.)
12 FS?C 25	Size >97	59 XEQ "P"	
13 PROMPT	Prompt to	60 "N"	
14 18.049	Set size 97	61 ASTO Y	Who's first?
15 RDTAX		62 "HP 1ST?"	
16 9	Load constants & special char.	63 AON	
17 STO 16	Dir. for Rook	64 PROMPT	If calc. to move first
18 ST- 17	move not stored on data cards	65 ASTO X	
19 6.5	Store Kings (Ki)	66 AOFF	
20 STO 92		67 X*Y?	GTO 00
21 ST- 56	Store Queens (Q)	68 GTO 00	Your move
22 5.09		69♦LBL 99	
23 STO 93	Store Bishops (B)	70 CF 00	
24 ST- 57		71 FS? 55	
25 4.03	Store Pawns (P)	72 XEQ 16	
26 STO 94		73 "FROM?"	
27 ST- 58		74 PROMPT	
28 1.01		75 "I"	Checkmate?
29 STO 83		76 X<0?	
30 STO 84		77 GTO 04	Stalemate?
31 STO 85		78 X=0?	
32 STO 86		79 GTO 05	Board pos. to Reg. number
33 STO 87		80 XEQ 06	Reg. no. of piece
34 ST- 65		81 STO 00	
35 ST- 66		82 "TO?"	
36 ST- 67		83 PROMPT	Board pos. to reg. #
37 ST- 68		84 XEQ 06	Reg. # of dest.
38 ST- 69		85 STO 01	Move piece
39 INT		86 CLX	
40 -	Store Knights(Kn)	87 X<> IND	
41 STO 95		00	
42 ST- 59		88 STO IND	
43 2.05	Store Rooks (R)	01	
44 STO 96		89 XEQ 07	Queening move?
45 ST- 60		90 FC? 55	No printer?
46 "A"	Store boundaries	91 GTO 00	
47 50.091		92 FS? 00	Print option?
48 SIGN	50.091 in LASTX	93 XEQ "P"	
49♦LBL 01	Store "A" in all	94♦LBL 00	Calc. move
		95 "I MOVE"	

PROGRAM LISTING

96	AVIEW		143	XEQ "P"	print board
97	PI		144	FC? 55	If printer, stop
98	STO 09	Init. "good move"	145	STOP	
99	96.055	value	146	GTO 99	
100	STO 02	Board index	147	LBL 07	Queening move?
101	CHS		148	60	Row 1
102	STO 00	Initial best move	149	RCL 01	Destination
103	LBL 11	value	150	X>Y?	Piece not in
104	RCL IND	Scan for move	151	RTN	last row?
02		Recall position	152	2	Rook value
105	SIGN		153	RCL IND	Get piece value
106	X=0?	Off board?	01		
107	GTO 00	Skip eval. pos.	154	X>Y?	Not a pawn?
108	LASTX	Black piece? (b)	155	RTN	Piece to replace
109	X<0?	Eval. b moves	156	"PIECE?"	pawn
110	XEQ 12		157	PROMPT	
111	LBL 00		158	STO IND	Store new piece
112	DSE 02		01		Pawn promotion?
113	GTO 11	Next position	159	RTN	
114	RCL 09		160	LBL 08	
115	PI	Best move value	161	ABS	Rook
116	X=Y?	No good move?	162	2	Not pawn move?
117	GTO 05	Stalemate	163	X<Y?	
118	"YOU"		164	RTN	
119	-25		165	92	Row 1
120	RCL 00	Best move	166	RCL 13	Destination
121	X<Y?	Your checkmate?	167	X<Y?	Not in last row
122	GTO 04	Checkmate	168	RTN	
123	CLX		169	-5.09	Queen
124	X<> IND	Final move	170	STO IND	Store piece
12			13		value
125	STO IND		171	RTN	
13			172	LBL 04	Announce
126	XEQ 08	Pawn promotion?	173	ASTO X	checkmate
127	"FROM "		174	"CHECKMA	
128	RCL 12	Origin	TE"		
129	XEQ 09	Get board loc.	175	AVIEW	
130	"F TO "		176	BEEP	
131	RCL 13	Destination	177	CLA	
132	XEQ 09	Get board loc.	178	ARCL X	
133	RCL 00	Move value	179	"F WON"	
134	FRC		180	PROMPT	
135	RCL 22	10	181	LBL 05	Announce
136	*		182	"STALEMA	Stalemate
137	FRC		TE"		
138	X#0?	Is move	183	BEEP	
139	"F, CHEC	checking?	184	PROMPT	
K"			185	LBL 09	Translate reg.
140	BEEP		186	INT	address to
141	AVIEW		187	ENTER↑	board position.
142	FS? 55	If printer,	188	ENTER↑	

PROGRAM LISTING

189 9		237 GTO 00	b piece
190 /		238 CF 09	Init. empty space
191 INT		239 X=0?	Empty space?
192 +		240 SF 09	
193 51		241 XEQ 12	Get move value
194 -		242 FS? 05	Kn or Ki move?
195 ARCL X		243 GTO 00	
196 RTN		244 FS? 09	Empty space?
197 *LBL 06	Translate board	245 GTO 15	
198 ENTER↑	position to	246 *LBL 00	
199 ENTER↑	register	247 ISG 04	Next move
200 1	address	248 GTO 14	
201 -		249 RTN	King move
202 5		250 *LBL 36	Knight move
203 /		251 SF 07	
204 INT		252 *LBL 33	
205 2		253 SF 05	Rook move (b)
206 /		254 *LBL 32	Bishop move (b)
207 -		255 *LBL 34	Queen move (b)
208 46		256 *LBL 35	
209 +		257 RTN	
210 RTN		258 *LBL 13	Pawn move (b)
211 *LBL 12		259 SF 06	Pawn move flag
212 STO 03	Test b move	260 RCL 02	Current p pos.
213 ABS	Store piece to	261 9	Offset forw. move
214 CF 05	test	262 XEQ 09	Poss. move
215 CF 06	Init. piece type	263 FS? 18	forward?
216 CF 07	indicators	264 1	Off board?
217 2		265 X=0?	Unoccupied dest?
218 X>Y?	B pawn?	266 XEQ 12	Evaluate move
219 GTO 13	Evaluate moves	267 RCL 02	Current move or.
220 X<>Y		268 RCL 22	Forw. right diag.
221 30	Gen. index for	269 XEQ 09	Poss. move right?
222 +	steps 218 & 219	270 FS? 18	Off board?
223 XEQ IND	32-36,(245-251)	271 CLX	
X		272 X>0?	White piece? (w)
224 RCL IND	32-36, move	273 XEQ 12	Evaluate move
X	dir. pointer	274 RCL 02	Pawn position
225 STO 04	Store pointer	275 8	Forw left diag.
226 *LBL 14		276 XEQ 09	Poss. move left
227 RCL 02	Board index	277 FS? 18	Off board?
228 STO 05	Copy board index	278 RTN	
229 *LBL 15		279 X<=0?	B piece?
230 RCL IND	First possible	280 RTN	
04	move offset	281 *LBL 12	Evaluate b move
231 ST+ 05	Add to current	282 CF 08	Init. pawn prom
232 RCL 05	pos. dest.	283 STO 07	flag
233 XEQ 08	Move off board?	284 FRC	Dest. contents
234 FS? 18		285 1 E2	
235 GTO 00	Next poss. move	286 *	Value of contents
236 X<0?	If dest. contains	287 STO 06	Value of move

PROGRAM LISTING

288 RCL Z	Dest. position	335 STO IND	Back in dest.
289 STO 08		08	
290 .4	B king move	336 RTN	
291 FS? 07	Decrease move	337♦LBL 12	B Pawn move
292 ST- 06	value	338 .5	
293 FS? 06	B pawn move?	339 ST+ 06	Increase move
294 XEQ 12	Not king move?	340 92	value
295 FC? 07	Evaluate move	341 RCL 08	Dest. Position
296 XEQ 13		342 X<Y?	Not queening?
297 RCL 00	Best move value	343 RTN	
298 RCL 06	Current move	344 SF 08	Queening
299 X<=Y?	value	345 9	
300 RTN	Worse?	346 ST+ 06	Increase move
301 RCL 03	Test piece	347 RTN	value
302 FS? 08	Promoting Pawn?	348♦LBL 13	
303 -5.09	Promote to Queen	349 FS? 06	B Pawn move?
304 STO IND	Move piece to	350 GTO 13	Pawn 2nd move
08	dest.	351 RCL 03	Current piece
305 CLX	Clear move orig.	352 30	
306 STO IND		353 -	
02	W side board	354 RCL IND	32-36, move dir.
307 56.096	index	X	pointer
308 STO 11	Init. better	355 STO 01	
309 STO 09	move flag	356♦LBL 03	Dest. position
310 CF 19	W move test	357 RCL 08	
311♦LBL 21	Piece to test	358 STO 10	
312 RCL IND		359♦LBL 10	Offset to dest.
11		360 RCL IND	
313 SIGN		01	
314 X=0?	Off board?	361 ST+ 10	
315 GTO 00		362 RCL 10	Dest. position
316 LASTX	Piece to move	363 XEQ 08	Off board?
317 X<=0?	B-or no piece?	364 FS? 18	
318 GTO 00	Next piece	365 GTO 00	Next move
319 XEQ 07	Eval. white move	366 XEQ 12	Evaluate move
320 FS? 19	Worst move then	367 X=Y?	Move of equal
321 GTO 04	last?	368 RTN	value to last
322♦LBL 00		369 FS? 05	Ki or Kn move
323 ISG 11	Next pos. to test	370 GTO 00	Next move
324 GTO 21		371 LASTX	Place value
325 RCL 09	Index	372 X=0?	Empty?
326 STO 00	Best move value	373 GTO 10	
327 RCL 02	B board position	374♦LBL 00	
328 STO 12		375 ISG 01	Next dir. pointer
329 RCL 08	Move destination	376 GTO 03	
330 STO 13		377 RTN	
331♦LBL 04		378♦LBL 13	Destination
332 RCL 03	B piece	379 RCL 08	Offset forw, left
333 STO IND	Back in origin	380 RCL 22	diagonal test
02		381 XEQ 00	
334 RCL 07	Dest. piece	382 RCL 08	Destination

PROGRAM LISTING

383 8	Offset forw,	431 GTO 29	
384♦LBL 00	right diagonal	432♦LBL 00	Next move
385 XEQ 09	Add offset & test	433 ISG 14	Increment Offset
386 FS? 18	dest.	434 GTO 28	pointer
387 RTN	Off board?	435 RTN	
388♦LBL 12		436♦LBL 36	W King move
389 INT	Piece	437 SF 03	
390 6	King	438♦LBL 33	W Knight move
391 X≠Y?	Is dest. piece	439 SF 01	
392 RTN	not the w King?	440♦LBL 32	W Rook move
393 .41	Increment move	441♦LBL 34	W Bishop move
394 ST+ 06	value piece	442♦LBL 35	W Queen move
395 RDN		443 RTN	W Pawn move
396 RTN		444♦LBL 12	W Pawn move flag
397♦LBL 07	W move evaluation	445 SF 02	Pawn position
398 CF 01	Init. piece flags	446 RCL 11	Forward offset
399 CF 02		447 RCL 17	Add offset & test
400 CF 03		448 XEQ 09	Off board?
401 2	Rook	449 FS? 18	
402 X>Y?	Is piece a Pawn?	450 1	Unoccupied dest?
403 GTO 12		451 X=0?	Evaluate move
404 X<>Y		452 XEQ 13	Worse than last
405 30	Gen. index for	453 FS? 19	move? yes
406 +	steps 402 & 403	454 RTN	Current move orig.
407 XEQ IND	32-36 (431-437)	455 RCL 11	Forw, left diag.
X	Set piece flags	456 RCL 20	offset
408 RCL IND	32-36, move	457 XEQ 00	Test move
X	offset pointer	458 FS? 19	Worse move?
409 STO 14	Store offset	459 RTN	Current move orig.
410♦LBL 28	pointer	460 RCL 11	Forw, right offset
411 RCL 11	Current move	461 RCL 21	
412 STO 15	origin	462♦LBL 00	Add offset & test
413♦LBL 29		463 XEQ 09	Off board?
414 RCL IND	First poss. move	464 FS? 18	yes
14	offset	465 RTN	Occupied by which
415 ST+ 15	Actual dest.	466 X≠0?	pieces?
416 RCL 15		467 X>0?	
417 XEQ 08	Move off board?	468 RTN	
418 FS? 18		469♦LBL 13	Evaluate w move
419 GTO 00	Next poss. move	470 FRC	
420 X>0?	W piece there?	471 ABS	
421 GTO 00	Next possibility	472 1 E2	
422 CF 10	Init. empty	473 *	Value of dest.
423 X=0?	space flag	474 FS? 03	contents
424 SF 10	Empty space? Yes	475 .4	W King move?
425 XEQ 13	Move value?	476 FS? 03	Decreased value
426 FS? 19	Worse than last?	477 -	W King move
427 RTN	Yes	478 FS? 02	Decreased value
428 FS? 01	W Ki or Kn?	479 XEQ 13	W Pawn move?
429 GTO 00	Next possibility	480 RCL 06	Eval. Pawn move
430 FS? 10	Blank space?	481 X<>Y	B move value

PROGRAM LISTING

482 -	Diff. between b	529 X=0?	alpha then
483 RCL 00	& w move value	530 SF 18	Off board
484 X<>Y	Best b move value	531 LASTX	Recall contents
485 X<=Y?	Worse move?	532 .END.	of destination
486 SF 19	Yes		
487 X<=Y?	Worse move?		
488 RTN	Yes		
489 RCL 09	Better move - get		
490 X<>Y	white's best		
491 X<Y?	Better move?		
492 STO 09	New w best move		
493 RTN	value		
494 LBL 13	Eval. w Pawn move		
495 .5	Increased move		
496 +	value		
497 RCL Z	Destination		
498 60	Row 5		
499 X<>Y	Init. w Pawn		
500 CF 04	promotion flag		
501 X<=Y?	Move to row 5?		
502 SF 04	Prom. move value		
503 RCL Z	Increased value		
504 9	Due to promo.		
505 FC? 04	Promotion?		
506 CLX	No promotion		
507 +	Add to move value		
508 RTN			
509 LBL 16			
510 "Y"			
511 ASTO Y	Print every move?		
512 "PRINT Y			
OUR"			
513 "F MOVE?			
"			
514 AON			
515 PROMPT			
516 ASTO X			
517 AOFF			
518 X=Y?			
519 SF 00	If Yes SF00		
520 RTN			
521 LBL 09			
522 +	Add offset		
523 LBL 08	Move off board?		
524 CF 18	Init. valid move		
525 SF 25	flag		
526 RCL IND	Init. error		
X	ignore flag		
527 SIGN	Recall contents		
528 FS?C 25	of dest. pos. if		
	nonexistent or		

PROGRAM LISTING

HP-82143 Version

HP-82162A Version

```

01*LBL "P"      Print board
02 SF 21        routine
03 ADV
04 SF 12        Set double width
05 9            mode
06 SKPCOL       Skip 9 columns
07 49.053       Characters "1" &
08 STO 13       "5"
09*LBL 00
10 ACCHR        "1" - "5"
11 2
12 SKPCOL
13 X<>Y
14 ISG X        Next numeral
15 GTO 00       (8)
16 PRBUF        Index to row 1
17 56.06
18 STO 15
19*LBL 01       First row of
20 RCL 13       column headers
21 ACCHR        Numeral index
22*LBL 02       Row header
23 2
24 SKPCOL
25 RCL IND      Skip 2 columns
15             Get piece from
26 INT         board
27 43          Generate index
28 +           to special
29 RCL IND     characters
X             Get special char.
30 ACSPEC
31 ISG 15       Accumulate spec.
32 GTO 02       char. in print
33 4.009       buffer
34 ST+ 15      Next board pos.
35 ISG 13      Next row
36 GTO 01      Increment row
37 ADV        index
38 ADV
39 ADV
40 CF 12
41 .END.

```

```

01*LBL "P"
02 SF 21
03 ADV
04 SF 12
05 9
06 SKPCOL
07 49.053
08 STO 13
09*LBL 00
10 ACCHR
11 2
12 SKPCOL
13 X<>Y
14 ISG X
15 GTO 00
16 56.06
17 STO 15
18*LBL 01
19 PRBUF
20 RCL 13
21 ACCHR
22*LBL 02
23 2
24 SKPCOL
25 RCL IND
15
26 INT
27 43
28 +
29 RCL IND
X
30 ACSPEC
31 ISG 15
32 GTO 02
33 4.009
34 ST+ 15
35 ISG 13
36 GTO 01
37 PRBUF
38 ADV
39 ADV
40 ADV
41 CF 12
42 END

```

PROGRAM DESCRIPTION

PINBALL

by Craig A. Pearce

Welcome to the "Wizard of Pinball" game. This program simulates, as closely as possible, the actual play in a genuine pinball machine. The user interacts with the game through the digit keys 1 and 3 (designated the left and right flippers respectively), and the digit 2, which is the tilt option. Failing to hit the correct flipper will still leave the user the option of "tilting" the machine and placing the ball back in play (maybe!).

The "Wizard of Pinball" allows from 1 to 4 players, with play alternating from player 1 to player 2 and so on back to player 1. Each player will receive a total of 5 balls for each game. The ability to win a free ball is also possible. In this case, the same player stays until the extra ball is lost, after which the play rotates to the next player (unless another free ball is won).

Shooting the ball is accomplished by pressing any numeric key. As in most genuine pinball games, the "Wizard of Pinball" returns the same ball to the same player to be reshot if no score was made and the ball exits immediately. The game allows up to three free game thresholds that award a credit (free game) when passed. Also, the program checks for a score that passes the previous "high - score to date". Another free game is awarded if any or all of the players pass this previously stored "HI-SCR".

THE DEVICES

Listed below are the several different scoring devices used in the program. The "device" name is given first as it is displayed on the HP-41. The full name of the device is given in parentheses after the formatted name, followed by a brief description of the device and of how it scores.

- "*STAR-50" (Star Rollovers) These are stars, like buttons on the play field. Each time the ball rolls over one of these buttons, the player receives 50 points.
- "*LANE-300" (Lane Rollovers) Lane rollovers are special paths that the ball travels through and scores an immediate 300 points for the player.
- "THUMP-x00" (Thumper-Bumpers) Sometimes called "Jet or Pop Bumpers". In this game 100 points are scored each time the ball strikes the bumpers. At any given time, the ball can bounce 1 to 10 times, scoring 100 to 1000 points. When this display comes up, the value of "x00" is the amount of points scored; x being the number of bumps the ball made.
- "SPIN-xy0" (Spinner Gate) Spinner gates on pinball machines are the devices that spin on a horizontal axis as the ball passes under

them. In this game, the spinner gate can spin up to 25 times, scoring 10 points for each spin, and showing the actual points made (also a tone is heard for each spin). In addition, for each 5 spins of the gate, the Out Bonus is advanced by 1000 points.

"KICK-x00" (Kick Out Hole) Kick out holes (or saucers) are those devices that the ball drops into, scores some points and is kicked back out into play. On "Wizard", the points for the kick out hole begins at 2000 and advances by 2000 each time the ball drops in one, until a point value of 10,000 is reached. This value is held for all additional hits of the hole.

"SLING-10" (Sling Shot Kickers) The sling shot kickers are devices that propel the ball away when struck, and score 10 points.

"DROP-X" (Drop Targets) Drop targets are scoring devices that fall away when struck, and score some points in the process. They are reset with each new ball, or when they are all down, which is a special case. In this game, there are three drop targets. Hitting the first and the second results in an immediate 10 points and a display of "DROP-1" and "DROP-2". When the third is hit, the player receives 100 points and is awarded another ball; the display will show SHOOT AGAIN. Although the targets are reset and can be knocked down again, only one extra ball can be earned per ball in play. When the current ball is lost, the same player then plays the "extra ball" (it is possible to win another extra ball with the free ball currently in play).

"*A-" to "*F-" (Alpha Targets) These are stationary targets that award the player an immediate 500 points each time they are struck. Also, during the play of any one ball, the calculator remembers the targets hit (in any order) and provides for higher Out Bonus scoring as follows:

Hitting A & B displays "BONUS x 2" and the player will receive twice the Out Bonus when the ball exits.

Getting A,B,C, & D displays "BONUS x 3" with resulting triple Out Bonus score.

If all 6 targets are hit in one turn, the Out Bonus is quintupled.

OUT BONUS All of the above devices whose formatted name begins with a "*" increase the Out Bonus by 1000 points (unless otherwise stated). When the ball exits the OUT HOLE, the player collects all the Out Bonus points accumulated during that play. The maximum limit on Out Bonus points is 29,000. This value is then multiplied by the "BONUS x" factor, allowing for a maximum of 145,000 points when the ball exits. The display shows the total out bonus points and decrements this count by 1000, adding 1000 points to the player's score each time.

FLIPPERS, TILTING, AND OUT

When the ball reaches the left or right flipper the display will show LEFT-1 or RGHT-3 (respectively). At this point the player has approximately one second to press the appropriate key (1 or 3) in order to put the ball back into play. Failure to hit the proper key will result in the ball exiting through the Out Hole.

