Program Description I

Program Title: SPACE WAR PLUS

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Program Description, Equations, Variables

YOU ARE COMMANDER OF THE STARSHIP 'KITTYHAWK', K, WHOSE MISSION IS TO FIND (BY USE OF LONG- AND SHORT-RANGE SENSORS) AND DESTROY 3 TO 7 ALGLOGS, A, IN A GALAXY WHOSE DIMENSIONS ARE 99 BY 99 UNITS OF DISTANCE (SEE SKETCH I). YOUR RESOURCES ARE 3 TORPEDOS, T, AND 1000 UNITS OF ENERGY, E, TO POWER PHASER CANNONS AND A PROTECTIVE FORCE FIELD. ALSO, THERE IS A SUPPLY BASE, B, SOMEWHERE TO REPLENISH THESE RESOURCES TO YOUR DOCKED SHIP. ONE STARDAY, D, IS USED EACH TIME YOUR SHIP IS MOVED AND YOU HAVE 18 STARDAYS TO COMPLETE THE MISSION. SENSORS DETECT THE RANGE, R, OF AN OBJECT WHEN $R<6$, AND ITS DIRECTION, θ, (TO NEAREST DEGREE) WHEN $R<17$ (SEE SKETCHS II AND III). THE CLOSER YOU ARE TO A TARGET THE BETTER THE CHANCES A TORPEDO WILL HIT IT AND THE FEWER ENERGY UNITS, E', ($100<E'<280$) REQUIRED BY PHASERS TO DESTROY IT. 100 MORE UNITS MAINTAIN A FORCE SHIELD AGAINST RETURN FIRE EACH TIME PHASERS ARE USED. WEAPONS WILL NOT FIRE IF TARGET IS NOT IN RANGE: $R<6$.

Operating Limits and Warnings

STEPS 2, 3, 7, 9, 11, AND 12 ARE SENSITIVE TO FLAG 3. 'ERROR' APPEARS WHEN TORPEDO, FIRING RANGE, AND TIME LIMITS ARE EXCEEDED.

MISTAKEN ATTEMPTS TO DESTROY THE BASE ARE RISKY, AND TO DOCK WITH ALGLOGS ARE DISASTROUS. TO DOCK OR FIRE WEAPONS, FINAL OUTPUT OF PREVIOUS SCAN (STEP 3 OR 12) SHOULD NOT BE ZERO.

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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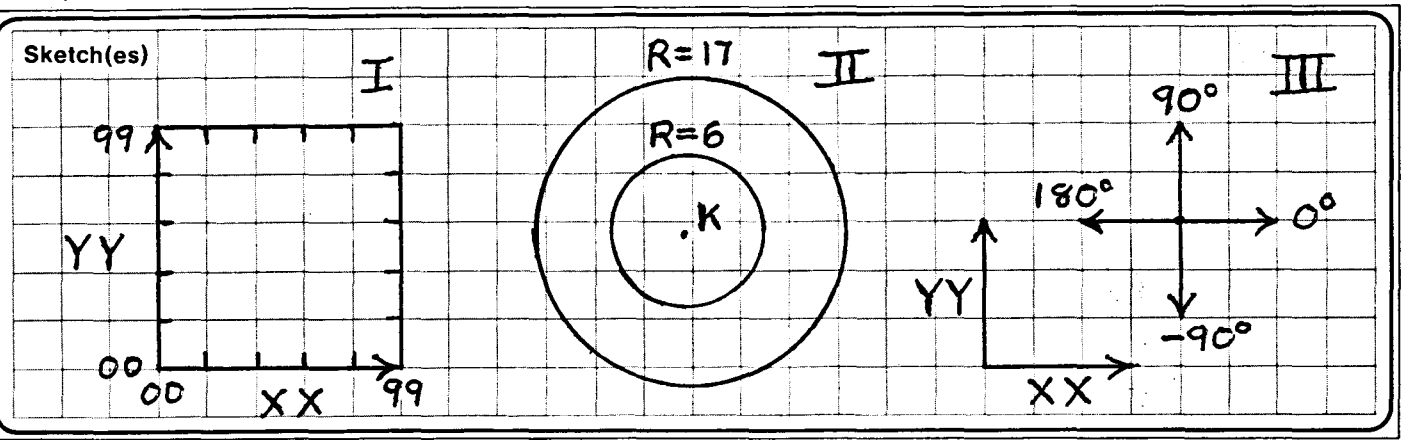
Program Description II

