Includes barcode for easy software entry.

HEWLETT-PACKARD

HP-41

USERS' LIBRARY SOLUTIONS

Games II

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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:

1. 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.

2. Set the HP-41C to PRGM mode (press the [PRGM] key) and press ■ [GTO] [.] [.] to prepare the calculator for the new program.

3. 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.

   a. 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].

   b. 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.

   c. The printer indication of divide sign is /. When you see / in the program listing, press [÷].

   d. The printer indication of the multiply sign is ‡. When you see ‡ in the program listing, press [×].

   e. The ⊢ character in the program listing is an indication of the [APPEND] function. When you see ⊢, press ■ [APPEND] in ALPHA mode (press ■ and the K key).

   f. All operations requiring register addresses accept those addresses in these forms:

      nn (a two-digit number)
      IND nn (INDIRECT: ■ , followed fy 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	Keystrokes	Display
01◆LBL "SAMPLE"	■ [LBL] [ALPHA] SAMPLE [ALPHA]	*01 LBL"SAMPLE*
02 "THIS IS A "	[ALPHA] *THIS IS A* [ALPHA]	*02"THIS IS A*
03 "⊢SAMPLE"	[ALPHA] ■ [APPEND] SAMPLE	*03" ⊢ SAMPLE*
04 AVIEW	■ AVIEW [ALPHA]	*04 AVIEW*
05 6	6	*05 6*
06 ENTER↑	[ENTER↑]	*06 ENTER ↑*
07 -2	2 [CHS]	*07 -2*
08 /	[÷]	*08 /*
09 ABS	[XEQ] [ALPHA] ABS [ALPHA]	*09 ABS*
10 STO IND L	[STO] ■ [.] L	*10 STO IND L*
11 "R3="	[ALPHA] R3= ■ [ARCL] 03	*11"R3=*
12 ARCL 03	■ [AVIEW]	*12 ARCL 03*
13 AVIEW	[ALPHA]	*13 AVIEW*
14 RTN	■ [RTN]	*14 RTN*

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**1. THE CAVES . . . . . by James Surber 1

Can you survive a trip through 67 interconnected caves, picking up nine items, and avoiding various hazards?

*†2. 5 X 5 CHESS . . . . . by Valentin Albillo 20

The HP-41 is a tough opponent in this fast-moving adaptation of 8 X 8 chess.

*3. PINBALL . . . . . by Craig Pearce 37

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)
"YYEEEIIII 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" "YYEEEIIII 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.

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

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]	(You don't have a knife to cut through the web)
	To go back	[XEQ] "J"	
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]	

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.

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 [R/S]		MOVING TO ()
	listed on the display)			(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

USER INSTRUCTIONS

SIZE: 076

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
	your HP off you may recall your position			
	and the game by simply recalling warnings			
	(user mode on)			
14	If you lose the game a new game may be			SEED?
	started by simply keying in a new seed	SEED		

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                 STORE
 24 STO 68            ADJACENT CAVES
 25 3                 TO 0
 26 STO 69
 27 5
 28 STO 70
 29 GTO 55
 30*LBL 99
 31 RCL 74
 32 9821              RANDOM
 33 *                 NUMBER
 34 .21137            GENERATOR
 35 +
 36 FRC
 37 STO 74
 38 *
 39 INT
 40 RTN
 41*LBL 98
 42 66                STORAGE
 43 XEQ 99            LOOP
 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            STORE LAST
 73 STO 71            CAVE
 74 RCL 73
 75 X=0?
 76 GTO 66
 77 67
 78 X=Y?
 79 GTO 67
 80 RCL 73
 81 1                 FIND ADJACENT
 82 -                 CAVES
 83 STO 68
 84 2
 85 +
 86 STO 69
 87 2                 ODD OR EVEN
 88 MOD
 89 X≠0?
 90 GTO 68
 91 RCL 73
 92 7
 93 -                 ODD
 94 0                 LOWER CAVE
 95 X<Y?
 96 X<>Y
 97 STO 70
```

PROGRAM LISTING

```
 98 GTO 55
 99◆LBL 68
100 RCL 73
101 7                    EVEN
102 +                    UPPER CAVE
103 67
104 X>Y?
105 X<>Y
106 STO 70
107 GTO 55
108◆LBL 67
109 62
110 STO 68               STORE
111 64                   ADJACENT
112 STO 69               CAVES TO 67
113 66
114 STO 70
115 GTO 55
116◆LBL 56
117 RCL 68               TEST
118 X=Y?                 IF LEGAL MOVE
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               XEQ HAZARDS
133 RCL IND              & VALUABLES
73
134 GTO IND
X
135◆LBL 00
136 "SAFE"               SAFE
137 XEQ 33
138◆LBL C
139 SF 13                FIND WARNINGS
140 RCL 68
141 XEQ 78
142 RCL 69
143 XEQ 78
144 RCL 70
145 XEQ 78
146 CF 13
147 "NO WARN             NO WARNINGS
ING"
148 FC?C 08
149 AVIEW
150 PSE
151◆LBL 77
152 CLA                  DISPLAY CAVES
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                DISPLAY
164 RCL IND              WARNINGS
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             MAGIC WAND
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             USE MAGIC
"                        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
```

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          MAGIC WORD
209 "MAGIC W
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
C"                  USE MAGIC
                      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
227 GTO 33          CAPE
228 XEQ 32
229 "INVISIB
LE TO"
230 "├ 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          AU (GOLD)
262◆LBL 07
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 "├GLOVES
"
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          MING VASE
SE"
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 "+ 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           REMOVE VALUABLE
73                    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          UGLY TROLL
OLL"
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"
333 FS? 13            WEB
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 "+WATER"
350 XEQ 33
351 FS? 02
352 GTO 00
353 GTO 46
354*LBL 16
355 "LOCKED
DOOR"                 LOCKED
356 FS? 13            DOOR
357 GTO 33
358 XEQ 31
359*LBL 36
360 FS? 00
361 "USE "            USE KEY
362 FC? 00            ROUTINE
363 XEQ 43
364 "+KEY"
365 XEQ 33
366 FS? 08
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          SMALL CAVES
AVE"
```

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                  GIVE SCORE
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                  DARK CAVE
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                  FEEL DRAFT
463 GTO 33
464 XEQ 31
465 "YYEEEII
II"
466 "⊢ THE P                PITS
ITS"
467 GTO 45
```

PROGRAM LISTING