Whenever the ball enters the Out Hole, the display shows "OUT" for about one second. During this time the player has the option of TILTING the machine in a last attempt to put the ball back in play. Tilting is accomplished by pressing key "2" while OUT is displayed. The chances are 4 out of 5 that the ball will be placed back in play. However, if that one remaining chance comes up, the display will show *TILT* and all bonus points are lost! Also, any free ball gained during that turn will be lost! The player's score is displayed and the play moves on.

END OF GAME

When the end of the game is reached, and the last player's score is reviewed, the program will select a random number as the MATCH DIGIT. This number is always between 00 & 90 (multiples of 10) and is compared against the last digits of the player(s) score(s). If any player has a match a free game is awarded. The display will be shown as MATCHx0, this is the number chosen by the calculator. If any player's score has passed the high score to date, the old HISCR- is changed; otherwise, it remains the same. The high score will be displayed as "HISCR-xxx,xx0. If any (or all) player score(s) passed the HISCR, a CREDIT is awarded.

Finally, all the player's scored are reviewed a final time and compared against the 3 free game thresholds. For each player who's score passes each of these thresholds, another free game is credited. Finally, the display shows GAME OVER.

STATUS

SIZE: 064

FIX: 0,2

USER MODE: ON

TOTAL PROGRAM BYTES: 1108 (Including utility program)

FLAGS USED

00	Set: Hi-score has been beat
	Clear: No new hi-score
01	Set: Reset player count to 0
	Clear: Don't reset count
02	Set: Score has been made
	Clear: No score yet
03	Set: Free ball awarded
	Clear: No free ball
04	Set: Score spinner gate
	Clear: Score thumper-bumpers
05	Set: Target A has been hit
	Clear: Target A not hit
06	Set: Target B has been hit
	Clear: Target B not hit
07	Set: Target C has been hit
	Clear: Target C not hit
08	Set: Target D has been hit
	Clear: Target D not hit
09	Set: Target E has been hit
	Clear: Target E not hit
10	Set: Target F has been hit
	Clear: Target F not hit
20	Set: Bonus has a multiplier
	Clear: No multiplier
21	Set: Printer is enabled
	Clear: Printer disabled
22	Set: Digit key pressed
	Clear: Digit key not pressed
27	Set: USER Mode ON
	Clear: USER Mode OFF
28	Set: Set radix to point
	Clear: Set radix to comma

When "PINBALL WIZARD" is run, or when "[shift] [a]" is pressed, all flags from F00 to F10 are cleared automatically. All flag operations are handled by the program.

DATA REGISTER ALLOCATION -

All data enclosed in quotes (" ") is string (Alpha) data, to be stored as shown. Numeric data is shown without quotes, again to be stored as shown. When a register number is followed by an alpha-string NOT enclosed in quotes, this is merely a description of what the register is used for, in the program.

Examples: R00: "OUT" (Indicates reg. 00 contains the word "OUT").
 R40: 1000 (Indicates reg. 40 contains the NUMBER 1000).
 R35: Match Digit (Indicates the program uses reg. 35 to store the Match Digit when generated. The user stores nothing in this register prior to program operation).

R00: "OUT"	R21: "SHOOT"	R42: Player 2 score
R01: "*STAR-"	R22: "AGAIN"	R43: Player 3 score
R02: "*LANE-"	R23: "MATCH-"	R44: Player 4 score
R03: "THUMP-"	R24: "HISCR-"	R45: No. of players in game
R04: "SPIN-"	R25: "SCORE-"	R46: Bonus Count
R05: "KICK-"	R26: "X 2"	R47: Kick Out Hole score
R06: "SLING-"	R27: "X 3"	R48: No. of current player up
R07: "DROP-"	R28: "CREDIT"	R49: Bonus multiplier
R08: " *A-"	R29: "X 5"	R50: Ball count
R09: " *B-"	R30: "PLAYER"	R51: Drop Target count
R10: " *C-"	R31: "*TILT*"	R52: Total cash spent on games
R11: " *D-"	R32: not used	R53: Total CREDITS count
R12: " *E-"	R33: not used	R54: 200,000 (Free game threshold #1)
R13: " *F-"	R34: not used	R55: 250,000 (Free game threshold #2)
R14: "RGHT-3"	R35: Match Digit	R56: 290,000 (Free game threshold #3)
R15: "BALL "	R36: Hi-score to date	R57: Indirect use register
R16: "LEFT-1"	R37: 10	R58: Player Indirect register
R17: not used	R38: 50	R59: not used
R18: "GAME "	R39: 100	R60: not used
R19: " OVER"	R40: 1000	R61: not used
R20: "BONUS "	R41: Player 1 score	R62: not used
		R63: Random seed

SAMPLE PROBLEM

Sample problem: Seed = .251

One player, 2 credits

DISPLAY	INPUT	FUNCTION	COMMENTS
	Load "WIZARD"		
	Set Size 064		
	Load Data		
	Start Program		
	.251	[XEQ] "WIZARD"	
1 CREDIT		[XEQ] "C"	We want to ring up two credits, so must press [XEQ] "C" twice.
2 CREDITS		[XEQ] "C"	
1 CREDIT		[XEQ] "B"	There is only one player, so [XEQ] "B" once--use one credit.
PLAYERS = 1		[XEQ] "A"	
PLAYER NO. 1			Start the game.
BALL 1 (flashes)			
	5		
NO SCORE - SHOOT AGAIN			
PLAYER NO. 1			
BALL 1			
	2		
*A-500			
OUT			Try some "Body English"
	2		
*STAR - 50			
RGHT - 3	3		
THUMP - 100			
*C-500			
DROP - 1			

DISPLAY	INPUT	FUNCTION	COMMENTS
RGHT - 3	3		
SPIN - 210			
SPIN - 240			
RGHT - 3	3		
LEFT - 1	1		
DROP - 2			
THUMP - 500			
SLING - 10			
OUT			Try to keep it in play one more time.
	2		
*LANE - 300			
SLING - 10			
SPIN - 40			
SLING - 10			
KICK - 2000			
*STAR - 50			
*A-500			
*LANE - 300			
SPIN - 130			
OUT			Let it go this time.
BONUS SCORE -			
18,000			
17,000			
16,000			
.			
.			
1,000			
PLAYER 1 -			
SCORE -			Continue game
23470			
PLAYER NO. 1			
BALL 2	6		
SPIN - 160			
.			
.			
etc.			

USER INSTRUCTIONS

				SIZE: 064
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
	This program requires 142 program registers and 064 data registers.			
1	Load the program		[GTO] ..	PACKING
2	Set Size 064			
3	Load the data registers			
4	INITIALIZE. The seed may be any fractional number*	Seed	[XEQ] WIZARD	CAP-PINBALL
5	Ring up credits (repeat up to 40 times)		[XEQ] "C"	X CREDITS
6	Ring up number of players (repeat as desired for 1-4 players)		[XEQ] "B"	X CREDITS
				PLAYERS = Y
7	Begin the game		[XEQ] "A"	PLAYER NO. 1 (flashes) BALL 1
8	Shoot the ball	0-9		NO SCORE -
				SHOOT AGAIN
	If this display appears you must shoot the			PLAYER X
	ball again. Otherwise the display will			BALL Y
	show the device(s) hit by the ball & the			
	points scored, or the flipper the ball is			(or OUT).
	near. The order (& number) of "hit"			
	devices is totally random. Please refer			
	to page 37 for device description.			--devices--etc
9	While the ball in is play, one of the			
	following displays may be seen. These			
	displays require an action.			
9a	The ball is near the right flipper			RGHT-3
	push 3 to try and keep it in play	3		--devices--etc

USER INSTRUCTIONS

SIZE: 064

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
9b	The ball is near the left flipper;			LEFT-1
	to keep it in play	1		--devices--etc.
9c	The ball is in the exit hole. To try to			OUT
	save the ball (by "tilting")	2		--devices--etc.
				or *TILT*
			Player X-score-YYYY0	
10	If the player's score is displayed then			
	play goes to the next player. GO TO			PLAYER NO. X
	STEP 8.			BALL Y
11	When ball goes out (no tilt)			BONUS SCORE -
	(for description of bonus score display,			X000
	see page 38)			(X-1) 000
	GO TO STEP 8			.
			Player X-score-YYYY0	
12	When the last player's last ball goes			BONUS SCORE -
	"OUT"			X000
				(X-1) 000
				.
			Player X-score-YYYY0	
				MATCH - X0
				HISCR - XXXXX
			Player 1-score-AAAAA	
			(Player 2-score-BBBBB)	
				!
				GAME OVER
13	To review money spent to date		[XEQ] "E"	\$X.00
14	To review total (existing) credits		[XEQ] "D"	X CREDIT

DISPLAY

[illegible]

APPENDIX C: UTILITY ROUTINE FOR USE WITH "THE WIZARD OF PINBALL" PROGRAM

(NOTE: This program can reside in a three (3) memory module HP-41C, co-resident with the WIZARD OF PINBALL program).

Because the WIZARD OF PINBALL uses the previously stored "High Score to Date (HISCR)" to determine if a CREDIT should be awarded, and can make use of the previously stored seed, number of credits, changes made in the Free Game thresholds, etc., a routine has been written to allow the user to save all the variables of the game, and return to it at a later date. This routine is given below:

LBL: "DTXR/W" (Data read/write via the 'X' register).

USE: This program will allow the user to save on magnetic cards the random seed of the game, the Free Game Thresholds, Hi-Score to Date and other data that is required to be restored before the original game continues or is restarted. Specifically, the registers are R36, to be saved on side one of the card, and R52 through R63 to be saved on side two of the card.

When reading in the card, the display will prompt with:

READ SIDE 1 and READ SIDE 2

When writing to a card, the 41C "BEEPS" and displays the word "WARNING" to indicate that a write, and NOT a read is about to be performed. Then, the display will prompt:

WRITE SIDE 1 and WRITE SIDE 2

PROGRAM LISTING:

```

01♦LBL "DTX
R/W"
02 CF 21
03♦LBL A
04 36
05 "READ SI
DE 1"
06 AVIEW
07 RDTAX
08 52.063
09 "READ SI
DE 2"
10 AVIEW
11 RDTAX
12 RTN
13♦LBL e
14 "WARNING
"
15 AVIEW
16 BEEP
17 36

```

```

18 "WRITE S
IDE 1"
19 AVIEW
20 WDTAX
21 52.063
22 "WRITE S
IDE 2"
23 AVIEW
24 WDTAX
25 END

```

INSTRUCTIONS:

1. Get a blank mag-card ready. (This can be reused over and over).
2. To WRITE data TO the card, press: [shift] [e]
(The HP-41 will BEEP a warning that a write is to be performed, followed by the prompts described above).
3. When display reads: "WRITE SIDE 1", feed side one of the card into the reader. When display reads "WRITE SIDE 2", insert side two of the card into the reader. The required registers are now saved.
4. To READ data FROM a card, press: [A]
5. When display reads "READ SIDE 1", insert that side into the card reader. When display reads "READ SIDE 2", insert side two into the reader.

PROGRAM LISTING

01♦LBL "WIZ ARD"	Check for fractional seed	50 RCL 53	Credits=0?
02 FRC		51 X=0?	Yes-go to LBL D
03 1/X		52 GTO D	No-reset player count?
04 LASTX		53 0	Yes-reset to 0
05 STO 63	Store seed	54 FS?C 01	
06 FIX 0		55 STO 45	
07 SF 27	Initialize	56 RCL 45	Player count at 4?
08 " CAP-PI NBALL"		57 4	
09 AVIEW		58 X=Y?	
10♦LBL a		59 GTO 11	Yes-go to LBL 11
11 .010	Clear Flags 0-10	60 1	No-increment player count
12♦LBL 10		61 ST+ 45	Deduct 1 credit
13 CF IND X		62 ST- 53	Display credits left
14 ISG X		63 TONE 5	
15 GTO 10		64 XEQ D	
16 SF 01		65 PSE	
17 CF 20		66♦LBL 11	Display number of players
18 CF 21		67 CLA	
19 FS? 55	Set Status F21 to match F55	68 ARCL 30	
20 SF 21		69 "FS ="	
21 RTN	(Cash Register)	70 ARCL 45	
22♦LBL E		71 AVIEW	(Start Game)
23 FIX 2		72 RTN	
24 "\$ "		73♦LBL A	Any players?
25 ARCL 52	Recall \$\$\$ spent	74 RCL 45	No-stop
26 FIX 0		75 X=0?	Yes-create loop counter from 41 to # of players
27 AVIEW		76 RTN	
28 RTN	(Coin Insert)	77 40	
29♦LBL C		78 +	
30 .25	Add 25\$ to cash register	79 RCL 40	
31 ST+ 52		80 /	
32 TONE 4		81 41	Store player pointer
33 39		82 STO 58	
34 RCL 53	No. of Credits 40 or more?	83 +	
35 X>Y?	Jump past "INC." Increment credits	84 0	
36 GTO D		85♦LBL 12	Set all players' scores to 0
37 ISG 53		86 STO IND	
38♦LBL D		87 ISG Y	
39 CLA	Display credits routine	88 GTO 12	
40 ARCL 53		89 1	Player up=1
41 "F "		90 STO 48	Ball count=1
42 ARCL 28		91 STO 50	Start up tune
43 RCL 53		92 TONE 9	
44 1		93 TONE 8	
45 X=Y?	Test for Sing. or plural	94 TONE 8	
46 "FS"	credit(s)	95 TONE 8	
47 AVIEW		96 TONE 7	
48 RTN		97 TONE 7	
49♦LBL B	(Credit Button)	98 BEEP	
		99 TONE 8	

PROGRAM LISTING

100 TONE 8		151♦LBL 17	(score made)
101 TONE 8		152 SF 02	Set score flag
102 TONE 9		153 CLA	Display device
103♦LBL 13	New ball-	154 ARCL IND	hit
104 41	reset player	X	
105 STO 58		155 GTO IND	Do dev. routine
106 1		X	
107 STO 48		156♦LBL 18	(flippers & out)
108♦LBL 14	Same ball-	157 -2	
109 1	next player	158 X<>Y	If -2, same as
110 STO 46	Outbonus-1	159 X=Y?	0; set display
111 1.003	Reset drop	160 0	
112 STO 51	targets	161 X<0?	If -1 or -3 go to
113 0	Kick out hole=0	162 GTO 19	flipper routine
114 STO 47		163 RCL 00	else - dsp "OUT"
115 25		164 CLD	
116 STO 49	Bonus multiplier	165 PSE	
117 XEQ a	Clear flags	166 FC?C 22	Tried a tilt?
118 SF 01		167 GTO 20	
119 CF 02		168 2	Yes-test for key
120 CLA	Display which	169 X=Y?	go it?
121 ARCL 30	player is up	170 GTO 20	Yes-go get
122 "F NO. "		171 5	random #
123 ARCL 48		172 XEQ 09	"TILT" if 1
124 AVIEW		173 1	
125 PSE		174 X=Y?	
126 CLA	Display ball	175 GTO 21	
127 ARCL 15	count	176 GTO 16	
128 ARCL 50		177♦LBL 20	No tilt tried
129 CF 22		178 CLA	display "OUT"
130♦LBL 15	Loop until digit	179 ARCL 20	
131 AVIEW	key is pressed	180 ARCL IND	Out bonus
132 PSE		49	
133 FC?C 22		181 AVIEW	
134 GTO 15		182 PSE	
135♦LBL 16	(select. scoring	183 RCL 46	Act. bonus score
136 12	device)	184 29	Bonus <29?
137 XEQ 09	Get random #	185 X<Y?	
138 4	-3>=rand#>=8	186 STO 46	Reset if greater
139 -		187 RCL 49	multiplier
140 X>0?	Score?	188 24	Reduce to normal
141 GTO 17	Yes-go to LBL17	189 -	
142 FS? 02	Any other score?	190 ST* 46	bonus X multip.
143 GTO 18	Yes-go to Lbl18	191 RCL 40	bonus val. =
144 "NO "	No-give ball	192 RCL 46	
145 ARCL 25	back to be	193 *	
146 ARCL 21	reshot	194 ST+ IND	Add to player
147 ARCL 22		58	score
148 AVIEW		195 FIX 3	Set display for
149 PSE		196 CF 28	bonus loop
150 GTO 14	Start over	197 RCL 46	

PROGRAM LISTING

198 CLD			248 STO 57	Index register
199♦LBL 22	Count down		249♦LBL 27	Match digit
200 PSE	bonus loop		250 RCL 36	High score
201 TONE 7			251 RCL IND	Player's score
202 DSE X			57	Player's higher?
203 GTO 22			252 X>Y?	Store new high
204 FIX 0	Reset display		253 STO 36	
205 SF 28			254 X>Y?	High score flag
206♦LBL 6	Test for last		255 SF 00	Trim last 2
207 CLA	player up		256 RCL 39	digits of score
208 ARCL 30			257 /	
209 "F "			258 FRC	
210 ARCL 48			259 RCL 39	
211 "F--"			260 *	
212 ARCL 25			261 RCL 35	Match digit
213 ARCL IND	Follow player #		262 X=Y?	Match?
58	with score		263 XEQ 24	Match
214 AVIEW			264 ISG 57	Increment player
215 FS? 03	Extra ball?		265 GTO 27	count/loop
216 GTO 14	Extra ball		266 CLA	Display match
217 RCL 45			267 ARCL 23	digit
218 RCL 48			268 ARCL 35	
219 X=Y?			269 AVIEW	
220 GTO 25	Last player up		270 PSE	
221 1	Last player		271 CLA	Display high
222 ST+ 48	Increment player		272 ARCL 24	score
223 ST+ 58	counter		273 ARCL 36	
224 GTO 14	Loop back		274 AVIEW	
225♦LBL 25	Last ball check		275 FS?C 00	New high?
226 5			276 XEQ 24	
227 RCL 50			277 PSE	
228 X=Y?	Fifth ball?		278 RCL 45	New index:
229 GTO 26	Last ball		279 40	player 1=41,
230 1	Increment ball		280 +	2-42, etc.
231 ST+ 50	count		281 RCL 40	
232 GTO 13			282 /	
233♦LBL 26	End of game		283 41	
234 10	Generate random		284 +	
235 XEQ 09	number (0-9)		285 STO 57	
236 1			286♦LBL 28	Display all scores
237 -			287 CLA	at end of game
238 10	Find match digit		288 ARCL 30	
239 *			289 "F "	
240 STO 35	Store match		290 RCL 57	
241 RCL 45	digit		291 INT	
242 40	Set up loop from		292 40	
243 +	41 to # of		293 -	
244 RCL 40	players where		294 ARCL X	
245 /	41=1, 42=2, etc.		295 "F - "	
246 41			296 ARCL IND	
247 +			57	

PROGRAM LISTING

297 AVIEW			346 X<>Y		
298 54.056			347 17		
299 RCL IND	Test final		348 +		
57	scores for free		349 X<>Y		
300 ENTER↑	game		350 CLA		
301♦LBL 23			351 ARCL IND	Flipper to hit	
302 CLX			Y		
303 RCL IND			352 AVIEW		
Z			353 PSE		
304 X<=Y?	Free game?		354 FC?C 22	Player response	
305 XEQ 24	Yes		355 GTO 29	No	
306 ISG Z			356 X=Y?	Proper response?	
307 GTO 23			357 GTO 16		
308 ISG 57			358♦LBL 29	Missed flipper	
309 GTO 28			359 0		
310 CLA	Announce end of		360 GTO 18	One free credit	
311 ARCL 18	game		361♦LBL 24		
312 ARCL 19			362 CLX	Increment credits	
313 AVIEW			363 1		
314 0	No players		364 ST+ 53		
315 STO 45			365 CLX		
316 BEEP			366 RCL 53		
317 RTN			367 40		
318♦LBL 09	Pseudo-random		368 X<=Y?	Forty credits?	
319 RCL 63	number generator		369 STO 53	No, store 40	
320 9821			370 RDN	Yes, give credit	
321 *			371 TONE 9		
322 .211327			372 RTN		
323 +			373♦LBL 01	Start rollovers	
324 FRC			374 1	Increment out-	
325 STO 63	Store new seed		375 ST+ 46	bonus	
326 *			376 RCL 38		
327 1			377 ST+ IND	Award 50 points	
328 +			58	Display device	
329 INT			378 ARCL X	name	
330 RTN			379 AVIEW		
331♦LBL 21	TILT routine		380 TONE 5		
332 CF 03	Clear free ball		381 TONE 5		
333 CLA			382 TONE 5		
334 ARCL 31	Display "*TILT*"		383 TONE 5		
335 AVIEW			384 TONE 5		
336 TONE 4			385 GTO 16		
337 TONE 3			386♦LBL 02	Lane rollovers	
338 TONE 2			387 1	Increment out-	
339 TONE 1			388 ST+ 46	bonus	
340 TONE 0			389 300	Award 300 points	
341 PSE			390 ST+ IND		
342 GTO b	Next player		58		
343♦LBL 19	Flippers routine		391 ARCL X	Display device	
344 ENTER↑			392 AVIEW	name	
345 ABS			393 TONE 6		

