

fix delay constant!

V	date	time	tape counter	changes from previous	endad
18	5/16	8 ⁰⁰ PM	259	add CO→FF in MOVE, FO→30 in FIRE	1061
19	5/17	7 ³⁰ PM	220	insert 95 90 in FIRE, 59→5B for IRQ.	1061
20	5/18	7 ³⁰ PM	259	17→1C in IFFY, 50→7F in EVAL, E9→A1 in EVAL, ^{rearrangement} to MAIN to IRQ vector	1063
21	5/19	10 ⁰⁰ PM	220	insertion in FIRE, change in IRQ vector.	
22	5/20	1 ³⁰ PM	259	A4→A6 in FIRE, 7F→50 in 5th EVAL	
23	5/20	2 ³⁰ PM	220	insertion in Keypress Fire object routine	
24	5/20	3 ⁰⁰ PM	259	50→70 in LOOP13, 08→0F in WART, insert A9 0F in OBJECT	
25	5/23	7 ¹⁵ PM	224	changes in LOOP12, LOOP13, LOOP16, HAND ^(fire) NREAR, addition to KP2	107F
26	5/28	6 ³⁰ PM	259	add LSR, 76→77 in LOOP16	10A2
27	5/29	12 ⁰⁰	224	addition to FIRE	10A3
28	6/2	5 ⁰⁰ PM	259	change in MAIN, EVAL	10Bd
29	6/16	5 ⁰⁰ PM	359	change in EVAL, LOOKSEE, LOOP16	10AC
30			224	delete PSEARCH, delete KP4, changes in KEY IN	1099
31	6/17	11 ⁰⁰ AM	259	minor corrections in EVAL, PAST	1099
32	6/17	11 ⁴⁵ AM	224	fixup PAST, FIRE	108F
33	6/20	7 ⁰⁰ PM	259	changes in OP SITE, ^{changes updating} MOVE, ^{addition of NOSEE} SEARCH, FIRE, LOOKSEE	108F
34	6/21	8 ⁰⁰ AM	224	corrections in MOVE, FIRE+NOSEE	1098
35	6/21	10 ⁰⁰ PM	259	addition of end bonus exclusivity in HPLAN, correction in INT vector	1094
36	6/22	9 ⁰⁰ PM	224	change IRQ vector, change in ^{VELMER, MAIN} LOOKSEE, ^{ENDGAME} NOSEE, add DODOT	10A1
37	6/23	8 ⁰⁰ PM	259	minor corrections in IRQ vector, NOSEE	10AC
38	6/23	8 ³⁰ PM	224	minor map correction, alteration to SITE (new algorithm)	10AF
39	6/25	10 ³⁰ PM	259	addition of variable movement delay provision	10AF
40	7/3	1 ³⁰ PM	224	new map, new map treatment, change in S as TAROBJ, YADCD, TERR, HOP RANGE	1069
41	7/12	8 ¹⁵ PM	259	corrections in HOP and TAROBJ ^{CHEX, addition of SEED routine}	107A
42	7/12	8 ³⁰ PM	350	Correct raised bit in EVAL 92→90	
43	7/12	18 ¹⁵			

KIMTANKTICS RECORD

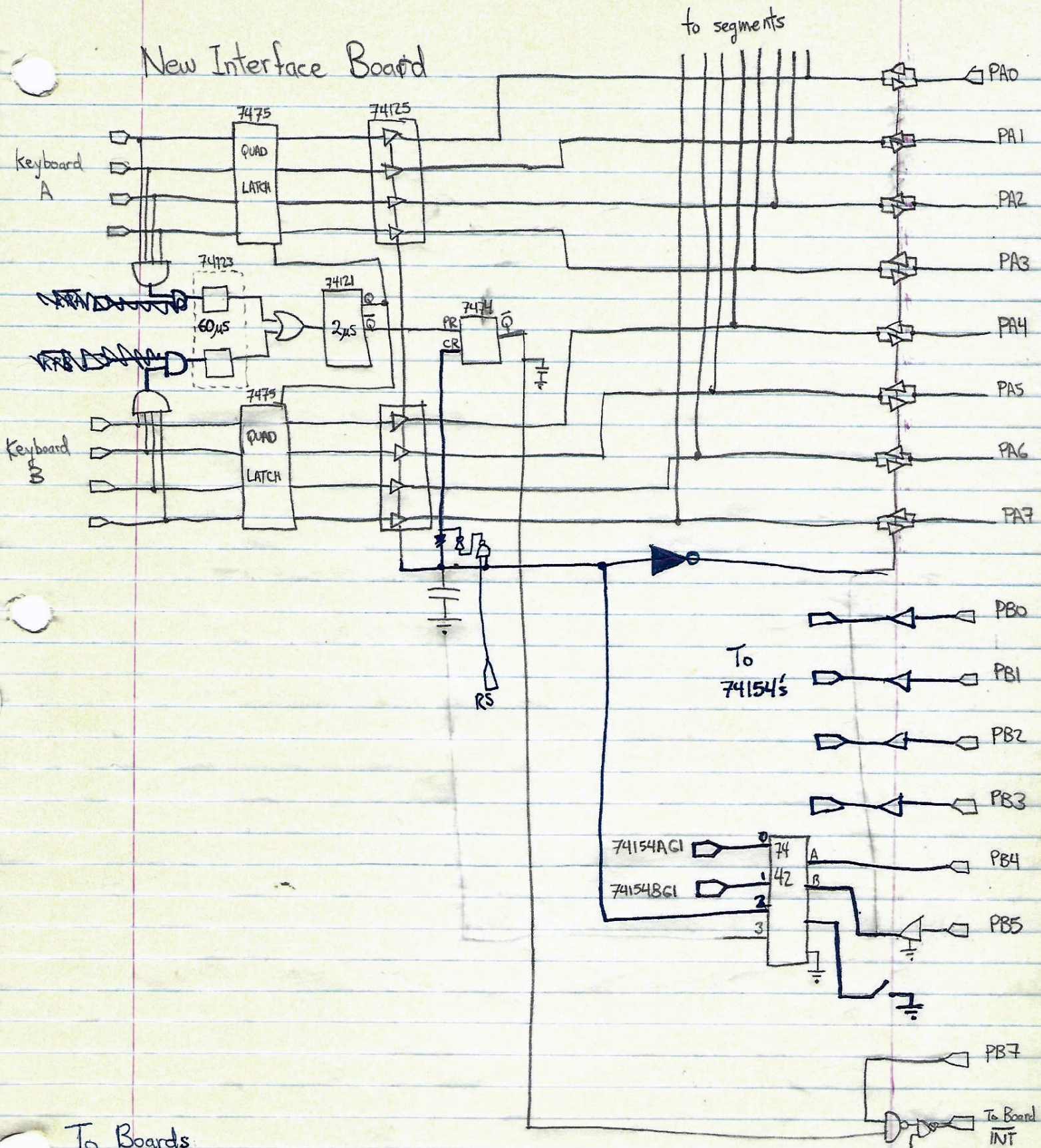
V	date	time	tape counter	changes from previous version	Ended
44	8/25	5 ⁰⁰ PM	360	new I/O structure	
45	8/26		400		
46	8/26	11 ³⁰ PM	360	minor changes in interrupt	105E
47	8/27	8 ³⁰ AM	400	specific interrupt preset	
48	8/27	12 ³⁰ PM	360	8d → 8C int made anew from T43	1068
49	8/28	9 ³⁰ PM	400	ID change in int, remove SET in MAIN, correct TRQ vector	1067
50	8/30	2 ³⁰ PM	355	changes in INT to fix ghost digits & reverse ORDERS	106C
51	8/30		400	change in BEGIN, software debounce constant,	105F
52	8/31	3 ⁰⁰ PM	355	new map	
53			300	slight change in beginning; clocking added to WAIT add TURN, INT addition in	0F8E
54	9/20	9 ¹⁵	345	changes in points initialization, points tie check, HPLAN, PAST, TARBAB	
55	9/20	9 ³⁰	390	TDLAY, HPLAN, LOOP13	
56	9/20	10 ⁴⁵	300	TRQ vector, LOOP13, TAROBJ	0F7E
57	9/21	7 ⁴⁵	345	EVAL bit, HPLAN, TRQ software debounce, TDLAY	0F7E
58	9/21	8 ¹⁵	390	timing corrections in TDLAY, INT, HPLAN,	
59	9/22	5 ⁰⁰	300	minor fix in random seed.	0F7E
60			345	add BTU ¹⁶ ref to BTU ¹⁶ in LOOP10, AOB, BOB, ^{tie} INT, ² OFAB	
61			391	HPLAN changes, new TDLAYS, new MPS, new GUNS, TARBAB	
62			300	correction in insertion, only 10 pts for objective	
63			345	negative points correction	
64	10/3	5 ⁰⁰ PM	391	defensive factors, defensive factors/load; def, fac calc in FIRE, INT. ^{acquisition time}	0F1B
				correct TRQ vector	
				correct whose armor is used, INT vector	