```
468*LBL 23
469 "HEAR SP
LASH"
470 FS? 13
471 GTO 33          WATER
472 XEQ 31
473 "ALL WAS
HED UP"
474 GTO 45
475*LBL 24
476 "SMELL D
RAGON"
477 FS? 13
478 GTO 33          DRAGONS
479 XEQ 31
480 FS? 07
481 GTO 03
482*LBL 42
483 "CHOMP"
484*LBL 45          CHOMP
485 XEQ 33
486 TONE 1          END GAME TONES
487 TONE 0
488 GTO "CAV
ES"
489*LBL 44
490 FS? 03
491 "USE "
492 FC? 03
493 XEQ 43          KNIFE ROUTINE
494 "+KNIFE"
495 XEQ 33
496 RTN
497*LBL 25
498 "HEAR SQ
UEEKS"
499 XEQ 33
500 FS? 13          BATS
501 RTN
502 TONE 9
503 TONE 9
504 4
505 XEQ 99
506 CF IND X
507 SF 09
508 "SNATCH"
509 XEQ 33
510*LBL E            BATS TOOK ()
511 XEQ 43
512*LBL 47
513 FC? 00
514 "+KEY "
515 FC? 01
516 "+LAMP "        EQUIPMENT
517 FC? 02          LIST
518 "+WATER
"
519 FC? 03
520 "+KNIFE
"
521 FC? 04
522 "+GLOVES
"
523 FC? 09
524 "+NOTHIN
G"
525 XEQ 33
526 GTO 00
527*LBL 43            BATS TOOK
528 "BATS TO
OK "
529 RTN
530*LBL 26
531 "HEAR VO
ICE"
532 FS? 13
533 GTO 33          WIZARDS
534 XEQ 33
535 TONE 4
536 TONE 5          WIZ. TONES
537 TONE 6
538 "WIZARD"
539 XEQ 33
540 SF 13
541 RCL 73          SET BOUNDS
542 3               OF WIZARD
543 -
544 1
545 X<Y?
546 X<>Y
547 STO 75
548 6
549 +
550 67
551 X>Y?
552 X<>Y
553 1000
554 /
555 ST+ 75
556*LBL 96           TEST CAVE
557 "CAVE "         CONTENT
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                DISPLAY
574 X<>Y                  EMPTY
575 X=Y?
576 "⊢ 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: MCHESS and P (for print board). The main program, MCHESS is independent of P and if the printer is not to be used then only MCHESS 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          P(82143A) 80 BYTES
TOTAL PROGRAM BYTES:  972           P(82162A) 82 BYTES
```

DATA REGISTERS

With "P" entered, TOT. REG. 247
Without "P" entered, TOT. REG. 236

00 ... 15		scratch		
16	+9	Rook	King & Queen	move directions arrays
17	-9			
18	+1			
19	-1			
20	-10	Bishop		
21	-8			
22	10			
23	8			
24	-19	Knight		
25	-17			
26	-7			
27	-11			
28	19			
29	17			
30	7			
31	11			
32	16.019	Rook	Directions arrays pointers	
33	24.031	Knight		
34	20.023	Bishop		
35	16.023	Queen		
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

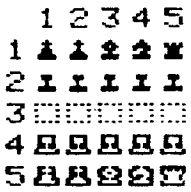
DISPLAY	INPUT	FUNCTION	COMMENTS
	Load P*	[GTO] ..	
PACKING	Load MCHESS	[GTO] ..	
PACKING		[XEQ] SIZE 097	
		[XEQ] MCHESS	
CARD	Load data card (2 tracks)		
If a printer exists in the system then the board will now be printed			
HP 1st?	N	[R/S]	
PRINT YOUR MOVE?**	Y	[R/S]	
FROM?	41	[R/S]	
TO?	31	[R/S]	
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		[R/S]	
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

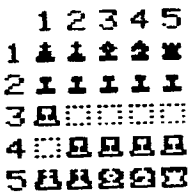
Initial board configuration



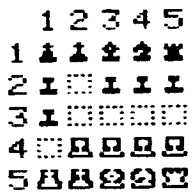
The player's move

The calculator's move

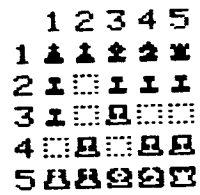
From 41 to 31



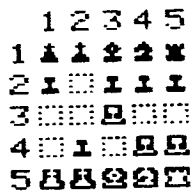
I MOVE
FROM 22 TO 31



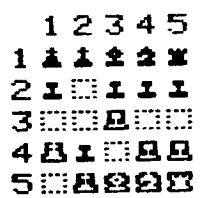
From 43 to 33



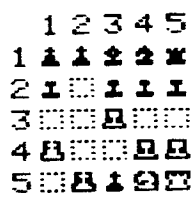
I MOVE
FROM 31 TO 42, CHECK



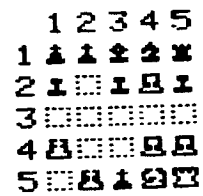
From 51 to 41



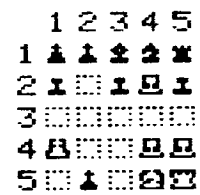
I MOVE
FROM 42 TO 53



From 33 to 24



I MOVE
FROM 53 TO 52, CHECK



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.		[GTO] ..	PACKING
	(Printer in MAN mode) Load the MCHESS		[GTO] ..	PACKING
	program.			
2	Start the program		[XEQ] "MCHESS"	
	If size not properly set, will see			SET SIZE 097
	"Set Size 097"		[XEQ] "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
IF YOU MOVE FIRST				
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	XY	[R/S]	I MOVE FROM
	want the piece moved			__ 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			CHECKMATE
	save it - checkmate	-1	[R/S]	I WON
IF THE CALCULATOR MOVES FIRST				
	"I MOVE" shows in the display.			I MOVE
5b	After the move is completed, will see			FROM __ TO __
	(CHECK is displayed if your king is now			(CHECK)
	under 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			STALEMATE
	move, but is not under check			
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
 02 CLRG
 03 FIX 0
 04 CF 29
 05 "SET SIZ
E 97"
 06 SF 25
 07 RCL 96            Size <97?
 08 FC?C 25           Prompt to
 09 PROMPT            Set size 97
 10 SF 25
 11 RCL 97            Size >97
 12 FS?C 25           Prompt to
 13 PROMPT            Set size 97
 14 18.049
 15 RDTAX             Load constants &
 16 9                  special char.
 17 STO 16            Dir. for Rook
 18 ST- 17             move not stored
 19 6.5                on data cards
 20 STO 92            Store Kings (Ki)
 21 ST- 56
 22 5.09
 23 STO 93            Store Queens (Q)
 24 ST- 57
 25 4.03              Store Bishops (B)
 26 STO 94
 27 ST- 58
 28 1.01              Store Pawns (P)
 29 STO 83
 30 STO 84
 31 STO 85
 32 STO 86
 33 STO 87
 34 ST- 65
 35 ST- 66
 36 ST- 67
 37 ST- 68
 38 ST- 69
 39 INT
 40 -                 Store Knights(Kn)
 41 STO 95
 42 ST- 59
 43 2.05              Store Rooks (R)
 44 STO 96
 45 ST- 60
 46 "A"               Store boundaries
 47 50.091
 48 SIGN              50.091 in LASTX
 49◆LBL 01            Store "A" in all
 50 RCL IND            empty registers
L
 51 X=0?
 52 ASTO IND
 L                    Next position
 53 ISG L
 54 GTO 01            Clear row between
 55 ΣREG 74            pawns
 56 CLΣ
 57 ASTO 79           If printer-print
 58 FS? 55             board
 59 XEQ "P"           (Separate prog.)
 60 "N"
 61 ASTO Y            Who's first?
 62 "HP 1ST?
"
 63 AON
 64 PROMPT
 65 ASTO X            If calc. to move
 66 AOFF               first
 67 X≠Y?
 68 GTO 00            GTO 00
 69◆LBL 99            Your move
 70 CF 00
 71 FS? 55
 72 XEQ 16
 73 "FROM?"
 74 PROMPT
 75 "I"
 76 X<0?              Checkmate?
 77 GTO 04
 78 X=0?              Stalemate?
 79 GTO 05
 80 XEQ 06            Board pos. to
 81 STO 00             Reg. number
 82 "TO?"             Reg. no. of piece
 83 PROMPT
 84 XEQ 06            Board pos. to
 85 STO 01             reg. #
 86 CLX               Reg. # of dest.
 87 X<> IND           Move piece
00
 88 STO IND
01
 89 XEQ 07            Queening move?
 90 FC? 55            No printer?
 91 GTO 00
 92 FS? 00            Print option?
 93 XEQ "P"
 94◆LBL 00            Calc. move
 95 "I MOVE"
```

PROGRAM LISTING

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

PROGRAM LISTING

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

PROGRAM LISTING

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

PROGRAM LISTING

```
383 8                  Offset forw,
384◆LBL 00              right diagonal
385 XEQ 09             Add offset & test
386 FS? 18              dest.
387 RTN                Off board?
388◆LBL 12
389 INT                Piece
390 6                  King
391 X≠Y?               Is dest. piece
392 RTN                 not the w King?
393 .41                Increment move
394 ST+ 06              value piece
395 RDN
396 RTN
397◆LBL 07             W move evaluation
398 CF 01              Init. piece flags
399 CF 02
400 CF 03
401 2                  Rook
402 X>Y?               Is piece a Pawn?
403 GTO 12
404 X<>Y
405 30                 Gen. index for
406 +                   steps 402 & 403
407 XEQ IND            32-36 (431-437)
X                      Set piece flags
408 RCL IND            32-36, move
X                       offset pointer
409 STO 14             Store offset
410◆LBL 28              pointer
411 RCL 11             Current move
412 STO 15              origin
413◆LBL 29
414 RCL IND            First poss. move
14                      offset
415 ST+ 15             Actual dest.
416 RCL 15
417 XEQ 08             Move off board?
418 FS? 18
419 GTO 00             Next poss. move
420 X>0?               W piece there?
421 GTO 00             Next possibility
422 CF 10              Init. empty
423 X=0?                space flag
424 SF 10              Empty space? Yes
425 XEQ 13             Move value?
426 FS? 19             Worse than last?
427 RTN                Yes
428 FS? 01             W Ki or Kn?
429 GTO 00             Next possibility
430 FS? 10             Blank space?
```

```
431 GTO 29
432◆LBL 00             Next move
433 ISG 14             Increment Offset
434 GTO 28              pointer
435 RTN
436◆LBL 36             W King move
437 SF 03
438◆LBL 33             W Knight move
439 SF 01
440◆LBL 32             W Rook move
441◆LBL 34             W Bishop move
442◆LBL 35             W Queen move
443 RTN                W Pawn move
444◆LBL 12             W Pawn move flag
445 SF 02              Pawn position
446 RCL 11             Forward offset
447 RCL 17             Add offset & test
448 XEQ 09             Off board?
449 FS? 18
450 1                  Unoccupied dest?
451 X=0?               Evaluate move
452 XEQ 13             Worse than last
453 FS? 19              move? yes
454 RTN                Current move orig.
455 RCL 11             Forw, left diag.
456 RCL 20              offset
457 XEQ 00             Test move
458 FS? 19             Worse move?
459 RTN                Current move orig.
460 RCL 11             Forw, right offset
461 RCL 21
462◆LBL 00             Add offset & test
463 XEQ 09             Off board?
464 FS? 18             yes
465 RTN                Occupied by which
466 X≠0?               pieces?
467 X>0?
468 RTN                Evaluate w move
469◆LBL 13
470 FRC
471 ABS
472 1 E2
473 *                  Value of dest.
474 FS? 03              contents
475 .4                 W King move?
476 FS? 03             Decreased value
477 -                  W King move
478 FS? 02             Decreased value
479 XEQ 13             W Pawn move?
480 RCL 06             Eval. Pawn move
481 X<>Y               B move value
```