PROGRAM LISTING

394 TONE 6		443 RCL 40	Score 1000*
395 TONE 6		444 *	kick-out
396 GTO 16		445 ST+ IND	
397♦LBL 03	Thumper-bumpers	58	
398 RCL 39	Score 100 points	446 ARCL X	Display device
399 STO 62	Temp. storage	447 AVIEW	
400 6	# for tone	448♦LBL 32	Tone for every
401 ENTER↑		449 TONE 7	1000 points
402 10		450 DSE Y	
403♦LBL 30	Max. number hits	451 GTO 32	
404 XEQ 09	Handle spinner	452 GTO 16	Go back for more
405 X<> 62	Random number	453♦LBL 06	Sling shot
406 RCL 62	Trade with score	454 10	kickers
407 STO 61	Store bounces	455 ST+ IND	Score 10 points
408 *		58	Display device
409 ST+ IND	Total points	456 ARCL X	name
58	Add to score	457 AVIEW	
410 ARCL X	Device name	458 TONE 5	
411 AVIEW		459 GTO 16	Go back for more
412♦LBL 31	Play tones for	460♦LBL 07	Drop targets
413 TONE IND	correct score	461 ISG 51	Increment # hit
Z		462 GTO 33	All dropped,
414 DSE 62		463 1.003	reset them
415 GTO 31	Spinner?	464 STO 51	Free ball flag
416 FS?C 04	Yes, return	465 SF 03	Score 100 points
417 RTN	No, go for more	466 RCL 39	
418 GTO 16	Spinner gate	467 ST+ IND	
419♦LBL 04	10 points & up	58	
420 RCL 37		468 CLA	Display same
421 STO 62		469 ARCL 21	player prompt
422 5	Tone # in 'Y'	470 ARCL 22	
423 ENTER↑		471 AVIEW	
424 25	Rndm # limit	472 TONE 8	
425 SF 04	Spinner gate	473 TONE 8	
426 XEQ 30	Score	474 GTO 16	Go back for more
427 RCL 61	Recall spins	475♦LBL 33	Not all down
428 5	For each 5 spins,	476 RCL 51	Score 10 points
429 /	add 1 to out-	477 1	
430 INT	bonus	478 -	
431 ST+ 46	Go back for more	479 ARCL X	Display # hit
432 GTO 16	Kick-out hole	480 AVIEW	
433♦LBL 05		481 TONE 5	
434 8		482 10	Score points
435 RCL 47	Score > 10K	483 ST+ IND	
436 X>Y?	If yes - switch	58	
437 X<>Y	with 8K	484 GTO 16	Go back for more
438 2		485♦LBL 08	Alpha targets
439 +		486 1	Increment out
440 STO 47	New score	487 ST+ 46	bonus
441 ENTER↑		488 6	Random # (1-6)
442 ENTER↑		489 XEQ 09	

PROGRAM LISTING

```

490 ENTER↑
491 ENTER↑
492 4
493 +
494 X<>Y
495 7
496 +
497 CLA
498 ARCL IND      Display hit
   X
499 SF IND 7      Set target flag
500 500
501 ST+ IND       Score 500 points
58
502 ARCL X
503 AVIEW
504 TONE 6
505 TONE 6
506 TONE 6
507 TONE 6
508 TONE 6
509 FC? 05        Target A?
510 GTO 34
511 FC? 06        Target B?
512 GTO 34
513 SF 20         Set bonus flag
514 26
515 STO 49
516 FC? 07        Bonus multiplier
517 GTO 34        Target C?
518 FC? 08        Target D?
519 GTO 34
520 27            Bonus multiplier
521 STO 49
522 FC? 09        Target E?
523 GTO 34
524 FC? 10        Target F?
525 GTO 34
526 TONE 9
527 TONE 9
528 29            Bonus multiplier
529 STO 49
530 LBL 34        Display bonus
531 FC? 20        Bonus?
532 GTO 16        Go back for more
533 CLA           Display value
534 ARCL 20
535 ARCL IND
   49
536 AVIEW
537 PSE

```

```

538 GTO 16      Go back for more
539 .END.

```

PROGRAM DESCRIPTION

TRUCK

By Kenneth Sharp

BREAKER - BREAKER 19 --- ALL YOU WOULD-BE EIGHTEEN WHEELERS!!!

You must get your shipment delivered within ten hours or be charged a penalty. Smokies are patrolling the roads and obstructions on the road slow you down. Listen closely to your CB for messages. Any of three roads (95, 89, or 97) will get you to your destination, but you may need to change routes several times during your run. Route changes are permitted only at designated exits. Smokies will fine you if they catch you speeding, wreckers will charge you for repairs if they must pull you from a crash. Get into your rig and put the pedal to the metal. See you on the flip-flop.

STATUS

SIZE: 019

FIX: 0

USER MODE: ON

TOTAL PROGRAM BYTES: 1640

DATA REGISTERS

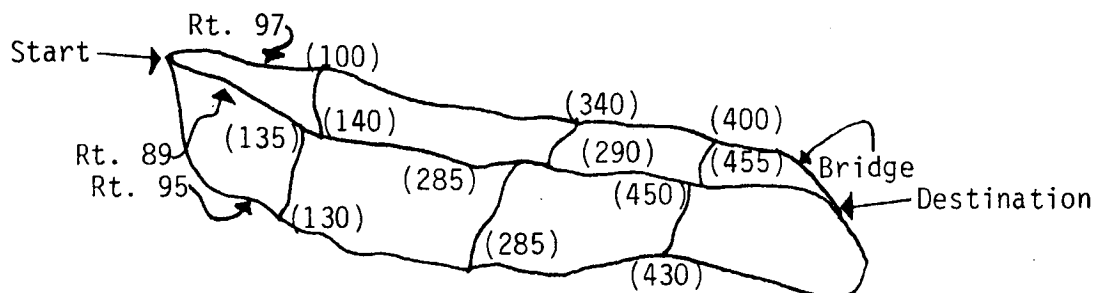
00-03	Time Smokey will remain	(Route #95)
04-06	Time to clear slide	(Route #89)
07	Time for road to dry	
08	Time to clear slide	(Route #97)
09	Time to repair bridge	
10	Random number	
11	Route	
12	Speed	
13	Previous position	
14	Present position	
15	Money	
16	Present position or HMS conversion	
17	Trip time	
18	Driving time	

FLAGS USED

00-03	Set: Smokey Present	(Route #95)
	Clear: Road Clear	(Route #95)
04-06	Set: Rock Slide	(Route #89)
	Clear: Road Clear	(Route #89)
07	Set: Wet Road	
	Clear: Road Clear	
08	Set: Rock Slide	(Route #97)
	Clear: Road Clear	(Route #97)
09	Set: Bridge Out	
	Clear: Road Clear	
27	Set: USER Mode	
	Clear: USER Mode Off	
29	Set: Digit Grouping	
	Clear: No Digit Grouping	

SAMPLE PROBLEM

You must drive from "Start" to "Destination" in less than 10 hours. You can change roads only at exits. A perfect run will net you \$100.00.



Route 95 is 725 miles long. It is heavily patrolled by "smokies".

Route 89 is 550 miles long. It is a mountain road plagued by rock slides.

Route 97 is 500 miles long. It has a curve that gets slick when wet, rock slides and a bridge that perpetually falls down.

() = mile post of exits

DISPLAY	INPUT	FUNCTION	COMMENTS
		[XEQ] "SIZE" 019	
		[XEQ] "TRUCK"	
SEED?	.987654321	[R/S]	Enter seed for random number
ROUTE?	89	[R/S]	Let's try route 89
SPEED?	55	[R/S]	Let's start at 55MPH
ROUTE NO. 89			
SPEED = 55MPH			
MI. POST 0			
CH. SPEED/RT.?	N (ENTER +)	[R/S]	No need to make changes yet
BREAKER 19			
BRIDGE OUT			
M.P. 490 ON 97			
CLOSED 4 HR.			
ROUTE NO. 89			
SPEED = 55MPH			
MI. POST 55			(One hour has past)

DISPLAY	INPUT	FUNCTION	COMMENTS
CH. SPEED/RT.? BREAKER 19 WET ROAD AT M.P. 165 ON 97 SPEED LMT. 35 ROUTE 89 SPEED = 55MPH MI. POST 110	N (ENTER ↑)	[R/S]	That doesn't affect us-no changes
CH. SPEED/RT.? BREAKER 19 SMOKEY AT M.P. 575 ON 95 ROUTE NO. 89 SPEED = 55MPH MI. POST 165	N	[R/S]	Route 89 is still clear
CH. SPEED/RT.? BREAKER 19 SMOKEY AT M.P. 290 ON 95 ROUTE NO. 89 SPEED = 55MPH MI. POST 220	N	[R/S]	Let's keep going
CH. SPEED/RT.? BREAKER 19 SMOKEY AT M.P. 135 ON 95 ROUTE NO. 89 SPEED = 55MPH MI. POST 275	N	[R/S]	No danger yet--keep trucking
CH. SPEED/RT.? SPEED-A/RT.-B DRIVING TIME		[R/S] [XEQ] "B" [R/S]	Let's try another road (R/S=Yes) Press "B" for route change 16 min. 22 sec. should put us at the exit

DISPLAY	INPUT	FUNCTION	COMMENTS
BREAKER 19			
ROCK SLIDE			
M.P. 405 ON 97			
CLOSED 4 HR.			
ROUTE NO. 97			We made the exit
SPEED = 55MPH			Speed was not changed
MI. POST 340			New Position
CH. SPEED/RT.?	N	[R/S]	Let's keep going for a while
BREAKER 19			
SMOKEY AT			
M.P. 135 ON 95			
ROUTE NO. 97			
SPEED = 55MPH			
MI. POST 395			
CH. SPEED/RT.?	N	[R/S]	Keep trucking
BREAKER 19			
ROCK SLIDE			
M.P. 405 ON 97			
CLOSED 7 HR.			
ROCKS			OH NO-0-0-0-0!!!
CRASH			OUCH
CALL WRECKER			
REPAIRS-\$45			Repair bill
ROUTE NO. 97			
SPEED = 55MPH			
MI. POST 405			Wrecker pulled us through slide
CH. SPEED/RT.?		[R/S]	Behind schedule--speed up
SPEED-A/RT.-B		[XEQ] "A"	Press "A" to change speed
SPEED?	65	[R/S]	Increase speed to 65 MPH
ROUTE NO. 97			
SPEED = 65MPH			New speed

DISPLAY	INPUT	FUNCTION	COMMENTS
MI. POST 405			
CH. SPEED/RT.?	N	[R/S]	Let's move out
BREAKER 19			
ROCK SLIDE			
M.P. 405 ON 97			
CLOSED 11 HR.			
ROUTE NO. 97			
SPEED = 65MPH			
MI. POST 470			
CH. SPEED/RT.?	N	[R/S]	Keep going
BREAKER 19			
WET ROAD AT			
M.P. 165 ON 97			
SPEED LMT. 35			
LATE			Well, at least we made it
MONEY = \$18		[R/S]	Lousy pay, isn't it?
TIME: OVER			
1HR.29MIN.3SC.		[R/S]	
ROUTE NO. 97			
SPEED = 0 MPH			
MI. POST 500			Stopped at our destination

USER INSTRUCTIONS

				SIZE: 019
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Start		[XEQ] "TRUCK"	SEED?
2	Enter any number $0 \leq n < 1$	No.	[R/S]	ROUTE?
3	Enter route* (89, 95, or 97)	No.	[R/S]	SPEED?
4	Enter speed* (85 MPH Maximum)	No.	[R/S]	ROUTE ____
				SPEED=____ MPH
				MILE POST ____
				CH. SPEED/RT?
5	If <u>no</u> changes are desired	N	[R/S]	BREAKER 19
	(Ignore display when "N" [ENTER] is			"CB messages &
	pressed)			consequences"
6	Go to step 5 <u>or</u> 7			
7	If changes are desired (see steps 8 & 10)		[R/S]	SPEED-A/RT.-B
8	If you wish to change "speed"		[XEQ] "A"	SPEED?
9	Go to step 4			
10	If you wish to change "route" or stop		[XEQ] "B"	DRIVING TIME
	short of an obstacle (also see step 17)			
11	Enter driving time needed to stop at exit	.mmss	[R/S]	BREAKER 19
	in form .mmss (mm=minutes; ss=seconds)			"CB messages&
	(must be less than one hour)*			consequences"
12	Go to step 6			
13	To review current CB messages anytime		[XEQ] "C"	STATUS:
	program is not running			"messages"
14	Go to step 6			
15	To see "time" anytime program is not		[XEQ] "D"	TIME:
	running			__HR__MIN__SC
	To return to program		[R/S]	
16	Go to step 6			

DISPLAY

[illegible]

PROGRAM LISTING

01♦LBL "TRU		49 STO 12	
CK"		50 85	Test for
02 FIX 0		51 -	excessive speed
03 SF 27		52 X>0?	
04 CF 29		53 GTO A	
05 CF 21		54♦LBL 10	
06 FS? 55		55 SF 28	
07 SF 21	Clear Flags 0-9	56 "ROUTE N	"Position"
08♦LBL a		0. "	Display
09 .009		57 ARCL 11	
10♦LBL 61		58 AVIEW	
11 CF IND X		59 PSE	
12 ISG X		60 "SPEED="	
13 GTO 61		61 ARCL 12	
14 ZREG 00	Clear necessary	62 "F MPH"	
15 CLZ	registers	63 AVIEW	
16 ZREG 06		64 PSE	
17 CLZ		65 "MI. POS	
18 0		T "	
19 STO 14	"Seed" for Random	66 ARCL 14	
20 "SEED ?"	Number	67 AVIEW	
21 PROMPT		68 PSE	
22 STO 10		69 "CH. SPE	
23 100		ED/RT.?"	
24 STO 15		70 PROMPT	Test for speed/
25 10		71 X=Y?	route change
26 STO 17		72 GTO 13	
27♦LBL 12		73 "SPEED-A	
28 "ROUTE ?	"Route" Prompt	/RT.-B"	
"		74 PROMPT	
29 PROMPT		75♦LBL 13	
30 STO 11		76 XEQ 60	
31 97		77 1	Deduct one hour
32 X=Y?	Test for invalid	78 ST- 17	from time
33 GTO A	Route	79 RCL 14	
34 RDN		80 STO 13	Store "Previous"
35 95		81 RCL 12	position
36 X=Y?		82 ST+ 14	
37 GTO A		83 XEQ IND	
38 RDN		11	
39 89		84 GTO 22	
40 X=Y?		85♦LBL 60	
41 X≠Y?		86 RCL 12	
42 GTO 12		87 X<=0?	Test if "Moving"
43♦LBL A		88 XEQ 10	
44 "SPEED ?	"Speed" Prompt	89 "BREAKER	
"		19"	
45 PROMPT		90 AVIEW	CB Messages
46 X=0?		91 BEEP	
47 GTO A		92 XEQ 62	
48 ABS		93 SF IND X	

PROGRAM LISTING

94 XEQ IND

X

95 RTN

96♦LBL 62

Random Number
generation

97 RCL 10

98 9821

99 *

100 .211327

101 +

102 FRC

103 STO 10

104 1 E1

105 *

106 INT

107 RTN

108♦LBL 95

Route 95-Test
position
see if past
smokey

109 14

110 STO 18

111 135

112 STO 16

113 FS? 00

114 XEQ 19

115 290

116 STO 16

117 FS? 01

118 XEQ 19

119 445

120 STO 16

121 FS? 02

122 XEQ 19

123 575

124 STO 16

125 FS? 03

126 XEQ 19

127 RTN

128♦LBL 14

Test for speeding

129 RCL 12

130 55

131 -

132 X<=0?

133 RTN

134 "EEE....

Police car

"

135 AVIEW

136 TONE 8

137 TONE 9

138 TONE 8

139 TONE 9

140 TONE 8

141 TONE 9

142 "SMOKEY"

143 AVIEW

144 PSE

145 2

146 *

147 ST- 15

148 "FINE OF

Fine for speeding

\$"

149 ARCL X

150 AVIEW

151 PSE

152 .25

"Time" penalty

153 ST- 17

154 RCL 16

155 STO 14

Restore position

156 GTO 10

157♦LBL 22

158 RCL 11

Determine "Route"

159 95

160 X=Y?

161 GTO 52

162 RCL 11

163 89

164 X=Y?

165 GTO 53

166 RCL 14

167 500

168 STO 18

Test to see if
at destination

169 -

170 X<0?

171 GTO 51

172♦LBL 54

173 RCL 12

Correct "Time"
and "Position"
if at Destination

174 /

175 ST+ 17

176 RCL 18

177 STO 14

178 RCL 17

179 X<0?

180 GTO 55

181 "ON TIME

Test for "On
Time" or "Late"

"

182 AVIEW

183 PSE

184♦LBL 56

185 "MONEY=\$

"

186 ARCL 15

187 AVIEW

Display "Earnings"

188 0

189 STO 12

190 STOP

PROGRAM LISTING

```

191 GTO D
192♦LBL 55
193 "LATE"
194 AVIEW
195 PSE
196 25 "Late" penalty
197 *
198 ST+ 15
199 GTO 56
200♦LBL 52
201 RCL 14
202 725 Test to see if at
203 STO 18 destination
204 -
205 X<0?
206 GTO 51
207 GTO 54
208♦LBL 53
209 RCL 14
210 550 Test to see if
211 STO 18 at destination
212 -
213 X>0?
214 GTO 54
215♦LBL 51
216 .009
217♦LBL 57
218 XEQ 41
219 ISG X
220 GTO 57
221 GTO 10
222♦LBL 41 Test for
223 FC? IND obstacle
X
224 RTN
225 DSE IND
X
226 RTN
227 CF IND X
228 RTN
229♦LBL 89 Route 89-Test to
230 16 see if past
231 STO 18 "Rock Slide"
232 145
233 STO 16
234 FS? 04
235 XEQ 19
236 300
237 STO 16
238 FS? 05
239 XEQ 19

```

```

240 465
241 STO 16
242 FS? 06
243 XEQ 19
244 RTN
245♦LBL 16 "Hit" rock slide
246 "*ROCKS*"
"
247 AVIEW
248 PSE
249♦LBL 11
250 "****CRAS
H****"
251♦LBL 21
252 AVIEW
253 PSE
254 "CALL WR
ECKER"
255 AVIEW
256 PSE
257 RCL 16
258 STO 14
259 XEQ 62 Determine
260 8 "Repair Bill"
261 *
262 5
263 +
264 ST- 15
265 "REPAIRS
-$"
266 ARCL X
267 AVIEW
268 PSE
269 2.5 "Time" penalty
270 ST- 17
271 GTO 10
272♦LBL 97 Route 97-Test
273 18 for "Skid",
274 STO 18 "Rock Slide" or
275 165 "Bridge Out"
276 STO 16
277 FS? 07
278 XEQ 19
279 16
280 STO 18
281 405
282 STO 16
283 FS? 08
284 XEQ 19
285 20
286 STO 18

```

Line	Code	Value	Notes
287	490		
288	STO	16	
289	FS?	09	
290	XEQ	19	
291	RTN		
292	LBL	19	
293	RCL	16	Test to see if
294	RCL	13	past obstacle
295	-		
296	X<=0?		
297	RTN		
298	RCL	14	
299	RCL	16	
300	-		
301	X<=0?		
302	RTN		
303	GTO	IND	
304	LBL	20	
305	"SPLASH"		"Hit" Bridge Out
306	AVIEW		
307	PSE		
308	"WET FEE		
309	T"		
310	GTO	21	
311	LBL	18	Test speed at
312	RCL	12	"Wet Road"
313	35		
314	-		
315	X<=0?		
316	RTN		
317	"--++SKI		Skid on "Wet
318	D+--+-"		Road"
319	AVIEW		
320	PSE		
321	GTO	11	
322	LBL	00	
323	3		
324	ST+	00	
325	LBL	23	Mile Posts for
326	XEQ	33	CB Messages
327	"M.P.	13	
328	5 ON 95"		
329	AVIEW		
330	PSE		
331	RTN		
332	LBL	01	
333	3		
334	ST+	01	Input (Increase)
335	LBL	24	Time for
336	XEQ	33	obstacle
337	"M.P.	29	
338	0 ON 95"		
339	AVIEW		
340	PSE		
341	RTN		
342	LBL	02	
343	3		
344	ST+	02	
345	LBL	25	
346	XEQ	33	
347	"M.P.	44	
348	5 ON 95"		
349	AVIEW		
350	PSE		
351	RTN		
352	LBL	03	
353	3		
354	ST+	03	
355	LBL	26	
356	XEQ	33	
357	"M.P.	57	
358	5 ON 95"		
359	AVIEW		
360	PSE		
361	RTN		
362	LBL	33	
363	"SMOKEY		"Smokey" Message
364	AT"		
365	AVIEW		
366	PSE		
367	RTN		
368	LBL	04	Mile Post for CB
369	3		Messages
370	ST+	04	Time for
371	RDN		obstacle
372	LBL	27	
373	XEQ	17	
374	"M.P.	14	
375	5 ON 89"		
376	AVIEW		
377	PSE		
378	GTO	15	
379	LBL	05	
380	3		
381	ST+	05	
382	RDN		
383	LBL	28	
384	XEQ	17	
385	"M.P.	30	
386	0 ON 89"		
387	AVIEW		

