

# Program Description I

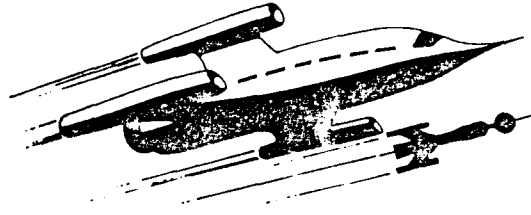
Program Title **Space War**

Contributor's Name **HEWLETT-PACKARD COMPANY**  
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 Address **1000 N.E. Circle Boulevard**  
 City **Corvallis, OR 97330**

State

Zip Code

## Program Description, Equations, Variables



You are the commander of the Nuclear Powered Reconnoiterer (NPR) Kittyhawk. The NPR Kittyhawk is the sole guardian of justice in a vast galaxy that measures 10 quadrants by 10 quadrants. Within the galaxy somewhere, anchored among the blazing stars, lie three agents of evil: the vile Alglogs, known throughout space as interstellar thieves and creators of cosmic mischief. Your mission as commander of the NPR Kittyhawk is to search out and destroy the fearsome Alglogs within 18 stardays.

Also within the galaxy somewhere is a Base, a haven to which your ship may return in order to resupply itself. The weapons carried by the Kittyhawk are torpedos, which are fired in a straight line, and phasers, which send out an omnidirectional burst of energy. In addition, your starship is equipped with short- and long-range sensors which can detect the presence of Alglogs or the Base in nearby space. One starday is used whenever the Kittyhawk changes its position, i.e., when a move is made. Details of the operation of the NPR Kittyhawk are given below.

### POWER ON (Card 1)

The Kittyhawk is started by supplying a seed  $s$  ( $0 \leq s \leq 1$ ) to the routine START (Card 1). This routine positions the three Alglogs, the Base, and the Kittyhawk randomly in the galaxy. For best results, the seed  $s$  should contain all the digits but 0 and end in a 1, 3, 7, or 9. Remember that the galaxy is a  $10 \times 10$  grid of quadrants; within each quadrant is a  $10 \times 10$  grid of smaller areas called sectors. The quadrants are numbered 00 through 99, as are the sectors. The position of an object, then, may be specified by giving its quadrant and sector (QQ.SS). Examples of allowable positions are 23.68, 10.99, 7.01, and 85.00. No two objects may occupy the same position. At the end of the routine START, the calculator displays the starting position of the NPR Kittyhawk.

### Operating Limits at

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, Equations, Variables

## LONG-RANGE SCAN (Card 1)

The long-range scan covers all quadrants adjacent to and including that of the Kittyhawk itself. This scan will detect and report the presence of Alglogs or the Base in those quadrants. Suppose objects are located in the quadrants as below.

62	63	64	65
		B	A
52	53	54	55
A	KH		
42	43	44	45

The long-range scan would include the quadrants adjacent to quadrant 53 (Q53). The output of the scan would be three lines as follows:

```
63.00400401
53.10400400
43.00400400
```

The first line shows the contents of quadrants 62, 63, and 64. Two digits are allocated to each quadrant, with the "4's" merely indicating separation of the quadrants. The Base would appear in the right-hand of the two digits, an Alglog in the left-hand digit. Notice that the Base appears in the top line (Q64) and an Alglog in the second line (Q52). The Alglog in quadrant 65 is beyond the range of the sensors and does not show up. The numbers 63, 53, and 43 refer to the middle quadrant of each line.

## Operating Limits and

The contents of nine squares are displayed with each long-range scan. If the Kittyhawk is at or near the edge of the galaxy, some of this information may be meaningless.

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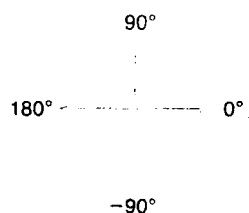
State

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## Program Description, Equations, Variables

## MOVE (Card 1)

If the Kittyhawk were in the position shown in the long-range scan above, a logical move would be to go to quadrant 52 to attack the Alglog. To make a move, one specifies the angle  $\theta$  and distance  $r$  to be covered. Orientation of angles is shown in the diagram below. Angles must be input in degrees.



The distance is specified in terms of quadrants. To move exactly one quadrant's width, specify an  $r$  of 1. To move from Q53 to Q52, then, select  $\theta = 180^\circ$  and  $r = 1$ . Suppose one wished to move from Q53 to Q64. This would require an angle of  $45^\circ$  and a distance of  $\sqrt{2}$ . The output at the end of the move routine is the Kittyhawk's new position.

Each move uses 1 starday. If a move is taken when no stardays remain, the display will flash zeros to indicate that the mission has failed.

Caution must be observed near the edges of the galaxy. Moving beyond an edge can result in the Kittyhawk's being lost in space.