Sketch(es)



Sample Problem(s) WITH AN INITIAL SEED, S=.123456789, THE KITTYHAWK IS LOCATED AT YY=86, XX=16. SENSORS INDICATE 3 ALGLOGS (N=4,3,2) ARE PRESENT BUT JUST 1 IS NEARBY (6<R<17). MOVE TO ATTACK. YOUR FIRST TORPEDO MISSES BUT THE SECOND DESTROYS THE TARGET. MOVE TO YY=XX=86 AND FIND ANOTHER ALGLOG (N=2) IN FIRING RANGE. PHASERS ELIMINATE IT.

(PARENTHESES INDICATE PAUSES.)

SUMMARY:

YY	XX	N	R	θ
86	16	4	6↔17	58°
95	27	4	4.84	146°
86	86	2	4.15	-28°

Solution(s)

KEYSTROKES:

.123456789 fA → 86.16 ;
B → 4. ;
fB → 58. ; 3 B → (3.),(2.),(1.),0. ;
95 ENTER↑ → 95. ;
27 A → 95.27;
B → 4. ;
f B → (4.84), 146. ;
C → (4.84), 146. ;

KEYSTROKES:

146.4 C → (0.) ;
R/S → 0. ;
86 ENTER↑ → 86. ;
A → 86.86;
B → (3.), 2. ;
f B → (4.15), -28. ;
225 D → (0.) ;
R/S → 0. .

Reference(s) 'SPACE WAR', (H.P.'S #179D AND GAMES PAC I). AREAS SCANNED BY SENSORS ARE APPROXIMATELY EQUAL IN BOTH VERSIONS. AREAS ARE SQUARE IN FIRST VERSION, CIRCULAR HERE. PHASER FIRE IS OMNI-DIRECTIONAL IN FIRST VERSION, CONE-SHAPED HERE.

SPACE WAR PLUS

1 START R,θ DOCK 2

MOVE SCAN TORP. PHASER STATUS

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	LOAD SIDES 1 AND 2.				
2	INPUT SEED, S, (0<S<1). OUTPUT	S	f	A	YY.XX
	IS YOUR POSITION.				
3	SCAN FOR ALGLOGS (N=8,7,...,2)		B		N
	AND BASE (N=1).				N/O
4	IF FINAL OUTPUT OF STEP 3		f	B	R
	IS NOT ZERO, CHECK RANGE, R,				θ
	AND DIRECTION, θ. IF VALUE OF				
	R DOES NOT APPEAR, 6<R<17.				
5	TO FIRE TORPEDO, ENTER AIMED	θ'	C		O/R
	DIRECTION, θ'. BLINKING ZERO				θ
	IS SEEN IF ALGLOG IS DESTROYED.				
6	TO FIRE PHASERS, ENTER ENERGY,	E'	D		O/R
	E'. (100 MORE UNITS GO TO SHIELD.)				θ
7	TO MOVE STARSHIP, ENTER	YY	ENTER↑		
	COORDINATES OF DESTINATION.	XX	A		YY.XX
8	DOCK FOR SUPPLIES AT BASE,		f	E	D
	(N=1), WHEN R<2. OUTPUT IS				T.E
	DAYS, D, TORPEDOS, T, AND				
	ENERGY, E, THEN AVAILABLE.				
9	START NEW GAME.		f	A	YY.XX
	OPTIONS:				
10	CHECK CURRENT STATUS.		E		D
					T.E
11	CHECK CURRENT POSITION.		A		YY.XX
12	SPECIFY FIRST OBJECT TO BE	N	B		N/O
	SCANNED.				
	NOTES:				
	-A. SCAN (STEPS 3 AND 12)				
	COUNTS DOWN TOWARD ZERO				
	BUT STOPS FOR FIRST OBJECT				
	WITH RANGE R<17.				
	-B. NUMBER, N, OF DESTROYED				
	ALGLOG DOES NOT APPEAR				
	THEREAFTER ON SCAN.				
	-C. BLINKING ZEROES APPEAR	E'	D		0.00000
	WHEN ALGLOG DEFEATS YOUR SHIP.				