PROGRAM LISTING

<pre> 379 PSE 380 GTO 15 381♦LBL 06 382 4 383 ST+ 06 384 RDN 385♦LBL 29 386 XEQ 17 387 "M.P. 46 5 ON 89" 388 AVIEW 389 PSE 390 GTO 15 391♦LBL 17 392 "ROCK SL IDE" 393 AVIEW 394 PSE 395 RTN 396♦LBL 07 397 3 398 ST+ 07 399♦LBL 30 400 "WET ROA D AT" 401 AVIEW 402 PSE 403 "M.P. 16 5 ON 97" 404 AVIEW 405 PSE 406 "SPEED L MT. 35" 407 AVIEW 408 PSE 409 RTN 410♦LBL 08 411 4 412 ST+ 08 413 RDN 414♦LBL 31 415 XEQ 17 416 "M.P. 40 5 ON 97" 417 AVIEW 418 PSE 419 GTO 15 420♦LBL 09 421 4 422 ST+ 09 423 RDN </pre>	<pre> 424♦LBL 32 425 "BRIDGE OUT" 426 AVIEW 427 PSE 428 "M.P. 49 0 ON 97" 429 AVIEW 430 PSE 431♦LBL 15 432 "CLOSED " 433 ARCL IND X 434 "F HR." 435 AVIEW 436 PSE 437 RTN 438♦LBL B 439 RCL 12 440 X#0? 441 GTO 58 442 TONE 0 443 "NOT MOV ING" 444 AVIEW 445 PSE 446 GTO 10 447♦LBL 58 448 RCL 14 449 STO 16 450 "DRIVING TIME" 451 PROMPT 452 HR 453 STO 18 454 INT 455 X#0? 456 GTO B 457 XEQ 60 458 RCL 18 459 ABS 460 ST- 17 461 RCL 16 462 STO 13 463 RCL 12 464 RCL 18 465 * 466 ST+ 14 467 RCL 18 468 X<0? </pre>
<pre> "Rock Slide" Warning "Wet Road" Warning Time for obstacle Mile Post for CB Messages </pre>	<pre> "Bridge Out" Warning "Route" Change "Driving Time" Prompt Convert from Hours Test for invalid time Restore "Positions" </pre>

PROGRAM LISTING

<pre> 469 CF 28 470 X<0? 471 XEQ 63 472 XEQ IND 11 473 FC? 28 474 XEQ 63 475 RCL 11 476 95 477 X=Y? 478 GTO 50 479 RCL 11 480 89 481 X=Y? 482 GTO 34 483 35 484 ENTER↑ 485 100 486 XEQ 38 487 36 488 ENTER↑ 489 340 490 XEQ 38 491 37 492 ENTER↑ 493 400 494 XEQ 38 495♦LBL 59 496 "NO EXIT" " 497 RVIEW 498 PSE 499 GTO 22 500♦LBL 63 501 X<> 13 502 X<> 14 503 X<> 13 504 RTN 505♦LBL 35 506 89 507 STO 11 508 140 509 STO 14 510 GTO 39 511♦LBL 36 512 89 513 STO 11 514 290 515 STO 14 516 GTO 39 517♦LBL 37 </pre>	<pre> 518 89 519 STO 11 520 455 521 STO 14 522♦LBL 39 523 .25 524 ST- 17 525 GTO 10 526♦LBL 38 527 RCL 14 528 - 529 RND 530 X=0? 531 GTO IND Y 532 RTN 533♦LBL 50 534 40 535 ENTER↑ 536 130 537 XEQ 38 538 41 539 ENTER↑ 540 285 541 XEQ 38 542 42 543 ENTER↑ 544 430 545 XEQ 38 546 GTO 59 547♦LBL 34 548 43 549 ENTER↑ 550 135 551 XEQ 38 552 44 553 ENTER↑ 554 285 555 XEQ 38 556 45 557 ENTER↑ 558 450 559 XEQ 38 560 46 561 ENTER↑ 562 140 563 XEQ 38 564 47 565 ENTER↑ 566 290 567 XEQ 38 </pre>
<pre> Test for direction of travel Test for Route Number Test for "Exit" Exchange Present- Previous Position if traveling away from destination Reenter Position after "exit" </pre>	<pre> Time required to "Exit" Test for "Exit" </pre>

PROGRAM LISTING

```

568 48
569 ENTER↑
570 455
571 XEQ 38
572 GT0 59
573♦LBL 40
574 89
575 STO 11
576 135
577 STO 14
578 GT0 39
579♦LBL 41
580 89
581 STO 11
582 285
583 STO 14
584 GT0 39
585♦LBL 42
586 89
587 STO 11
588 450
589 STO 14
590 GT0 39
591♦LBL 43
592 95
593 STO 11
594 130
595 STO 14
596 GT0 39
597♦LBL 44
598 95
599 STO 11
600 285
601 STO 14
602 GT0 39
603♦LBL 45
604 95
605 STO 11
606 430
607 STO 14
608 GT0 39
609♦LBL 46
610 97
611 STO 11
612 100
613 STO 14
614 GT0 39
615♦LBL 47
616 97
617 STO 11
618 340

```

Restore Position
after "Exit"

```

619 STO 14
620 GT0 39
621♦LBL 48
622 97
623 STO 11
624 400
625 STO 14
626 GT0 39
627♦LBL D
628 "TIME:"
629 RCL 17
630 X<0?
631 "F OVER"
632 X>0?
633 "F TO GO"
"
634 AVIEW
635 PSE
636 HMS
637 ABS
638 STO 16
639 INT
640 CLA
641 ARCL X
642 "FHR."
643 RCL 16
644 FRC
645 1 E2
646 *
647 STO 16
648 INT
649 ARCL X
650 "FMN."
651 RCL 16
652 FRC
653 1 E2
654 *
655 INT
656 ARCL X
657 "FSC."
658 AVIEW
659 STOP
660 GT0 10
661♦LBL C
662 "STATUS:"
"
663 AVIEW
664 23.032
665 ENTER↑
666 .01
667♦LBL 49

```

"Time" Display

Convert to Hours-
Minutes-Seconds

"Status" Display

Test for CB
Messages

PROGRAM LISTING

668	FS?	IND	
X			
669	TONE	IND	
X			
670	FS?	IND	
X			
671	XEQ	IND	Display CB
Y			Messages
672	ISG	X	
673	ISG	Y	
674	GTO	49	
675	GTO	10	
676	END		

PROGRAM DESCRIPTION

FLIPO

By Dr. Robert E. Swanson

"FLIPO" is played on an 8 x 8 board; the playing pieces are discs which are black on one side and white on the other. The player with the most discs of his/her color on the board at the end of the game is the winner.

A move consists of placing a piece on an empty square so that at least one of the opponents pieces is enclosed between the piece just played and any other disc of the same color. The surrounded pieces are then flipped, i.e., they become the color of the captor's discs. Any number of discs may be enclosed in one or more rows (a row being a continuous straight horizontal, vertical, or diagonal line of discs). However, an empty square may not be enclosed, only full rows of opponent pieces may be flipped. If more than one row is outflanked by a single move, all pieces must be flipped. A disc may be outflanked only by placing a piece on the board; opponent pieces left enclosed because of other factors are not considered "captured". Working through the sample game should help make these rules clear.

I. Board Information

The board may be represented by an 8 x 8 matrix (8 rows by 8 columns) of squares. The squares are identified by their row number, R, and column number, C, where R and C range from 1 to 8. Each board is represented in the calculator by the register with the same numeric value.

II Generating Plays

In order for the calculator to "recognize" an outflanking location, an algorithm based on Hasegawa's rank order of board positions is used. This ordering assigns corner locations the highest rank and works down from there through all 60 locations. This leads to the development of a routine which generates board positions in rank order to test for outflankability. The first position that meets this simple criterion, then, becomes the machine-generated play for that round.

According to the rules of the game, if you can not outflank any of your opponent's discs, you forfeit your turn. (This is the only condition under which you can skip a turn.) You indicate forfeiture by pressing the [R/S] key without keying in a numeric entry at the prompt for your play. Don't be surprised if the calculator discovers that you have overlooked a play! It will make the play for you and display it, together with the number of flips, in the usual manner. As a matter of fact, you could use the "no play" feature even when you know you have several playable positions, but are unsure which of them to play. The program will terminate the game when neither side can make use of any of the remaining vacant squares. (Or when all squares are occupied.)

The board count that is displayed along with the play and the flips needs some clarification for the special case of "no play". The disc counter, R01, is always 1 disc ahead of the actual number of discs that have been played; i.e. the disc counter expects that the next play will, in fact, take place. A "no play" gets displayed along with the expected disc count. This should not cause any confusion, because a "no play" does not increment R01. The next play (by the opponent) will be displayed with the same disc count.

III. Data Processing

Once a "play" code appears in the stack, whether it was generated by the program or entered by the user, it is tested to see if it corresponds to a vacant board square. (User input is first tested to see if it corresponds to a board square at all.) If the play passes the preliminary screening tests, it is subjected to further scrutiny by the program. It determines: 1) Which, if any, of the 8 adjacent squares are occupied by the opponent's discs, and 2) if there is a peripheral outflanker disc. If an outflanker exists, then all the intervening opponent discs must be "flipped" and counted. If the user's input does not correspond to an outflanking position, then it is rejected and the user is prompted again for input.

IV. Routines and Labels

The "See Bd" routine (label C) permits you to call for a review of the calculator's version of the game board before your next play (see User Instruction Notes 4 & 5). As is true for all other portions of the program, "See Bd" may be activated with or without a printer. With the "Automatic See Bd" routine (label A) you can obtain the review automatically after each round of play. Key "A" acts as a toggle, i.e., it enables "Automatic See Bd" if previously disabled, and vice versa.

The "Tally" routine (label E) is executed automatically at the end of every game. Its main purpose is to calculate the number of black and white discs on the board, and also the differential black-white count. Pressing key E at a program halt will cause the game to terminate prematurely. (However, you can resume the game by pressing key B; the prompt for your play will appear in the display.) The execution time for "Tally" is fairly long, so to let you know that you have pressed the right key, the message "TALY:" appears almost immediately in the display to replace the "flying goose" annunciator.

Label D calls the routine which allows the user to have the first play of the game. If you want the machine to have the first play, then press the R/S key at the "YOU FIRST?<D>" prompt, otherwise press key D. (The program automatically sets user mode for you.) The "Back" (to your play) routine (label B) will prompt for your next play. This is normally used in two places in the game: 1) When you wish to abort the "See Bd" routine. 2) When you wish to resume the game after a midgame tally.

It should perhaps be noted here that: When you press keys A-E, the routine for which the keyboard access is intended will be executed if, and only if, it is appropriate to do so; otherwise, the program pointer will be returned to the prompt that was in force at that time.

V. Game Variations

There are four variations built into this program: 1) The user may choose to play first, or let the calculator have the first play, 2) when the calculator plays first, it can select any one of four possible plays, 3) it is possible to have the program select a play on the user's behalf, and 4) the user may forfeit 1,2,3 or all 4 corners when playing a game with handicaps. This forfeiture option provides a remarkably broad range of difficulty and game variety, especially in view of the second variation. Furthermore, the method used for increasing the level of difficulty does not significantly increase the execution time per game.

VI. Recreating Board Positions

From time to time you may realize that a certain play, or series of plays, just cost you the game. You can quickly reestablish the board positions as they existed at the time of the crucial play and try an alternate tactic IF you have kept a record of the plays. You only need to change one line (temporarily) of the program; just follow these instructions: GTO .348. In PRGM mode see RCL 02. Delete this line and insert a STOP in its place. PRGM mode off; GTO.; PACKING. Begin a new game. (Note: If the machine played first in the game, you will have to be sure that the status of flags 07 and 08 correspond to that particular play.) Enter your plays in the usual manner. The program will halt at the new STOP. Enter the play the machine previously made for that round. After all the desired plays have been entered then: Enter PRGM mode, GTO .348, delete the STOP, reinsert RCL 02, PACK. Press key B, the prompt for your play will appear in the display. You may now continue the game as before.

Alternately, if you have a record of the plays up to the point where you would like to change tactics, you could go back to step 4 and make the same plays (the calculator's plays are not random).

VII. Some Game Notes

You must have at least 256 registers available to play this game.

The game always begins with four discs already positioned on the four central squares: White occupies 44 & 55; Black occupies 45 & 54.

The first player is always black, and the first plays are limited to squares 34, 43, 56, 65.

To view the board at any prompt for your play (including the prompt for your first play) [XEQ] "C" or [XEQ] "A". The latter will cause the board to be displayed after each round of play.

The calculator may be shut off and play resumed later, provided that the data registers have not been disturbed; the stack, however, may be used for other purposes. It's a good idea to record the calculator's "board" before shutting down.

Warning: Do not press [R/S] followed by [XEQ] "B" when the calculator is processing your play and computing its own move. It's too difficult, although not impossible, to recover from the effects of a partial run.

GLOSSARY

Adjacent square - A board square which is in physical contact with the square upon which a disc has just been placed.

Board square; register - Each board square is assigned a two-digit number to identify its position in an 8 x 8 matrix. Each board square is represented in the calculator by the correspondingly - numbered data register.

Central squares - The four squares in the center of the playing board; 44, 45, 54, and 55.

Codes, alpha - "B" = black disc, "W" = white disc. On the board "*" denotes a black disc, and "O" denotes a white disc.

Flip - To turn over the opponents piece(s).

Handicap - Abbr. "Hdc" - The forfeiture of one or more corner board squares by the stronger player to the weaker player before the game begins.

NG (abbr. of No Good) - A message that appears in the display after the user enters an inappropriate number as a play.

No Play - Forfeiture of a play when no opponent discs can be outflanked from any of the remaining vacant squares.

Outflank - Placing a disc so that your opponent's row (or rows) of disc(s) is enclosed by your discs (i.e. one at each end of a row).

Peripheral square - Any board square which is not adjacent to the current play square.

Play square - A square upon which the user has just placed a disc.

Rounds (of play) - A set of two consecutive plays, user's (first) and machine's (second). The first round of a game is an incomplete one if the calculator plays first. The last round may also be incomplete.

STATUS

SIZE: 103

FIX: 0, 2

USER MODE: ON/OFF

TOTAL PROGRAM BYTES: 1071

DATA REGISTERS

00	Pointer, IND GTO
01	Bd COUNT
03	Guard*
04	Guard*
05	Pointer, IND STO
06	Machine last play
07	Your last play
08	0.00001 Guard
09	0.00009
10, 19, 20, 29, 30, 39, 40, 49, 50, 59, 60, 69, 70, 79, 80, 89, 94-99	Guard*
11-18	Board
21-28	
31-38	
41-48	
51-58	
61-68	
71-78	
81-88	
90	100
91	101
92	102
93	FLP CT
100	0.1
101	"W"
102	"B"

*Guard registers are primarily used to detect illegal plays and for processing moves

FLAGS USED

01	Set: Automatic see board	
	Clear: No automatic see board	
04	Set: Printer is ON	
	Clear: Printer is OFF or disconnected	
07	Toggled on alternate executions of routine	
08	Toggled on every execution of routine	
	(Status of these flags determine which of four opening plays machine begins game with)	
12	Set: Print double wide	
	Clear: Print single wide	
21	Set: Printer enable	
	Clear: Printer disable	
25	Set: Ignore error	
	Clear: Halt, if error	
27	Set: USER mode on	
	Clear: USER mode off	
42	Set: Execute line .286	
	Clear: Skip line .286	
55	Set: Printer is on line	
	Clear: No printer	
42	(Second definition)	
	Machine plays for you	} (Machine's play next, if F142 and F143 are clear)
43	You entered a play	

SAMPLE PROBLEM

A straightforward game without handicapping, calculator plays first.

You must have 153 program registers and 103 data registers available for this program.

DISPLAY	INPUT	FUNCTION	COMMENTS
	Load "FLIPO"		
	PACK	[XEQ] PACK	
PACKING			
	Set size 103	[XEQ]"FLIPO"	
HANDICAP?			
For a no handicap game, just press [R/S]			
		[R/S]	
Hdc = 0			
YOU 1ST? <D>			
Since the calculator is to have the first move, just press [R/S]. However, to see the board before the 1st play, press [XEQ]"A". The prompt will then reappear.			
		[XEQ]"A"	
YOU 1ST? <D>			
If playing without a printer, [R/S] must be pushed to see each line of the board. Press [R/S] to continue the game. (Printout of board:			
			12345678
			1:-----
			2:-----
			3:-----
			4:---0*---
			5:---*0---
			6:-----
			7:-----
			8:-----
The calculator then makes its move and displays			
1.B65.01 W?			
(1st disc played. Black disc square 65. One white disc was flipped. White move?)			
Note: Press [XEQ] C to see the board before entering a move. Automatic See Bd is cancelled (only) after the calculator has made the first play.			
After the last row is viewed, the prompt for whites move reappears.			
PLAY W?	66	[R/S]	
2.W66.01			
The calculator makes its move, etc.			

SAMPLE PROBLEM

DISPLAY	INPUT	FUNCTION	COMMENTS
3.B34.01 PLAY W?	33	[R/S]	The board after moves #12, 13.
4.W33.01 5.B43.01 W?	35		12345678
6.W35.02 7.B36.01 W?	53	[R/S]	1 : ----- 2 : ----*----
8.W53.03 9.B63.01 W?	46	[R/S]	3 : --00**-- 4 : --00**--
10.W46.01 11.B56.02 W?	64	[R/S]	5 : --00**-- 6 : --*000--
12.W64.02 13.B25.02 W?			7 : ----- 8 : -----
To view the board press [XEQ] C - after the board is printed, the prompt returns PLAY W? [XEQ]"C"			
Remember, press [R/S] if no printer is attached			
The following shows the last few moves of the game. ALL moves which were not shown, are listed on page 80.			
The board looks like this after the 56th and 57th moves have been made. Black is ahead 32 to 29. However, White can outflank Black from all 3 vacant squares. Which one will yield the best margin? To let the calculator find the best move, press [R/S] with no numeric entry.			
PLAY W?		[R/S]	
58.W87.04 59.B77.01 W?			12345678
1 2 3 4 5 6 7 8			1 : 00000000
1:0 0 0 0 0 0 0 0			2 : *000000*
2:* 0 0 0 0 0 0 *			3 : *000000*
3:* 0 0 0 0 0 0 *			4 : *0*00*0*
4:* 0 0 0 0 * 0 *			5 : *0***00*
5:* 0 * 0 * 0 0 *			6 : *****0*
6:* * * * 0 * 0 *			7 : *-***-*
7:* - * * * * *			8 : *****0-*
8:* * * * * 0 0 *			
PLAY W?	72	[R/S]	
60.W72.02 TALY: (scrolling) TALY: B28, W36			
The calculator terminates the game automatically after the 60th disc is played.			

SAMPLE PROBLEM

If the printer is attached tally is printed as:

Where - 8 is the difference between Black and White discs

TALY: B28, W36
-8 ***

The final board looks like:

```
      12345678
1: 00000000
2: *000000*
3: *000000*
4: *0000*0*
5: *0*0*00*
6: *00*0*0*
7: *0*****
8: *****00*
```

Game 1 was actually generated entirely by the calculator, but in a slightly different way from that illustrated above: The player entered 65 to get the game started, and the calculator responded with 66 to complete the round. At every prompt thereafter, R/S was pressed without making an entry to have the calculator find each play.

1. B65.01	31. B84.01
2. W66.01	32. W86.03
3. B34.01	33. B85.02
4. W33.01	34. W58.01
5. B43.01	35. B57.02
6. W35.02	36. W68.02
7. B36.01	37. B26.03
8. W53.03	38. W37.05
9. B63.01	39. B23.04
10. W46.01	40. W32.03
11. B56.02	41. B17.02
12. W64.02	42. W18.01
13. B25.02	43. B12.02
14. W16.01	44. W11.01
15. B15.01	45. B21.01
16. W14.01	46. W62.05
17. B42.02	47. B73.02
18. W31.01	48. W76.02
19. B41.01	49. B67.03
20. W51.02	50. W82.01
21. B24.01	51. B81.02
22. W47.07	52. W78.05
23. B52.03	53. B28.05
24. W13.02	54. W27.01
25. B48.04	55. B88.05
26. W38.01	56. W22.01
27. B74.01	57. B71.05
28. W61.03	58. W87.04
29. B75.01	59. B77.01
30. W83.02	60. W72.02

"TALY: B28,W36
-8 ****"

Execution time: Without printer, 18 minutes
With printer, 28 minutes

USER INSTRUCTIONS

				SIZE: 103
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	This program requires 153 program registers and 103 data registers.			
2	Load Program		[GTO] ..	PACKING
3	Set Size 103			
4	Initialize		[XEQ] "FLIPO"	
4a	If Size is not adequate:			SIZE >=103
	Execute Size 103		[R/S]	HANDICAP?
4b	If Size is adequate			HANDICAP?
5a	To play a no-handicap game		[R/S]	Hdc - 0
				YOU 1st? <D>
5b	To play a game with handicapping			
	(n = 1,2,3 or 4. Any other entry defaults			
	to zero)	n	[R/S]	Hdc = n
				YOU 1st? <D>
NOTE: The following is the format used to indicate the display during play:				
DD.XRC.dd (Y?). Where DD. is the number of discs placed on the board so far				
(excludes 4 central discs, but includes any handicapped discs); X is code for				
player (B for black, W for white); RC is the row and column number of the newly				
occupied square; dd is the number of flips; and Y? is the prompt for your play.				
(B if you made the first play, W if you made the second.)				
6a	If you want to have the first play		[XEQ] "D"	PLAY : B?
	Enter your play	RC	[R/S]	DD.BRC.dd
	The calculator computes its move			DD.WRC.dd B?
	Enter your next move	RC	[R/S]	DD.BRC.dd
				DD.WRC.dd B?
	etc.			