## Operating Limits and Warnings

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## Program Description

**SHORT-RANGE SCAN (Card 2)**

The short-range scan gives a detailed picture of the quadrant the Kittyhawk is presently in. The output is 10 lines of information output by PRINTx commands, each line representing a row of the quadrant. The rows are output in the order 9, 8, 7, ..., 0. Each line consists of 10 digits that represent the ten sectors in the row. A "0" in a line means that that sector is unoccupied; a "3" marks the location of the Kittyhawk, a "4" an Alglog, and a "7" the Base. Suppose the output of a short-range scan were as shown below:

Row 9	0.000000000
Row 8	0.040000000
Row 7	0.000000000
Row 6	0.000000000
Row 5	0.000000003
Row 4	0.000000000
Row 3	0.000000000
Row 2	7.000000000
Row 1	0.000000000
Row 0	0.000400000

This scan indicates the presence of Alglogs in sectors 04 and 82, the Kittyhawk in sector 59, and the Base in sector 20.

**TORPEDO (Card 2)**

The Kittyhawk begins its mission with 3 torpedos. A torpedo may be fired at an Alglog within the same quadrant. If the torpedo passes within 1° of the Alglog, the Alglog is destroyed and the torpedo is spent. To fire a torpedo, simply specify the angle of fire in degrees.

If no torpedos remain and you attempt to fire a torpedo, the display will show "Error."

## Operating Limits are

**PHASERS (Card 2)**

At the start of the mission, 1000 units of energy are available for firing phasers. Unlike torpedos, phasers fire equally in all directions and can destroy as many Alglogs as are within range. Only Alglogs within the same quadrant as the Kittyhawk may be fired on. The closer the Alglog, the less energy is required to destroy it. A minimum of 105 units and a maximum of 275 units may be needed to destroy an Alglog. To fire phasers, simply specify the amount of energy to be used.

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## Program Description, Equations, Variables

Whenever an Alglog is fired on with phasers, there is a danger that the fire will be returned. Accordingly, the Kittyhawk uses another 100 units of energy to maintain shields against each Alglog within the quadrant.

If more energy is needed than is available, flashing zeros will be displayed to indicate that the mission has failed.

### DOCK (Card 2)

The Kittyhawk may dock at the Base by moving into a sector adjacent to that of the base and executing the routine DOCK. If the docking is successful, the Kittyhawk's supply of torpedos and energy are replenished to their initial level: 3 torpedos, 1000 units of energy. The display at the end of this routine shows the current supply of energy and torpedos.

### STATUS

Two routines are available for providing information on the status of the mission. Either of these routines may be executed at any time.

The first, on card 1, shows the number of days remaining in the mission. Simply press **A** and the number of days will be displayed.

The second, on card 2, shows the remaining energy and torpedos. Both values are output in a single display as Energy.Torpedos. For example, a supply of 500 energy units and 2 torpedos would be displayed as 500.2. This information is available by pressing **A** on card 2.

## Operating Limits and

### MAP OF GALAXY

A map of the galaxy (playing board) is located on page 04-03 in the game of Submarine Hunt.

### Reference:

This program is based on an HP-65 Users' Library program written by Lee Gregory, Jr.

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Sketch(es)

Sample Problem(s)

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

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

Solution(s)

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

Reference(s)

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

Playing boards for Submarine Hunt and Space War.  
 You might wish to use copies of this page for your games.

## Sketch(es)

## Example:

From the log of the NPR Kittyhawk:

Load side 1 and side 2 of Space War 1.

## Keystrokes:

.63154897 **A** →

**C** →

## Outputs:

50.53 (KH position)

60.00400400 \*\*\*

50.00400400 \*\*\* (Long scan)

40.00400400 \*\*\*

## Sample Problem(s)

Current map of galaxy:

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
9										9									9
8										8									8
7										7									7
6	•	•								6									6
5	KH	•								5			3						5
4	•	•								4									4
3										3									3
2										2									2
1										1									1
0										0									0

Quadrants

Sectors

Dots indicate quadrants known to contain neither Alglogs nor Base.

Move in direction  $-45^\circ$ .

## Solution(s)

45 **CHS** **ENTER** 5.5 **E** →

**C** →

14.62 (New position)

24.00400400 \*\*\*

14.00400401 \*\*\* (Long scan)

4.00400410 \*\*\*

Current map of galaxy:

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
9										9									9
8										8									8
7										7									7
6	•	•								6			3						6
5	•	•								5									5
4	•	•								4									4
3										3									3
2				•	•	•				2									2
1				•	KH	B				1									1
0				•	•	A				0									0

Quadrants

Sectors

## Reference(s)

## Sketch(es)

## Sample Problem(s)

Move to Q05 to attack.

45 **CHS** **ENTER** 2 **↵** **E** →

5.62 (Now in Q05)

Load side 1 and side 2 of Space War 2.

**A** →

0.000000000 \*\*\* (Short scan)  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.030000000 \*\*\* (KH in S62)  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.004000000 \*\*\* (Alglog in S03)

Current map of galaxy:

	0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9	
9											9											9
8											8											8
7											7											7
6	•	•									6			3								6
5	•	•									5											5
4	•	•									4											4
3											3											3
2				•	•	•					2											2
1				•	•	•					1											1
0				•	•	•					0				4							0
	0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9	

Quadrants

Sectors

Fire a torpedo in direction -80°.