Program Listing I

STEP	KEY ENTRY	KEY CODE	COMMENTS
001 *	LBL C	31 25 13	FIRE TORPEDO, IF POSSIBLE, AND DECIDE ON HIT OR MISS.
	CF3	35 61 03	
	RCL D	34 14	
	F?0	35 71 00	
	CHS	42	
	1	01	
	−	51	
	X<0	31 71	
	√X	31 54	
010	STØ D	33 14	
	R↓	35 53	
	RCL B	34 12	
	−	51	
	ABS	35 64	
	RCL C	34 13	
	1/X	35 62	
	X>Y	32 81	
	GTØ 6	22 06	
	GTØ fb	22 31 12	
020 *	LBL D	31 25 14	FIRE PHASERS, IF POSSIBLE, AND DECIDE ON SUCCESS OR FAILURE.
	CF3	35 61 03	
	F?0	35 71 00	
	GTØ C	22 13	
	ABS	35 64	
	STØ−0	33 51 00	
	RCL C	34 13	
	X^2	32 54	
	5	05	
	×	71	
030	EEX	43	
	2	02	
	STØ−0	33 51 00	
	+	61	
	−	51	
	RCL 0	34 00	
	X<0	31 71	
	GTØ 8	22 08	
	R↓	35 53	
	X>0	31 81	
040	GTØ 6	22 06	
	GTØ fb	22 31 12	
*	LBL B	31 25 12	SCAN, STARTING WITH HIGHEST- OR SPECIFIED-VALUE OF N. FIND R AND θ FOR EACH OBJECT.
	RCL E	34 15	
	F?3	35 71 03	
	GSB fd	32 22 14	
	STI	35 33	
	SF0	35 51 00	
*	LBL I	31 25 01	
	DSP0	23 00	
050	RCL(i)	34 24	
	X=0	31 51	
	GTØ fc	22 31 13	
	RCL 9	34 09	
	−	51	
	P⇄S	31 42	
	RCL(i)	34 24	
	RCL 9	34 09	STOP SCAN FOR FIRST OBJECT FOR WHICH R<17.
	P⇄S	31 42	
	−	51	
060	X⇄Y	35 52	
	R→P	32 72	
	STØ C	33 13	
	X⇄Y	35 52	
	STØ B	33 12	
	1	01	
	7	07	
	RCL C	34 13	
	X>Y	32 81	
	GTØ 5	22 05	
070	RCI	35 34	
	RTN	35 22	
*	LBL 9	31 25 09	STORE TORPEDOS AND ENERGY.
	3	03	
	STØ D	33 14	
	10^X	32 53	
	STØ 0	33 00	
	RTN	35 22	
*	LBL 8	31 25 08	DEFEATED KITTYHAWK RENDERED POWERLESS
	CLX	44	
080	STØ 0	33 00	
	P⇄S	31 42	
	STØ 0	33 00	
	P⇄S	31 42	
	STØ D	33 14	
	SF0	35 51 00	
	DSP 9	23 09	
*	LBL 4	31 25 04	BLINKING ZEROS
	PAUSE	35 72	
	GTØ 4	22 04	
090 *	LBL 5	31 25 05	PART OF, AND EXIT FROM, LOOP 1 IN B
	RCI	35 34	
	PAUSE	35 72	
*	LBL fc	32 25 13	
	DSZ	31 33	
	GTØ 1	22 01	
	CLX	44	
	STØ B	33 12	
	RTN	35 22	
*	LBL fa	32 25 11	STORE SEED, START GAME, DECIDE NUMBER OF ALGLOGS, AND CHOOSE COORDINATES FOR ALL OBJECTS.
100	SF0	35 51 00	
	F?3	35 71 03	
	STØ A	33 11	
	GSB 3	31 22 03	
	RCL A	34 11	
	5	05	
	×	71	
	4	04	
	+	61	
	INT	31 83	
110	STØ E	33 15	
	GSB 9	31 22 09	
	9	09	

REGISTERS

0 E	1 B-XX	2 A2-XX	3 A3-XX	4 A4-XX	5 A5-XX	6 A6-XX	7 A7-XX	8 A8-XX	9 K-XX
S0 D	S1 B-YY	S2 A2-YY	S3 A3-YY	S4 A4-YY	S5 A5-YY	S6 A6-YY	S7 A7-YY	S8 A8-YY	S9 K-YY