USER INSTRUCTIONS

SIZE: 103

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
6b	If you want the calculator to make the first move		[R/S]	DD.BRC.dd W?
	Enter your move	RC	[R/S]	DD.WRC.dd
	Calculator computes its move			DD.BRC.dd W?
	Enter your next move	RC	[R/S]	DD.WRC.dd
	etc.			
7	If your RC entry is not valid	RC	[R/S]	DD.XRC.NG W?
	Try again (NG= no good)	RC	[R/S]	
8	If you think you do not have a legal move		[R/S]	
	The calculator will try to find a move			
	If it can't find one:			DD.X0.00
	If it finds a legal move:			DD.XRC.dd
	It then calculates its own move:			DD.XRC.dd Y?
	Continue as in Step 6 above.			
9	At each prompt for your play you may:			DD.XRC.dd Y?
9a	Make your next move	RC	[R/S]	DD.XRC.dd
9b	View the board		[XEQ] "C"	
	If no printer: will display the board one line at a time. Press [R/S] between lines.			
	If a printer is in the system: will print out playing board & moves of last round.			
	Then prompts			PLAY Y?
9c	Enable (or disable) "Automatic See B"		[XEQ] "A"	
	Displays as in 9b			PLAY Y?
	If you do not wish to view all rows of the			
	calculator's "board", you may return to			
	the play prompt by		[R/S] [XEQ] "B"	PLAY Y?
9c	End the game or obtain mid-game tally		[XEQ] "E"	(scrolling) TALY:
				TALY: BM WN

USER INSTRUCTIONS

SIZE: 103

[illegible]

PROGRAM LISTING

<pre> 01♦LBL "FLI P0" 02♦LBL 12 Check current 03 "SIZE">=1 SIZE 03" 04 CF 01 05 CF 12 06 CF 13 07 CF 27 User mode flag 08 SF 21 09 SF 25 Error ignore flag 10 ΣREG 97 11 FC? 25 12 PROMPT 13 FC?C 25 14 GTO 12 Recheck SIZE, 15 ΣREG 94 if necessary 16 CLST 17 99 18♦LBL 15 "Self-load" 19 STO IND R01-R99 X 20 DSE X 21 GTO 15 22 STO 07 Clear R07 & R93 23 STO 93 (flip counter) 24 Σ+ Generate 100 ind. 25 STO 90 address, R100 26 Σ+ Generate 101 ind. 27 STO 91 address, R101 28 Σ+ Generate 102 ind. 29 STO 92 address, R102 30 RCL 09 9 31 X<> 77 Store address of 32 X<> 72 next board 33 X<> 22 register for 34 X<> 27 RCL, LBL17 35 X<> 78 routine, L.242 36 X<> 87 37 X<> 82 38 X<> 71 39 X<> 21 40 X<> 12 41 X<> 28 42 X<> 17 43 X<> 67 44 X<> 76 45 X<> 73 46 X<> 62 47 X<> 32 48 X<> 23 </pre>	<pre> 49 X<> 37 50 X<> 26 51 X<> 57 52 X<> 75 53 X<> 74 54 X<> 52 55 X<> 42 56 X<> 24 57 X<> 47 58 X<> 25 59 X<> 56 60 X<> 65 61 X<> 64 62 X<> 53 63 X<> 43 64 X<> 34 65 X<> 46 66 X<> 35 67 X<> 58 68 X<> 85 69 X<> 84 70 X<> 51 71 X<> 41 72 X<> 14 73 X<> 48 74 X<> 15 75 X<> 66 76 X<> 63 77 X<> 33 78 X<> 36 79 X<> 68 80 X<> 86 81 X<> 83 82 X<> 61 83 X<> 31 84 X<> 13 85 X<> 38 86 X<> 16 87 STO 00 Address, first 88 X<> 88 IND GTO 89 X<> 81 90 X<> 11 91 X<> 18 92 STO 02 Save initiator 93 1 E-5 94 STO 08 ISG, DSE index 95 ST* 09 (ditto) 96 ADV Clear print buf 97 ADV 98 "HANDICA P?" </pre>
---	--

PROGRAM LISTING

```

99 TONE 9
100 PROMPT      (At prompt,
101 RCL 04       X=0.00001)
102 X<>Y        Key in handicap,4
103 ABS
104 INT
105 X>Y?        Entered n>4?
106 CLX         default to 0
107 STO 04      Save handicap
108 ST+ 01      Adj disc counter
109 XEQ 55      To .579
110 FIX 0
111 "Hdc="
112 XEQ 56      To .604
113 XEQ IND     To .116,.125,.127
X              .137, or .147
114 ADV
115 PSE
116 GTO IND     To .155, Lbl 16
00
117 LBL 01      Readjust addresses
118 RCL 28      stored in certain
119 X<> 67      board registers
120 X<> 88      to prepare for
121 STO 28      game with
122 RCL 27      handicaps
123 X<> 78
124 X<> 58
125 STO 27
126 LBL 00
127 RTN
128 LBL 02
129 RCL 21
130 X<> 67
131 X<> 88
132 STO 21
133 RCL 22
134 X<> 78
135 X<> 58
136 STO 22
137 RTN
138 LBL 03
139 RCL 82
140 X<> 67
141 X<> 88
142 STO 82
143 RCL 72
144 X<> 78
145 X<> 58
146 STO 72
147 RTN

```

```

148 LBL 04
149 RCL 77
150 X<> 67
151 X<> 88
152 X<> 78
153 X<> 58
154 STO 77
155 RTN
156 LBL 16      From .115
157 GRAD        SF 42
158 CF 12
159 "YOU 1ST
?<D>"
160 PROMPT      CF 42
161 DEG
162 LBL D
163 RCL 10
164 STO 00
165 1/X
166 ST+ 44
167 ST+ 45
168 ST+ 54
169 ST+ 55
170 GTO IND     To .173, 175, .177,
04             .179, or .181
171 LBL C       Dis/Enable - See
172 LBL E       Bd & Tally Rout.
173 GTO IND     Back to .155
00
174 LBL 04
175 ST+ 88
176 LBL 03
177 ST+ 81
178 LBL 02
179 ST+ 11
180 LBL 01
181 ST+ 18
182 LBL 00
183 FC? 42
184 CHS
185 STO IND
90
186 SIGN
187 " W"
188 ASTO IND
91
189 ASTO IND
92
190 " B"
191 X<0?
192 ASTO IND
91

```

Occupy the handicap squares

(0.1 in X)
Machine plays first?
Occupied sq code & sign digit
+1 or -1
White discs
Copy "W" into R101 & R102

Black discs
Machine first?
Save in R100

PROGRAM LISTING

193 X>0?			238 X<>Y	occupied square
194 ASTO IND	User first?		239 ENTER↑	code
92	Save in R101		240 CLX	Prepare stack for
195 GTO IND			241 STO 04	next GTO
04			242 GTO 01	Clr rnd counter
196♦LBL 04			243♦LBL 17	To .253
197 ST* 88	Copy machine's		244 RCL IND	Machine's next
198♦LBL 03	sign digit into		X	trial play
199 ST* 81	the handicap		245 FRC	
200♦LBL 02	squares		246 X=0?	Unoccupied sq?
201 ST* 11			247 GTO 01	To .253
202♦LBL 01			248 LASTX	
203 ST* 18			249 X=Y?	All sq tested?
204♦LBL 00	(+1 or -1 in X)		250 GTO 02	To .262
205 ABS			251 R↑	<X =+0.1 or -0.1>
206 CHS	-1		252 X<>Y	Ptr. from last reg.
207 ST* 45	Black's sign digit		253 GTO 17	Try next sq in seq
208 ST* 54			254♦LBL 01	
209 SF 04			255 RDN	
210 FS?C 01	Disable "Review"		256 ABS	To .359
211 GTO C	Automatic see bid		257 XEQ 00	Any flips found?
212♦LBL 10	.513		258 X≠0?	To .275
213 RCL 02	18		259 GTO 03	
214 STO 00	Next IND GTO add		260 X<>Y	Copy next pointer
215 FS? 42	You first?		261 RCL IND	in X
216 GTO IND			T	.242; process sq
X			262 GTO 17	0.00009 in X
217 RCL 01	.283		263♦LBL 02	0.00 (Fix 2)
218 XEQ 55	1 (first disc)		264 INT	Save 0 (No play)
219 ARCL IND	Ck prtr status		265 STO IND	in R06 or 07
91	Alpha code, B		05	(last play)
220 RCL 06			266 "F "	
221 STO 05	Pointer, save last		267 ARCL X	Is printer on?
222 RCL 46	play		268 FS? 04	
223 RCL 64	-----		269 PRA	
224 FS? 08	34 Machine		270 SIGN	(for possible
225 RCL 34	65 selects		271 RCL 07	termination of
226 X<Y?	43 its first		272 RCL 06	game)
227 RCL 65	56 play		273 -	(Your last play -
228 FS? 07			274 X≠0?	machine's in X)
229 X<>Y			275 ENTER↑	1 of the last 2
230 FC? 08			276♦LBL 03	not 'no play'?
231 FS?C 07	Toggle F07 every		277 BEEP	
232 X=0?	other time;		278 X=Y?	Continue game?
233 SF 07	(always false; an		279 FS? 42	Machine played
234 FC?C 08	AND filler		280 GTO 01	for you?
235 SF 08	Toggle F08		281 FS? 01	Auto See Bd mode?
236 RCL IND	every time		282 GTO 04	To .504; rtn to
90	Copy R100 into X		283 ADV	.283 via .578
237 CHS	+0.1, your		284♦LBL 18	Start new message?
			285 FS? 42	

PROGRAM LISTING

286 "PLAY:"			
287 ARCL IND	Copy your alpha	333 GTO 04	To .504
92	code in R102	334♦LBL 01	From .328
288 "F?"	into alpha reg.	335 XEQ 57	.608
289 7		336 DEG	CF 42 or 43
290 STO 05	Save ptr. to save	337 DSE 05	Change frm 7 to 6
291 CF 12	your next play &	338♦LBL 02	From .304
292 CLST	flips in R07	339 RCL IND	Occupied sq code
293 TONE 6		90	& mach's sign
294 GRAD		340 FS? 42	digit
295 PROMPT	In case .304 xeqd	341 GTO 01	No legal play?
296 CLZ	Dsp. mach.'s play	342 CHS	To .347
297 INT	(Safeguard	343 RCL 01	Convert sign digit
298 STO 03	against 0.1)	344 XEQ 02	# of discs +1
299 STO 04	Save play or 0	345 ARCL IND	.590 (ARCL X, etc.)
300 RCL 01	In case .304 xeq	91	Mach's alpha code
301 XEQ 55	No. of discs +1	346 R↑	(+.1 or -.1 now
302 ARCL IND	Ck. prtr status	347 R↑	in X)
92	Append you disc	348♦LBL 01	From .340
303 RCL 03	α-code	349 RCL 02	18
304 X=0?	Recover your play	350 GTO 17	To .242
305 GTO 02	No play for you?	351♦LBL A	Auto See Bd
306 RAD	To .337	352 FC?C 01	Toggle flag 01
307 RCL 10	SF 43, CF 42	353 SF 01	From .309 etc. &
308 X<>Y	10	354♦LBL 03	.325
309 X<=Y?	Validate	355 FIX 0	Your invalid play
310 GTO 03	.353 your	356 ARCL 03	'No Good'
311 RCL 89	89 entry	357 "F NG"	Disable xeq'n of
312 X<=Y?		358♦LBL B	.499 if B was
313 GTO 03		359 GTO IND	pressed
314 X<>Y		00	To .283 or .155
315 RCL IND		360♦LBL 00	(Play Sq. in X,/
X		361 XEQ 01	0.1 in Y)
316 X=Y?	Guard register?	362 X<> T	Copy(-Sq) into X
317 GTO 03		363 RCL 09	0.00009 (ISG,DSE
318 FRC		364 -	index)
319 X≠0?	Square already	365 XEQ 01	Process next pr.
320 GTO 03	taken?	366 X<> T	0.00001
321 STO 04	Clr. rnd counter	367 RCL 08	ISG, DSE index=10
322 RCL IND	Occupied sq code	368 +	Process next pr.
90	mach's sign in X	369 XEQ 01	
323 RCL 03	Your play in X	370 X<> T	
324 XEQ 00	To .359	371 RCL 08	
325 X=0?	No flips found?	372 -	ISG, DES index=11
326 GTO 03	To .353	373 XEQ 01	Process 4th pr.
327♦LBL 01		374 CLX	
328 X=Y?	Cont. the game?	375 X<> 93	Flip ct; clr R93
329 GTO 01	To .333	376 X=0?	No flips found?
330 5	To term. game	377 RTN	To .257 or .324
331 STO 00	For IND GTO	378 R↑	Play Sq. in X
332 BEEP		379 INT	
		380 X<>Y	Flip count in X

PROGRAM LISTING

381 RCL 91	101	427 RCL IND	sq/edge is encountered
382 /		Y	
383 +		428 FRC	
384 STO IND	Save flips in R06	429 X=Y?	Another opp disc?
05	(mach.),R07 (you)	430 GTO 13	
385 ARCL X		431 CHS	
386 X<>Y	.1 & opp. sign	432 X≠Y?	A vacant square
387 CHS	.1 & players sign	433 RTN	or edge?
388 SIGN	Current player's	434 SIGN	
389 LASTX	sign dig	435 ABS	
390 ABS	0.1	436 CHS	-1
391 ST+ IND	Code, occupied sq	437 X<>Y	
Z		438 R↑	Play sq in X
392 RDN		439 R↑	Peripheral sq in
393 ST* IND	Copy curr. player	440♦LBL 14	X
Y	sign digit in	441 DSE X	Start moving
394 ABS	the play sq	442 AOFF	toward the play
395 ST+ 01	Inc. disc counter	443 X=Y?	sq
396 ST+ 04	Incr. rnd counter	444 GTO 01	back to starting
397 FS? 04	printer on?	445 R↑	pt.? to .449
398 PRA	60	446 ST* IND	-1
399 RCL 60		Y	Change the sign
400 RCL 01		447 ST- 93	digit (flip)
401 X<=Y?	Any vac. sq left?	448 RDN	Increment the
402 ENTER↑	continue playing	449 GTO 14	flip counter
403 RTN	To .257 or .324	450♦LBL 01	
404♦LBL 01	Process adj sqs	451 RDN	
405 STO Z	Save play sq in Z	452 RTN	
406 X<>Y	+1 or -.1 in X	453♦LBL E	Tally routine
407 ISG Y	Adj in Y	454♦LBL 05	From .512 or .578
408 AOFF	(NOP)	455 7	
409 RCL IND	Copy adj reg.	456 STO 00	Ptr for IND GTO
Y	into X	457 XEQ 55	Ck printer status
410 FRC		458 "TALY:"	
411 X=Y?	Opp's disc here?	459 XEQ 57	.608 (AVIEW)
412 XEQ 13		460 PSE	
413 X<> T	Test adj sq on	461 11.088	Pointer, R11-88
414 CHS	opp side of the	462 SF 25	Error ignore flag
415 STO Z	current	463 0	
416 X<>Y	directional axis	464 ENTER↑	
417 ISG Y		465 LN	Error for right
418 AOFF		466♦LBL 06	scroll
419 RCL IND		467 RCL IND	Calculate the
Y		Z	number of black
420 FRC		468 FRC	discs now on the
421 X≠Y?	No opp disc here?	469 X≠0?	board, and do a
422 RTN		470 SIGN	differential
423♦LBL 13	Keep moving out	471 X<0?	count.
424 RDN	in same direction	472 ST- Z	
425 ISG Y	until outflanking	473 +	
426 AOFF	disc or vacant	474 OCT	NOPS to reduce

PROGRAM LISTING

475 DEC	scrolling rate	524 XEQ 03	.601
476 ISG 2	-----	525 PSE	
477 GTO 06	Format the display	526 X<> L	Rnd counter in X
478 "FB"	of disc count by	527 1	
479 FIX 0	color	528 X>Y?	Were there 2
480 CF 29		529 CLX	'no plays' in
481 ARCL Y		530 -	succession?
482 "F,W"		531 +	
483 CHS		532 XEQ 02	.590
484 -		533 ARCL IND	
485 TONE 7		91	
486 XEQ 56	.604	534 RCL 06	Mach's last play
487 LASTX	Differential disc	535 XEQ 03	.601
488 FS?C 04	count	536 ADV	
489 PRX	Is printer on?	537 PSE	-----
490 ADV		538 LBL 01	From .515
491 LBL 07		539 XEQ 55	Check printer
492 CF 12	Restore standard	540 FIX 0	status
493 FC? 55	conditions.	541 CF 29	
494 CF 21		542 11.018	
495 SF 29		543 STO 03	Ptr for IND RCL
496 DEG		544 1.008	of board reg's
497 FIX 2		545 STO 05	Count rows
498 STOP		546 " "	
499 GTO 07	'Final' stop	547 LBL 08	
500 LBL B	-----	548 ARCL X	
501 RCL 02	Initialize to	549 ISG X	Generate column
502 STO 00	resume game	550 GTO 08	numbers
503 GRAD	after a mid-	551 FS? 04	
504 GTO IND	game tally	552 PRA	
X	To .285	553 LBL 09	Begin major loop
505 LBL 04		554 " "	
506 ADV	Auto See Bd &/or	555 ARCL 05	Current row no.
507 GRAD	end game	556 "F:"	
508 CF 21		557 LBL 11	Begin minor loop
509 AVIEW		558 RCL IND	Recode the discs
510 PSE	Pause to view last	03	(by color) and
511 PSE	play	559 FRC	vacant squares
512 FC? 01	Not Auto See Bd	560 X<0?	in the row for
513 GTO 05	To .453	561 "F*"	the alpha reg.
514 LBL C	From .170	562 X=0?	
515 FS? 04	Prtr ON, last rnd?	563 "F-"	
516 GTO 01	To .537	564 X>0?	
517 RCL 01	-----	565 "FO"	
518 RCL 04	Reassemble disc	566 ISG 03	
519 -	count and the	567 GTO 11	
520 XEQ 55	last round of	568 TONE 7	
521 ARCL IND	plays for review	569 AVIEW	
92		570 2.01	
522 RCL 07	Your last play	571 ST+ 03	Update pointer
523 TONE 7		572 ISG 05	for IND RCL of
			next row

PROGRAM LISTING

573 GTO 09	
574♦LBL B	To abort see Bd
575 ADV	
576 CLD	
577 CLST	
578♦LBL D	
579 GTO IND	Prevents a 2nd
00	xeq'n of .161
580♦LBL 55	To .283, .453,
581 CF 04	or .490
582 SF 12	Check printer
583 SF 21	status and
584 SF 25	other house-
585 SF 27	keeping
586 CLA	Error ignore flag
587 ACA	User mode flag
588 CLD	NOP, if prtr. is
589 FS?C 25	ON
590 SF 04	Prevent right
591♦LBL 02	scroll if error
592 CLA	Printer ON?
593 FIX 0	From .531, .343
594 SF 29	
595 RCL 10	10
596 X<>Y	
597 X<Y?	Is X a 1-digit
598 " "	number?
599 ARCL X	
600 FIX 2	
601 RTN	
602♦LBL 03	From .523, .534
603 X=0?	
604 "F "	From .485, .111
605♦LBL 56	
606 ARCL X	
607 FS? 04	printer ON?
608 PRA	
609♦LBL 57	From .334, .458
610 CF 21	
611 AVIEW	View, no stop
612 SF 21	
613 .END.	

PROGRAM DESCRIPTION

CODE CRACK

Given a fractional number the program uses a simple random number generator to create a "secret" code which you must guess (in as few guesses as possible). You must specify the length of the hidden code, and the highest number to be used in that code. Lengths may vary from 4 to 6 elements and allowable highest numbers are 6 through 9.

Each guess you make is compared to the calculator's hidden code. The number of correct characters in the correct position, and the number of guess characters found in the hidden code but in the wrong position is calculated. The resulting display shows your guess along with an "*" for a "perfect" element and a "+" for each one which is right, but in the wrong place. The order of the "+"s and "*"s is irrelevant.

A couple of notes: Numbers may be repeated in a given code. Entering the same "seed" (fractional number) will cause the calculator to generate the same sequence of codes (unless the other options are different).