80 **CHS** **C** →

2.000000000 (2 Alglogs left)

Return to Base and dock.

Load side 1 and side 2 of SW1.

90 **ENTER** 1 **E** →

15.62 (New position)

## Reference(s)



Sketch(es)

Sample Problem(s)

Load side 1 and side 2 of SW2.

A

0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.030000007 \*\*\* (KH in S62, Base  
 in S69)  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*

Current map of galaxy:

	0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9
9											9										9
8											8										8
7											7										7
6	•	•									6		3						7		6
5	•	•									5										5
4	•	•									4										4
3											3										3
2				•	•	•					2										2
1				•	•	•					1										1
0				•	•	•					0										0
	0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9

Quadrants

Sectors

Move to S68.

Load side 1 and side 2 of SW1.

0 ENTER .6 E

15.68

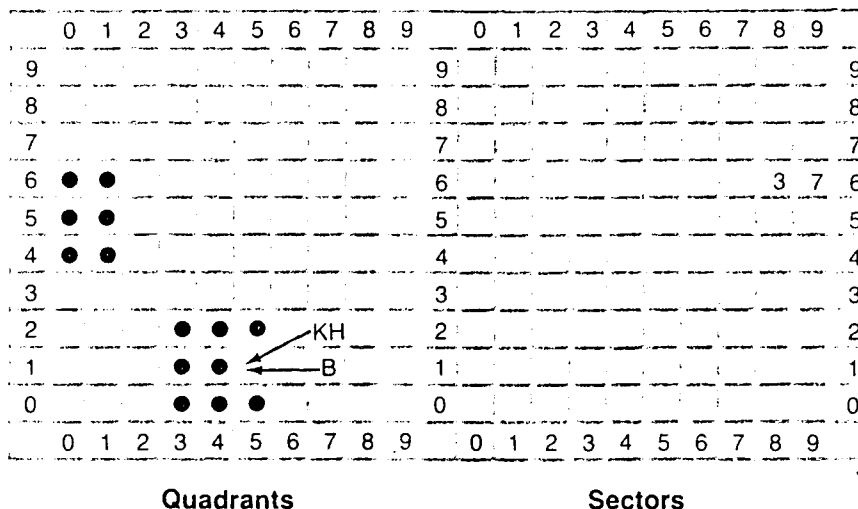
Solution(s)

Reference(s)

Sketch(es)

Sample Problem(s)

Current map of galaxy:



Dock.

Load side 1 and side 2 of SW2.

**E** →

1000.3

(Energy, torpedos  
replenished)

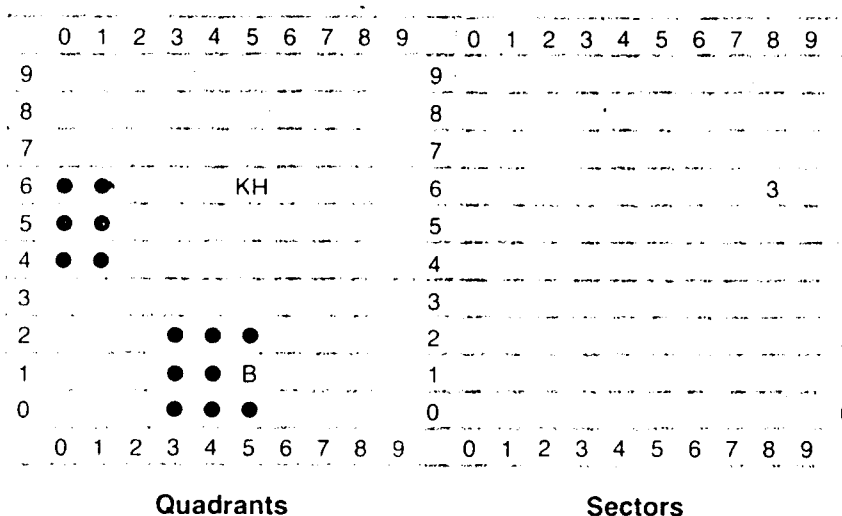
Load side 1 and side 2 of SW1.

90 **ENTER** 5 **E** →

65.68

(New position)

Current map of galaxy:



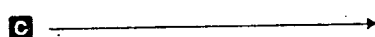
Solution(s)

Reference(s)

Sketch(es)

Sample Problem(s)

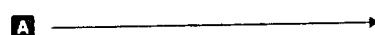
C



75.00400400 \*\*\*  
 65.00410400 \*\*\* (Note Alglog in Q65)  
 55.00400400 \*\*\*

Load side 1 and side 2 of SW2.