Table: Keypresses

Button	Old Code	New Code
0	Q E	✓ 0 B ENDI
1	B	1
2	A	2
3	9	3
4	7	✓ 4 J KP5
5	6	5
6	5	6
7	3	7
8	2	8
9	1	✓ 9 B ENDI
.	d	✓ A J KP7
=	C	✓ B J KP3
+	8	✓ C B KP2
14		
X	0	✓ d B KP0
-	4	✓ F B KP1
$\frac{\circ}{\circ}$	W	✓ E ENDI
ON	F	14 B ENDI

0302
0300

New Interface Board



To Boards

- c 8 Segment lines
- c 4 Digit lines
- s 1 Select
- s 4 input code
- s 1 RP

Map Terrain Code
Old Map

0	Clear	8
1	Hill	9
2	River	A
3	Forest	B
4	Clear-Road	C
5	Hill-Road	D
6	River-Road	E
7	Forest-Road	F

} Impassable

R0	33,00,00,26,00,40,30,00,33,33,33,33,02,00,00,44
R1	33,00,00,20,44,14,40,40,03,33,33,33,02,64,44,11
R2	33,30,00,46,20,00,03,34,40,33,33,33,44,32,20,00
R3	03,30,44,00,02,00,30,00,04,40,43,77,30,00,20,00
R4	00,04,33,30,02,20,00,03,03,04,04,33,33,30,20,00
R5	* 00,04,33,33,30,02,08,00,00,04,30,03,33,30,20,00
R6	00,44,03,33,30,02,20,00,03,04,00,03,33,30,20,00
R7	00,30,00,03,00,10,20,00,03,04,00,03,00,02,20
R8	04,00,00,00,10,00,20,00,30,03,30,00,00,00,33,20
R9	04,10,00,00,00,30,02,20,00,03,40,22,20,00,00,20
R10	04,00,10,00,00,00,00,80,22,28,86,73,32,20,22,00
R11	04,41,01,11,00,03,00,88,00,08,88,37,73,32,00,44
R12	03,43,81,10,10,90,02,00,03,00,08,37,37,46,46,00
R13	04,30,00,01,01,09,92,21,10,00,30,07,00,32,20,00
R14	34,03,08,03,00,10,99,92,11,00,00,07,00,00,02,03
R15	04,40,80,03,08,01,19,22,11,10,00,34,03,03,02,00
R16	00,34,40,30,30,22,22,00,10,10,10,44,30,00,02,30
R17	33,00,43,00,22,00,30,00,01,01,11,40,00,03,32,20
R18	00,03,43,08,23,34,40,30,00,00,04,11,03,03,28,02
R19	30,03,34,04,46,00,04,44,43,40,04,00,10,22,03,00
R20	30,00,00,00,32,80,30,00,04,34,44,30,02,00,00,33
R21	00,33,03,03,02,20,00,03,00,00,04,40,02,01,00,33