PROGRAM LISTING

```
482 -                  Diff. between b
483 RCL 00              & w move value
484 X<>Y               Best b move value
485 X<=Y?              Worse move?
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
512 "PRINT Y           Print every move?
OUR"
513 "⊢ 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
529 X=0?                alpha then
530 SF 18              Off board
531 LASTX              Recall contents
532 .END.               of destination
```

PROGRAM LISTING

HP-82143 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         Skip 2 columns
25 RCL IND 15     Get piece from
26 INT             board
27 43             Generate index
28 +               to special
29 RCL IND X       characters
                  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.
```

HP-82162A Version

```
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-xOO" (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 MATCHxO, 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,xxO. 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"	
		[XEQ] "C"	We want to ring up two credits,
1 CREDIT		[XEQ] "C"	so must press [XEQ] "C" twice.
2 CREDITS			
		[XEQ] "B"	There is only one player, so
1 CREDIT			[XEQ] "B" once--use one credit.
PLAYERS = 1			
		[XEQ] "A"	Start the game.
PLAYER NO. 1			
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 - 23470			Continue game
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
				BALL 1 (flashes)
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-YYYYO
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,			XOOO
	see page 38)			(X-1) OOO
	GO TO STEP 8			.
				Player X-score-YYYYO
12	When the last player's last ball goes			BONUS SCORE -
	"OUT"			XOOO
				(X-1) OOO
				.
				Player X-score-YYYYO
				MATCH - XO
				HISCR - XXXXX
				Player 1-score-AAAAA
				(Player 2-score-BBBBB)
				!
				GAME OVER
13	To review money spent to date		[XEQ] "E"	$X.OO
14	To review total (existing) credits		[XEQ] "D"	X CREDIT

USER INSTRUCTIONS

SIZE: 064

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
	*If DATA ERROR is displayed, reenter your seed & press [R/S]			
	Note: If the "HIGH-SCORE TO DATE" register does not contain a value,			
	the high score will be 0 and the first player will be awarded a free			
	game credit no matter how low the score.			
	Since the presence of a printer in the system configuration will slow			
	execution time considerably (as well as use a lot of paper), it is			
	recommended that a printer not be used.			

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

PROGRAM LISTING

```
100 TONE 8
101 TONE 8
102 TONE 9
103*LBL 13          New ball-
104 41               reset player
105 STO 58
106 1
107 STO 48
108*LBL 14           Same ball-
109 1                next player
110 STO 46          Outbonus-1
111 1.003           Reset drop
112 STO 51           targets
113 0               Kick out hole=0
114 STO 47
115 25              Bonus multiplier
116 STO 49          Clear flags
117 XEQ a
118 SF 01
119 CF 02
120 CLA             Display which
121 ARCL 30          player is up
122 "⊢ NO. "
123 ARCL 48
124 AVIEW
125 PSE
126 CLA             Display ball
127 ARCL 15          count
128 ARCL 50
129 CF 22
130*LBL 15          Loop until digit
131 AVIEW            key is pressed
132 PSE
133 FC?C 22
134 GTO 15
135*LBL 16          (select. scoring
136 12               device)
137 XEQ 09          Get random #
138 4               -3>=rand#>=8
139 -
140 X>0?            Score?
141 GTO 17          Yes-go to LBL17
142 FS? 02          Any other score?
143 GTO 18          Yes-go to Lbl18
144 "NO "           No-give ball
145 ARCL 25          back to be
146 ARCL 21          reshot
147 ARCL 22
148 AVIEW
149 PSE
150 GTO 14          Start over
```

```
151*LBL 17          (score made)
152 SF 02           Set score flag
153 CLA             Display device
154 ARCL IND         hit
 X
155 GTO IND         Do dev. routine
X
156*LBL 18          (flippers & out)
157 -2
158 X<>Y            If -2, same as
159 X=Y?             0; set display
160 0
161 X<0?            If -1 or -3 go to
162 GTO 19           flipper routine
163 RCL 00          else - dsp "OUT"
164 CLD
165 PSE
166 FC?C 22         Tried a tilt?
167 GTO 20
168 2               Yes-test for key
169 X≠Y?             go it?
170 GTO 20          Yes-go get
171 5                random #
172 XEQ 09          "TILT" if 1
173 1
174 X=Y?
175 GTO 21
176 GTO 16
177*LBL 20          No tilt tried
178 CLA              display "OUT"
179 ARCL 20
180 ARCL IND        Out bonus
 49
181 AVIEW
182 PSE
183 RCL 46          Act. bonus score
184 29              Bonus <29?
185 X<Y?
186 STO 46          Reset if greater
187 RCL 49           multiplier
188 24              Reduce to normal
189 -
190 ST* 46          bonus X multip.
191 RCL 40          bonus val. =
192 RCL 46
193 *
194 ST+ IND         Add to player
58                   score
195 FIX 3           Set display for
196 CF 28            bonus loop
197 RCL 46
```

PROGRAM LISTING

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

PROGRAM LISTING

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

PROGRAM LISTING

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

PROGRAM LISTING

```
490 ENTER↑
491 ENTER↑
492 4
493 +
494 X<>Y
495 7
496 +
497 CLA
498 ARCL IND
  X                 Display hit
499 SF IND Y         Set target flag
500 500
501 ST+ IND
58                  Score 500 points
502 ARCL X
503 AVIEW
504 TONE 6
505 TONE 6
506 TONE 6
507 TONE 6
508 TONE 6
509 FC? 05
510 GTO 34          Target A?
511 FC? 06
512 GTO 34          Target B?
513 SF 20
514 26              Set bonus flag
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

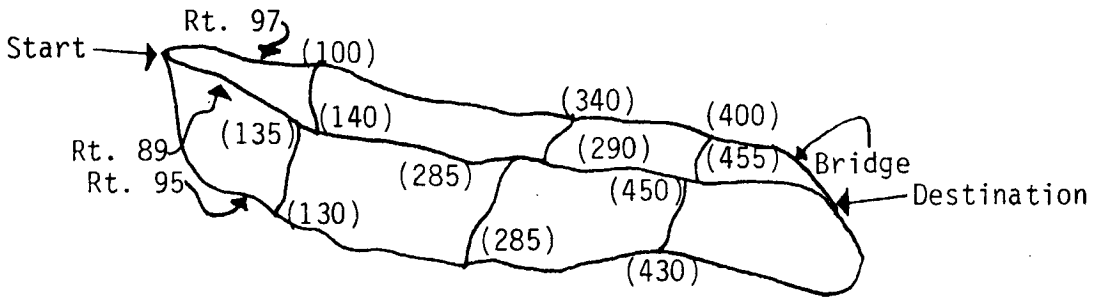
00-03	Time Smokey will remain	(Route #95)
04-06	Time to clear slide	(Route #89)
07	Time for road to dry	
08	Time to clear slide	(Route #97)
09	Time to repair bridge	
10	Random number	
11	Route	
12	Speed	
13	Previous position	
14	Present position	
15	Money	
16	Present position or HMS conversion	
17	Trip 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.?	N (ENTER ↑)	[R/S]	That doesn't affect us-no changes
BREAKER 19			
WET ROAD AT			
M.P. 165 ON 97			
SPEED LMT. 35			
ROUTE 89			
SPEED = 55MPH			
MI. POST 110			
CH. SPEED/RT.?	N	[R/S]	Route 89 is still clear
BREAKER 19			
SMOKEY AT			
M.P. 575 ON 95			
ROUTE NO. 89			
SPEED = 55MPH			
MI. POST 165			
CH. SPEED/RT.?	N	[R/S]	Let's keep going
BREAKER 19			
SMOKEY AT			
M.P. 290 ON 95			
ROUTE NO. 89			
SPEED = 55MPH			
MI. POST 220			
CH. SPEED/RT.?	N	[R/S]	No danger yet--keep trucking
BREAKER 19			
SMOKEY AT			
M.P. 135 ON 95			
ROUTE NO. 89			
SPEED = 55MPH			
MI. POST 275			
CH. SPEED/RT.?		[R/S]	Let's try another road (R/S=Yes)
SPEED-A/RT.-B		[XEQ] "B"	Press "B" for route change
DRIVING TIME	.1622	[R/S]	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-O-O-O-O!!!
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≤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 no changes are desired	N	[R/S]	BREAKER 19
	(Ignore display when "N" [ENTER] is			"CB messages &
	pressed)			consequences"
6	Go to step 5 or 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			

USER INSTRUCTIONS

SIZE: 019

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
17	If you have gone past your exit and wish			
	to return, execute steps 7 and 10 as			
	directed. Enter driving time as directed			
	in step 11 except enter "Change Direction"			
	before pressing [R/S].	.mmss	CH. DIR**R/S	BREAKER 19
				"CB messages &
				consequences"
18	Go to step 6			
19	To restart game after reaching destination		[XEQ] [SHIFT]"a"	SEED?
	Go to step 2			
20	End of Game (if on time)			ON TIME:
				MONEY $
			[R/S]	TIME TO GO:
				__HR__MIN__SC
21	End of Game (if late)			LATE:
				MONEY $
			[R/S]	TIME: OVER
				__HR__MIN__SC
				ROUTE NO.___
	*Display will reprompt if entry is invalid			
	** CHS on keyboard			

PROGRAM LISTING

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

PROGRAM LISTING