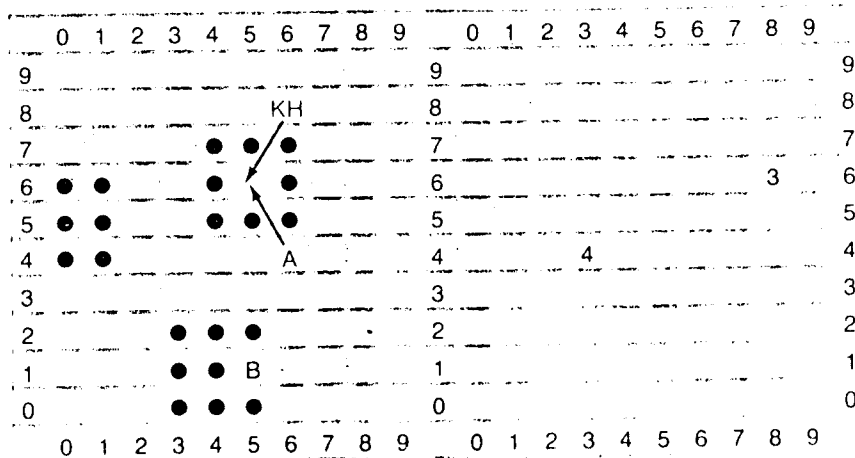
A



0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000030 \*\*\* (KH in S68)  
 0.000000000 \*\*\*  
 0.004000000 \*\*\* (Alglog in S43)  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*  
 0.000000000 \*\*\*

Current map of galaxy:

Solution(s)

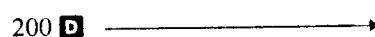


Quadrants

Sectors

Use phasers. Try 200 energy units.

200 D

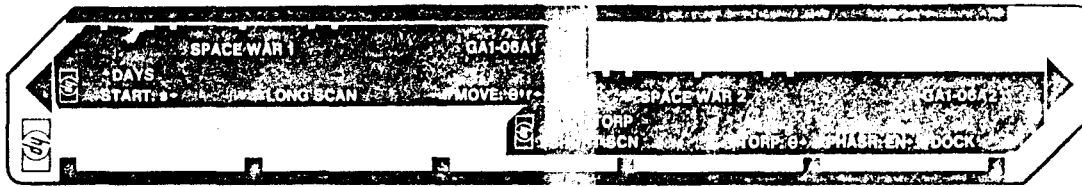


1.000000000 (1 Alglog left)

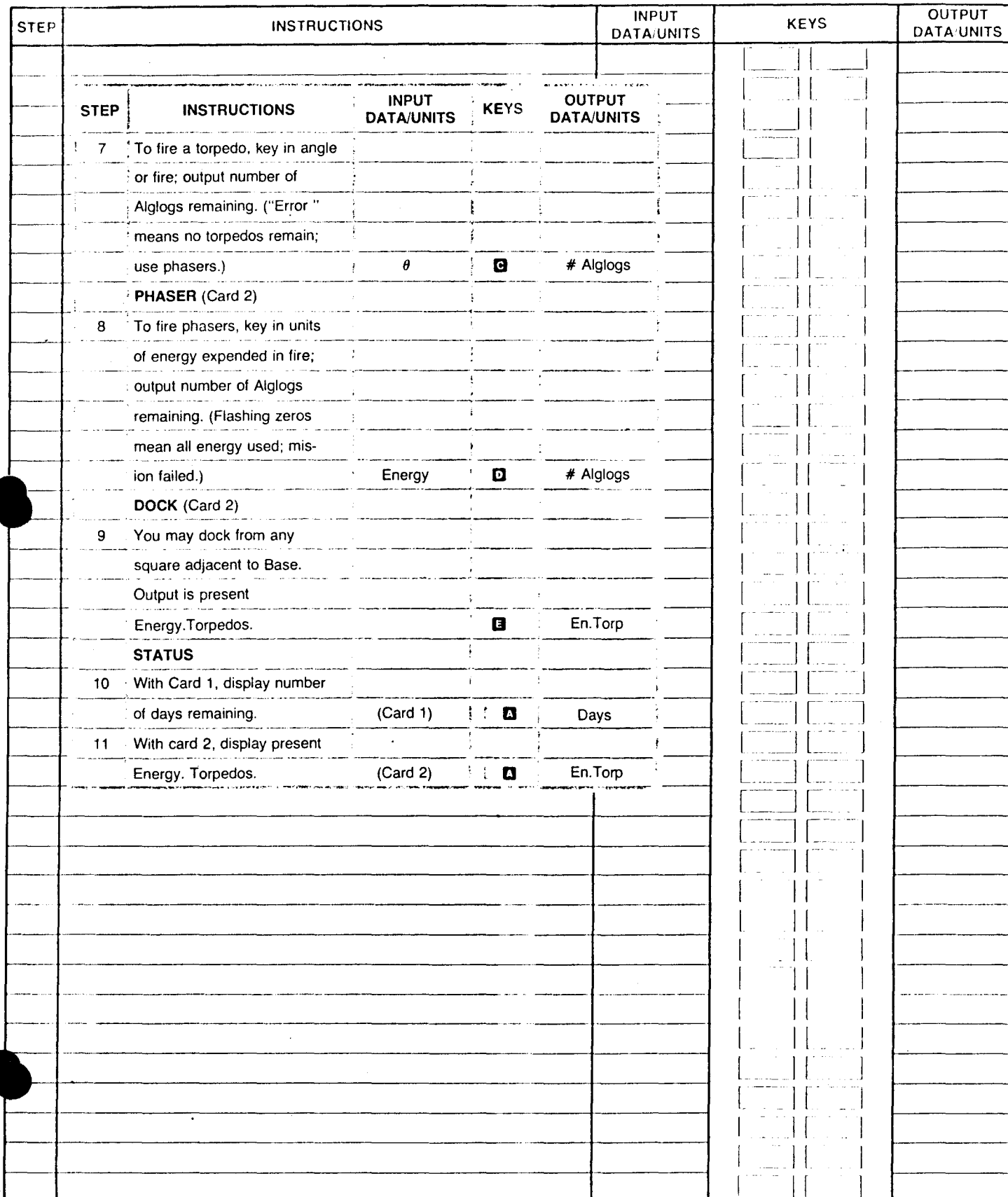
The rest of the mission will be left as an exercise for the cadet.