*

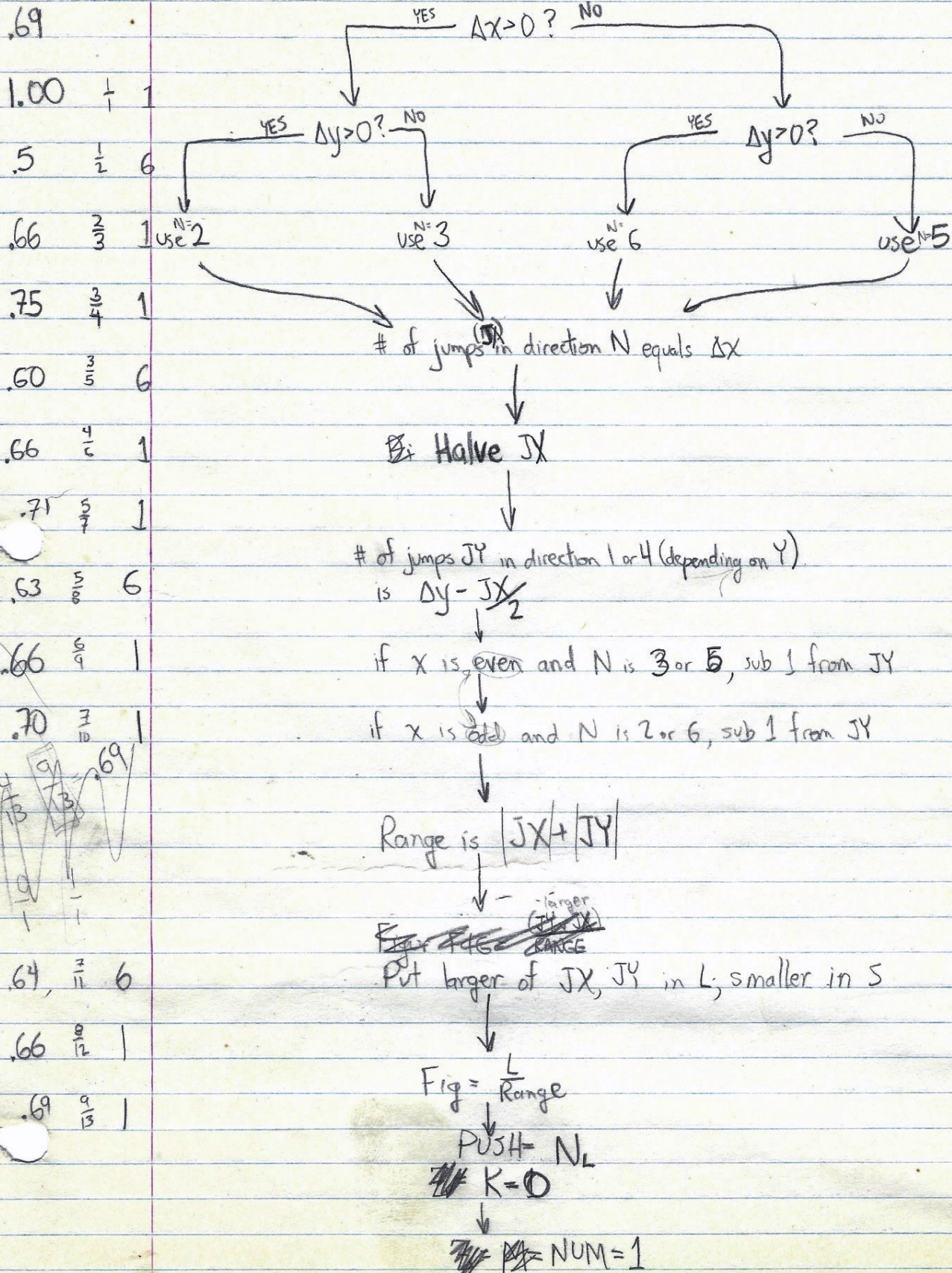
Third Map Terrain Codes

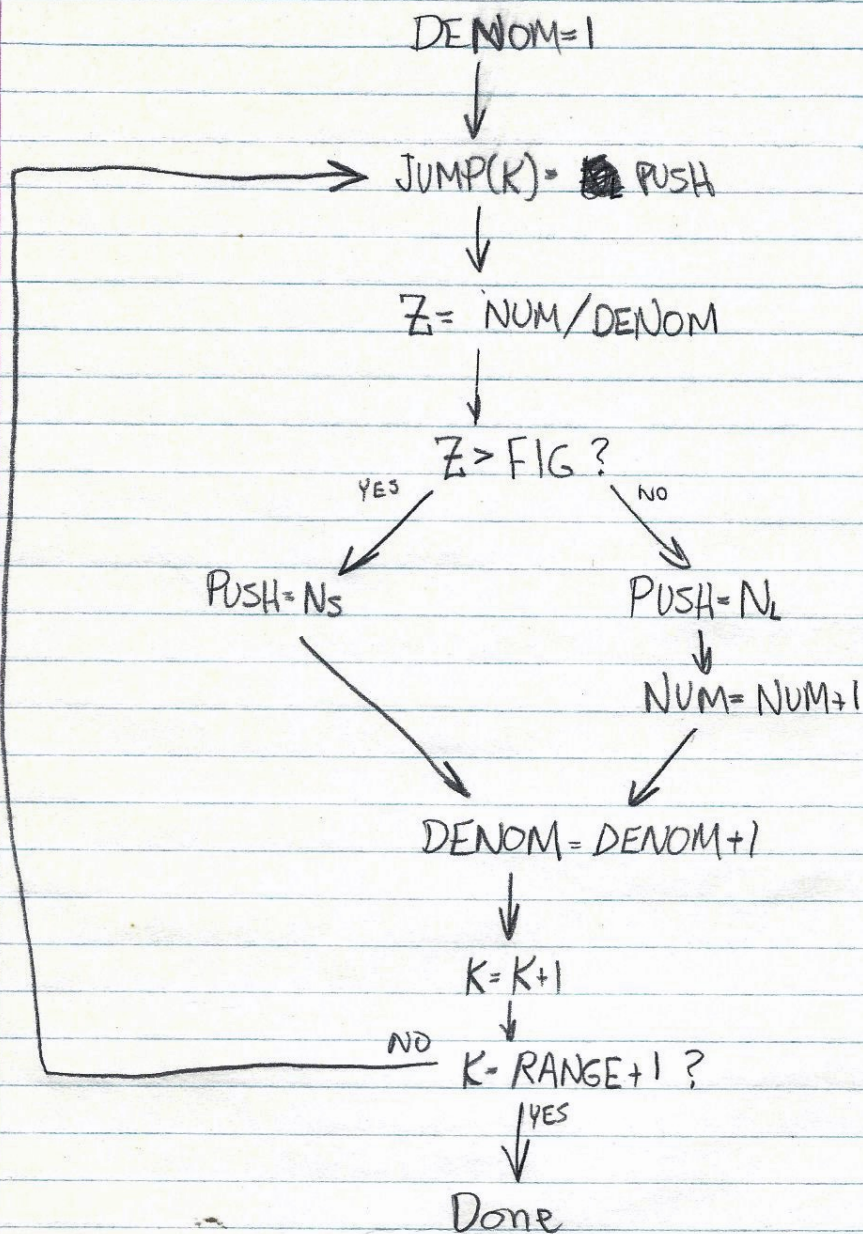
Row

1	33, 31, 10, 14, 55, 44, 33, 04, 74, 44, 10, 33, 33, 30, 00, 33
2	13, 23, 07, 43, 30, 30, 47, 71, 10, 08, 74, 47, 30, 03, 81, 33
3	30, 07, 41, 30, 01, 11, 30, 11, 14, 14, 70, 30, 74, 11, 83, 30
4	44, 43, 30, 30, 01, 12, 30, 37, 41, 71, 33, 10, 37, 11, 10, 37
5	04, 88, 00, 00, 33, 33, 04, 41, 10, 11, 28, 10, 07, 01, 03, 63
6	34, 80, 33, 11, 13, 17, 71, 13, 30, 10, 38, 30, 30, 47, 07, 73
7	07, 31, 13, 10, 34, 71, 11, 10, 03, 00, 38, 01, 03, 07, 37, 20
8	07, 03, 01, 04, 41, 11, 10, 33, 01, 33, 33, 11, 10, 07, 34, 30
9	07, 33, 30, 71, 11, 03, 03, 01, 11, 10, 01, 10, 00, 30, 73, 00
10	34, 30, 01, 73, 33, 10, 03, 31, 10, 30, 01, 11, 33, 03, 40, 33
11	01, 44, 01, 42, 11, 10, 00, 01, 03, 31, 10, 03, 10, 00, 74, 33
12	03, 14, 00, 43, 11, 00, 33, 31, 01, 31, 10, 33, 03, 13, 14, 00
13	30, 04, 30, 73, 00, 13, 11, 01, 13, 33, 38, 27, 30, 00, 41, 33
14	03, 37, 34, 43, 01, 00, 00, 11, 47, 44, 88, 03, 31, 34, 71, 13
15	01, 07, 73, 00, 00, 30, 31, 11, 30, 88, 77, 34, 74, 37, 31, 30
16	01, 37, 33, 30, 33, 01, 11, 30, 38, 80, 11, 40, 30, 47, 33, 00
17	03, 06, 30, 30, 01, 11, 00, 10, 20, 30, 00, 33, 03, 34, 03, 30
18	30, 41, 00, 00, 30, 10, 00, 01, 10, 33, 33, 03, 03, 07, 01, 30
19	00, 74, 30, 30, 00, 34, 03, 33, 30, 11, 01, 00, 11, 43, 03, 01
20	03, 04, 31, 30, 37, 40, 77, 30, 03, 03, 13, 00, 10, 70, 00, 11
21	00, 04, 03, 14, 43, 03, 00, 77, 30, 33, 30, 30, 34, 43, 31, 10
22	03, 33, 44, 73, 33, 33, 30, 03, 47, 03, 33, 07, 73, 30, 31, 30
23	11, 37, 70, 00, 03, 00, 03, 30, 10, 47, 15, 43, 33, 01, 10, 33
24	33, 37, 30, 00, 30, 00, 00, 30, 00, 00, 50, 00, 00, 00, 13, 33

0	Clear	4	Clear + Road	8	Lake
1	Slope	5	Slope + Road		
2	Depression	6	Depression + Road		
3	Forest	7	Forest + Road		

New Range Algorithm - uses old coordinate system
 $\Delta y, \Delta x$





needed: FIG, N_s, N_L, NUM,
DENOM, K,
RANGE
PUSH 8 bytes

0000 0010
↑↑
20
02
↑↑ 0000 0000
526 ↑ 120

9.25
13

Needed per unit:

- 8 bytes for path
- 2 bytes for position
- 1 byte for strength
- 1 byte for rebuild pot
- 1 byte for mode

TIMING CONSIDERATIONS

One tick of Represents

DIGIT	250 μ s
KOUNTR	62 ms
CLOCKL	250 ms
CLOCKH	62 s

On this basis, a game will last between 21 and 36 minutes

The display is strobed at 250 Hz

The duty cycle for display interrupts is 102 machine cycles or 40%

Execution time for various orders

	8 MPS	7 MPS	6 MPS	5 MPS	4 MPS
Fire	31	31	31	31	31
Search	12	12	12	12	12
Turn	12	12	12	12	12
move-clear	6	6.9	8	9.6	12
move-slope	12	13.7	16	19.2	24
move-hole	14	16	18.3	22.4	28
move-woods	16	18.3	22.7	25.6	32
move-road+clear	3	3.4	4	4.8	6
move-road+slope	6	6.9	8	9.6	12
move-road+hole	7	8	9.2	11.2	14
move-road+woods	8	9.1	10.3	12.8	16