STATUS

SIZE: 024

FIX: 0

USER MODE: ON/OFF

TOTAL PROGRAM BYTES: 269

DATA REGISTERS

00	Guess
01	Code Element Inventory List
02	
03	
04	
05	Helps calculate +'s
06	
07	
08	
09	
10	Seed
11	Highest code number
12	Number of code digits
13	PSE looping
14	Number of guesses
15	Scratch
16	MSD
17	Hidden code by element
18	
19	
20	
21	
22	Number of *'s
23	Number of +'s

FLAGS USED

5	Set: Re-initializing inventory list
	Clear: Calculating +'s
21	Set: Printer Enable
	Clear: Printer disabled
27	Set: Set User mode
	Clear: Clears User mode
29	Set: Digit grouping commas
	Clear: No comma

SAMPLE PROBLEM

1. The first game is played with the least difficult options selected.

- a) Number of digits in hidden sequence : 4
- b) Highest digit allowed in sequence : 6
- c) Seed : .5284163

2. This game uses the same conditions as #1.

DISPLAY	INPUT	FUNCTION	COMMENTS
	Load Program		
	Set Size 024		Start Program
		[XEQ] "CC"	
No. Digits?	4	[R/S]	
No. in Code?	6	[R/S]	
Seed?	.5284163	[R/S]	
Guess 4	3366	[R/S]	
3366	1212	[R/S]	
1212 **	4512	[R/S]	
4512 ++++	1245	[R/S]	
OK, 4 Tries			
Play another game - Same conditions.			
		[XEQ] "C"	
Guess 4	2235	[R/S]	
2235 ++	1466	[R/S]	
1466 +	3623	[R/S]	
3623 ++	6552	[R/S]	
OK, 4 Tries			

	USER INSTRUCTIONS	
--	--------------------------	--

SIZE: 024

[illegible]

PROGRAM LISTING

01*LBL "CC"		47 1	
02 FIX 0		48 ST+ 14	# of guesses
03 CF 29		49 0	
04 SF 21		50 STO 22	Initialize # of
05 "NO. DIG	Prompts for and	51 STO 23	correct elements
ITS?"	stores # of	52*LBL 10	
06 PROMPT	digits in code	53 RCL 00	
07 STO 12	Highest code #	54 STO 15	
08 "NO. IN	and seed	55 XEQ 06	
CODE?"		56*LBL 02	Process guess
09 PROMPT		57 RCL 15	
10 STO 11		58 10	
11 "SEED?"		59 /	
12 PROMPT		60 FRC	
13 STO 10		61 LASTX	
14*LBL C		62 INT	
15 CF 27		63 STO 15	
16 9		64 RDN	
17 ENTER↑		65 10	
18 0	Zeros # of	66 *	
19 STO 14	guesses	67 1	
20*LBL 00		68 FC? 05	Clear flag?
21 STO IND	Zeros R9-R1	69 ST- IND	Modify inventory
Y		Y	list for (+)
22 DSE Y		70 FS? 05	elements
23 GTO 00		71 ST+ IND	Set flag?
24 XEQ 06		Y	Change to evaluate
25*LBL 01	Changes Value in	72 FS? 05	next guess
26 RCL 10	R10 (seed)	73 GTO 11	
27 997	Random number	74 RDN	
28 *	generator	75 RCL IND	CHECK for
29 FRC		13	completely
30 STO 10		76 X=Y?	correct elements
31 RCL 11		77 XEQ 03	
32 *	Store by element	78*LBL 11	Loop for each
33 INT	R16-R21	79 DSE 13	element of
34 1		80 GTO 02	guess
35 +	Store "Inventory	81 FS? 05	
36 STO IND	List" R9-R1	82 GTO 12	
13		83 RCL 12	
37 1		84 RCL 22	
38 ST+ IND		85 X=Y?	Is guess
Y		86 GTO 04	'perfect'
39 DSE 13		87 9	
40 GTO 01		88 STO 13	
41 "GUESS"		89*LBL 05	
42 ARCL 12	Prompt for 1st	90 RCL IND	Used modified
43 AVIEW	Game	13	inventory to
44*LBL 14	Evaluate Guess	91 X>0?	calculate +
45 CF 05	Clear-modify	92 ST+ 23	guesses
46 STO 00	inventory R9-R1	93 DSE 13	

PROGRAM LISTING

94	GTO	05	
95	RCL	12	
96	RCL	23	
97	-		
98	RCL	22	
99	-		
100	STO	23	
101	SF	05	
102	GTO	10	
103♦	LBL	03	
104	1		Score 1 for each
105	ST+	22	totally correct
106	RTN		element
107♦	LBL	06	
108	RCL	12	Help set up loops
109	15.01501		
110	+		
111	STO	13	
112	RTN		
113♦	LBL	04	
114	SF	27	Correct guess
115	"OK, "		
116	ARCL	14	
117	"F TRIES		
	"		
118	AVIEW		
119	RTN		
120♦	LBL	12	
121	CLA		Build output
122	ARCL	00	of *'s and +'s.
123	"F "		
124	RCL	22	
125	X=0?		
126	GTO	07	
127♦	LBL	08	
128	"F*"		
129	DSE	X	
130	GTO	08	
131♦	LBL	07	
132	RCL	23	
133	X=0?		
134	GTO	13	
135♦	LBL	09	
136	"F+"		
137	DSE	X	
138	GTO	09	
139♦	LBL	13	
140	AVIEW		Display
141	GTO	14	Go to process
142	.END.		next guess.

PROGRAM DESCRIPTION

ADVENTURE

By Layne K. Johnson

This adventure takes place at an automated dam (which is currently being held by terrorists) located high in the Alps. The object of the game is to get past the security systems of the dam and shut off the computer without being detected by the terrorists. The player must use intuition and guesswork to determine which command(s) to use in any given situation. The commands to be used in this adventure are listed on page 100-101.

The adventure exists solely in the HP-41's data storage registers. With guidance from the program (which provides verb and noun input routines as well as outputs results) any number of adventures can be created. An adventure is limited only by your imagination.

CREATING YOUR OWN ADVENTURE

The purpose of the program is to provide the interface between the user and the adventure data. To be able to write an adventure of your own you must understand how the program works. You should also go through the program listing and comments (very thoroughly) before writing an adventure. If you wish to play an adventure first, skip the following section and go to the example adventure.

To understand the verb routines, you must understand the manner in which the items are encoded. Each item is contained in two or more registers. One register contains the name of the item, and the other register(s) contain any numerical code(s) for the item. The encoding is done as follows: (R09 & R10 are used as an example)

R09 (sign) x.fgghhijj Ekk

R10 Name of the item

Sign: if positive, R09 references an item. If negative, R09 tells the program to search for an auxiliary routine starting with the Interpreter.

x: If x is greater than 1, an item from the inventory is needed to complete the action of the verb. The program will ask "WHAT?" on the verbs "FEED" and "GIVE".

f: If f is 5, item HH must not exist or the verb will not work. If f is 6, item HH must exist or the verb will not work. If f is 7, the player must be in room HH or the verb will not work. If f is 8, and an improper verb has been used, the program will search the list five registers back. This allows multiple verbs to work on an item. If f is 9, "GET" can not be used on this item.

gg: This value is the verb number that will work on this item.

hh: This is the necessary item (or room) needed (to be in) to complete the action of the verb.

kk: This is the number of the register that contains the item's name. (In this example, this is R10.)

ii: The event that will occur if the right verb is used and the f condition is met. The event list follows:

- 00: Return and complete the action of the verb.
- 01: Add item jj to the room the play is in.
- 02: There is a passage to room jj. "GO IN?" is displayed.
- 03: Move the player to room jj.
- 04: Change this item's code to the code contained in register jj.
- 05: Remove item jj from the inventory.
- 06: Display the message starting at register jj. Do NOT complete the action of the verb. This option allows the adventure to tell the player why an action cannot be performed.
- 07: Exchange the player's inventory with room jj's item list.
- 08: Exchange the room's exits with room jj's exit list.
- 09: End the adventure. Display "THE END".
- 10: Display the message which starts at register jj.
- 11: The player is dead. Display the message starting at register jj, then display "YOU DIED".
- 12: Change item jj's code list to the contents of this item's register location minus five. This allows action taken on one item to affect another item.
- 13: Exchange the room's item list with room jj's item list.
- 14: Ask the question starting at this item's register minus one. The answer for the primary event is in register jj. Events are stored as follows: 0. primary Secondary as 0.iijjiiijj in the register just after the question.

If ii is greater than 14 then 14 is subtracted from ii and the HP-41 will execute event 10 starting at the item's code register minus one. This allows the adventure to describe what happened when the player worked with the item.

The action of the verbs "GET" and "ATTACK" can NOT be event 02. If the register that contains what room the player is in has changed and the program cannot complete the verb, that item will not be removed from the room. The same is true for happening 03.

On multiple verbs (f = 8), the verbs "GET", "THROW", "GOTO", and "EXAMINE", will not get to the alternate item code.

Verb/Name/Number List:

GET	- 01	PRESS	- 08	INVentory	- Not applicable
OPEN	- 02	READ	- 09	DROP	- Not applicable
THROW	- 03	GIVE	- 10	Look	- Not applicable
FEED	- 04	MOVE	- 11	?	- Not applicable
EXAMINE	- 05	LIFT	- 12	^ N	- Not applicable
GOTO	- 05	PULL	- 13	^ S	- Not applicable
WORK	- 06	ATTACK	- 14	^ E	- Not applicable
CLIMB	- 07			^ W	- Not applicable

SPECIFIC VERB ROUTINES

Lines 151-176 contain the "PUSH", "PRESS", "OPEN", "WORK", "READ", "MOVE", and "LIFT" verb routines. Since these verbs do not physically change the adventure data (except by the happening routines) they all use the same entrance and exit from the processing routines. Since each verb only needs to be represented by a label, its name, and an ID number, this part of the program is very flexible. Verbs can be added, deleted, or even have their names changes.

Lines 187-197 contain the "FEED" and "GIVE" routines. If one of these is the verb called for, the processing routine will ask "WHAT?" item the play is feeding or giving away. If it is the right item, that item is then removed from the game.

Lines 232-258 contain a utility routine. Each verb, after its completion, passes through this routine. The number of the room the player is in is checked and if it is over 90 the routine subtracts 90 and prompts the player to read in the appropriate card set. Since registers available for the adventure data are 03-95, the programmer can create from one to ten different parts for the same adventure. Since reading in a new card set causes the loss of the items in the inventory, the adventure created should be of the "accomplish-a-goal" type, or the "escape" type rather than an adventure based on finding treasure.

GENERAL NOTES (for working your way through an adventure):

The following verbs are available for your use in accomplishing the adventure's goals:

Verbs that work on items "YOU SEE" ... (Input verb [R/S], Item name [R/S])

GET	PRESS
OPEN	READ
THROW	GIVE
FEED	MOVE
EXAMINE	LIFT
GOTO	PULL
WORK	ATTACK
CLIMB	DROP (out of the player's inventory)

Information verbs (Input verb [R/S])

INV Inventory of items carried
 L Look at room again
 ? Look at room exits again

Movement verbs (Input verb [R/S])

^N Go north
 ^S Go south
 ^E Go east
 ^W Go west

Other notes:

-At times when the player asks the program to do something and the HP-41 replies "I CAN'T", the player can ask to try again with something in the inventory.

Example:

"OPEN DOOR"	[R/S]	"I CAN'T"
TRY	[R/S]	"TRY?"
KEY	[R/S]	"OK"
(and the DOOR opens)		

This can only be tried once after the "I CAN'T" or "HA" displays. If this does not complete the actions, the action must be entered again before the player can try another item from the inventory.

-When the player "FEED"'s or "GIVE"'s an item from the inventory to an item in the adventure (and if one of these is the verb called for), then the program will ask the player "WHAT?" item is to be fed or given away.

Example:

"GIVE"	[R/S]	"GIVE?"
"DROID"	[R/S]	"WHAT?"
"TOOLS"	[R/S]	"OK"
(Item now removed from game)		

-The player should never attempt to carry more than four items and never add more than five items to a room (things will start disappearing).

-The player can not "READ", "OPEN", "FEED", "EXAMINE", or "WORK" on an item in the inventory.

-To go through a "GO IN?" display, the player must either press [R/S] or key in another command.

-If the "HUH?" display is shown, the player has either given the HP-41 a command it does not know, or misspelled the verb or the item's name.

-Be aware that this program uses flags 05 through 19. It is therefore suggested that the user not use a printer with this program. Also, before using a peripheral, the user may want to check the status of the appropriate flag(s).

STATUS

SIZE: 096

FIX: 0

USER MODE: OFF

TOTAL PROGRAM BYTES: 1116

DATA REGISTERS

00	Inventory - contains the register numbers of the codes for the items you're carrying.
01	Scratchpad
02	Room pointer - the beginning of the description of the room you're in.
03-95	Adventure data

Each room of the adventure is set up as follows. Registers 03-08 are used only as example.

03	OOM
04	UARE R
05	S A SQ
06	THIS I
07	AA.BBCCDDEE
08	Register numbers of codes for items in room

In reg 07

AA - Register with room's name
 BB - Register which starts data for room to the North (optional)
 CC - As BB - for room to South
 DD - As in BB - for room to East
 EE - As in BB - for room to West

(If BB - EE are non-zero, then that direction is an exit direction)

FLAGS USED

- 05 Set: You can't have item HH, to complete verb processing.
- 06 Set: You have to have item HH to complete verb processing.
- 07 Set: You have to be in room HH to complete verb processing.
 /Utility.
- 08 Set: Wrong verb used? Try item code list five registers back.
- 09 Set: You can not GET this item.
- 10 Set: You need an item from the inventory to complete the verb,
 ask WHAT? item (for the GIVE and FEED verbs), or use the
 "I CAN'T/TRY" routine for the rest.
- 11 Set: The DROP routine becomes the THROW routine when this
 flag is set.
- 12 Set: Bypass the verb completion barriers, but not the
 happening barriers.
- 13 Set: The FEED and GIVE routines set this flag, it get the
 WHAT? routine rather than the "I CAN'T/TRY" routine.
- 14 Set: Display message after the completion of the happening.
 /Utility.
- 15 Set: Set if the player can TRY to input (use) some item from
 the inventory, otherwise the TRY input is ignored.
- 16 Set: When done with the happening go through the Look routine.
- 17 Set: Do the "SO?" display rather than the "OK" display.
- 18 Set: Utility.
- 19 Set: Do the "HA" display rather than the "I CAN'T" display.
- 21 Set: Printer enabled.
 Clear: Printer disabled.
- 23 Set: Alpha data entered.
 Clear: No data entered.
- 25 Set: Ignore 1 error.
 Clear: Don't ignore errors.

SAMPLE PROBLEM

The situation: An automated dam located high in the Alps controls the yearly flooding of this time of year. Downstream a U.N. meeting on nuclear disarmament is being secretly held on an island in a tributary to the Rhone. Ninety percent of the world governments have representatives present and there is a problem. Terrorists bent on destroying the U.N. meeting have taken control of the dam's computer and have set it to open the locks, releasing the flood waters. Officials of the U.N. do not want to interrupt the meeting in fear that it will be impossible to again get the world governments together for this meeting. Your mission is then to get past the security systems of dam and shut down the computer without activating the terrorist's program. Good luck.

You have been flown to the dam and start in the helicopter hangar.

If you get in a situation from which there is no egress, load the data set for that section of the Adventure and start it over.

DISPLAY	INPUT	FUNCTION	COMMENTS
	Load Program		
	Set Size 096		
	Load data set (1) of ADV "TERRORIST DAM" #1		
	Begin the Adventure	[XEQ] "ADV"	
"YOU'RE IN A HANGAR"			
"WITH"			
"ELEVATOR DOOR HERE"			
"YOU SEE:"			
"DOOR"	OPEN	[R/S]	
"OPEN?"	DOOR	[R/S]	
"ALARM"			
"YOU'RE IN A CELL"			
	Well since this got us nowhere, let us try again		
	Load data set (1) of ADV "TERRORIST DAM" #1		
	Begin the Adventure	[XEQ] "ADV"	

DISPLAY	INPUT	FUNCTION	COMMENTS
"YOU'RE IN A HANGAR"			
etc.	EXAMINE	[R/S]	
"EXAMINE?"	DOOR	[R/S]	
"YOU'RE IN A HANGAR"			
"WITH"			
"ELEVATOR DOOR HERE"			
"YOU SEE:"			
"LATCH"			
"DOOR"	PULL	[R/S]	
"PULL?"	LATCH	[R/S]	
"GO IN?"		[R/S]	
"DOOR CLOSES"			
"YOU'RE IN A VATOR"			
"YOU SEE:"			
"LEVER 1"			
"LEVER 2"	Well you have made it to the elevator, you can take it from here. Good Luck!		

ADVENTURE DATA SET 1 - TERRORIST DAM

RR00 - 0		RR48 - "LOSES"	
RR01 - 0		RR49 - "DOOR C"	
RR02 - 9		RR50 - 2.90499 *E57	(SLOT)
RR03 - -95.	I (CELL)	RR51 - 2.904701628*E57	(SLOT)
RR04 - 0	I	RR52 - "ALARM"	
RR05 - "R HERE"	I (HANGER)	RR53 - 1.902001604*E18	(DOOR)
RR06 - "OR DOO"	I	RR54 - " ON"	
RR07 - "ELAVAT"	I	RR55 - "SENSOR"	
RR08 - 94.	I	RR56 - 1.906002650*E55	(SENSOR)
RR09 - .92	I	RR57 - "SLOT"	
RR10 - -77.	I (VATOR)	RR58 - 1.805000150*E18	(DOOR)
RR11 - .798385	I	RR59 - "OFFICE"	
RR12 - "ARRAY"	I (LOUNGE)	RR60 - "MURAL"	
RR13 - "OF DIS"	I	RR61 - "DIME"	
RR14 - "SIGNS"	I	RR62 - "CHAIRS"	
RR15 - 74.2211	I	RR63 - "ID"	
RR16 - .736968	I	RR64 - "LOCKER"	
RR17 - " AHEAD"	I (OFFICE)	RR65 - 1.601 *E61	(DIME)
RR18 - "DOOR"	I	RR66 - "O SAFE"	
RR19 - "RITY"	I	RR67 - "NOPE N"	
RR20 - "A SECU"	I	RR68 - 1.911001067*E60	(MURAL)
RR21 - 59.0016	I	RR69 - 1.905000165*E62	(CHAIRS)
RR22 - .5856	I	RR70 - 1.601 *E63	(ID)
RR23 - "ABOVE"	I (GEN RM)	RR71 - 1.905000170*E64	(LOCKER)
RR24 - "CE UP"	I	RR72 - "HMM.."	
RR25 - "L OFFI"	I	RR73 - 1.902001871*E64	(LOCKER)
RR26 - "CONTRO"	I	RR74 - "LOUNGE"	
RR27 - 45.	I	RR75 - "LEVER 1"	
RR28 - .474736	I	RR76 - "LEVER 2"	
RR29 - " HERE"	I (OFFICE)	RR77 - "VATOR"	
RR30 - "L DESK"	I	RR78 - 1.902000316*E18	(DOOR)
RR31 - "CONTRO"	I	RR79 - 1.9 *E18	(DOOR)
RR32 - 59.	I	RR80 - 1.908002679*E75	(LEVER 1)
		RR81 - "MOVES"	

ADVENTURE DATA SET 1 - TERRORIST DAM

RR33 - .344337	I	RR82 - "VATOR"
RR34 - 1.9	*E93 (DESK)	RR83 - 1.908002704*E75 (LEVER 1)
RR35 - "STAIRS"		RR84 - "KLUNK"
RR36 - 1.907000333*E35	(STAIRS)	RR85 - 1.913002683*E76 (LEVER 2)
RR37 - 1.907000328*E35	(STAIRS)	RR86 - "ALARM"
RR38 - 1.911000392*E44	(PHONE)	RR87 - 1.902001704*E18 (DOOR)
RR39 - "ARM-"		RR88 - "LOSES"
RR40 - "CH -AL "		RR89 - "DOOR C"
RR41 - "CE MAT"		RR90 - 1.913001611*E91 (LATCH)
RR42 - "NO VOI"		RR91 - "LATCH"
RR43 - 2.806651704*E44	(PHONE)	RR92 - 1.805000190*E18 (DOOR)
RR44 - "PHONE"		RR93 - "DESK"
RR45 - "GEN RM"		RR94 - "HANGER"
RR46 - "GEN"		RR95 - "CELL"
RR47 - 1.9	*E46 (GEN)	

ADVENTURE DATA SET 2 - TERRORIST DAM

RR00 - 0		RR48 - "DOOR"	
RR01 - 0		RR49 - 1.913000230*E53	(LATCH)
RR02 - 9.		RR50 - "LOOR"	
RR03 - -95.	I (CELL)	RR51 - " 3RD F"	
RR04 - 0	I	RR52 - 1.906002646*E70	(LIFT)
RR05 - " HERE"	I (OFFICE)	RR53 - "LATCH"	
RR06 - "L DESK"	I	RR54 - "SHAFT"	
RR07 - "CONTRO"	I	RR55 - 1.911000224*E59	(PANEL)
RR08 - 94.	I	RR56 - "HIDES"	
RR09 - .92883684	I	RR57 - "DROID"	
RR10 - "ABOVE"	I (GEN RM)	RR58 - 1.902002715*E62	(DROID)
RR11 - "CE UP"	I	RR59 - "PANEL"	
RR12 - "L OFFI"	I	RR60 - "TO A"	
RR13 - "CONTRO"	I	RR61 - "MOVES"	
RR14 - 83.	I	RR62 - "DROID"	
RR15 - .818180	I	RR63 - 1.805001555*E62	(DROID)
RR16 - "D HERE"	I (GEN RM)	RR64 - 1.911002684*E79	(KNOB 1)
RR17 - "E DROI"	I	RR65 - "ALARM"	
RR18 - "SERVIC"	I	RR66 - 1.911001704*E77	(KNOB 3)
RR19 - 83.	I	RR67 - "OFF"	
RR20 - .63818180	I	RR68 - "GEN 2"	
RR21 - "E LIFT"	I (SHAFT)	RR69 - 1.911002676*E78	(KNOB 2)
RR22 - "SERVIC"	I	RR70 - "LIFT"	
RR23 - 54.	I	RR71 - 1.907000320*E85	(STAIRS)
RR24 - .4652	I	RR72 - "ALERT"	
RR25 - "RS"	I (ROOM)	RR73 - "DROID"	
RR26 - "LOCKE"	I	RR74 - "N OFF,"	
RR27 - "TORAGE"	I	RR75 - "ALL GE"	
RR28 - TOOL S"	I	RR76 - 1.911001389*E79	(KNOB 1)
RR29 - 45.35000024	I	RR77 - "KNOB 3"	
RR30 - .4040	I	RR78 - "KNOB 2"	
RR31 - "R HERE"	I (HALL)	RR79 - "KNOB 1"	
RR32 - "TY D00"	I	RR80 - 1.907000309*E85	(STAIRS)

