

Program Description I

Program Title ROBOT TRAP

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Program Description, Equations, Variables YOU MOVE YOUR ANDROID TO ANY ADJACENT SQUARE PER MOVE ON A 10X10 PLAYING BOARD STUDED WITH DESTRUCTIVE FORCE FIELDS AND UP TO 20 ENEMY ROBOTS IN SUCH A WAY AS TO LURE THE ROBOTS INTO THEIR OWN ELECTRONIC BOOBY TRAPS AND SAVE THE ANDROID. THE ROBOTS WILL ALWAYS CLOSE ON THE ANDROID, MOVING TO THE SQUARE ADJACENT TO THEIR PRESENT POSITION WHICH IS NEARER TO THE LINE AND COLUMN POSITION OF THE ANDROID, AND WILL TEAM UP TO DESTROY HIM. ROBOTS, LIKE THE ANDROID, ARE DESTROYED BY MOVING INTO A FORCE FIELD, THE ANDROID IS DESTROYED BY COLLIDING WITH A ROBOT, IF ROBOTS COLLIDE ALL BUT ONE INVOLVED ARE DESTROYED. YOU CHOOSE THE INITIAL NUMBER OF ROBOTS, THE NUMBER OF FORCE FIELDS IS EQUAL TO THE INITIAL NUMBER OF ROBOTS PLUS ONE, THEREFORE EVEN A FEW ROBOTS CAN BE CHALLENGING AND THE MORE ROBOTS THE MORE DIFFICULT. ALL INITIAL POSITIONS ARE PSEUDO-RANDOMLY GENERATED.

Operating Limits and Warnings DO NOT MOVE OFF THE BOARD. EXECUTION TIMES AT ALL POINTS IN THE PROGRAM INCREASE DRAMATICALLY WITH THE INITIAL NUMBER OF ROBOTS.

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

Sketch(es) R= ROBOT; A = PLAYER'S ANDROID; I = FORCE FIELD

#1	0	1	2	3	4	5	6	7	8	9	#2	0	1	2	3	4	5	6	7	8	9	#3	0	1	2	3	4	5	6	7	8	9	#4	0	1	2	3	4	5	6	7	8	9
9											9											9											9										
8											8											8											8										
7	R										7											7											7										
6											6											6											6										
5											5											5											5										
4											4											4											4										
3											3											3											3										
2											2											2											2										
1											1											1											1										
0											0											0											0										

GAME
Sample Problem(s) LOAD SIDES 1&2 OF ROBOT TRAP CARD 1. ENTER SEED = 0.321456987
(S, ENTER), SELECT 4 ROBOTS AND START (4, A). THE INFORMATION BELOW IS

OUTPUT. THIS CORRESPONDS TO FIG #1 UNCIRCLED POSITIONS. LOAD SIDES 1&2 OF R.T. CARD 2. MOVE ANDROID TO POSIT. 64 (MOVE TO UPPER LEFT; 7, A). BOARD IS NOW FIG #1 CIRCLED POSITIONS. ROBOT FROM 94 IS DESTROYED IN 84, OUTPUT IS 3 (ROBOTS LEFT); 64 (PLAYER'S POSIT.). MOVE TO POSIT. 75 (9, A). BOARD IS NOW FIG 2 UNCIRCLED. MOVE TO 85 (8, A). BOARD IS NOW FIG 2 CIRCLED. STAY IN 85 (5, A). BOARD IS NOW FIG 3 UNCIRCLED, ROBOT FROM 83 IS DESTROYED IN 84, OUTPUT IS 2 (ROBOTS LEFT); 85 (PLAYER'S POSIT.). MOVE TO 94 (7, A). BOARD IS NOW FIG 3 CIRCLED, ROBOT FROM

START OUTPUT:

(9)	0.000400000
(8)	0.000100000
(7)	4.000000000
(6)	1.000000000
(5)	0.000070000
(4)	1.000000000
(3)	0.000004000
(2)	0.000000100
(1)	0.000000400
(0)	0.001000000

55.

Solution(s) 75 IS DESTROYED IN 84, OUTPUT IS 1; 94. STAY IN 94 (5, A). BOARD IS NOW FIG 4. STAY IN 94 AGAIN (5, A). ROBOT FROM 74 IS DESTROYED IN 84, OUTPUT IS FLASHING 0.00 (YOU WIN!). (YOU WERE ALSO LUCKY!)

Reference(s)

User Instructions

ROBOT TRAP CARD 1

1 2

START:
 START → B BOARD CHECK?