Miscellanea - KIMTANKTICS III, V1

Player A is always human: abstanknos 0-7

Player B is human or computer: abstanknos 8-F

Verb codes:	0	move	0	nothing
	1	search	1	hop dir 1
	2	fire	2	hop dir 2
	3	target	3	hop dir 3
	4	mode	4	hop dir 4
	5	report	5	hop dir 5

terrain codes

0	clear
1	slope
2	dry creekbed
3	forest, town
4	road+clear
5	road+slope
6	road+creekbed
7	road+forest
8	impassable

9
A
B
C
D
E
F



6	hop dir 6
7	search
8	fire
9	orders
A	report

Study of Tank Armor

Tank	Hull F	Hull S	Hull R	Turret	SPI F/S/R	My F/S/R
PzKw IIIj	50/69°	30/90°	53/80°	30/70°	5/3/5	3/2/3
PzKw IVR	80/78°	30/90°	20/80°	50/75°	7/3/2	4/2/1
PzKw V a	80/35°	40/60°	40/60°	80/80°	11/3/3	7/2/2
PzKw VI a	100/85°	70/90°	82/82°	90/90°	9/7/7	5/4/3
PzKw VI b	120/40°	80/80°	80°/60°	100/70°	13/7/7	9/4/3
T34/76c	45	45	45	60	8/5/5	4/3/2
T34/85	110	75	45	65	11/8/6	6/4/3
JSII	120	90	60	90	10/9/6	7/5/3
KVI	75	75	75	75	—	4/4/4
KVII	75	75	75	75	—	4/4/4
T55	100	80	60	80	12/6/6	6/5/3
T62	100	80	60	100	14/6/6	6/5/3
M4					6/3/2	3/2/1
M4/76					6/3/2	3/2/1
M60A2					17/8/5	11/5/2
Cent 105					16/9/6	10/5/3

Study of Tank Guns

Tank	Gun Type	Penetration, 60°, mm					My Value
		MV	457m	915m	MV ²	SPI Value	
PzKw III;	50mm, L60	11.85	61	50	1.5	8	32
PzKw IV	75mm L48	5.0	90	80	3.8	14	50
PzKw V A	75mm L70	6.4	141	121	5.9	18	79
PzKw VI a	88mm L56	7.6	110	(98?)	6.2	15	60
PzKw VI b	88mm L71	10.4	182	167	10.4	21	A7
T34/76	76mm L41					7	32
T34/85	85mm L51					14	50
JSII	122mm L43					15	60
KVI	76mm L30						20
KVII	152mm L20						30
T55	100mm L54					20	AD
T62	115m					21	A8
M4						10	40
M4/76						13	48
M60A2						30	FD
Centurion 105						22	B0

Tank Characteristics

	GUN	FRONT	SIDE	REAR	SPI MPS	MPS	ACQT
Pzr IIIj	32	3	2	3	5	5	70
Pzr IVh	50	4	2	1	4	4	70
Pzr V	79	7	2	2	7	7	70
- Pzr VIa	60	5	4	3	5	5	70
- Pzr VIb	A7	9	4	3	4	4	70
40							
- T34/76	38	4	3	2	8	8	90
- T34/85	58	6	4	3	8	8	90
JS II	60	7	5	3	4	4	80
KVI	20	4	4	4		4	90
KVII	30	4	4	4		4	90
T55	A0	6	5	3		7	80
T62	AB	6	5	3		7	80
M4	40	3	2	1		5	80
M4/76	48	3	2	1		5	80
M60A2	F0	11	5	2		7	60
Cent 105	B0	10	5	3		6	70

Scenario Schedule D

Number	TANK A	#	TANK B	#
0	Pz Kw IIIj	4	Pz Kw IIIj	4
1	Pz Kw IIIj	8	Pz Kw IIIj	8
2	T34/85	8	T34/85	8
3	Pz Kw IVh	8	Pz Kw IVh	8
4	Pz Kw IIIj	8	T34/76	6
5	Pz Kw V	6	T34/85	8
6	Pz Kw IVh	8	T34/76	8
7	Pz Kw VIIa	8	JSII	8
8	Pz Kw V	4	M4/76	8
9	Pz Kw VIIb	3	M4/76	8
A	KVI	6	Pz Kw IIIj	8
B	M4/76	8	Pz Kw VIIb	8
C	Pz Kw IIIj	8	M4/76	8
d	Pz Kw IVh	8	JSII	8
E	Pz Kw IIIj	8	JSII	8

Values Associated With Scenario Schedule D

Page 1 10/2/78

	00/10	20/30	40/50	60/70	80/90	100/100	120/120			
	GUN	SPD	OB	RFAC	SFAC	FFAC	ACQT			
A	00	32	05	04	03	02	03	70		
	01	32	05	08	03	02	03	70		
	02	58	08	08	03	04	06	90		
	03	50	04	08	01	02	04	70		
	04	32	05	08	03	02	03	70		
	05	79	07	06	02	02	07	70		
	06	50	04	08	01	02	04	70		
	07	60	05	08	03	04	05	70		
	08	79	07	04	02	02	07	70		
	09	A7	04	03	03	04	09	70		
	0A	20	04	06	04	04	04	90		
	0B	48	05	08	01	02	03	80		
	0C	32	05	08	03	02	03	70		
	0d	50	04	08	01	02	04	70		
	0E	32	05	08	03	02	03	70		
	0F	32	05	08	03	02	03	70		
B	10	32	05	0C	03	02	03	70		
	11	32	05	10	03	02	03	70		
	12	58	08	10	03	04	06	90		
	13	50	04	10	01	02	04	70		
	14	38	08	0E	02	03	04	90		
	15	58	08	10	03	04	06	90		
	16	38	08	10	02	03	04	90		
	17	60	04	10	03	05	07	90		
	18	48	05	10	01	02	03	80		
	19	48	05	10	01	02	03	80		
	1A	32	05	10	03	02	03	70		
	1B	A7	04	10	03	04	09	70		
	1C	48	05	10	01	02	03	80		
	1d	60	04	10	03	05	07	90		
	1E	60	04	10	03	05	07	90		
	1F	60	04	10	03	05	07	90		

0400	A9 00	AOA #00	set type of game 00=solitaire
	8d 00 14	STA 1400	01=2-player
	A9 01	LDA #01	
	85 E6	STA GAME	
	d8	CLD	
	A9 FF	LDA #FF	set up keypress marker
	85 EE	STA KP	
	8d 01 17	STA GSUBJ(0)	
	85 C7	STA GSUBJ(1)	initialize keypress memory
	85 C8	STA GVERB(0)	
	85 C9	STA GVERB(1)	
	85 CA	STA GVERB(1)	
	A2 1F	LDX #1F	
	9d 80 17	STA DISP(0), X	put B's into display
	CA	DEX	
	10 FA	BPL FA	
	A9 d2 (dF)	LDA #d2	set up IRQ vector
	8d FE 17	STA 17FE	
	A9 07 17	LDA #07	
0428	8d FF 17	STA 17FF	
	85 C6 14	STA CLOCH	make sure ENDCAME doesn't hit
	Ad 07 14	LDA 1407	now you can open IRQ gate
	8d 07 17	STA 1707	
	85 C6 14	STA CLOCH	
	A5 EE	LDA KP	
	C9 FF	CMP #FF	keypress yet?
	F0 FA	BEQ FA	if not, keep checking
	8d d2 03	STA RAND(2)	*insertion next page
	A5 C4	LDA DIGIT	store random seed
	8d d4 03	STA RAND(1)	

29	OF	AND #OF	strip away A's keypress
AA		TAX	
Bd	00 01	LDA AGUN,X	get A's gun strength
85	AE	STA HNDCP(0)	
Bd	10 01	LDA BGUN,X	B's now
85	AF	STA HNDCP(1)	
Bd	20 01	LDA ASPD,X	
85	67	STA THANDCP(0)	
Bd	30 01	LDA BSPD,X	
85	68	STA THANDCP(1)	
86	6C	STX GAMENO	save game number
Bd	60 01	LDA ARFAC,X	
85	6d	STA RFAC(0)	
Bd	70 01	LDA BRFAC,X	
85	6E	STA RFAC(1)	
Bd	80 01	LDA ASFAC,X	
85	6F	STA SFAC(0)	
Bd	90 01	LDA BSFAC,X	
85	70	STA SFAC(1)	
Bd	A0 01	LDA AFFAC,X	
85	71	STA FFAC(0)	
Bd	B0 01	LDA BFFAC,X	
85	72	STA FFAC(1)	
Bd	C0 01	LDA AACQT,X	
85	73	STA ACQT(0)	
Bd	d0 01	LDA BACQT,X	
85	74	STA ACQT(1)	