Reference(s)

\*\*\*Shown by PRINT on HP-97 and by PAUSE on HP-67.



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1 and side 2 of <i>Space War 1</i> .			
2	To initialize, key in a seed $s$ ( $0 \leq s \leq 1$ ). Output is the starting position of Kittyhawk.	s	A	QQ.SS
3	You have 18 stardays. Your options are outlined below. Be sure the appropriate card is loaded for each option.			
	<b>LONG RANGE SCAN</b> (Card 1)			
4	Output 3 lines of scan. KH is in center. QQ refers to middle quadrant of each line. Digits AB refer to Alglogs and Base.		C	QQ.AB4AB4AB
	<b>MOVE</b> (Card 1)			
5	Key in direction and distance (in quadrants) of desired move; output new position of Kittyhawk. (Flashing zeros means all stardays used; mission failed.)	. 0	ENTER	
		r	E	QQ.SS
	<b>SHORT RANGE SCAN</b> (Card 2)			
6	Output 10 rows of present quadrant in order 9, 8, ..., 0. Kittyhawk = 3, Alglog = 4, Base = 7.		A	X.XXXXXXXX
	<b>TORPEDO</b> (Card 2)			



## Space War

STEP		KEY ENTRY	COMMENTS	STEP	KEY ENTRY	COMMENTS
001		LSLH	Initialize.	057	SF2	
002		CLRE	If seed = 0, use π.	058	CLX	
003		X=00		059	PCLC	
004		P1		060	X=00	
005		ST09		061	SF2	
006		1		062	CLX	
007		0		063	PCLC	
008		ST04	Point to R <sub>A</sub> and prepare to compute random starting positions	064	X=Y?	Set flag 2 if position occupied.
009		2		065	SF2	
010		0		066	P1	
011		ST01	Compute a position. Check not occupied.	067	PTN	
012		LBL9		068	LBLC	Long Scan.
013		GBR1		069	2	
014		GBR0		070	FIX	
015		F20		071	9	
016		GT09		072	9	
017		ST01	Store position.	073	9	Store constant 0.00400400
018		ISZ1		074	+	
019		PCL1		075	ST02	
020		2		076	DSF0	
021		5	Exit loop after filling R <sub>E</sub> .	077	SFC	
022		X=Y?		078	RCLE	
023		GT09		079	INT	
024		EEX		080	ST00	
025		3		081	PCL4	
026		ST06	Energy = 1000.	082	+	Scan line above KH.
027		3		083	GBR3	
028		ST07	Torpedoes = 3.	084	PCL0	
029		ST09		085	GBR3	Scan line with KH.
030		1		086	PCL0	
031		0		087	PCL4	
032		ST08	Days = 18	088	-	Scan line below KH.
033		PCLC	Display position of Kittyhawk.	089	GBR3	
034		PTN		090	PTN	
035		LBL1	Generate one starting position of the form QQ SS, where QQ is quadrant, SS is sector.	091	LBL3	Routine scans one line, i.e., 3 quadrants.
036		PCL1		092	PCL2	
037		9		093	ST01	
038		9		094	P4	
039		7		095	ST03	
040		X		096	ST+1	R <sub>1</sub> ← QQ.00400400, where QQ refers to middle quadrant
041		FRC		097	1	
042		ST09		098	-	
043		EEX		099	GBR0	First quadrant.
044		4		100	GBR5	
045		X		101	GBR5	
046		INT		102	ST+1	
047		GBR5		103	PCL3	
048		GBR5		104	GBR0	
049		PTN		105	EEX	
050		LBL0		106	5	Middle quadrant.
051		PCL4	Routine tests to see if position in X-register is already occupied.	107	+	
052		X=Y?		108	ST+1	
053		SF2		109	PCL3	
054		CLX		110	1	
055		PCLB		111	+	
056		X=Y?		112	GBR0	