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	LOAD SIDES 1&2 OF ROBOT TRAP CARD 1			
2	OPTION - IF YOU DO NOT WANT MACHINE TO CHECK FOR DUPLICATE START ENTRIES PRESS C; THIS IS A TOGGLE SWITCH, 0 → NO CHECK, 1 → CHECK		C	1 OR 0
3	ENTER A SEED (0 ≤ S ≤ 1) AND THE NUMBER OF ROBOTS YOU WISH TO CHALLENGE (# ≤ 20) (# OF FORCE FIELDS = # ROBOTS + 1). OUTPUT IS A MAP OF THE TEN LINES OF THE BOARD (9,8...0) PRECEDED BY THE LINE NUMBER (PAUSED). FORCE FIELD = 1. ROBOT = 4, PLAYER'S ANDROID = 7. THEN THE PLAYER'S POSITION (LY, WHERE L=LINE, C=COLUAN).	S # ROBOTS	ENTER A	n; (9,8...0) XXXXXXXXXX PLAYER'S POSIT.
4	LOAD SIDES 1&2 OF R.T. CARD 2			
5	MAKE MOVE (1-9). 5 = NO CHANGE 7 8 9 IN POSIT., 7 = MOVE TO UPPER LEFT 4 5 6 SQUARE, 6 = MOVE TO RIGHT SQUARE, ETC. 1 2 3	MOVE	A	# ROBOTS LEFT; PLAYER'S POSITION OR WIN (0.00) OR LOSE (-8.00)
6	OPTION - FOR A REVIEW OF ROBOT'S CURRENT POSITIONS		B	ROBOT'S POSITIONS; PLAYER'S POSITION.
7	OPTION - FOR A PRINTED (PAUSED) MAP OF THE CURRENT BOARD LOAD SIDES 1&2 OF R.T. CARD 1 AND PRESS B, MAP AS IN STEP #3 IS PRODUCED, THEN GO TO STEP #4		B	n; (9,8...0) XXXXXXXXXX PLAYER'S POSIT.
	(CONTINUED ON PAGE 4)			

User Instructions

ROBOT TRAP CARD 2

1 2

MOVE REVIEW

[illegible]

PRINT BOARD
LINE 9,8...0

REGISTERS									
0 USED	1 PP.FF	2 RR.FF	3 RR.FF	4 RR.FF	5 RR.FF	6 RR.FF	7 RR.FF	8 RR.FF	9 RR.FF
S0 RR.FF	S1 RR.FF	S2 RR.FF	S3 RR.FF	S4 RR.FF	S5 RR.FF	S6 RR.FF	S7 RR.FF	S8 RR.FF	S9 RR.FF
A RR.FF	B RR.FF	C # OF ROBOTS LEFT	D # OF FENCES	E RANDOM #	I CONTROL				

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	RCL E	34 15			INT	31 83	
	INT	31 83		170	DSP 0	23 00	
* LBL 2	32 25 15				RTN	35 22	
RCL (i)	34 24			* LBL 1	31 25 01		
FRAC	32 83			R+	35 53		
I	01			RCL (i)	34 24		
0	00			I	01		
120	X	71		0	00		
INT	31 83			X	71		
X=Y?	32 51			FRAC	32 83		
GSB 1	31 22 01			I	01		
R+	35 53			180	0	00	
DSZ I	31 33			X	71		
GTO 2	22 31 15			CHS	42		
RCL 0	34 14			10 ^x	32 53		
STO I	35 33			STO + 0	33 61 00		
RCL E	34 15			RTN	35 22		
130	INT	31 83		* LBL 2	31 25 02		
* LBL 8	31 25 08			R+	35 53		
RCL (i)	34 24			RCL (i)	34 24		
I	01			I	01		
0	00			190	0	00	
÷	81			÷	81		
INT	31 83			FRAC	32 83		
X=Y?	32 51			I	01		
GSB 2	31 22 02			0	00		
R+	35 53			X	71		
140	FO?	35 71 00		INT	31 83		
GTO 4	22 04			CHS	42		
DSZ I	31 33			10 ^x	32 53		
GTO 8	22 08			FO?	35 71 00		
SFO	35 51 00			200	GTO 3	22 03	
ISZ I	31 34			4	04		
GTO 8	22 08			X	71		
* LBL 4	31 25 04			STO + 0	33 61 00		
CFO	35 61 00			RTN	35 22		
RCL E	34 15			* LBL 3	31 25 03		
150	INT	31 83		3	03		
DSP 0	23 00			X	71		
PAUSE	35 72			STO + 0	33 61 00		
RCL 0	34 00			RTN	35 22		
DSP 9	23 09			210	* LBL C	31 25 13	
PRT -X-	31 84			FA?	35 71 01		
CLX	44			GTO 1	22 01		
STO 0	33 00			SF 1	35 51 01		
2	02			0	00		
4	04			RTN	35 22		
160	STO I	35 33		* LBL 1	31 25 01		
F2?	35 71 02			CF 1	35 61 01		
GTO 5	22 05			1	01		
DSZ (i)	32 33			RTN	35 22		
GTO E	22 15			220			
SF 2	35 51 02						
GTO E	22 15						
* LBL 5	31 25 05						
RCL 1	34 01						