A2	0F	FF 14 00	LDX #0F	
A9	01	LOOP10	LDA #01	
95	00		STA FACE,X	set initial facing
85	B3		STA HAT	game over marker
A9	00		LDA #00	
95	90		STA IVERB,X	set actions
95	10		STA SEEN,X	set sighting
A9	0F		LDA #0F	
9d	C0 03		STA AMMO,X	set ammo
CA			DEX	
10	14		BPL LOOP10	* insertion next page
20	8B 00		JSR CHEX	choose a target hex
A5	E7		LDA CHEXX	
85	E1		STA STARGX	
85	E3		STA FROMX	set up ranging
A5	E8		LDA CHEXY	
85	E2		STA STARGY	
85	E4	FF 3F 00	STA FROMY	
20	8B 00	LOOP11	JSR CHEX	choose Player A mother hex
A5	E7		LDA CHEXX	
85	E5		STA TOX	
85	40		STA XPOS(0)	
A5	E8		LDA CHEXY	
85	E6		STA TOY	
85	50		STA YPOS(0)	
20	76 00		JSR RANGE	
A5	E9		LDA RANGE	get range from Player A mother
C9	08		CMP #08	hex to target; if less than 8,
90	3F		BCC LOOP11	try again
A9	01		LDA #01	
85	EA		STA ABSTKNO	
20	73 00		JSR PLNCHK	place remaining player A tanks

13,
A4 6C
BE 4D 01
20 5C 00
A4 6C
BE 50 01
20 5C 00

LDY GAMENO
LDX AOB,Y get A number of tanks dead
JSR BTU
LDY GAMENO
LDX BOB,Y get B number of tanks
JSR BTU

FF 40 00

A5 E1	C3 PUNKT	LDA STARGX	
85 E3		STA FROMX	set up strat targ for ranging
A5 E2		LDA STARGY	
85 E4	FF 41 00	STA FROMY	
20 8B 00	C6 LOOP12	JSR CHEX	
A5 E7		LDA CHEXX	place mother tank of
85 E5		STA TOX < STA XPOS(8)	2nd player
85 48		LDA CHEXY	
A5 E8		STA TOY	
85 E6		STA YPOS(8)	
85 58		JSR RANGE	check range to targ
20 76 00		LDA RANGE	
A5 E9		CMP #08	too close?
C9 08		BCC LOOP12	if so, try again
90 41		LDX #00	if not, check range
A7 00		JSR LDFROM	to other guy's
20 90 00		LDA FROMY	mother tank
A5 50		JSR RANGE	
20 76 00		LDA RANGE	
A5 E9		CMP #08	too close?
C9 08		BCC PUNKT	if so, try again
90 40		LDA #09	if not, let's put down the
A9 09		STA ABSTKNO	others.
85 EA		JSR PLNCHK	do it
20 73 00		LDA #00	
A9 00		STA PTSL(0)	initialize points
85 C0		STA PTSL(1)	
85 C1		STA PTSH(0)	
85 C2		STA PTSH(1)	
85 C3		STA ABSTKNO	
85 EA		TAX	
AA		LDA STARGX	
A5 E1			

85 E3
A5 E2
85 E4 FF 45 00
20 91 00

LOOP13

20 76 00

A5 EA
4A
4A
4A
AA

A5 E9
18

75 C0

95 C0

A9 00

75 C2

95 C2

E6 EA

A6 EA

E0 10

D0 45

20 8D 00

4A, 4A, 4A, 4A

69 4C

85 C6

A5 E1

A4 E2

85 CF

84 CE

LDA FROMX

STA FROMX

set up ranging

LDA STARGY

STA FROMY

JSR LDT0

STA FROMX

LDA STARGY

STA FROMY

JSR RANGE

LDA ABSTKNO

LSR

LSR

LSR

TAX

get who
index it

LDA RANGE

get range from tank to target

CLC

ADC PTSL(0), X

give points handicap

STA PTSL(0), X

LDA #00

ADC PTSH(0), X

double-byte addition

STA PTSH(0), X

INC ABSTKNO

next tank

LDX ABSTKNO

CPX #10

done?

BNE LOOP13

if not, do next tank

JSR RAND

LSR, LSR, LSR, LSR

ADC #1C

initialize clock

STA CLOCKH

LDA STARGX

LDY STARGY

STA TEMP5

STY TEMP4

A9 00	LDA #00	
A2 5F	LDX #5F	
9d 80 17	STA DISP,X	clear orders + display
CA	DEX	
10 FA	BPL FA	
A2 15	LDX #15	put target on A's display
20 5E 00	JSR OUTPOS	
A2 05	LDX #05	put target on B's display
20 5E 00	JSR OUTPOS	
A2 00	LDX = CA	
A4 6C	LDY GAMENO	
B9 E7 1F <29 7F	LDA TABLE,Y <AND#7F	
8d 8A 17	STA DISP+A	put game number out
A2 1A	LDX = 1A	
8d 9A 17	STA DISP+1A	put game number out

MAIN ROUTINE

053E	A2 1D	FF 0d 00	LDX #1D	
	5B		LOOP	CLI
	CA		DEX	next tank
	1D 02		BPL 02	
	A2 0F		LDX #0F	
	86 Ed		STX ACTANK	save tank no
	B5 90		LDA IVERB X	get individual verb for that tank
	7B		SET	
	d0 9A		BNE WART	if no verb,
	8A		TXA	
	A4 E0		LDY GAME	is this a solitaire game?
	d0 0E		BNE BOOK	if not, do HPLAN
	29 0B		AND #0B	if so, check abstanke;
	F0 0E		BEQ BOOK	if human, go HPLAN
	4C 2d 00	FF 0E 00	JMP CPLAN	
	4C 25 00	FF 9A 00 BOOK	JMP HPLAN	
	B4 20	WART	LDY EXECT, X	if there's a verb, check its
	C4 C5		CPY CLOCKL	exaction time
	d0 0d		BNE LOOP	
	B4 D0		LDY FACE, X	dead?
	F0 0d		BEQ LOOP	
	C9 07		CMP #07	branch to correct routine
	F0 13		BEQ SEARCH	
	C9 0F		CMP #0F	
	d0 03		BNE 03	
	4C 19 00		JMP FIRE	
	C9 0B		CMP #0B	
	90 03		BCC 03	
	4C 6E 00		JMP TURN	

ROUTINE MOVE

85 B2		STA DIR
0581 95 00		STA FACE,X
B5 40		LDA XPOS,X
85 A4		STA JUMPX
B5 50		LDA YPOS,X
85 A5		STA JUMPY
20 6d 00		JSR HOP
A2 0F	FF 10 00	LDX #0F
B5 40	PAPER	LDA XPOS,X
C5 A4		CMP JUMPX
d0 11		BNE CHITLN
B5 50		LDA YPOS,X
C5 A5		CMP JUMPY
d0 11		BNE CHITLN
E4 Ed		CPX ACTANK
d0 12	- FF 11 00	BNE OUT
CA	CHITLN	DEX
10 10		BPL PAPER
20 6B 00		JSR TERR
29 08		AND #08
d0 12		BNE OUT
A6 Ed		LDX ACTANK
A5 A4		LDA JUMPX
95 40		STA XPOS,X

A5 A5 LDA JUMPY
95 50 FF 12 00 STA YPOS,X
0A9 00 OUT LDA #00
95 10 00 FF 12 00 STA SEEN,X
8A FF 00 OUT LDA #FF
A6 IF 00 TAY
20 1A 00 FF 12 00 JSR NOSEE
A9 FF 00 OUT LDA #FF
4C 1F 00 JMP OPSTE