ADVENTURE DATA SET 2 - TERRORIST DAM

RR33 - "SECURI"	I	RR81 - 1.705201315*E82	(GEN)
RR34 - 86.0030	I	RR82 - "GEN"	
RR35 - .43	I	RR83 - "GEN RM"	
RR36 - 1.9	*E87 (PHONE)	RR84 - 1.907000315*E85	(STAIRS)
RR37 - "ALARM"		RR85 - "STAIRS"	
RR38 - 1.902001604*E48	(DOOR)	RR86 - "HALL"	
RR39 - "LOCKED"		RR87 - "PHONE"	
RR40 - 1.902001039*E44	(LOCKER)	RR88 - 1.9	*E91 (DESK)
RR41 - "BOARD"		RR89 - .8876696684	
RR42 - "INPUT"		RR90 - "ON"	
RR43 - 1.805001793*E48	(DOOR)	RR91 - "DESK"	
RR44 - "LOCKER"		RR92 - 1.908002789*E93	(SWITCH)
RR45 - "ROOM"		RR93 - "SWITCH"	
RR46 - 1.911000220*E59	(PANEL)	RR94 - "OFFICE"	
RR47 - 1.905000149*E48	(DOOR)	RR95 - "CELL"	

ADVENTURE DATA SET 3 - TERRORIST DAM

RR00 - 0		RR48 - "MEMORY"	
RR01 - 0		RR49 - "PLUG"	
RR02 - 9.		RR50 - 1.6	*E38 (KEY)
RR03 - -95.	I (CELL)	RR51 - .5253546464	
RR04 - 0.	I	RR52 - 1.6	*E55 (PLIERS)
RR05 - "R HERE"	I (HALL)	RR53 - 1.6	*E56 (S DRVR)
RR06 - "TY DOO"	I	RR54 - 1.6	*E57 (WRENCH)
RR07 - "SECURI"	I	RR55 - "PLIERS"	
RR08 - 94.0015	I	RR56 - "S DRVR"	
RR09 - .89888766	I	RR57 - "WRENCH"	
RR10 - "RS"	I (ROOM)	RR58 - 1.913000215	*E59 (LATCH)
RR11 - "LOCKE"	I	RR59 - "LATCH"	
RR12 - "TORAGE"	I	RR60 - 1.702090893	*E81 (DOOR)
RR13 - "TOOL S"	I	RR61 - "SHAFT"	
RR14 - 63.09000017	I	RR62 - "LOCKER"	
RR15 - .6464	I	RR63 - "ROOM"	
RR16 - -61.	I (SHAFT)	RR64 - 2.902501351	*E62 (LOCKER)
RR17 - .5860	I	RR65 - "ALARM"	
RR18 - "PUTER"	I (ROOM)	RR66 - 1.902001604	*E81 (DOOR)
RR19 - "TY COM"	I	RR67 - .60	
RR20 - "SECURI"	I	RR68 - .777666	
RR21 - 63.000927	I	RR69 - .797866	
RR22 - .3529	I	RR70 - 1.908000204	*E90 (KEY C)
RR23 - "UTER"	I (ROOM)	RR71 - 1.908000204	*E91 (KEY B)
RR24 - "L COMP"	I	RR72 - 1.908000204	*E92 (KEY A)
RR25 - "CONTRO"	I	RR73 - .7066	
RR26 - 63.00000022	I	RR74 - .7166	
RR27 - .394537	I	RR75 - .7266	
RR28 - "ALARM"		RR76 - 1.908001375	*E91 (KEY B)
RR29 - 1.913001704	*E49 (PLUG)	RR77 - 1.908001374	*E92 (KEY A)

ADVENTURE DATA SET 3 - TERRORIST DAM

RR30 - 2.902520140 *E48 (MEMORY)	RR78 - 1.908001374 *E90 (KEY C)
RR31 - "BYE UN"	RR79 - 1.908001373 *E91 (KEY B)
RR32 - "OPEN"	RR80 - "OPEN"
RR33 - "LOCKS"	RR81 - "DOOR"
RR34 - 2.902530136 *E44 (COMP)	RR82 - 1.908002767 *E92 (KEY A)
RR35 - 2.914001237 *E44 (COMP)	RR83 - .8266
RR36 - 2.901001033 *E47 (MICRO)	RR84 - 1.908001383 *E90 (KEY C)
RR37 - 1.905000150 *E48 (MEMORY)	RR85 - 1.908001373 *E91 (KEY B)
RR38 - "KEY"	RR86 - .858466
RR39 - 1.806001033 *E44 (COMP)	RR87 - 1.908001368 *E90 (KEY C)
RR40 - 1.913001044 *E46 (DISKS)	RR88 - 1.908001386 *E91 (KEY B)
RR41 - "SAFE"	RR89 - 1.908001369 *E92 (KEY A)
RR42 - "FF, UN"	RR90 - "KEY C"
RR43 - "UTER O"	RR91 - "KEY B"
RR44 - "COMP"	RR92 - "KEY A"
RR45 - 1.913001044 *E49 (PLUG)	RR93 - -94.2215
RR46 - "DISKS"	RR94 - "HALL"
RR47 - "MICRO"	RR95 - "CELL"

SIZE: 096

[illegible]

PROGRAM LISTING

```

01*LBL "ADV
..
02 FIX 0
03 CF 21
04 RDN
05*LBL "L"
06 RCL 02
07 1
08 -
09 RCL IND
X
10 "YOU'RE I
N A "
11 ARCL IND
X
12 AVIEW
13 PSE
14 X<0?
15 GTO 00
16 " WITH"
17 AVIEW
18 CLA
19 RDN
20 1
21 -
22 XEQ 10
23 PSE
24*LBL 00
25 RCL 02
26 RCL IND
X
27 X=0?
28 GTO "?"
29 "YOU SEE
:"
30 AVIEW
31 SF 14
32 XEQ 21
33*LBL "?"
34 RCL 02
35 1
36 -
37 LASTX
38 RCL IND
Y
39 FRC
40 ABS
41 X=0?
42 GTO 30
43 "EXITS A
RE: "

```

Some program comments are contained within the program description

LOOK ROUTINE:
(begins at line 4)
5-11 displays the room's name.
If R07 is positive; the optional room description is displayed.

Display items in the room.

Display the room exits.

```

44 1 E2
45 STO 01
46 *
47 X>Y?
48 "FN"
49 FRC
50 RCL 01
51 *
52 X>Y?
53 "FS"
54 FRC
55 RCL 01
56 *
57 X>Y?
58 "FE"
59 FRC
60 X*0?
61 "FW"
62 CLD
63*LBL 30
64 STOP
65*LBL 16
66 RCL 00
67 FRC
68 STO 00
69 5.019
70*LBL 28
71 CF IND X
72 ISG X
73 GTO 28
74 ASTO X
75 ASTO Y
76 ASHF
77 ASTO L
78 " "
79 ARCL X
80 ASTO X
81 " "
82 ARCL X
83 ASHF
84 ASTO X
85 CLA
86 ARCL Y
87 ARCL L
88 SF 25
89 GTO IND
X
90 GTO 23
91*LBL "GE"
92 SF 12
93 1

```

VERB ENTRY:

Clear flags 05 through 19.

Get and set up verb entry.

Get first two letters of the verb.

GET ROUTINE:

PROGRAM LISTING

94 XEQ 27		141 XEQ 05	End of Drop
95 FS?C 09		142 FC?C 11	routine
96 GTO 25		143 GTO 11	
97 RCL 00		144 3	(Throw routine
98 INT		145 STO 01	processes the
99 XEQ 10		146 SF 12	verb then goes
100 RCL 00		147 RCL IND	to the "DROP"
101 INT		02	routine.)
102 1 E2		148 1 E2	
103 ST/ 00		149 *	
104 RDN		150 XEQ 22	
105 ST+ 00		151 GTO 11	PUSH ROUTINE:
106 GTO 11		152+LBL "PU"	page of text
107+LBL "IN"		153 13	
108 CLA		154 GTO 00	PRESS ROUTINE:
109 RCL 00		155+LBL "PR"	
110 FRC		156 8	
111 CLD		157 GTO 00	OPEN ROUTINE:
112+LBL 21		158+LBL "OP"	
113 1 E2		159 2	
114 *		160 GTO 00	WORK ROUTINE:
115 X=0?		161+LBL "WO"	
116 GTO 00		162 6	
117 RCL IND		163 GTO 00	CLIMB ROUTINE:
X		164+LBL "CL"	
118 X<0?		165 7	
119 GTO "S"		166 GTO 00	READ ROUTINE:
120 LOG		167+LBL "RE"	
121 VIEW IND		168 9	
X		169 GTO 00	MOVE ROUTINE:
122 RDN		170+LBL "MO"	
123 FRC		171 11	
124 GTO 21		172 GTO 00	LIFT ROUTINE:
125+LBL 00		173+LBL "LI"	
126 FS? 14		174 12	
127 RTN		175+LBL 00	Subroutine.
128 STOP		176 XEQ 27	Gives entrance to
129 GTO 16		177 GTO 11	verb processing
130+LBL "TH"		178+LBL "AT"	ATTACK ROUTINE
131 SF 11	THROW ROUTINE:	179 SF 19	
132+LBL "DR"		180 14	
133 CLX		181 XEQ 27	Only if an item
134 XEQ 15	DROP ROUTINE:	182 RCL 00	can be Attacked
135 R↑		183 INT	will processing
136 INT		184 XEQ 18	return to this
137 ST+ IND		185 "DESTROY	routine. The item
02		ED"	is destroyed and
138 1 E2	Add item Thrown	186 AVIEW	removed from the
139 ST/ IND	or Dropped to	187 GTO 11	game.
02	the room the	188+LBL "FE"	FEED ROUTINE:
140 X<>Y	player is in	189 4	page 100 of text

PROGRAM LISTING

190 GTO 00			240 CLA	
191♦LBL "GI"	GIVE ROUTINE:		241 XEQ 10	
192 10			242♦LBL 00	
193♦LBL 00			243 RCL 02	
194 SF 13	FEED or GIVE,		244 90	
195 XEQ 27	remove the item		245 -	Need to read next
196 RCL 01	fed or given away		246 X<=0?	data set?
197 XEQ 05	from the game.		247 GTO 00	
198 GTO 11			248 " READ "	YES? prompt for
199♦LBL "GO"	GOTO ROUTINE:		249 ARCL X	and read the data.
200♦LBL "EX"	EXAMINE ROUTINE:		250 AVIEW	
201 SF 12			251 RDTA	
202 SF 17			252 SF 16	
203 5			253♦LBL 00	Return to LOOK
204 XEQ 27			254 FS?C 16	routine?
205 GTO 11			255 GTO "L"	
206♦LBL "↑N"	GO NORTH		256 " SQ?"	Else give proper
207 2			257 FC?C 17	response.
208 GTO 00			258 " OK"	
209♦LBL "↑S"	GO SOUTH		259 GTO 30	
210 4			260♦LBL 27	VERB PROCESSING
211 GTO 00			261 STO 01	ROUTINE:
212♦LBL "↑E"	GO EAST		262 RCL 02	
213 6			263 XEQ 15	
214 GTO 00			264 R↑	
215♦LBL "↑W"	GO WEST		265♦LBL 22	
216 8			266 INT	
217♦LBL 00			267 ST+ 00	
218 10↑X			268 2	
219 RCL 02	MOVEMENT		269 RCL IND	
220 1	ROUTINES		00	
221 -			270 ENTER↑	
222 X<>Y			271 LOG	
223 RCL IND			272 INT	
Y			273 10↑X	
224 ABS			274 /	Get item code
225 *			275 X>Y?	list -X>1?
226 INT			276 SF 10	Ask WHAT? not the
227 1 E2			277 FRC	I CANT/TRY routine.
228 MOD			278 10	
229 X=0?	This exit		279 *	
230 GTO 23	possible		280 SF IND X	Set flag = F
231 STO 02	NO? go to HUH?		281 FRC	(see page 98)
232 SF 16	routine		282 1 E2	
233♦LBL 11	UTILITY ROUTINE:		283 *	
234 FC?C 14	page 100 of text		284 INT	
235 GTO 00			285 RCL 01	
236 RCL 00			286 X≠Y?	
237 1			287 GTO 02	Wrong Verb?
238 -			288 LASTX	YES? go to 02
239 INT			289 FRC	

PROGRAM LISTING

290 1 E2			
291 *			
292 INT			
293 FC?C 07	Need to be in the		
294 GTO 00	right room?		
295 RCL 02	(see page 3)		
296 X=Y?	NO? go to 00		
297 GTO 01	Right room? go		
298♦LBL 02	to 01		
299 FS?C 12	Possible to		
300 RTN	override verb		
301 RCL 00	completion		
302 INT	barriers?		
303 ST- 00	YES? then return.		
304 5			
305 -			
306 FS?C 08	Try verb used		
307 GTO 22	with verb needed		
308 GTO 25	in register 5		
309♦LBL 00	back?		
310 X=0?	YES? do so, else		
311 GTO 01	go to I CANT		
312 FS?C 10	display.		
313 GTO 00	Go to 'WHAT?'		
314 RCL 00	routine? YES? go		
315 FRC	to 00.		
316♦LBL 24			
317 1 E2	Routine to check		
318 *	if F = 5 or 6		
319 INT	conditions are		
320 X=Y?	met. (see page 3)		
321 SF 18			
322 RDN			
323 LASTX			
324 FRC			
325 X=0?			
326 GTO 24	Conditions met?		
327 FS?C 06	NO? go to the		
328 FS?C 18	I CANT display.		
329 FS?C 18			
330 GTO 25			
331 GTO 01			
332♦LBL 00	'WHAT?' routine.		
333 "WHAT"			
334 SF 15			
335 FC?C 13	Ask WHAT? item		
336 GTO 25	the player is		
337♦LBL 20	going to use from		
338 STO 01	their inventory		
339 CLX	to complete the		
340 XEQ 15	verb.		
341 R↑			
342 INT			
343 RCL 01		Wrong item?	
344 X=Y?		YES? go to I CANT	
345 GTO 25		display.	
346♦LBL 01			
347 RCL IND			
00			
348 ENTER↑			
349 LOG			
350 INT			
351 10↑X			
352 /			
353 1 E7			
354 *			
355♦LBL 29		Break item code	
356 1 E2		into happening#	
357 MOD		and the happening	
358 INT		data.	
359 LASTX			
360 FRC			
361 1 E2			
362 *			
363 INT			
364 X<>Y			
365 14			
366 X<Y?			
367 SF 14		Does a message	
368 X<Y?		need to be shown?	
369 ST- Y		YES? set flag 14.	
370 RDN			
371 X<>Y			
372 CLA			
373 GTO IND		Go to happening.	
Y		II=00 ROUTINE:	
374♦LBL 00		page 99 of text	
375 RTN		II-01 ROUTINE:	
376♦LBL 01		page 99 of text	
377 ST+ IND		Add the item to	
02		the room and	
378 1 E2		change this item's	
379 ST/ IND		code so it can't	
02		add another item.	
380 RCL IND			
00			
381 SCI 5			
382 RND			
383 FIX 0			
384 STO IND			
00			
385 SF 16			

PROGRAM LISTING

386 RTN	II=02 ROUTINE	433 RCL IND	Exchange the room
387♦LBL 02	page 99 of text	X	exits with room
388 "GO IN?"	Does the player	434 X<> IND	JJ's exits.
389 CF 23	want to enter the	Z	
390 STOP	room?	435 STO IND	
391 FS?C 23	YES? do so.	Y	
392 GTO 16	NO? then return	436 RTN	II=09 ROUTINE
393 SF 16	and process the	437♦LBL 09	page 99 of text
394 STO 02	command.	438 " THE EN	
395 RTN		D"	
396♦LBL 03	II=03 ROUTINE	439 STOP	II=10 ROUTINE
397 STO 02	page 99 of text	440♦LBL 10	page 99 of text
398 SF 16		441 ARCL IND	
399 RTN	II=04 ROUTINE	X	
400♦LBL 04	page 99 of text	442 DSE X	Display message.
401 RCL IND	Change to new	443 RCL IND	End of message?
X	item code.	X	YES? display it
402 STO IND		444 SIGN	and return.
00		445 X#0?	NO? get six more
403 RTN	II=05 ROUTINE	446 AVIEW	characters.
404♦LBL 05	page 99 of text	447 X#0?	
405 1 E2		448 RTN	
406 ST/ 02		449 RDN	
407 RCL 00		450 GTO 10	
408 INT	Remove item JJ	451♦LBL 11	II-11 ROUTINE
409 STO 01	from the	452 XEQ 10	page 99 of text
410 RCL Z	inventory	453 "YOU DIE	
411 XEQ 18		D"	
412 1 E2		454 PROMPT	II=12 ROUTINE
413 ST* 02		455♦LBL 12	page 99 of text
414 RCL 01		456 RCL 00	
415 ST+ 00		457 5	
416 RTN		458 -	
417♦LBL 06	II=06 ROUTINE	459 RCL IND	
418 XEQ 10	page 99 of text	X	
419 GTO 25		460 STO IND	
420♦LBL 07	II=07 ROUTINE	Z	
421 RCL 00	page 99 of text	461 RTN	II-13 ROUTINE
422 FRC	Exchange	462♦LBL 13	page 99 of text
423 X<> IND	inventory with	463 RCL IND	Exchange the
Y	room JJ's item	02	room's item list
424 RCL 00	list.	464 X<> IND	with room JJ's
425 INT		Y	item list.
426 +		465 STO IND	
427 STO 00		02	
428 RTN		466 SF 16	
429♦LBL 08	II=08 ROUTINE	467 RTN	II-14 ROUTINE
430 RCL 02	page 99 of text	468♦LBL 14	page 99 of text
431 1		469 RCL IND	
432 -		X	
		470 RCL 00	

PROGRAM LISTING

471 INT	Ask question.	518 GTO 16	given command.
472 DSE X	Is the answer the	519 R↑	YES? can player
473 XEQ 10	same as what is	520 FC?C 15	try an item?
474 X<>Y	in register JJ?	521 1	YES? allow TRY
475 +	YES? do happening	522 GTO 20	input
476 STOP	pair: .IIJJ	523♦LBL 18	UTILITY ROUTINE
477 ASTO X	NO? do happening	524 2.90002	
478 X=Y?	pair: .0000IIJJ	525 X<>Y	
479 1 E6		526 RCL IND	
480 X=Y?		02	
481 1 E2		527 FRC	
482 RCL IND		528♦LBL 26	
L		529 1 E2	
483 *	UTILITY ROUTINE	530 *	
484 GTO 29		531 INT	Compress room or
485♦LBL 15		532 X=Y?	inventory item
486 "F? "		533 GTO 01	lists so that no
487 PROMPT	Get the item's	534 RDN	gaps exist from
488 RCL IND	name and return	535 LASTX	any removed
X	with what	536 FRC	items.
489 FRC	register it's	537 ISG Z	
490♦LBL 17	code is in.	538 X=0?	
491 1 E2		539 GTO 26	
492 *		540♦LBL 01	
493 RCL IND		541 RCL Z	
X		542 INT	
494 LOG		543 10↑X	
495 RCL IND		544 /	
X		545 ST- IND	
496 R↑		02	
497 ASTO X		546 0	
498 X=Y?		547 X<> IND	
499 RTN		02	
500 R↑		548 FRC	
501 FRC		549 1 E10	
502 X=0?		550 *	
503 GTO 17		551♦LBL 19	
504♦LBL 23	HUH? ROUTINE:	552 1 E2	
505 "HUH?"		553 FC?C 07	
506 CLD		554 ST/ IND	
507 GTO 30		02	
508♦LBL 25	I CANT/TRY	555 /	
509 RDN	ROUTINE:	556 FRC	
510 "TRY"		557 X=0?	
511 ASTO Y		558 SF 07	
512 "I CANT"	Give proper	559 ST+ IND	
513 FS?C 19	response.	02	
514 " HA"		560 LASTX	
515 STOP	Did the player	561 INT	
516 ASTO X	input TRY?	562 X=0?	
517 X=Y?	NO? then process	563 GTO 19	
		564 .END.	