TOGGLE SWITCH FOR
CHECK?
0 → NO CHECK
1 → CHECK

LABELS					FLAGS	SET STATUS		
A START	B BOARD	C CHECK?	D USED	E USED	0 USED	FLAGS	TRIG	DISP
a USED	b USED	c USED	d USED	e USED	1 CHECK?	ON OFF	DEG ☒	FIX ☒
0 USED	1 USED	2 USED	3 USED	4 USED	2 USED	0 ☐ ☒	GRAD ☐	SCI ☐
5 USED	6 USED	7 USED	8 USED	9	3	1 ☐ ☒	RAD ☐	ENG ☐
						2 ☐ ☒		n <u>9</u>
						3 ☐ ☒		

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	* LBL A	31 25 11	STORE PLAYER'S MOVE CODE IN I LBL'S R9 SET UP FOR PLAYER'S MOVE		RCL D	34 14	DETERMINE ROBOT'S L MOVE
	SPACE	35 84			STO I	35 33	
	STO I	35 33			* LBL a	32 25 11	
	GTO (i)	22 24		060	RCL 1	34 01	
* LBL 1	31 25 01				I	01	
	1	01			0	00	
	CHS	42			÷	81	
	ENT 4	41			INT	31 83	
	GTO 1	22 01			RCL (i)	34 24	
010	* LBL 2	31 25 02			1	01	
	1	01		0	00		
	CHS	42		÷	81		
	ENT ↑	41		INT	31 83		
	0	00		070	X>Y?	32 81	GTO (-) MOVE
	GTO 1	22 01		GTO 1	22 01		
* LBL 3	31 25 03			X=Y?	32 51	GTO (0) MOVE	
	1	01		GTO e	22 31 15		
	CHS	42		1	01		
	ENT ↑	41		0	00		
020	1	01		STO + (i)	33 61 24	(+) MOVE	
	GTO 1	22 01		* LBL e	32 25 15		
* LBL 4	31 25 04			DSZ I	31 33		
	0	00		RCL I	35 34		
	ENT ↑	41		080	1	01	
	1	01		X≠Y?	32 61		
	CHS	42		GTO a	22 31 11		
	GTO 1	22 01		RCL D	34 14		
* LBL 5	31 25 05			STO I	35 33		
	0	00		* LBL C	31 25 13	DETERMINE ROBOT'S C MOVE	
030	ENT ↑	41		RCL 1	34 01		
	GTO 1	22 01		GSB 2	31 22 02		
* LBL 6	31 25 06			RCL (i)	34 24		
	0	00		GSB 2	31 22 02		
	ENT ↑	41		090	X>Y?	32 81	GTO (-) MOVE
	1	01		GTO 3	22 03		
	GTO 1	22 01		X=Y?	32 51	GTO (0) MOVE	
* LBL 7	31 25 07			GTO b	22 31 12		
	1	01		1	01		
	ENT ↑	41		STO + (i)	33 61 24	(+) MOVE	
040	CHS	42		* LBL b	32 25 12		
	GTO 1	22 01		DSZ I	31 33		
* LBL 8	31 25 08			RCL I	35 34		
	1	01		1	01		
	ENT ↑	41		100	X≠Y?	32 61	
	0	00		GTO C	22 13		
	GTO 1	22 01		RCL D	34 14		
* LBL 9	31 25 09			STO 0	33 00		
	1	01		* LBL c	32 25 13	CHECK FOR DESTRUCTION BY FORCE FIELDS	
	ENT ↑	41		RCL 0	34 00		
050	* LBL 1	31 25 01	MAKE PLAYER'S MOVE	STO I	35 33		
	STO + 1	33 61 01		RCL (i)	34 24		
	R ↓	35 53		FRAC	32 83		
	1	01		EEX	43		
	0	00		110	Z	02	
	X	71		X	71		
	STO + 1	33 61 01		RCL D	34 14		

REGISTERS

0 USED	1 PP.FF	2 RR.FF	3 RR.FF	4 RR.FF	5 RR.FF	6 RR.FF	7 RR.FF	8 RR.FF	9 RR.FF
S0 RR.FF	S1 RR.FF	S2 RR.FF	S3 RR.FF	S4 RR.FF	S5 RR.FF	S6 RR.FF	S7 RR.FF	S8 RR.FF	S9 RR.FF
A RR.FF	B RR.FF	C # OF ROBOTS LEFT			D # OF FENCES		E RANDOM #		I CONTROL