ROUTINE TURN

FF 6E 00

4A TURN D LSR FACE, X get bit into Carry

B5 00 LDA FACE, X

90 0B BCC LEFT

69 00 ADC #00 right turn - inc facing

C9 07 CMP #07

d0 02 BNE 02

A9 01 LDA #01

4C 6F 00 JMP TURP

38 LEFT SEC

E9 01 SBC #01 left - dec facing

d0 02 BNE 02

A9 06 FF 6F 00 LDA #06

95 00 TURP STA FACE, X

20 1A 00 JSR NOSEE

A9 C0 LDA #C0

4C 1F 00 JMP OPSITE

ROUTINE FIRE

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FF 19 00

B4	80		FIRE	LDY IOBJ,X	
8A				TXA	
29	07			AND #07	
AA				TAX	
B9	10	00		LDA SEEN,Y	
4A				LSR	
CA				DEX	
1D	FC			BPL FC	
B0	03			BCS 03	
4C	1E	00		JMP MISS	
A6	Ed			LDX ACTANK	
dE	C0	03		DEC AMMO,X	
30	F6			BMI MISS	
20	90	00		JSR LDFROM	
B5	80			LDA IOBJ,X	
AA				TAX	
20	91	00		JSR LOTO	
20	83	00		JSR SIGHT	
20	6B	00		JSR TERR	
AA				TAX	
Bd	8B	03		LDA COV(0),X	
85	AC			STA DINSR	
A5	Ed			LDA ACTANK	
4A				LSR	
4A				LSR	
4A				LSR	
AA				TAX	
85	CB			STA TEMP1	← FOR #01
B5	AE			LDA GUN,X	

← 49 01

85	AB			STA DIVDND
20	8F	00		JSR DIVIDE
A5	Ad			LDA QUOTNT
85	AB			STA DIVDND
A5	E9			LDA RANGE
85	AC			STA DIVSR
20	8F	00		JSR DIVIDE
A5	d7			LDA NL
A4	Ed			LDY ACTANK
B6	80			LDX IOBJ,Y
d5	00			CMP FACE,X
d0	07			BNE 07
A6	CB			LDX TEMP1
B5	6d			LDA RFAC,X
4C	1d	00		JMP SHOOT
A8				TAY
B9	B6	00		LDA FACTAB,Y
d5	00			CMP FACE,X
d0	07			BNE 07
A6	CB			LDX TEMP1
B5	71			LDA FFAC,X
4C	1d	00		JMP SHOOT
A6	CB			LDX TEMP1
B5	6F	FF	1d 00	LDA SFAC,X
85	AC		SHOOT	STA DIVSR
A5	Ad			LDA QUOTNT
85	AB			STA DIVDND
20	8F	00		JSR DIVIDE
20	8d	00		JSR RAND
29	0F			AND #0F
C5	Ad			CMP QUOTNT
B0	1E			BCS MISS

A4 Ed

B6 80

A9 00

95 00

95 90

BA

18

20 1A 00 FF 1E 00 JSR NOSEE

066E

A9 80

MISS

LDA #80

LDY ACTANK

LDX IOBJ,Y

LDA #00

STA FACE,X

STA IVERB,X

ROUTINE OPSITE

FF IF 00

066E	85	CC		OP SITE	STA TEMP2
	A5	Ed			LDA ACTANK
	A8				TAY
	29	08			AND #08
	49	08	AA	FF 20 00	EOR #08 <TAX
	86	CB		NEDY	STX TEMP1
	20	8d	00	NEDY	JSR RAND
	C5	CC			CMP TEMP2
	A6	CB			LDX TEMP1
	B0	24			BCS EDGE
	20	23	00	FF 24 00	JSR LOOKSEE
	E8			EDGE	INX
0648	8A				TXA
	29	07			AND #07
	d0	20		FF 17 00	BNE NEDY
	A5	E0		COVER	LDA GAME
	d0	25			BNE HPLAN
	A5	Ed			LDA ACTANK
	29	08			AND #08
	d0	25			BNE HPLAN
	4C	2d	00		JMP CPLAN

SUBROUTINE LOOKSEE

INPUT [X] = # of looking tank [Y] = # of sought tank

FF 23 00

065A	86 A8	LOOKSEE	STX LOOK
	84 A9		STY SEE
	20 90 00		JSR LDFROM
	98		TYA
	AA		TAX
	20 91 00		JSR LDTO
	20 83 00		JSR SIGHT
	A5 A8		LDA LOOK
	29 07		AND #07
	A8		TAY
	A6 A9		LDX SEE
	18	FF 16 00	CLC
	76 10	UP	ROR SEEN,X
	88		DEY
	10 16		BPL UP
	A8		TAY
	A5 B4		LDA BLOCK
	d0 18		BNE CAP
	38	FF 18 00	SEC
	A6 A9	CAP	LDX SEE
	36 10		ROL SEEN,X
	88		DEY
	10 18		BPL CAP
	20 30 00		JSR DODOT
	A6 A8		LDX LOOK
	A4 A9		LDY SEE
0690	60		RTS

LDX LOOK
LDA FACE,X
BEQ 01

A6 A8
B5 00
FD 01

SUBROUTINE (DODOT

INPUT: [X]: abstkno of seen tank

SE

FF 30 00

8A		DODOT	TXA	
29	08		AND #08	
49	08		EOR #08	get enemy mother tank
0A			ASL	double it
85	AA		STA LOTEMP	
8A			TXA	
29	07		AND #07	get reltkno of seen tank
18			CLC	
65	AA		ADC LOTEMP	get digit number
A8			TAY	
B5	10		LDA SEEN,X	
d0	21		BNE POOP00	
B9	80 17		LDA DISP,Y	
29	7F		AND #7F	
4C	22 00	FF 21 00	JMP RIM	
B9	80 17	POOP00	LDA DISP,Y	
09	80	FF 22 00	ORA #80	
99	80 17	RIM	STA DISP,Y	
60			RTS	

ROUTINE HPLAN

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FF 25 00

A5	Ed		HPLAN	LDA ACTANK
0A				ASL
0A				ASL
AA				TAX
Bd	A0	17		LDA ORDER,X
A6	Ed			LDX ACTANK
95	90			STA INERB,X
C9	00			CMP #00
F0	A6			BEQ EHPLAN
C9	07			CMP #07
90	26			BCC PRUNE
A5	C5			LDA CLOCKL
69	30			ADC #30
95	20			STA EXECT,X
4C	A4	00	FF 26 00	JMP AVOCAD
85	B2		PRUNE	STA DIR
B5	40			LDA XPOS,X
85	A4			STA JUMPX
B5	50			LDA YPOS,X
85	A5			STA JUMPY
20	6B	00		JSR TERR
29	04			AND #04
85	AA			STA LOTEMP
20	6d	00		JSR HOP
20	6B	00		JSR TERR
A6	AA			LDX LOTEMP
d0	02			BNE 02
29	03			AND #03
AA				TAX
Bd	80	03		LDA TDLAY,X

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85	AB			STA DIVDND
A5	Ed			LDA ACTANK
4A				LSR
4A				LSR
4A				LSR
AA				TAX
B5	67			LDA MPS,X
85	AC			STA DINSR
20	8F	00		JSR DIVIDE
A5	Ad			LDA QUOTNT
0A				ASL
65	C5			ADC CLOCKL
A6	Ed			LDX ACTANK
95	20	FF	A4 00	STA EXECT,X
8A			AVOCAD	TXA
0A				ASL
0A				ASL
AA		FF	A5 00	TAX
Bd	A1	17	PRSMN	LDA ORDER+1,X
9d	A0	17		STA ORDER,X
E8				INX
8A				TXA
29	03			AND #03
d0	A5			BNE PRSMN
9d	9F	17	FF A6 00	STA ORDER-1,X
A6	Ed		EHPLAN	LDX ACTANK
4c	0d	00		JMP LOOP