```
 94 XEQ IND
X
 95 RTN
 96◆LBL 62          Random Number
 97 RCL 10          generation
 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
109 14             position
110 STO 18         see if past
111 135            smokey
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
 $"
149 ARCL X
150 AVIEW
151 PSE
152 .25             "Time" penalty
153 ST- 17
154 RCL 16
155 STO 14          Restore position
156 GTO 10
157◆LBL 22
158 RCL 11          Determine "Route"
159 95
160 X=Y?
161 GTO 52
162 RCL 11
163 89
164 X=Y?
165 GTO 53
166 RCL 14
167 500
168 STO 18          Test to see if
169 -              at destination
170 X<0?
171 GTO 51
172◆LBL 54
173 RCL 12          Correct "Time"
174 /              and "Position"
175 ST+ 17         if at Destination
176 RCL 18
177 STO 14
178 RCL 17
179 X<0?
180 GTO 55
181 "ON TIME        Test for "On
"                  Time" or "Late"
182 AVIEW
183 PSE
184◆LBL 56
185 "MONEY=$
"
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                Test to see if at
202 725                   destination
203 STO 18
204 -
205 X<0?
206 GTO 51
207 GTO 54
208◆LBL 53
209 RCL 14                Test to see if
210 550                   at destination
211 STO 18
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
```

PROGRAM LISTING

```
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
18
304◆LBL 20
305 "SPLASH"        "Hit" Bridge Out
306 AVIEW
307 PSE
308 "WET FEE
T"
309 GTO 21
310◆LBL 18          Test speed at
311 RCL 12          "Wet Road"
312 35
313 -
314 X<=0?
315 RTN
316 "-+-+SKI        Skid on "Wet
D+-+-"              Road"
317 AVIEW
318 PSE
319 GTO 11
320◆LBL 00
321 3
322 ST+ 00
323◆LBL 23          Mile Posts for
324 XEQ 33          CB Messages
325 "M.P. 13
5 ON 95"
326 AVIEW
327 PSE
328 RTN
329◆LBL 01
330 3               Input (Increase)
331 ST+ 01          Time for
332◆LBL 24          obstacle
333 XEQ 33
334 "M.P. 29
0 ON 95"
335 AVIEW
336 PSE
337 RTN
338◆LBL 02
339 3
340 ST+ 02
341◆LBL 25
342 XEQ 33
343 "M.P. 44
5 ON 95"
344 AVIEW
345 PSE
346 RTN
347◆LBL 03
348 3
349 ST+ 03
350◆LBL 26
351 XEQ 33
352 "M.P. 57
5 ON 95"
353 AVIEW
354 PSE
355 RTN
356◆LBL 33
357 "SMOKEY
AT"                 "Smokey" Message
358 AVIEW
359 PSE
360 RTN
361◆LBL 04           Mile Post for CB
362 3               Messages
363 ST+ 04          Time for
364 RDN             obstacle
365◆LBL 27
366 XEQ 17
367 "M.P. 14
5 ON 89"
368 AVIEW
369 PSE
370 GTO 15
371◆LBL 05
372 3
373 ST+ 05
374 RDN
375◆LBL 28
376 XEQ 17
377 "M.P. 30
0 ON 89"
378 AVIEW
```

PROGRAM LISTING

```
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          "Rock Slide"
392 "ROCK SL        Warning
IDE"
393 AVIEW
394 PSE
395 RTN
396◆LBL 07
397 3
398 ST+ 07
399◆LBL 30          "Wet Road"
400 "WET ROA        Warning
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               Time for obstacle
412 ST+ 08
413 RDN
414◆LBL 31          Mile Post for CB
415 XEQ 17          Messages
416 "M.P. 40
5 ON 97"
417 AVIEW
418 PSE
419 GTO 15
420◆LBL 09
421 4
422 ST+ 09
423 RDN
424◆LBL 32
425 "BRIDGE         "Bridge Out"
OUT"                Warning
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 "⊢ HR."
435 AVIEW
436 PSE
437 RTN
438◆LBL B           "Route" Change
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        "Driving Time"
 TIME"              Prompt
451 PROMPT
452 HR              Convert from
453 STO 18          Hours
454 INT
455 X≠0?            Test for invalid
456 GTO B           time
457 XEQ 60
458 RCL 18
459 ABS
460 ST- 17
461 RCL 16
462 STO 13          Restore
463 RCL 12          "Positions"
464 RCL 18
465 *
466 ST+ 14
467 RCL 18
468 X<0?
```

PROGRAM LISTING

```
469 CF 28
470 X<0?
471 XEQ 63          Test for
472 XEQ IND         direction of
11                  travel
473 FC? 28
474 XEQ 63
475 RCL 11          Test for Route
476 95              Number
477 X=Y?
478 GTO 50
479 RCL 11
480 89
481 X=Y?
482 GTO 34
483 35
484 ENTER↑
485 100             Test for "Exit"
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 AVIEW
498 PSE
499 GTO 22
500◆LBL 63          Exchange Present-
501 X<> 13          Previous
502 X<> 14          Position if
503 X<> 13          traveling away
504 RTN             from destination
505◆LBL 35
506 89
507 STO 11          Reenter Position
508 140             after "exit"
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
518 89
519 STO 11
520 455
521 STO 14
522◆LBL 39
523 .25             Time required to
524 ST- 17          "Exit"
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              Test for "Exit"
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
```

PROGRAM LISTING

```
568 48
569 ENTER↑
570 455
571 XEQ 38
572 GTO 59
573◆LBL 40          Restore Position
574 89              after "Exit"
575 STO 11
576 135
577 STO 14
578 GTO 39
579◆LBL 41
580 89
581 STO 11
582 285
583 STO 14
584 GTO 39
585◆LBL 42
586 89
587 STO 11
588 450
589 STO 14
590 GTO 39
591◆LBL 43
592 95
593 STO 11
594 130
595 STO 14
596 GTO 39
597◆LBL 44
598 95
599 STO 11
600 285
601 STO 14
602 GTO 39
603◆LBL 45
604 95
605 STO 11
606 430
607 STO 14
608 GTO 39
609◆LBL 46
610 97
611 STO 11
612 100
613 STO 14
614 GTO 39
615◆LBL 47
616 97
617 STO 11
618 340
619 STO 14
620 GTO 39
621◆LBL 48
622 97
623 STO 11
624 400
625 STO 14
626 GTO 39
627◆LBL D           "Time" Display
628 "TIME:"
629 RCL 17
630 X<0?
631 "⊢ OVER"
632 X>0?
633 "⊢ TO GO
"
634 AVIEW
635 PSE
636 HMS             Convert to Hours-
637 ABS             Minutes-Seconds
638 STO 16
639 INT
640 CLA
641 ARCL X
642 "⊢HR."
643 RCL 16
644 FRC
645 1 E2
646 *
647 STO 16
648 INT
649 ARCL X
650 "⊢MN."
651 RCL 16
652 FRC
653 1 E2
654 *
655 INT
656 ARCL X
657 "⊢SC."
658 AVIEW
659 STOP
660 GTO 10
661◆LBL C           "Status" Display
662 "STATUS:
"
663 AVIEW           Test for CB
664 23.032          Messages
665 ENTER↑
666 .01
667◆LBL 49
```

PROGRAM LISTING

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

Display CB
Messages

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 kets 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	Indirect address
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 :---O*---
5 :---*O---
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		
6.W35.02 7.B36.01 W?	53	[R/S]	
8.W53.03 9.B63.01 W?	46	[R/S]	
10.W46.01 11.B56.02 W?	64	[R/S]	
12.W64.02 13.B25.02 W?			