HEWLETT-PACKARD

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Games II

Bar Codes

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GAMES II

THE CAVES	1
5 x 5 CHESS	9
PINBALL	15
TRUCK	21
FLIPO	29
CODE CRACK	34
ADVENTURE	36

THE CAVES

PROGRAM REGISTERS NEEDED: 244

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ROW 1 (1 : 3)



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ROW 5 (15 : 18)



ROW 6 (18 : 24)



ROW 7 (24 : 31)



ROW 8 (31 : 35)



ROW 9 (36 : 43)



ROW 10 (44 : 50)



ROW 11 (51 : 56)



ROW 12 (57 : 63)



ROW 13 (63 : 67)



ROW 14 (67 : 70)



ROW 15 (70 : 76)



ROW 16 (76 : 83)



ROW 17 (84 : 92)



ROW 18 (93 : 100)



ROW 19 (101 : 108)



ROW 20 (109 : 115)



ROW 21 (116 : 123)



ROW 22 (124 : 128)



ROW 23 (129 : 132)



ROW 24 (133 : 137)



ROW 25 (138 : 143)



ROW 26 (144 : 147)



ROW 27 (148 : 151)



ROW 28 (152 : 156)



ROW 29 (157 : 162)



ROW 30 (163 : 168)



ROW 31 (169 : 174)



ROW 32 (175 : 177)



ROW 33 (178 : 183)



ROW 34 (184 : 185)



ROW 35 (186 : 190)



ROW 36 (191 : 196)



ROW 37 (197 : 203)



ROW 38 (203 : 209)



ROW 39 (209 : 212)



ROW 40 (212 : 217)



ROW 41 (217 : 219)



ROW 42 (219 : 222)



ROW 43 (222 : 226)



ROW 44 (227 : 229)



ROW 45 (229 : 230)



ROW 46 (230 : 236)



ROW 47 (237 : 237)



ROW 48 (238 : 244)



ROW 49 (244 : 249)



ROW 50 (249 : 252)



ROW 51 (252 : 257)



ROW 52 (257 : 261)



ROW 53 (261 : 267)



ROW 54 (267 : 268)



ROW 55 (270 : 274)



ROW 56 (274 : 277)



ROW 57 (277 : 282)



ROW 58 (282 : 285)



ROW 59 (285 : 288)



ROW 60 (288 : 291)



ROW 61 (291 : 297)



ROW 62 (297 : 299)



ROW 63 (299 : 305)



ROW 64 (305 : 312)



ROW 65 (312 : 318)



ROW 66 (318 : 323)



ROW 67 (323 : 327)



ROW 68 (327 : 332)



ROW 69 (333 : 337)



ROW 70 (338 : 342)



ROW 71 (342 : 346)



ROW 72 (346 : 349)



ROW 73 (350 : 355)



ROW 74 (355 : 356)



ROW 75 (357 : 361)



ROW 76 (361 : 365)



ROW 77 (365 : 371)



ROW 78 (371 : 375)



ROW 79 (376 : 377)



ROW 80 (378 : 383)



ROW 81 (383 : 384)



ROW 82 (385 : 388)



ROW 83 (388 : 393)



ROW 84 (393 : 395)



ROW 85 (395 : 398)



ROW 86 (399 : 404)



ROW 87 (404 : 410)



ROW 88 (410 : 415)



ROW 89 (415 : 420)



ROW 90 (421 : 424)



ROW 91 (425 : 427)



ROW 92 (427 : 432)



ROW 93 (432 : 434)



ROW 94 (434 : 439)



ROW 95 (440 : 442)



ROW 96 (443 : 446)



ROW 97 (446 : 451)



ROW 98 (451 : 454)



ROW 99 (454 : 458)



ROW 100 (458 : 460)



ROW 101 (461 : 462)



ROW 102 (463 : 465)



ROW 103 (465 : 466)



ROW 104 (466 : 469)



ROW 105 (469 : 472)



ROW 106 (473 : 473)



ROW 107 (473 : 476)



ROW 108 (476 : 479)



ROW 109 (479 : 483)



ROW 110 (484 : 488)



ROW 111 (488 : 492)



ROW 112 (492 : 495)



ROW 113 (495 : 498)



ROW 114 (498 : 503)



ROW 115 (503 : 508)



ROW 116 (508 : 512)



ROW 117 (513 : 516)



ROW 118 (516 : 518)



ROW 119 (518 : 521)



ROW 120 (522 : 524)



ROW 121 (524 : 527)



ROW 122 (528 : 530)



ROW 123 (530 : 532)



ROW 124 (532 : 537)



ROW 125 (538 : 541)



ROW 126 (541 : 551)



ROW 127 (552 : 557)



ROW 128 (557 : 562)



ROW 129 (563 : 568)



ROW 130 (568 : 574)



ROW 131 (575 : 578)



PROGRAM REGISTERS NEEDED: 139

ROW 1 (1 : 3)



ROW 2 (4 : 5)



ROW 3 (5 : 12)



ROW 4 (12 : 17)



ROW 5 (18 : 22)



ROW 6 (23 : 28)



ROW 7 (28 : 33)



ROW 8 (34 : 41)



ROW 9 (41 : 46)



ROW 10 (47 : 52)



ROW 11 (53 : 59)



ROW 12 (59 : 62)



ROW 13 (63 : 71)



ROW 14 (71 : 75)



ROW 15 (76 : 82)



ROW 16 (82 : 89)



ROW 17 (89 : 95)



ROW 18 (95 : 99)



ROW 19 (99 : 109)



ROW 20 (110 : 117)



ROW 21 (118 : 124)



ROW 22 (124 : 128)



ROW 23 (129 : 132)



ROW 24 (133 : 139)



ROW 25 (139 : 145)



ROW 26 (146 : 154)



ROW 27 (155 : 160)



ROW 28 (161 : 169)



ROW 29 (169 : 174)



ROW 30 (174 : 179)



ROW 31 (179 : 182)



ROW 32 (182 : 193)



ROW 33 (194 : 205)



ROW 34 (206 : 215)



ROW 35 (216 : 224)



ROW 36 (224 : 233)



ROW 37 (233 : 240)



ROW 38 (240 : 245)



ROW 39 (246 : 253)



ROW 40 (253 : 261)



ROW 41 (262 : 268)



ROW 42 (269 : 276)



ROW 43 (276 : 285)



ROW 44 (285 : 292)



ROW 45 (293 : 299)



ROW 46 (300 : 306)



ROW 47 (306 : 311)



ROW 48 (312 : 319)



ROW 49 (320 : 327)



ROW 50 (328 : 338)



ROW 51 (338 : 346)



ROW 52 (347 : 355)



ROW 53 (356 : 364)



ROW 54 (364 : 371)



ROW 55 (372 : 380)



ROW 56 (381 : 388)



ROW 57 (389 : 398)



ROW 58 (398 : 406)



ROW 59 (407 : 414)



ROW 60 (415 : 421)



ROW 61 (422 : 428)



ROW 62 (429 : 434)



ROW 63 (435 : 441)



ROW 64 (442 : 449)



ROW 65 (449 : 457)



ROW 66 (457 : 464)



ROW 67 (464 : 474)



ROW 68 (474 : 481)



ROW 69 (482 : 493)



ROW 70 (494 : 502)



ROW 71 (502 : 510)



ROW 72 (511 : 512)



ROW 73 (513 : 517)



ROW 74 (518 : 526)



ROW 75 (527 : 532)



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ROW 1 (1:6)



ROW 2 (7:12)



ROW 3 (13:19)



ROW 4 (19:27)



ROW 5 (28:33)



ROW 6 (33:41)



ROW 7 (41:42)



CHESS (82143A VERSION)

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ROW 3 (13 : 18)



ROW 4 (19 : 27)



ROW 5 (28 : 33)



ROW 6 (33 : 41)



ROW 7 (41 : 41)



PROGRAM REGISTERS NEEDED: 143

ROW 1 (1 : 4)



ROW 2 (5 : 8)



ROW 3 (8 : 11)



ROW 4 (12 : 18)



ROW 5 (19 : 25)



ROW 6 (25 : 32)



ROW 7 (32 : 38)



ROW 8 (39 : 46)



ROW 9 (46 : 53)



ROW 10 (54 : 61)



ROW 11 (62 : 69)



ROW 12 (69 : 75)



ROW 13 (76 : 84)



ROW 14 (85 : 92)



ROW 15 (92 : 99)



ROW 16 (99 : 106)



ROW 17 (107 : 112)



ROW 18 (113 : 119)



ROW 19 (119 : 123)



ROW 20 (124 : 132)



ROW 21 (133 : 138)



ROW 22 (139 : 144)



ROW 23 (144 : 151)



ROW 24 (152 : 159)



ROW 25 (160 : 167)



ROW 26 (168 : 175)



ROW 27 (175 : 182)



ROW 28 (183 : 190)



ROW 29 (190 : 197)



ROW 30 (197 : 204)



ROW 31 (204 : 210)



ROW 32 (211 : 217)



ROW 33 (217 : 224)



ROW 34 (224 : 231)



ROW 35 (232 : 238)



ROW 36 (239 : 246)



ROW 37 (247 : 254)



ROW 38 (255 : 263)



ROW 39 (263 : 269)



ROW 40 (270 : 277)



ROW 41 (278 : 285)



ROW 42 (286 : 292)



ROW 43 (293 : 298)



ROW 44 (298 : 304)



ROW 45 (305 : 309)



ROW 46 (310 : 319)



ROW 47 (319 : 322)



ROW 48 (323 : 332)



ROW 49 (333 : 340)



ROW 50 (340 : 348)



ROW 51 (349 : 357)



ROW 52 (357 : 364)



ROW 53 (364 : 372)



ROW 54 (373 : 380)



ROW 55 (381 : 387)



ROW 56 (388 : 394)



ROW 57 (394 : 401)



ROW 58 (402 : 407)



ROW 59 (408 : 415)



ROW 60 (415 : 421)



ROW 61 (422 : 429)



ROW 62 (430 : 438)



ROW 63 (439 : 447)



ROW 64 (448 : 453)



ROW 65 (454 : 460)



ROW 66 (461 : 465)



ROW 67 (465 : 472)



ROW 68 (473 : 479)



ROW 69 (480 : 487)



ROW 70 (487 : 497)



ROW 71 (498 : 504)



ROW 72 (504 : 510)



ROW 73 (510 : 516)



ROW 74 (516 : 521)



ROW 75 (522 : 527)



ROW 76 (527 : 533)



ROW 77 (534 : 539)



WIZARD (UTILITY PROGRAM)

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GAMES II

PROGRAM REGISTERS NEEDED: 16

ROW 1 (1 : 3)



ROW 2 (3 : 5)



ROW 3 (5 : 9)



ROW 4 (9 : 11)



ROW 5 (12 : 16)



ROW 6 (17 : 18)



ROW 7 (18 : 22)



ROW 8 (22 : 24)



ROW 9 (24 : 25)



TRUCK

HEWLETT PACKARD
SOLUTIONS BOOK:
GAMES II

PROGRAM REGISTERS NEEDED: 235

ROW 1 (1 : 3)



ROW 2 (4 : 9)



ROW 3 (9 : 15)



ROW 4 (16 : 21)



ROW 5 (22 : 28)



ROW 6 (28 : 33)



ROW 7 (34 : 42)



ROW 8 (42 : 46)



ROW 9 (47 : 54)



ROW 10 (55 : 56)



ROW 11 (57 : 61)



ROW 12 (62 : 65)



ROW 13 (65 : 69)



ROW 14 (69 : 71)



ROW 15 (72 : 73)



ROW 16 (73 : 80)



ROW 17 (81 : 88)



ROW 18 (88 : 89)



ROW 19 (90 : 97)



ROW 20 (98 : 101)



ROW 21 (102 : 110)



ROW 22 (110 : 115)



ROW 23 (115 : 120)



ROW 24 (121 : 126)



ROW 25 (126 : 134)



ROW 26 (134 : 139)



ROW 27 (139 : 143)



ROW 28 (144 : 148)



ROW 29 (148 : 154)



ROW 30 (155 : 162)



ROW 31 (163 : 169)



ROW 32 (170 : 177)



ROW 33 (178 : 181)



ROW 34 (181 : 185)



ROW 35 (186 : 193)



ROW 36 (193 : 199)



ROW 37 (200 : 206)



ROW 38 (207 : 213)



ROW 39 (214 : 218)



ROW 40 (218 : 224)



ROW 41 (225 : 232)



ROW 42 (232 : 237)



ROW 43 (237 : 242)



ROW 44 (243 : 246)



ROW 45 (246 : 250)



ROW 46 (250 : 254)



ROW 47 (254 : 259)



ROW 48 (259 : 265)



ROW 49 (265 : 270)



ROW 50 (270 : 276)



ROW 51 (276 : 281)



ROW 52 (282 : 287)



ROW 53 (287 : 293)



ROW 54 (294 : 304)



ROW 55 (304 : 308)



ROW 56 (308 : 312)



ROW 57 (312 : 316)



ROW 58 (316 : 323)



ROW 59 (323 : 325)



ROW 60 (325 : 331)



ROW 61 (332 : 334)



ROW 62 (334 : 340)



ROW 63 (340 : 343)



ROW 64 (343 : 348)



ROW 65 (349 : 352)



ROW 66 (352 : 356)



ROW 67 (356 : 359)



ROW 68 (360 : 367)



ROW 69 (367 : 367)



ROW 70 (368 : 376)



ROW 71 (376 : 377)



ROW 72 (377 : 383)



ROW 73 (384 : 387)



ROW 74 (387 : 390)



ROW 75 (391 : 392)



ROW 76 (393 : 400)



ROW 77 (400 : 403)



ROW 78 (403 : 404)



ROW 79 (405 : 406)



ROW 80 (406 : 415)



ROW 81 (415 : 416)



ROW 82 (416 : 422)



ROW 83 (423 : 425)



ROW 84 (425 : 428)



ROW 85 (428 : 432)



ROW 86 (432 : 435)



ROW 87 (436 : 443)



ROW 88 (443 : 446)



ROW 89 (447 : 450)



ROW 90 (450 : 456)



ROW 91 (456 : 463)



ROW 92 (464 : 471)



ROW 93 (471 : 478)



ROW 94 (478 : 485)



ROW 95 (485 : 490)



ROW 96 (490 : 496)



ROW 97 (496 : 500)



ROW 98 (500 : 507)



ROW 99 (508 : 514)



ROW 100 (514 : 520)



ROW 101 (520 : 526)



ROW 102 (527 : 536)



ROW 103 (536 : 541)



ROW 104 (541 : 546)



ROW 105 (547 : 552)



ROW 106 (553 : 558)



ROW 107 (559 : 564)



ROW 108 (564 : 570)



ROW 109 (570 : 576)



ROW 110 (576 : 582)



ROW 111 (582 : 588)



ROW 112 (589 : 595)



ROW 113 (596 : 602)



ROW 114 (602 : 608)



ROW 115 (608 : 614)



ROW 116 (615 : 621)



ROW 117 (621 : 627)



ROW 118 (628 : 631)



ROW 119 (631 : 634)



ROW 120 (635 : 642)



ROW 121 (642 : 649)



ROW 122 (650 : 655)



ROW 123 (656 : 661)



ROW 124 (662 : 664)



ROW 125 (664 : 670)



ROW 126 (670 : 676)



TRUCK

HEWLETT PACKARD
SOLUTIONS BOOK:
GAMES II

ROW 127 (676 : 676)



PROGRAM REGISTERS NEEDED: 153

ROW 1 (1 : 3)



ROW 2 (3 : 6)



ROW 3 (7 : 13)



ROW 4 (14 : 20)



ROW 5 (21 : 28)



ROW 6 (29 : 35)



ROW 7 (36 : 42)



ROW 8 (42 : 48)



ROW 9 (49 : 55)



ROW 10 (55 : 61)



ROW 11 (62 : 68)



ROW 12 (68 : 74)



ROW 13 (75 : 81)



ROW 14 (81 : 88)



ROW 15 (88 : 94)



ROW 16 (95 : 98)



ROW 17 (98 : 108)



ROW 18 (109 : 112)



ROW 19 (113 : 120)



ROW 20 (121 : 128)



ROW 21 (129 : 135)



ROW 22 (135 : 142)



ROW 23 (143 : 150)



ROW 24 (150 : 157)



ROW 25 (158 : 159)



ROW 26 (159 : 168)



ROW 27 (168 : 175)



ROW 28 (175 : 183)



ROW 29 (184 : 190)



ROW 30 (190 : 198)



ROW 31 (199 : 207)



ROW 32 (208 : 215)



ROW 33 (215 : 222)



ROW 34 (223 : 230)



ROW 35 (230 : 237)



ROW 36 (238 : 247)



ROW 37 (247 : 256)



ROW 38 (257 : 263)



ROW 39 (264 : 270)



ROW 40 (271 : 281)



ROW 41 (281 : 286)



ROW 42 (286 : 293)



ROW 43 (294 : 303)



ROW 44 (304 : 313)



ROW 45 (313 : 322)



ROW 46 (322 : 330)



ROW 47 (331 : 339)



ROW 48 (339 : 346)



ROW 49 (347 : 354)



ROW 50 (355 : 359)



ROW 51 (360 : 366)



ROW 52 (367 : 374)



ROW 53 (375 : 384)



ROW 54 (385 : 394)



ROW 55 (395 : 402)



ROW 56 (403 : 412)



ROW 57 (412 : 419)



ROW 58 (420 : 430)



ROW 59 (430 : 441)



ROW 60 (442 : 450)



ROW 61 (451 : 458)



ROW 62 (458 : 461)



ROW 63 (462 : 472)



ROW 64 (472 : 479)



ROW 65 (480 : 486)



ROW 66 (486 : 493)



ROW 67 (494 : 501)



ROW 68 (502 : 512)



ROW 69 (512 : 520)



ROW 70 (520 : 526)



ROW 71 (527 : 535)



ROW 72 (535 : 542)



ROW 73 (542 : 546)



ROW 74 (546 : 552)



ROW 75 (553 : 560)



ROW 76 (561 : 566)



ROW 77 (567 : 572)



ROW 78 (573 : 580)



ROW 79 (581 : 587)



ROW 80 (588 : 596)



ROW 81 (597 : 604)



ROW 82 (605 : 611)



ROW 83 (612 : 613)



ROW 1 (1:5)



ROW 2 (5:7)



ROW 3 (8:8)



ROW 4 (9:15)



ROW 5 (15:24)



ROW 6 (24:33)



ROW 7 (34:41)



ROW 8 (41:48)



ROW 9 (48:56)



ROW 10 (57:67)



ROW 11 (68:74)



ROW 12 (75:81)



ROW 13 (82:90)



ROW 14 (91:98)



ROW 15 (99:107)



ROW 16 (108:113)



ROW 17 (114:117)



ROW 18 (117:123)



ROW 19 (123 : 130)



ROW 20 (130 : 137)



ROW 21 (138 : 142)



ROW 1 (1 : 5)



ROW 2 (5 : 10)



ROW 3 (10 : 14)



ROW 4 (15 : 21)



ROW 5 (22 : 29)



ROW 6 (29 : 32)



ROW 7 (32 : 39)



ROW 8 (40 : 43)



ROW 9 (43 : 48)



ROW 10 (49 : 58)



ROW 11 (58 : 66)



ROW 12 (67 : 72)



ROW 13 (73 : 78)



ROW 14 (78 : 84)



ROW 15 (84 : 90)



ROW 16 (91 : 95)



ROW 17 (95 : 102)



ROW 18 (102 : 107)



ROW 19 (107 : 116)



ROW 20 (116 : 124)



ROW 21 (124 : 130)



ROW 22 (130 : 134)



ROW 23 (134 : 141)



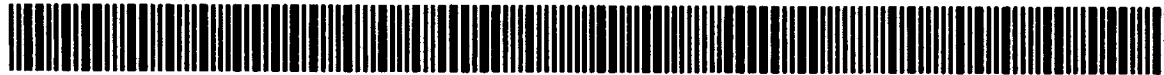
ROW 24 (141 : 148)



ROW 25 (148 : 152)



ROW 26 (152 : 157)



ROW 27 (157 : 161)



ROW 28 (161 : 165)



ROW 29 (166 : 170)



ROW 30 (170 : 173)



ROW 31 (173 : 178)



ROW 32 (178 : 184)



ROW 33 (184 : 187)



ROW 34 (187 : 191)



ROW 35 (191 : 197)



ROW 36 (197 : 200)



ROW 37 (200 : 205)



ROW 38 (206 : 209)



ROW 39 (209 : 214)



ROW 40 (214 : 221)



ROW 41 (222 : 230)



ROW 42 (230 : 239)



ROW 43 (240 : 248)



ROW 44 (248 : 252)



ROW 45 (253 : 257)



ROW 46 (258 : 263)



ROW 47 (263 : 272)



ROW 48 (273 : 282)



ROW 49 (282 : 290)



ROW 50 (291 : 299)



ROW 51 (300 : 308)



ROW 52 (308 : 316)



ROW 53 (316 : 325)



ROW 54 (326 : 331)



ROW 55 (331 : 336)



ROW 56 (336 : 345)



ROW 57 (345 : 353)



ROW 58 (354 : 361)



ROW 59 (362 : 371)



ROW 60 (372 : 379)



ROW 61 (380 : 387)



ROW 62 (388 : 392)



ROW 63 (392 : 401)



ROW 64 (401 : 409)



ROW 65 (410 : 415)



ROW 66 (416 : 423)



ROW 67 (424 : 434)



ROW 68 (435 : 438)



ROW 69 (439 : 448)



ROW 70 (449 : 453)



ROW 71 (453 : 461)



ROW 72 (462 : 469)



ROW 73 (470 : 478)



ROW 74 (479 : 484)



ROW 75 (485 : 491)



ROW 76 (491 : 499)



ROW 77 (500 : 505)



ROW 78 (506 : 511)



ROW 79 (512 : 514)



ROW 80 (514 : 522)



ROW 81 (522 : 526)



ROW 82 (526 : 534)



ROW 83 (535 : 543)



ROW 84 (544 : 551)



ROW 85 (551 : 558)



ROW 86 (559 : 564)



NOTES

NOTES

NOTES

Hewlett-Packard Software

In terms of power and flexibility, the problem-solving potential of the HP-41 programmable calculator is nearly limitless. And in order to see the practical side of this potential, HP has different types of software to help save you time and programming effort. Every one of our software solutions has been carefully selected to effectively increase your problem-solving potential. Chances are, we already have the solutions you're looking for.

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