REGISTERS									
0	1	2	3	4	5	6	7	8	9
Used	Used	Used	Used	10	Used	Energy	Torpedoes	Days	Algorithms
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	D	E	F	G	H	I	J
Algo 1	Algo 2	Algo 3	Base	Kittyhawk	Pointer				



001 *LBLA	Short Scan	057 *CHS	
002 FRY		058 1P	
003 DSFS		059 7	
004 SFC	A "3" marks KH,	060 ST+1	
005 P+S	"4" marks Aliglog,	061 RTN	
006 9	"7" marks Base.	062 *LBLC	
007 STOI		063 CFB	
008 C		064 STOG	
009 *LBL9		065 RCL7	
010 STOI	Clear R <sub>10</sub> - R <sub>19</sub> to hold	066 1	
011 DSZ1	scans of rows 0 thru 9,	067 X*Y?	
012 GTOS	respectively.	068 GTCB	
013 STGO		069 -	
014 3		070 STOI	
015 RCLC	Locate KH in quadrant.	071 1	
016 GSE0		072 9	
017 4		073 STOI	
018 RCL4	Check Aliglog 1.	074 GSB1	
019 GSB0		075 GSB1	
020 4		076 GSB1	
021 RCL9	Check Aliglog 2.	077 RCL9	
022 GSB0		078 CFB	
023 4		079 RTN	
024 RCLC	Check Aliglog 3.	080 *LBL1	
025 GSB0		081 DSZ1	
026 7		082 FCB	
027 RCL0	Check for Base.	083 RTN	
028 GSB0		084 RCL1	
029 9		085 INT	
030 STOI		086 RCLC	
031 *LBL8	Print R <sub>19</sub> , R <sub>18</sub> , ..., R <sub>10</sub> as	087 INT	
032 RCL1	rows 9, 8, ..., 0.	088 X*Y?	
033 FRTN		089 RTN	
034 DSZ1		090 GSB7	
035 GTOS		091 CLX	
036 RCL0		092 RCL0	
037 FRTX		093 -	
038 P+S		094 ABS	
039 RTN		095 1	
040 *LBL0	Routine tests whether an	096 X*Y?	
041 ENT1	object is in KH's quadrant.	097 RTN	
042 INT		098 1	
043 RCLC		099 CHS	
044 INT	If not, return.	100 STOI	
045 X*Y?		101 SFR	
046 RTN		102 1	
047 R1	If so, locate 3, 4, or 7 in	103 ST-9	
048 R4	proper sector of proper	104 RTN	
049 FRC	row, represented by R <sub>10</sub> -R <sub>19</sub>	105 *LBL7	
050 GSB5		106 RCL1	
051 -INT		107 FRC	
052 STOI		108 GSB5	
053 CLX		109 STOI	
054 LSTA		110 INT	
055 FRC		111 RCLC	
056 GSB5		112 FRC	

REGISTERS									
0	1	2	3	4	5	6	7	8	9
Used	Used			10		Energy	Torpedos	Days	Aliglogs
Row 0	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9
A	Aliglog 1	B	Aliglog 2	C	Aliglog 3	D	Base	E	Kittyhawk
									Pointer

3, 4, or 7 times 10<sup>-1</sup> (-S<sub>4</sub>)  
Add to register S<sub>4</sub>.

---

Torpedo.

---

Save angle.

---

If no torpedoes remain,  
display "Error".  
Otherwise subtract one  
from no. torpedoes.

---

Check if Aliglogs 1, 2, and  
3 are in the path of the  
torpedo.  
Display no. Aliglogs left.

---

Routine tests if Aliglog  
will be hit by torpedo.  
If F0 set, an Aliglog has  
been hit - return.  
If Aliglog not in same  
quadrant as KH, return.

---

Find angle to Aliglog.

---

Compare to angle of fire.

---

If Aliglog 1° or more away,  
no hit.

---

If hit, store -1 as Aliglog's  
position.

---

F0 set to indicate torpedo  
is sent.  
Decrement no. Aliglogs.