```
  12345678
1 :--------
2 :----*---
3 :--00**--
4 :--00**--
5 :--00**--
6 :--*000--
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?

```
  1 2 3 4 5 6 7 8
1:0 0 0 0 0 0 0 0
2:* 0 0 0 0 0 0 *
3:* 0 0 0 0 0 0 *
4:* 0 0 0 0 * 0 *
5:* 0 * 0 * 0 0 *
6:* * * * 0 * 0 *
7:* - * * * * * *
8:* * * * * 0 0 *
```

```
  12345678
1 :00000000
2 :*000000*
3 :*000000*
4 :*0*00*0*
5 :*0***00*
6 :*******0*
7 :*-*****-*
8 :******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.XO.OO
	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

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
	To continue the game		[XEQ] "B"	PLAY Y?
	Enter your play.			
10	When game ends due to "no plays exist"			
	condition, TALY: executes automatically			
11	If a printer is used it should be in			
	MAN mode.			

PROGRAM LISTING

```
 01◆LBL "FLI
PO"
 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       Recheck SIZE,
 14 GTO 12         if necessary
 15 ΣREG 94
 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
 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?"
```

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             To .155, Lbl 16
116 GTO IND         ----------------
00                  Readjust addresses
117*LBL 01          stored in certain
118 RCL 28          board registers
119 X<> 67          to prepare for
120 X<> 88          game with
121 STO 28          handicaps
122 RCL 27
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            10
163 RCL 10          Next IND GTO
164 STO 00           address
165 1/X             Occupy center
166 ST+ 44           board squares
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          Occupy the
176*LBL 03           handicap squares
177 ST+ 81
178*LBL 02
179 ST+ 11
180*LBL 01
181 ST+ 18          ----------------
182*LBL 00          (0.1 in X)
183 FC? 42          Machine plays
184 CHS              first?
185 STO IND         Occupied sq code
90                   & sign digit
186 SIGN            +1 or -1
187 " W"            White discs
188 ASTO IND        Copy "W" into
 91                  R101 & R102
189 ASTO IND
 92
190 " B"            Black discs
191 X<0?            Machine first?
192 ASTO IND        Save in R100
 91
```

PROGRAM LISTING

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

PROGRAM LISTING

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

PROGRAM LISTING

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

PROGRAM LISTING

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

PROGRAM LISTING

```
573 GTO 09
574◆LBL B          To abort see Bd
575 ADV
576 CLD
577 CLST
578◆LBL D          Prevents a 2nd
579 GTO IND         xeq'n of .161
00                 To .283, .453,
580◆LBL 55          or .490
581 CF 04          Check printer
582 SF 12           status and
583 SF 21           other house-
584 SF 25           keeping
585 SF 27          Error ignore flag
586 CLA            User mode flag
587 ACA            NOP, if prtr. is
588 CLD             ON
589 FS?C 25        Prevent right
590 SF 04           scroll if error
591◆LBL 02         Printer ON?
592 CLA            From .531, .343
593 FIX 0
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 "⊢ "           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	Helps calculate +'s
05	
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

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Enter the program		[GTO] ..	PACKING
2	Set size 024			
3	Execute program		[XEQ] "CC"	NO. DIGITS?
4	Enter number of digits in hidden code			
	(must be 4, 5 or 6)	n	[R/S]	NO. IN CODE?
5	Enter highest number allowed in code	m	[R/S]	SEED?
	$(6 \leq M \leq 9)$			
6	Enter a seed. May be any fractional number	seed	[R/S]	GUESS N
7	Enter first guess - N digits	guess	[R/S]	guess [ ]
	In the display [ ] may contain nothing or			
	+(s) and/or *(s).			
8	Enter next guess	guess	[R/S]	guess [ ]
9	Repeat step #8 until display shows:			OK, X guesses
	Where X is number of guesses			
10	To play another game with the same			
	conditions.		[XEQ] "C"	GUESS N
11	To play another game with different			
	conditions.		[XEQ] "CC"	NO. DIGITS?

PROGRAM LISTING