A SEED, #	B θ	C R	D T	E M=NO. OBJECTS	I USED

Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS
	STI	35 33	ARM KITTYHAWK AND SET TIME LIMIT FOR MISSION.
*	LBL 2	31 25 02	
	GSB 3	31 22 03	
	STØ(i)	33 24	
	GSB(3)	31 22 03	
	P⇄S	31 42	
	STØ(i)	33 24	
120	P⇄S	31 42	
	DSZ	31 33	
	GTØ2	22 02	
	1	01	
	8	08	
	P⇄S	31 42	
	STØ0	33 00	
	P⇄S	31 42	
*	LBLA	31 25 11	MOVE SHIP AND/OR DISPLAY ITS POSITION.
	F?3	35 71 03	
130	GTØ0	22 00	
	DSP2	23 02	
	P⇄S	31 42	
	RCL9	34 09	
	P⇄S	31 42	
	INT	31 83	
	RCL9	34 09	
	EEX	43	
	2	02	
	÷	81	
140	+	61	
	RTN	35 22	
*	LBLfe	32 25 15	DOCK.
	RCLC	34 13	
	2	02	
	X≤y	32 71	
	GTØE	22 15	
	RCI	35 34	
	1	01	
	X≠y	32 61	
150	GTØ8	22 08	
	GSB9	31 22 09	
*	LBLE	31 25 15	DISPLAY STATUS.
	CF3	35 61 03	
	P⇄S	31 42	
	RCL0	34 00	
	P⇄S	31 42	
	DSP0	23 00	
	PAUSE	35 72	
	RCL0	34 00	
160	INT	31 83	
	EEX	43	
	4	04	
	÷	81	
	RCLD	34 14	
	+	61	
	DSP4	23 04	
	RTN	35 22	
*	LBL0	31 25 00	

STEP	KEY ENTRY	KEY CODE	COMMENTS
	P⇄S	31 42	SHIP MOVES AND ONE STARDAY PASSES.
170	RCL0	34 00	
	P⇄S	31 42	
	1/x	35 62	
	R↓	35 53	
	STØ9	33 09	
	X⇄y	35 52	
	P⇄S	31 42	
	STØ9	33 09	
	1	01	
	STØ-0	33 51 00	
180	P⇄S	31 42	
	SF0	35 51 00	
	GTØA	22 11	
*	LBLfb	32 25 12	DECIDE TO DISPLAY θ OR R AND θ.
	CF3	35 61 03	
	DSP2	23 02	
	6	06	
	RCLC	34 13	
	RND	31 24	
	X≤y	32 71	
190	CF0	35 61 00	
	X≤y	32 71	
	PAUSE	35 72	
	DSP0	23 00	
	RCLB	34 12	
	RND	31 24	
	RTN	35 22	
*	LBL3	31 25 03	GENERATE SPACE COORDINATE.
	RCLA	34 11	
	9	09	
200	9	09	
	7	07	
	X	71	
	FRAC	32 83	
	STØA	33 11	
	EEX	43	
	2	02	
	X	71	
	RTN	35 22	
*	LBL6	31 25 06	WAS BASE OR ALGLOG ATTACKED?
210	RCI	35 34	
	1	01	
	X=y	32 51	
	GTØ8	22 08	
CLX→	~~SEED~~ CLX	44	
	STØ(i)	33 24	
	SF0	35 51 00	
	DSP0	23 00	
	GTØ4	22 04	
*	LBLfd	32 25 14	CHECK INPUT VALUE OF N.
220	X⇄y	35 52	
	X>y	32 81	
	X⇄y	35 52	
	RTN	35 22	

LABELS

A MOVE	B SCAN	C TORP.	D PHAS.	E STATUS
a START	b R, θ	c DSZ	d N>M?	e DOCK
0 IN A	1 LOOP	2 LOOP	3 XX, YY	4 BLINK
5 LOOP	6 N=1?	7	8 LOST	9 SUPPLY

FLAGS

0	R>6
1	
2	
3	USED

SET STATUS

FLAGS	ON	OFF	TRIG		DISP	
0	☑	☐	DEG	☑	FIX	☑
1	☐	☑	GRAD	☐	SCI	☐
2	☐	☑	RAD	☐	ENG	☐
3	☐	☑			n	0