---

Routine finds angle and  
distance from KH to  
Aliglog





# Program Listing

## DUPLICATE LISTING

001	*LELA	21 11	057	SF2	16 21 02	113	EEX	-23	169	INT	16 34
002	CLRG	16-53	058	CLX	-51	114	8	08	170	GSB5	23 05
003	X=0?	16-43	059	RCLC	36 13	115	=	-24	171	FRC	16 44
004	P1	16-24	060	X=Y?	16-33	116	ST+1	35-55 01	172	+	-55
005	ST09	35 09	061	SF2	16 21 02	117	RCL1	36 01	173	+	-55
006	1	01	062	CLX	-51	118	PRTX	-14	174	FRC	16 44
007	0	00	063	RCLD	36 14	119	RTN	24	175	LSTX	16-63
008	ST04	35 04	064	X=Y?	16-33	120	*LBL0	21 00	176	INT	16 34
009	2	02	065	SF2	16 21 02	121	0	00	177	GSB4	23 04
010	0	00	066	R1	-31	122	ST05	35 05	178	+	-55
011	ST01	35 46	067	RTN	24	123	R1	-31	179	RCL2	36 02
012	*LEL9	21 09	068	*LELC	21 13	124	RCLA	36 11	180	FRC	16 44
013	GSB1	23 01	069	4	04	125	INT	16 34	181	RCL3	36 03
014	GSB8	23 08	070	FIX	-11	126	X=Y?	16-33	182	FRC	16 44
015	F2?	16 23 02	071	9	09	127	GSB1	23 01	183	GSB4	23 04
016	ST09	22 09	072	9	09	128	CLX	-51	184	INT	16 34
017	ST01	35 45	073	9	09	129	RCLB	36 12	185	+	-55
018	ISZI	16 26 46	074	=	-24	130	INT	16 34	186	RCL0	36 00
019	RCL1	36 46	075	ST02	35 02	131	X=Y?	16-33	187	+	-55
020	2	02	076	DSP8	-63 08	132	GSB1	23 01	188	INT	16 34
021	5	05	077	SFC	16-11	133	CLX	-51	189	LSTX	16-63
022	X=Y?	16-32	078	RCLC	36 15	134	RCLC	36 13	190	FRC	16 44
023	ST09	22 09	079	INT	16 34	135	INT	16 34	191	GSB5	23 05
024	EEX	-23	080	ST00	35 00	136	X=Y?	16-33	192	+	-55
025	3	03	081	RCL4	36 04	137	GSB1	23 01	193	*LBL7	21 07
026	ST06	35 06	082	+	-55	138	CLX	-51	194	+	-55
027	3	03	083	GSB3	23 03	139	RCLD	36 14	195	GSB8	23 08
028	ST07	35 07	084	RCL0	36 00	140	INT	16 34	196	F2?	16 23 02
029	ST09	35 09	085	GSB3	23 03	141	X=Y?	16-33	197	ST00	22 00
030	1	01	086	RCL0	36 00	142	GSB2	23 02	198	ST0E	35 15
031	8	08	087	RCL4	36 04	143	RCL5	36 05	199	1	01
032	ST08	35 08	088	-	-45	144	RTN	24	200	ST-8	35-45 08
033	RCLC	36 15	089	GSB3	23 03	145	*LBL1	21 01	201	RCL8	36 08
034	RTN	24	090	RTN	24	146	RCL4	36 04	202	X=0?	16-45
035	*LBL1	21 01	091	*LBL3	21 03	147	ST+5	35-55 05	203	ST06	22 06
036	RCL9	36 09	092	RCL2	36 02	148	RTN	24	204	RCLC	36 15
037	9	09	093	ST01	35 01	149	*LBL2	21 02	205	RTN	24
038	9	09	094	R1	-31	150	1	01	206	*LBL6	21 06
039	7	07	095	ST03	35 03	151	ST+5	35-55 05	207	CLX	-51
040	X	-35	096	ST+1	35-55 01	152	RTN	24	208	PSE	16 51
041	FRC	16 44	097	1	01	153	*LBL5	21 15	209	ST06	22 06
042	ST09	35 09	098	-	-45	154	*R	44	210	*LBL4	21 04
043	EEX	-23	099	GSB0	23 00	155	FIX	-11	211	RCL4	36 04
044	4	04	100	GSB5	23 05	156	DSP1	-63 01	212	X	-35
045	X	-35	101	GSB5	23 05	157	RND	16 24	213	RTN	24
046	INT	16 34	102	ST+1	35-55 01	158	ST00	35 00	214	*LBL5	21 05
047	GSB5	23 05	103	RCL3	36 03	159	X2Y	-41	215	RCL4	36 04
048	GSB5	23 05	104	GSB0	23 00	160	RND	16 24	216	=	-24
049	RTN	24	105	EEX	-23	161	DSP2	-63 02	217	PTN	24
050	*LBL8	21 08	106	5	05	162	RCLC	36 15	218	*LBL0	21 00
051	RCLA	36 11	107	=	-24	163	GSB5	23 05	219	.	-62
052	X=Y?	16-33	108	ST+1	35-55 01	164	ST03	35 03	220	1	01
053	SF2	16 21 02	109	RCL3	36 03	165	INT	16 34	221	ST07	22 07
054	CLX	-51	110	1	01	166	RCLC	36 15	222	*LBL6	21 16 11
055	RCLB	36 12	111	+	-55	167	GSB4	23 04	223	RCL8	36 08
056	X=Y?	16-33	112	GSB0	23 00	168	ST02	35 02	224	RTN	24