```
01*LBL "CC"
02 FIX 0
03 CF 29
04 SF 21
05 "NO. DIG
ITS?"                 Prompts for and
06 PROMPT             stores # of
07 STO 12             digits in code
08 "NO. IN            Highest code #
CODE?"                and seed
09 PROMPT
10 STO 11
11 "SEED?"
12 PROMPT
13 STO 10
14*LBL C
15 CF 27
16 9
17 ENTER↑
18 0                  Zeros # of
19 STO 14             guesses
20*LBL 00
21 STO IND            Zeros R9-R1
Y
22 DSE Y
23 GTO 00
24 XEQ 06
25*LBL 01             Changes Value in
26 RCL 10             R10 (seed)
27 997                Random number
28 *                  generator
29 FRC
30 STO 10
31 RCL 11
32 *                  Store by element
33 INT                R16-R21
34 1
35 +                  Store "Inventory
36 STO IND            List" R9-R1
13
37 1
38 ST+ IND
Y
39 DSE 13
40 GTO 01
41 "GUESS"
42 ARCL 12            Prompt for 1st
43 AVIEW              Game
44*LBL 14             Evaluate Guess
45 CF 05              Clear-modify
46 STO 00             inventory R9-R1
47 1
48 ST+ 14             # of guesses
49 0
50 STO 22             Initialize # of
51 STO 23             correct elements
52*LBL 10
53 RCL 00
54 STO 15
55 XEQ 06
56*LBL 02             Process guess
57 RCL 15
58 10
59 /
60 FRC
61 LASTX
62 INT
63 STO 15
64 RDN
65 10
66 *
67 1
68 FC? 05             Clear flag?
69 ST- IND            Modify inventory
Y                     list for (+)
70 FS? 05             elements
71 ST+ IND            Set flag?
Y                     Change to evaluate
72 FS? 05             next guess
73 GTO 11
74 RDN
75 RCL IND            CHECK for
13                    completely
76 X=Y?               correct elements
77 XEQ 03
78*LBL 11             Loop for each
79 DSE 13             element of
80 GTO 02             guess
81 FS? 05
82 GTO 12
83 RCL 12
84 RCL 22
85 X=Y?               Is guess
86 GTO 04             'perfect'
87 9
88 STO 13
89*LBL 05
90 RCL IND            Used modified
13                    inventory to
91 X>0?               calculate +
92 ST+ 23             guesses
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          Score 1 for each
104 1               totally correct
105 ST+ 22          element
106 RTN
107◆LBL 06          Help set up loops
108 RCL 12
109 15.01501
110 +
111 STO 13
112 RTN
113◆LBL 04          Correct guess
114 SF 27
115 "OK. "
116 ARCL 14
117 "⊢ TRIES
"
118 AVIEW
119 RTN
120◆LBL 12          Build output
121 CLA             of *'s and +'s.
122 ARCL 00
123 "⊢   "
124 RCL 22
125 X=0?
126 GTO 07
127◆LBL 08
128 "⊢*"
129 DSE X
130 GTO 08
131◆LBL 07
132 RCL 23
133 X=0?
134 GTO 13
135◆LBL 09
136 "⊢+"
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.fgghhiijj 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.iijjiijj 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 barriors, but not the happening barriors.
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"	
"YOURE IN A HANGAR"			
"WITH"			
"ELEVATOR DOOR HERE"			
"YOU SEE:"			
"DOOR"	OPEN	[R/S]	
"OPEN?"	DOOR	[R/S]	
"ALARM"			
"YOURE 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
"YOURE IN A 'HANGAR"			
etc.	EXAMINE	[R/S]	
"EXAMINE?"	DOOR	[R/S]	
"YOURE IN A HANGAR"			
"WITH"			
"ELEVATOR DOOR HERE"			
"YOU SEE:"			
"LATCH"			
"DOOR"	PULL	[R/S]	
"PULL?"	LATCH	[R/S]	
"GO IN?"		[R/S]	
"DOOR CLOSES"			
"YOURE 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
RR01 - 0
RR02 - 9
RR03 - -95.                I (CELL)
RR04 - 0                   I
RR05 - "R HERE"            I (HANGER)
RR06 - "OR DOO"            I
RR07 - "ELAVAT"            I
RR08 - 94.                 I
RR09 -   .92               I
RR10 - -77.                I (VATOR)
RR11 -   .798385           I
RR12 - "ARRAY"             I (LOUNGE)
RR13 - "OF DIS"            I
RR14 - "SIGNS"             I
RR15 - 74.2211             I
RR16 -   .736968           I
RR17 - "  AHEAD"            I (OFFICE)
RR18 - "DOOR"              I
RR19 - "RITY"              I
RR20 - "A SECU"            I
RR21 - 59.0016             I
RR22 -   .5856             I
RR23 - "ABOVE"             I (GEN RM)
RR24 - "CE UP"             I
RR25 - "L OFFI"            I
RR26 - "CONTRO"            I
RR27 - 45.                 I
RR28 -   .474736           I
RR29 - "  HERE"            I (OFFICE)
RR30 - "L DESK"            I
RR31 - "CONTRO"            I
RR32 - 59.                 I
RR48 - "LOSES"
RR49 - "DOOR C"
RR50 - 2.90499    *E57     (SLOT)
RR51 - 2.904701628*E57     (SLOT)
RR52 - "ALARM"
RR53 - 1.902001604*E18     (DOOR)
RR54 - " ON"
RR55 - "SENSOR"
RR56 - 1.906002650*E55     (SENSOR)
RR57 - "SLOT"
RR58 - 1.805000150*E18     (DOOR)
RR59 - "OFFICE"
RR60 - "MURAL"
RR61 - "DIME"
RR62 - "CHAIRS"
RR63 - "ID"
RR64 - "LOCKER"
RR65 - 1.601      *E61     (DIME)
RR66 - "O SAFE"
RR67 - "NOPE N"
RR68 - 1.911001067*E60     (MURAL)
RR69 - 1.905000165*E62     (CHAIRS)
RR70 - 1.601      *E63     (ID)
RR71 - 1.905000170*E64     (LOCKER)
RR72 - "HMM.."
RR73 - 1.902001871*E64     (LOCKER)
RR74 - "LOUNGE"
RR75 - "LEVER 1"
RR76 - "LEVER 2"
RR77 - "VATOR"
RR78 - 1.902000316*E18     (DOOR)
RR79 - 1.9        *E18     (DOOR)
RR80 - 1.908002679*E75     (LEVER 1)
RR81 - "MOVES"
```

ADVENTURE DATA SET 1 - TERRORIST DAM

RR33 - .344337 I

RR34 - 1.9 *E93 (DESK)

RR35 - "STAIRS"

RR36 - 1.907000333*E35 (STAIRS)

RR37 - 1.907000328*E35 (STAIRS)

RR38 - 1.911000392*E44 (PHONE)

RR39 - "ARM-"

RR40 - "CH -AL"

RR41 - "CE MAT"

RR42 - "NO VOI"

RR43 - 2.806651704*E44 (PHONE)

RR44 - "PHONE"

RR45 - "GEN RM"

RR46 - "GEN"

RR47 - 1.9 *E46 (GEN)

RR82 - "VATOR"

RR83 - 1.908002704*E75 (LEVER 1)

RR84 - "KLUNK"

RR85 - 1.913002683*E76 (LEVER 2)

RR86 - "ALARM"

RR87 - 1.902001704*E18 (DOOR)

RR88 - "LOSES"

RR89 - "DOOR C"

RR90 - 1.913001611*E91 (LATCH)

RR91 - "LATCH"

RR92 - 1.805000190*E18 (DOOR)

RR93 - "DESK"

RR94 - "HANGER"

RR95 - "CELL"

ADVENTURE DATA SET 2 - TERRORIST DAM

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

ADVENTURE DATA SET 2 - TERRORIST DAM

RR33 - "SECURI" I
RR34 - 86.0030 I
RR35 - .43 I
RR36 - 1.9 *E87 (PHONE)
RR37 - "ALARM"
RR38 - 1.902001604*E48 (DOOR)
RR39 - "LOCKED"
RR40 - 1.902001039*E44 (LOCKER)
RR41 - "BOARD"
RR42 - "INPUT"
RR43 - 1.805001793*E48 (DOOR)
RR44 - "LOCKER"
RR45 - "ROOM"
RR46 - 1.911000220*E59 (PANEL)
RR47 - 1.905000149*E48 (DOOR)

RR81 - 1.705201315*E82 (GEN)
RR82 - "GEN"
RR83 - "GEN RM"
RR84 - 1.907000315*E85 (STAIRS)
RR85 - "STAIRS"
RR86 - "HALL"
RR87 - "PHONE"
RR88 - 1.9 *E91 (DESK)
RR89 - .8876696684
RR90 - "ON"
RR91 - "DESK"
RR92 - 1.908002789*E93 (SWITCH)
RR93 - "SWITCH"
RR94 - "OFFICE"
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)
RR31 - "BYE UN"
RR32 - "OPEN"
RR33 - "LOCKS"
RR34 - 2.902530136 *E44 (COMP)
RR35 - 2.914001237 *E44 (COMP)
RR36 - 2.901001033 *E47 (MICRO)
RR37 - 1.905000150 *E48 (MEMORY)
RR38 - "KEY"
RR39 - 1.806001033 *E44 (COMP)
RR40 - 1.913001044 *E46 (DISKS)
RR41 - "SAFE"
RR42 - "FF, UN"
RR43 - "UTER O"
RR44 - "COMP"
RR45 - 1.913001044 *E49 (PLUG)
RR46 - "DISKS"
RR47 - "MICRO"

RR78 - 1.908001374 *E90 (KEY C)
RR79 - 1.908001373 *E91 (KEY B)
RR80 - "OPEN"
RR81 - "DOOR"
RR82 - 1.908002767 *E92 (KEY A)
RR83 - .8266
RR84 - 1.908001383 *E90 (KEY C)
RR85 - 1.908001373 *E91 (KEY B)
RR86 - .858466
RR87 - 1.908001368 *E90 (KEY C)
RR88 - 1.908001386 *E91 (KEY B)
RR89 - 1.908001369 *E92 (KEY A)
RR90 - "KEY C"
RR91 - "KEY B"
RR92 - "KEY A"
RR93 - -94.2215
RR94 - "HALL"
RR95 - "CELL"

USER INSTRUCTIONS

This program requires 159 program registers and 96 data registers

SIZE: 096

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load the program and pack		[GTO]..	PACKING
2	Set size 096			
3	Load data set (1) or "Terriost Dam"			
4	Begin the Adventure		[XEQ] "ADV"	You're in a
				etc.
5	When program annunciator goes off, enter			
	your action. Use verbs given in the	Verb	[R/S]	
	program description.			
6	After the calculator gives its response			
	enter your next action, etc.	Verb	[R/S]	
7	When the program calls for it, load			READ 2.
	data set 2 (or 3). Continue adventure			(or 3.)

PROGRAM LISTING

```
 01*LBL "ADV
"
 02 FIX 0
 03 CF 21
 04 AON
 05*LBL "L"
 06 RCL 02
 07 1
 08 -
 09 RCL IND
X
 10 "YOURE 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 "-N"
 49 FRC
 50 RCL 01
 51 *
 52 X>Y?
 53 "-S"
 54 FRC
 55 RCL 01
 56 *
 57 X>Y?
 58 "-E"
 59 FRC
 60 X≠0?
 61 "-W"
 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
 95 FS?C 09
 96 GTO 25
 97 RCL 00
 98 INT
 99 XEQ 18
100 RCL 00
101 INT
102 1 E2
103 ST/ 00
104 RDN
105 ST+ 00
106 GTO 11
107*LBL "IN"
108 CLA
109 RCL 00
110 FRC
111 CLD
112*LBL 21
113 1 E2
114 *
115 X=0?
116 GTO 00
117 RCL IND
X
118 X<0?
119 GTO "S"
120 LOG
121 VIEW IND
 X
122 RDN
123 FRC
124 GTO 21
125*LBL 00
126 FS? 14
127 RTN
128 STOP
129 GTO 16
130*LBL "TH"
131 SF 11
132*LBL "DR"
133 CLX
134 XEQ 15
135 R↑
136 INT
137 ST+ IND
02
138 1 E2
139 ST/ IND
02
140 X<>Y
```

If an item is not specifically protected against being picked up. GET will remove it from the room and add to the player's inventory list.

INVENTORY ROUTINE

Subroutine. Gives the names of the items contained in the inventory. (i.e., what is being carried.)

THROW ROUTINE:

DROP ROUTINE:

Add item Thrown or Dropped to the room the player is in