SUBROUTINE NOSEE - wipes out sighting of a tank who has done something

INPUT: [X] = abstkno of tank whose sighting is to be wiped out

FF 1A 00

8A		NOSEE	TXA	
29	07		AND #07	
A8			TAX	get relative tank no
8A			TXA	
29	08		AND #08	
49	08		EOR #08	
AA			TAX	get enemy mother abstkno
A9	FF		LDA #FF	
18			CLC	
2A		HUP	ROL	
88			DEY	
10	FC		BPL HUP	
85	66		STA TEMPB	
A5	66	FOO	LDA TEMPB	
35	10		AND SEEN,X	
95	10		STA SEEN,X	
20	30 00		JSR DODOT	
E8			INX	
8A	17		TXA	
29	07		AND #07	
d0	F1		BNE FOO	
60			RTS	

PJUMP

FF 27 00

PJUMP

0702

A6 ED

20 90 00

B5 60

85 E5

B5 70

85 E6

20 76 00

A5 D7

20 28 00

18

65 B1

85 B1

A5 D8

20 28 00

18

65 B0

85 B0

A5 B1

C5 B0

30 2A

A5 D7

4C 2B 00 FF 2A 00

A5 D8 FF 2B 00 SML

A6 ED STDIR

LDX ACTANK

JSR LDFROM

LDA TARGX(0),X

STA TOX

LDA TARGY(0),X

STA TOY

JSR RANGE

LDA NL

JSR PJMPA

CLC

ADC WGTL

STA WGTL

LDA NS

JSR PJMPA

CLC

ADC WGTS

STA WGTS

LDA WGTL

CMP WGTS

BMI SML

LDA NL

JMP STDIR

LDA NS

LDX ACTANK

all this deleted

except table FF 27 00

95 80
 85 B2
 B5 40
 85 A4
 B5 50
 85 A5
 20 6D 00
 20 6B 00
 AA
 BD 80 03
 65 C5
 A6 ED
 95 20
 A9 00
 95 90
 06EB 4C 0D 00

STA IOBJ(0),X
 STA DIR
 LDA XPOS(0),X
 STA JUMPX
 LDA YPOS(0),X
 STA JUMPY
 JSR HOP
 JSR TERR
 TAX
 LDA TDLAY(0),X
 ADC CLOCKL
 LDX ACTANK
 STA EXECT(0),X
 LDA #00
 STA IVERB(0),X
 JMP LOOP

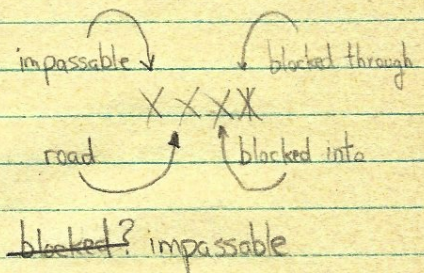
all deleted except
 4C 01 00

SUBROUTINE PJMPA

Input: ~~abst kno in X~~, dir (NL or NS) in A

Output: WGT_{FF 28 00} in A

A6 ED	28	PJMPA	LDX ACTANK
85 B2			STA DIR
A9 00			LDA #00
85 CB			STA TEMP1
B5 40			LDA XPOS(0), X
85 A4			STA JUMPX
B5 50			LDA YPOS(0), X
85 A5			STA JUMPY
20 6D 00			JSR HOP
20 6B 00			JSR TERR
48			PHA
29 08			AND #08
F0 29			BEQ RESIS
A9 80 ⁶⁸			LDA #80
60 94 00	FF 29 00	RTS	
68	RESIS	PLA	
48		PHA	
4A		LSR	
4A		LSR	
90 96		BCC TRANS	
A4 ED		LDY ACTANK	
B6 10		LDX MODE(0), Y	
BD 71 03		LDA WGT(0), X	
85 CB	FF 96 00	STA TEMP1	
68	TRANS	PLA	
49 03		FOR #03	
		AND #07	
18		CLC	
65 CB		ADC TEMP1	



blocked into

ROUTINE CPLAN

FF 2D 00

this whole routine killed except for entry+exit pts

AG ED	2D	CPLAN	LDX ACTANK
A5 E1			LDA STARGX
95 60			STA TARGX(0),X
A5 E2			LDA STARGY
95 70			STA TARGY(0),X
8A			TXA
A8			TAY
29 08			AND #08
49 08			EOR #08
AA			TAX
A9 00			LDA #00
85 CB			STA TEMP1
A9 20			LDA #20
85 B5	FF 2E 00		STA BRANGE
7E A0 17	2E	POWER	ROR SEEN,X
88			DEY
10 2E			BPL POWER
90 2F			BCC RING
66 DB			ROR TEMP1
38			SEC
4C 30 00	FF 2E 00		JMP BIND
66 DB	FF 30 00 2F	RING	ROR TEMP1
A4 ED	FF 31 00 30	BIND	LDY ACTANK
3E A0 17	31	VOLTS	ROL SEEN(0),X
88			DEY
10 31 00			BPL VOLTS
A4 ED			LDY ACTANK
E8			INX
8A			TXA
29 07			AND #07
D0 2E			BNE POWER
A2 00			LDX #00
A5 CB			LDA TEMP1

FD 36 FF 32 00
 66 CB 32 FLIP
 90 33
 20 91 00

BEQ NTRAY
 ROR TEMP1
 BCC TRAY
 JSR LOTO,X

STA TOX
 LDA #0,X
 STA TOX

86 CD
 A6 ED
 20 90 00

STX TEMP3
 LDX ACTANK
 JSR LDFROM

STA FROMX
 LDA FROMX
 STA FROMX

20 76 00

JSR RANGE

A6 CD

LDX TEMP3

A5 E9

LDA RANGE

C5 B5

CMP BRANGE

B0 33

BCS TRAY

85 B5

STA BRANGE

86 B6 FF 33 00

STX BWHO

E8 33 TRAY

INX

E0 08

CPX #08

D0 32

BNE FLIP

20 8D 00

JSR RAND

29 07

AND #07

C5 B5

CMP BRANGE

90 34

BCC SLITHER

A5 B6

LDA BWHO

A6 ED

LDX ACTANK

95 80

STA IOBT(0),X

A9 02

LDA #02

95 90

STA IVERB(0),X

A9 40

LDA #40

65 C5

ADC CLOCKL

95 20		STA EXECT(0),X
4C 0D 00	FF 34 00	JMP LOOP
46 B5	34 SLTHER	LSR BRANGE
C5 B5		CMP BRANGE
90 35		BCC MODE5
A4 B6		LDY BWHO
B9 40 00		LDA XPOS(0),Y
95 60		STA TARGX(0),X
B9 50 00		LDA YPOS(0),Y
95 70		STA TARGY(0),X
A9 06		LDA #06
4C 93 00	FF 35 00	JMP PREP
A9 05	35 MODE5	LDA #05
4C 93 00	FF 36 00	JMP PREP
1B	36 NTRAY	CLC
A9 20		LDA #20
85 B5		STA BRANGE
A2 07	FF 37 00	LDX #07
BD A0 17	37 ARM	LDA SEEN(0),X
F0 38		BEQ HAND
20 91 00		JSR LDTO(0),X
		STA TDX
		LDA YPOS(0),X
		STA TLY
86 BD		STX TEMP3
A6 ED		LDX ACTANK
20 90 00		JSR LDFROM
		STA FROMX
		LDA YPOS(0),X
		STA FROMY
20 76 00		JSR RANGE
A5 E9		LDA RANGE
C5 B5		CMP BRANGE
B0 38		BCC HAND