## Duplicate Listing

001	*LELA	21 11	057	CHS	-22	113	GSE5	23 05	159	PCLD	36 14
002	FIN	-11	058	10*	16 33	114	INT	16 34	170	INT	16 34
003	DSFS	-63 09	059	X	-35	115	-	-45	171	ROLE	36 15
004	SPC	16-11	060	ST-1	35-55 45	116	RCL1	36 01	172	INT	16 34
005	PFS	16-51	061	RTN	24	117	FRC	16 44	173	X*Y?	16-32
006	9	09	062	*LBLC	21 13	118	ROLE	36 15	174	GT0a	22 16 11
007	STOI	35 46	063	CF0	16 22 00	119	GSE5	23 05	175	RCLD	36 14
008	0	00	064	ST00	35 00	120	FRC	16 44	176	FRC	16 44
009	*LELS	21 09	065	RCL7	36 07	121	-	-45	177	GSE5	23 05
010	STOI	35 45	066	1	01	122	GSE5	23 05	178	ST00	35 00
011	DSZI	16 25 46	067	X*Y?	16-34	123	*P	34	179	INT	16 34
012	GT09	22 09	068	GT0B	22 12	124	RTN	24	180	ROLE	36 15
013	ST00	35 00	069	-	-45	125	*LELD	21 14	181	FRC	16 44
014	3	03	070	ST07	35 07	126	ST00	35 00	182	GSE5	23 05
015	ROLE	36 15	071	1	01	127	ST-6	35-45 06	183	STOI	35 01
016	GSE0	23 00	072	9	09	128	1	01	184	INT	16 34
017	4	04	073	STOI	35 46	129	9	09	185	-	-45
018	RCLa	36 11	074	GSE1	23 01	130	STOI	35 46	186	ABS	16 31
019	GSE0	23 00	075	GSE1	23 01	131	GSE4	23 04	187	2	02
020	4	04	076	GSE1	23 01	132	GSE4	23 04	188	X*Y?	16-35
021	RCLB	36 12	077	RCL9	36 09	133	GSE4	23 04	189	GT0a	22 16 11
022	GSE0	23 00	078	CF0	16 22 00	134	RCL9	36 09	190	RCL0	36 00
023	4	04	079	RTN	24	135	RTN	24	191	FRC	16 44
024	RCLD	36 13	080	*LBL1	21 01	136	*LBL4	21 04	192	GSE5	23 05
025	GSE0	23 00	081	ISZI	16 26 46	137	RCL6	36 06	193	RCL1	36 01
026	7	07	082	F0?	16 23 00	138	X*0?	16-45	194	FRC	16 44
027	RCLD	36 14	083	RTN	24	139	GT06	22 06	195	GSE5	23 05
028	GSE0	23 00	084	RCL1	36 45	140	ISZI	16 26 46	196	-	-45
029	9	09	085	INT	16 34	141	RCL1	36 45	197	ABS	16 31
030	STOI	35 46	086	ROLE	36 15	142	INT	16 34	198	2	02
031	*LBL0	21 00	087	INT	16 34	143	ROLE	36 15	199	X*Y?	16-35
032	RCL1	36 45	088	X*Y?	16-32	144	INT	16 34	200	GT0a	22 16 11
033	PRTX	-14	089	RTN	24	145	X*Y?	16-32	201	EEX	-23
034	DSZI	16 25 46	090	GSE7	23 07	146	RTN	24	202	3	03
035	GT08	22 08	091	CLX	-51	147	EEX	-23	203	ST06	35 06
036	RCL0	36 00	092	RCL0	36 00	148	2	02	204	3	03
037	PRTX	-14	093	-	-45	149	ST-6	35-45 06	205	ST07	35 07
038	PFS	16-51	094	ABS	16 31	150	GSE7	23 07	206	GT00	22 00
039	RTN	24	095	1	01	151	X*	53	207	*LBLa	21 16 11
040	*LBL0	21 00	096	X*Y?	16-35	152	EEX	-23	208	RCL6	36 06
041	ENT1	-21	097	RTN	24	153	2	02	209	RCL7	36 07
042	INT	16 34	098	1	01	154	+	-55	210	*LBL0	21 00
043	ROLE	36 15	099	CHS	-22	155	RCL0	36 00	211	1	01
044	INT	16 34	100	STOI	35 45	156	X*Y?	16-35	212	0	00
045	X*Y?	16-32	101	SF0	16 21 00	157	RTN	24	213	+	-24
046	RTN	24	102	1	01	158	1	01	214	XZY	-41
047	F4	-31	103	ST-9	35-45 09	159	CHS	-22	215	INT	16 34
048	F4	-31	104	RTN	24	160	STOI	35 45	216	+	-55
049	FRC	16 44	105	*LBL7	21 07	161	1	01	217	FIX	-11
050	GSE5	23 05	106	RCL1	36 45	162	ST-9	35-45 09	218	DSP1	-63 01
051	INT	16 34	107	FRC	16 44	163	RTN	24	219	RTN	24
052	STOI	35 46	108	GSE5	23 05	164	*LBL6	21 06	220	*LBL5	21 05
053	CLX	-51	109	STOI	35 01	165	CLX	-51	221	1	01
054	LSTX	16-63	110	INT	16 34	166	FSE	16 51	222	0	00
055	FRC	16 44	111	ROLE	36 15	167	GT06	22 06	223	X	-35
056	GSE5	23 05	112	FRC	16 44	168	*LBLE	21 15	224	RTN	24