```
141 XEQ 05
142 FC?C 11
143 GTO 11
144 3
145 STO 01
146 SF 12
147 RCL IND
02
148 1 E2
149 *
150 XEQ 22
151 GTO 11
152*LBL "PU"
153 13
154 GTO 00
155*LBL "PR"
156 8
157 GTO 00
158*LBL "OP"
159 2
160 GTO 00
161*LBL "WO"
162 6
163 GTO 00
164*LBL "CL"
165 7
166 GTO 00
167*LBL "RE"
168 9
169 GTO 00
170*LBL "MO"
171 11
172 GTO 00
173*LBL "LI"
174 12
175*LBL 00
176 XEQ 27
177 GTO 11
178*LBL "AT"
179 SF 19
180 14
181 XEQ 27
182 RCL 00
183 INT
184 XEQ 18
185 "DESTROY
ED"
186 AVIEW
187 GTO 11
188*LBL "FE"
189 4
```

End of Drop routine

(Throw routine processes the verb then goes to the "DROP" routine.)

PUSH ROUTINE: page of text

PRESS ROUTINE:

OPEN ROUTINE:

WORK ROUTINE:

CLIMB ROUTINE:

READ ROUTINE:

MOVE ROUTINE:

LIFT ROUTINE:

Subroutine. Gives entrance to verb processing

ATTACK ROUTINE

Only if an item can be Attacked will processing return to this routine. The item is destroyed and removed from the game.

FEED ROUTINE: page 100 of text

PROGRAM LISTING

```
190 GTO 00
191◆LBL "GI"      GIVE ROUTINE:
192 10
193◆LBL 00
194 SF 13         FEED or GIVE,
195 XEQ 27        remove the item
196 RCL 01        fed or given away
197 XEQ 05        from the game.
198 GTO 11
199◆LBL "GO"      GOTO ROUTINE:
200◆LBL "EX"      EXAMINE ROUTINE:
201 SF 12
202 SF 17
203 5
204 XEQ 27
205 GTO 11
206◆LBL "↑N"      GO NORTH
207 2
208 GTO 00
209◆LBL "↑S"      GO SOUTH
210 4
211 GTO 00
212◆LBL "↑E"      GO EAST
213 6
214 GTO 00
215◆LBL "↑W"      GO WEST
216 8
217◆LBL 00
218 10↑X
219 RCL 02        MOVEMENT
220 1             ROUTINES
221 -
222 X<>Y
223 RCL IND
Y
224 ABS
225 *
226 INT
227 1 E2
228 MOD
229 X=0?          This exit
230 GTO 23        possible
231 STO 02        NO? go to HUH?
232 SF 16         routine
233◆LBL 11        UTILITY ROUTINE:
234 FC?C 14       page 100 of text
235 GTO 00
236 RCL 00
237 1
238 -
239 INT
240 CLA
241 XEQ 10
242◆LBL 00
243 RCL 02
244 90
245 -             Need to read next
246 X<=0?         data set?
247 GTO 00
248 " READ "      YES? prompt for
249 ARCL X        and read the data.
250 AVIEW
251 RDTA
252 SF 16
253◆LBL 00        Return to LOOK
254 FS?C 16       routine?
255 GTO "L"
256 " SO?"        Else give proper
257 FC?C 17       response.
258 " OK"
259 GTO 30        VERB PROCESSING
260◆LBL 27        ROUTINE:
261 STO 01
262 RCL 02
263 XEQ 15
264 R↑
265◆LBL 22
266 INT
267 ST+ 00
268 2
269 RCL IND
00
270 ENTER↑
271 LOG
272 INT
273 10↑X
274 /             Get item code
275 X>Y?          list -X>1?
276 SF 10         Ask WHAT? not the
277 FRC           I CANT/TRY routine.
278 10
279 *
280 SF IND X      Set flag = F
281 FRC           (see page 98 )
282 1 E2
283 *
284 INT
285 RCL 01
286 X≠Y?
287 GTO 02        Wrong Verb?
288 LASTX         YES? go to 02
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              barriors?
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 tne
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?             Does a message
367 SF 14            need to be shown?
368 X<Y?             YES? set flag 14.
369 ST- Y
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
387*LBL 02
388 "GO IN?"
389 CF 23
390 STOP
391 FS?C 23
392 GTO 16
393 SF 16
394 STO 02
395 RTN
396*LBL 03
397 STO 02
398 SF 16
399 RTN
400*LBL 04
401 RCL IND
X
402 STO IND
00
403 RTN
404*LBL 05
405 1 E2
406 ST/ 02
407 RCL 00
408 INT
409 STO 01
410 RCL Z
411 XEQ 18
412 1 E2
413 ST* 02
414 RCL 01
415 ST+ 00
416 RTN
417*LBL 06
418 XEQ 10
419 GTO 25
420*LBL 07
421 RCL 00
422 FRC
423 X<> IND
Y
424 RCL 00
425 INT
426 +
427 STO 00
428 RTN
429*LBL 08
430 RCL 02
431 1
432 -
```

II=02 ROUTINE
page 99 of text
Does the player want to enter the room?
YES? do so.
NO? then return and process the command.

II=03 ROUTINE
page 99 of text

II=04 ROUTINE
page 99 of text

Change to new item code.

II=05 ROUTINE
page 99 of text

Remove item JJ from the inventory

II=06 ROUTINE
page 99 of text

II=07 ROUTINE
page 99 of text

Exchange inventory with room JJ's item list.

II=08 ROUTINE
page 99 of text

```
433 RCL IND
X
434 X<> IND
Z
435 STO IND
Y
436 RTN
437*LBL 09
438 " THE EN
D"
439 STOP
440*LBL 10
441 ARCL IND
 X
442 DSE X
443 RCL IND
X
444 SIGN
445 X≠0?
446 AVIEW
447 X≠0?
448 RTN
449 RDN
450 GTO 10
451*LBL 11
452 XEQ 10
453 "YOU DIE
D"
454 PROMPT
455*LBL 12
456 RCL 00
457 5
458 -
459 RCL IND
X
460 STO IND
Z
461 RTN
462*LBL 13
463 RCL IND
02
464 X<> IND
Y
465 STO IND
02
466 SF 16
467 RTN
468*LBL 14
469 RCL IND
X
470 RCL 00
```

Exchange the room exits with room JJ's exits.

II=09 ROUTINE
page 99 of text

II=10 ROUTINE
page 99 of text

Display message.
End of message?
YES? display it and return.
NO? get six more characters.

II-11 ROUTINE
page 99 of text

II=12 ROUTINE
page 99 of text

II-13 ROUTINE
page 99 of text
Exchange the room's item list with room JJ's item list.

II-14 ROUTINE
page 99 of text

PROGRAM LISTING

```
471 INT
472 DSE X
473 XEQ 10
474 X<>Y
475 +
476 STOP
477 ASTO X
478 X≠Y?
479 1 E6
480 X=Y?
481 1 E2
482 RCL IND
L
483 *
484 GTO 29
485◆LBL 15
486 "⊢? "
487 PROMPT
488 RCL IND
X
489 FRC
490◆LBL 17
491 1 E2
492 *
493 RCL IND
X
494 LOG
495 RCL IND
X
496 R↑
497 ASTO X
498 X=Y?
499 RTN
500 R↑
501 FRC
502 X≠0?
503 GTO 17
504◆LBL 23
505 "HUH?"
506 CLD
507 GTO 30
508◆LBL 25
509 RDN
510 "TRY"
511 ASTO Y
512 "I CANT"
513 FS?C 19
514 "  HA"
515 STOP
516 ASTO X
517 X≠Y?
```

Ask question. Is the answer the same as what is in register JJ? YES? do happening pair: .IIJJ NO? do happening pair: .0000IIJJ

UTILITY ROUTINE

Get the item's name and return with what register it's code is in.

HUH? ROUTINE:

I CANT/TRY ROUTINE:

Give proper response.

Did the player input TRY? NO? then process