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	STO I	35 33			-	51	
	R+	35 53		170	X > O?	31 81	ROBOT; ALREADY DESTROYED & RTN
*	LBL D	31 25 14			RTN	35 22	
	RCL (i)	34 24			R+	35 53	
	INT	31 83			EEX	43	
	X=Y?	32 51			Z	02	EXECUTE DESTRUCTION
120	GSB 4	31 22 04	DESTROY ROBOT; (OR PLAYER IF PLAYER)		STO + (i)	33 61 24	
	R+	35 53			R+	35 53	
	DSZ I	31 33			RCL C	34 13	DECREMENT # OF ROBOTS LEFT
	GTO D	22 14			I	01	
	DSZ (i)	32 33			-	51	
	GTO C	22 31 13		180	STO C	33 13	
	RCL D	34 14			RTN	35 22	
	STO O	33 00		*	LBL 5	31 25 05	CONTINUE
*	LBL d	32 25 14	CHECK FOR COLLISION		EEX	43	
	RCL O	34 00			Z	02	
	STO I	35 33			RCL 1	34 01	IS PLAYER DESTROYED? YES - GTO 'LOSE' DISP.
130	RCL (i)	34 24			X > Y?	32 81	
	INT	31 83			GTO 1	22 01	
	DSZ I	31 33			RCL C	34 13	ALL ROBOTS DESTROYED? YES - GTO 'WIN' DISP.
	GTO E	22 15			X = O?	31 51	NO - PRT # LEFT
	GTO 5	22 05	IF FINISHED GTO 5	190	GTO 2	22 02	
*	LBL E	31 25 15			PRT -X-	31 84	
	RCL (i)	34 24			X=Y	35 52	
	INT	31 83			INT	31 83	
	X=Y?	32 51			PRT -X-	31 84	PRT PLAYER POSIT. END
140	GSB 4	31 22 04	DESTROY ROBOT; (OR PLAYER)		RTN	35 22	'LOSE' DISPLAY (FLASHING -8.00)
	R+	35 53		*	LBL 1	31 25 01	
	DSZ I	31 33			I	01	
	GTO E	22 15			CHS	42	
	DSZ (i)	32 33			STO I	35 33	
	GTO d	22 31 14		200	8	08	
*	LBL 1	31 25 01	LBL'S 1-4 SUBR. FROM ABOVE		CHS	42	
	I	01	(1 - MAKE (-) ROBOT L MOVE)		PAUSE	35 72	
	O	00			GTO (i)	22 24	
	STO - (i)	33 51 24		*	LBL 2	31 25 02	'WIN' DISPLAY (FLASHING 0.00)
	GTO E	22 31 15			I	01	
150	* LBL 2	31 25 02	(2 - GET C COORDINATE)		CHS	42	
	I	01			STO I	35 33	
	O	00			CL X	44	
	÷	81			PAUSE	35 72	
	FRAC	32 93		210	GTO (i)	22 24	
	I	01		*	LBL B	31 25 12	REVIEW ROBOT POSITIONS, END WITH PLAYER
	O	00			SPACE	35 84	
	X	71			RCL D	34 14	
	INT	31 83			STO I	35 33	
	RTN	35 22		*	LBL O	31 25 00	
160	* LBL 3	31 25 03	(3 - MAKE (-) ROBOT C MOVE)		EEX	43	
	I	01			Z	02	
	STO - (i)	33 51 24			RCL (i)	34 24	
	GTO 6	22 31 12			INT	31 83	
*	LBL 4	31 25 04	(4 - DESTROY ROBOT;)	220	X = Y?	32 71	ROBOT; IS NOT DESTROYED PRT POSITION
	R+	35 53			PRT -X-	31 84	
	RCL (i)	34 24			DSZ I	31 33	
	EEX	43			GTO O	22 00	
	Z	02			RTN	35 22	

LABELS					FLAGS		SET STATUS		
A	B	C	D	E	0		FLAGS	TRIG	DISP
Move	REVIEW	USED	USED	USED			ON OFF		
a	USED	c	USED	d	USED	1	0 ☐ ☒	DEG ☒	FIX ☒
0	USED	1	USED	3	USED	2	1 ☐ ☒	GRAD ☐	SCI ☐
5	USED	6	USED	8	USED	3	2 ☐ ☒	RAD ☐	ENG ☐
		7	USED	9	USED		3 ☐ ☒		n <u>2</u>