```
518 GTO 16
519 R↑
520 FC?C 15
521 1
522 GTO 20
523◆LBL 18
524 2.90002
525 X<>Y
526 RCL IND
02
527 FRC
528◆LBL 26
529 1 E2
530 *
531 INT
532 X=Y?
533 GTO 01
534 RDN
535 LASTX
536 FRC
537 ISG Z
538 X≠0?
539 GTO 26
540◆LBL 01
541 RCL Z
542 INT
543 10↑X
544 /
545 ST- IND
02
546 0
547 X<> IND
02
548 FRC
549 1 E10
550 *
551◆LBL 19
552 1 E2
553 FC?C 07
554 ST/ IND
02
555 /
556 FRC
557 X=0?
558 SF 07
559 ST+ IND
02
560 LASTX
561 INT
562 X≠0?
563 GTO 19
564 .END.
```

given command. YES? can player try an item? YES? allow TRY input

UTILITY ROUTINE

Compress room or inventory item lists so that no gaps exist from any removed items.

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HP-41

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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

HEWLETT PACKARD
SOLUTIONS BOOK:
GAMES II

ROW 1 (1 : 3)

ROW 2 (3 : 6)

ROW 3 (6 : 11)

ROW 4 (11 : 15)

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 (115 : 123)

ROW 22 (124 : 128)

ROW 23 (128 : 132)

ROW 24 (132 : 137)

ROW 25 (137 : 143)

ROW 26 (143 : 147)

ROW 27 (147 : 151)

ROW 28 (152 : 156)

ROW 29 (157 : 162)

ROW 30 (162 : 168)

ROW 31 (169 : 174)

ROW 32 (174 : 177)

ROW 33 (178 : 183)

ROW 34 (183 : 185)

ROW 35 (185 : 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)

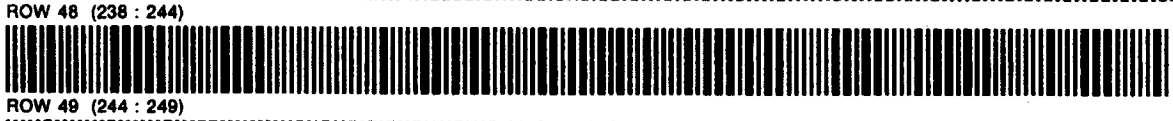
ROW 44 (227 : 229)

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 : 269)

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)

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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)

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ROW 95 (440 : 442)

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ROW 98 (451 : 454)

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ROW 100 (458 : 460)

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ROW 102 (463 : 465)

ROW 103 (465 : 466)

ROW 104 (466 : 469)

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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)

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)

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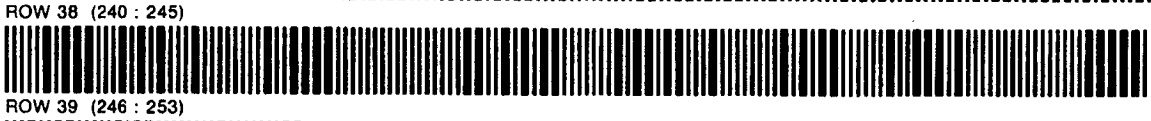

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ROW 42 (269 : 276)

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ROW 45 (293 : 299)

ROW 46 (300 : 306)

ROW 47 (306 : 311)

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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)

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ROW 73 (513 : 517)

ROW 74 (518 : 526)

ROW 75 (527 : 532)

CHESS (82162A VERSION)

PROGRAM REGISTERS NEEDED: 12

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)

PROGRAM REGISTERS NEEDED: 12

HEWLETT PACKARD
SOLUTIONS BOOK:
GAMES II

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ROW 2 (7 : 12)

ROW 3 (13 : 18)

ROW 4 (19 : 27)

ROW 5 (28 : 33)

ROW 6 (33 : 41)

ROW 7 (41 : 41)

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)

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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)

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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)

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ROW 52 (357 : 364)

ROW 53 (364 : 372)

ROW 54 (373 : 380)

ROW 55 (381 : 387)

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ROW 67 (465 : 472)

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ROW 69 (480 : 487)

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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)

ROW 1 (1 : 3)

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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)

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)

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ROW 11 (57 : 61)

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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)

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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)

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ROW 50 (270 : 276)

ROW 51 (276 : 281)

ROW 52 (282 : 287)

ROW 53 (287 : 293)

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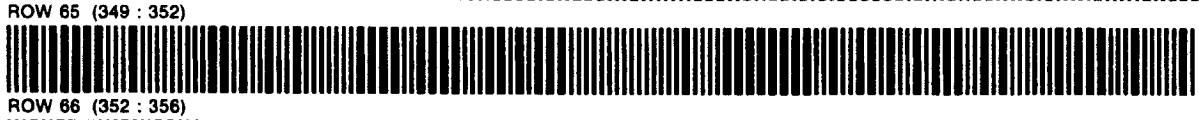

ROW 66 (352 : 356)

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ROW 68 (360 : 367)

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ROW 70 (368 : 376)

ROW 71 (376 : 377)

ROW 72 (377 : 383)

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ROW 74 (387 : 390)

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ROW 78 (403 : 404)

ROW 79 (405 : 406)

ROW 80 (406 : 415)

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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)


ROW 127 (676 : 676)

FLIPO

PROGRAM REGISTERS NEEDED: 153

HEWLETT PACKARD
SOLUTIONS BOOK:
GAMES II

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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)

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ROW 34 (223 : 230)

ROW 35 (230 : 237)

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ROW 37 (247 : 256)

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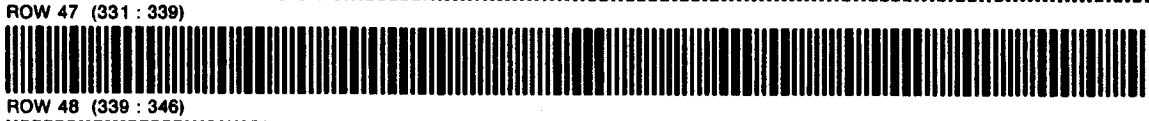

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ROW 63 (462 : 472)

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ROW 67 (494 : 501)

ROW 68 (502 : 512)

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ROW 70 (520 : 526)

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ROW 72 (535 : 542)

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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)

ADVENTURE

PROGRAM REGISTERS NEEDED: 160

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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)

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ROW 15 (84 : 90)

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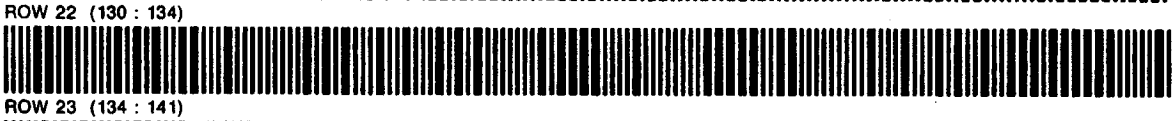
ROW 21 (124 : 130)

ROW 22 (130 : 134)



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ROW 29 (166 : 170)

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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)

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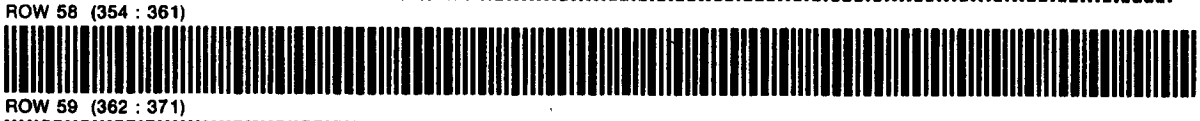

ROW 59 (362 : 371)

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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To increase the versatility of your HP-41, HP has an extensive library of "Application Pacs". These programs transform your HP-41 into a specialized calculator in seconds. Included in these pacs are detailed manuals with examples, miniature plug-in Application Modules, and keyboard overlays. Every Application Pac has been designed to extend the capabilities of the HP-41.

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Circuit Analysis 00041-15024
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Surveying 00041-15005
Securities 00041-15026
Statistics 00041-15002
Stress Analysis 00041-15027
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Home Management 00041-15023
Machine Design 00041-15020
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Lending, Saving and Leasing 00041-90086
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Test Statistics 00041-90082
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Electrical Engineering 00041-90088
Fluid Dynamics and Hydraulics 00041-90139
Games II 00041-90443
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Heating, Ventilating & Air Conditioning 00041-90140
Mechanical Engineering 00041-90090
Solar Engineering 00041-90138
Calendars 00041-90145
Cardiac/Pulmonary 00041-90097
Chemistry 00041-90102
Games 00041-90099
Optometry I (General) 00041-90143
Optometry II (Contact Lens) 00041-90144
Physics 00041-90142
Surveying 00041-90141
Time Module Solutions 00041-90395

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GAMES II

THE CAVES
5 X 5 CHESS
PINBALL
TRUCK
FLIPO
CODE CRACK
ADVENTURE

HEWLETT PACKARD

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