85 B5		STA BRANGE
A5 CD		LDA TEMP3
85 B6	FF 38 00	STA BWHO
A6 CD	38 HAND	LDX TEMP3
CA		DEX
10 37		BPL ARM
A5 B5		LDA BRANGE
C9 20		CMP #20
D0 39		BNE LEG
A9 01		LDA #01
4C 93 00	FF 39 00	JMP PREP
20 80 00	39 LEG	JSR RAND
29 0F		AND #0F
C5 B5		CMP BRANGE
B0 3A		BCS MODE3
A9 02		LDA #02
4C 93 00	FF 3A 00	JMP PREP
46 B5	3A MODE3	LSR BRANGE
C5 B5		CMP BRANGE
B0 3B		BCS MODE4
A9 03	FF 3B 00	LDA #03 < JMP PREP
^{4C 93 00} A9 04	FF 93 003B	LDA #04
A6 ED	93 PREP	LDX ACTANK
95 10		STA MODE(0),X
4C 27 00		JMP PJUMP

A0 00
8C 03 14

8E 04 14

8d 03 14

08AB

68

A8

68

AA

68

40

A1 01 14

8d 00 14

4A

4A

Ad 02 14

A2 00 ← A0 FB

B0 03 ← A0 Fd

4A

4A

4A

4A

F8

29 0F ← 8C 00 14

A8

86 EB

8A

0A

0A

0A

85 EC

08d0

84 EE

98

d5 60

LDY #00

STY 1403

STX 1404

FF 3d 00 STA 1403

ENDI PLA

TAY

PLA

TAX

PLA

RTI

1401

1400

LSR

LSR

LDA 1402

LDX #00 ← LDY #FB

BCS 07 ← LDY #Fd

LSR

LSR

LSR

LSR

INX

AND #0F ← STY 1400

TAY

STX WHO

TXA

ASL

ASL

ASL

STA WHO8

STY KP

TYA

CMP LKP,X

B interrupt

d0 Ad

A5 6B

38

F5 62

C9 01

B0 Ad

A5 C5

0BE1

d5 64

F0 3d

FF Ad 00

A5 6B

PAST

95 62

A5 C5

95 64

94 60

98

AA

F0 3d

E0 0E

F0 3d

E0 09

do 03
4c 5B 00

F0 3d

E0 0A

d0 03

4C 58 00

E0 0B

d0 03

4C 4A 00

E0 0C

F0 47

ED 0E

F0 44

BNE PAST

LDA KOUNTR

SEC

SBC LCKPL,X

CMP #01

BCS PAST

LDA CLOCCK

CMP LCKPH,X

BEQ ENDI

LDA KOUNTR

STA LCKPL,X

LDA CLOCCK

STA LCKPH,X

STY LKP,X

TYA

TAX

BEQ ENDI

CPX #0E

BEQ ENDI

CPX #09

~~BEQ ENDI~~

CPX #0A

BNE 03

JMP KP7

CPX #0B

BNE 03

JMP KP3

CPX #0C

BEQ KP2

CPX #0E

BEQ KP1

< BNE 03
JMP TARBAB

E0 0d
F0 03
4C 4C 00

CPX #0d
BEQ 03
JMP KP5

Keypress Service Routines

FF 41 00

A6 EB	41 KPO	LDX WHO	(fire)
B5 C7		LDA GSUBJ(0),X	check that GSUBJ is
30 43		BMI OUTO	in order
A9 0F		LDA #0F	fire verb
95 C9		STA GVERB,X	
A0 05		LDY #05	
A5 EC		LDA WHO8	
0A		ASL	
1B		CLC	

69 07		ADC #07	get appropriate digit
-------	--	---------	-----------------------

AA FF 42 00

B9 9A 03	42 LOOP2	LDA FMESG(0),Y	put out
20 60 00		JSR FOLDIN	FIRE-?
CA		DEX	message
88		DEY	

10 42 FF 43 00

4C 3D 00 FF 44 00 43 OUTO

A5 B3 44 KP1

D0 03

4C 67 00

0946

A6 EB

B5 C7

30 43

A9 09

95 C9

0950

A0 0B

A5 EC

0A

1B

69 00

AA FF 46 00

B9 EA 03

20 60 00

46 LOOP3

LDX WHO	(fire)
LDA GSUBJ(0),X	check that GSUBJ is
BMI OUTO	in order
LDA #0F	fire verb
STA GVERB,X	
LDY #05	
LDA WHO8	
ASL	
CLC	
ADC #07	get appropriate digit
TAX	
LDA FMESG(0),Y	put out
JSR FOLDIN	FIRE-?
DEX	message
DEY	
BPL LOOP2	
JMP ENDI	
LDA HAT	(orders)
BNE 03	
JMP LOOP19	if endgame, put out points
LDX WHO	
LDA GSUBJ(0),X	
BMI OUTO	
LDA #09	
STA GVERB(0),X	
LDY #0B	
LDA WHO8	
ASL	
CLC	
ADC #00	get to correct digit
TAX	
LDA TMESG(0),Y	put out message
JSR FOLDIN	

CA		DEX	
88		DEY	
10 46		BPL LOOP3	
4C 3D 00	FF 47 00	JMP ENDI	
A6 EB	KP2	LDX WHO	clear stack
B5 C7, A8		LDA GSUBJ, X, TAY	
30 43		BMI OUTO	
0A		ASL	
0A		ASL	
AA	FF 48 00	TAX	
A9 00	LOOP1	LDA #00	
9d A0 17		STA ORDER, X	
E8		INX	
8A		TXA	
29 03		AND #03	
d0 48		BNE LOOP1	
		JMP	
4C 58 00	FF 4A 00	JMP KP7	
A6 EB	KP3	LDX WHO	
A9 FF		LDA #FF	
95 C7		STA GSUBJ, X	
A9 0A		LDA #0A	
95 C9		STA GVERB, X	
A0 07		LDY #07	
A5 EC		LDA WHO8	
0A		ASL	
18		CLC	
69 07		ADC #07	
AA	FF 4B 00	TAX	
B9 dc 03	LOOP4	LDA RMESG(0), Y	

20 60 00

CA

88

10 4B

4C 3D 0D

FF 4C 00

0997

A6 EB

B5 C9

10 4D ⁰⁹⁰⁴

A5 EC

18

79 A0 03

38

E9 01

95 C7

85 EA

A8

A5 EC

0A

18

69 OF

AA

B9 C0 03

A8

B9 E7 1F

20 60 00

CA

~~A4 EA~~~~B9 10 00~~~~A8~~~~B9 E7 1F~~~~20 60 00~~~~CA~~

4C KP5

FF 57 00

BAB00

JSR FOLDIN

DEX

DEY

BPL LOOP4

JMP ENDI

LDX WHO

LDA GVERB(0),X

BPL OBJECT

LDA WHO8

CLC

ADC DECODE(0),Y

SEC

SBC #01

STA GSUBJ(0),X

STA ABSTKNO

TAY

LDA WHO8

ASL

CLC

ADC #OF

TAX

LDA AMMO(0),Y

TAY

LDA TABLE,Y

JSR FOLDIN

DEX

~~LDY ABSTKNO~~~~LDA MODE(0),Y~~~~TAY~~~~LDA TABLE,Y~~~~JSR FOLDIN~~~~DEX~~(numeric key - 1 thru 8)
KP: 5,6,8,9,A,D,E

must be a subject

calculate abstankno
referred to

store it

get correct digit
index it

put out ammo

move this
chunk
down to *

A9 00

9D 80 17

CA

A5 EA

0A

0A

18

69 03

A8

FF A9 00

B9 A0 17

ELMER

84 A6

A8

F0 AA

B9 E7 1F

FF AA 00

20 60 00

FUDD

CA

A4 A6

88

98

29 03

C9 03

D0 A9

A9 00

9D 80 17

CA

86 3E

A6 EA

B4 9D

F0 03

B9 E7 1F

FF AA 00

A6 3E

20 60 00

CA

20 61 00

LDA #00

STA DISP,X

DEX

LDA ABSTKNO

ASL

ASL

CLC

ADC #03

TAY

LDA ORDER,Y

STY TEMP7

TAY FUDD

BEQ FUDD

LDA TABLE,Y

JSR FOLDIN

DEX

LDY TEMP7

DEY

TYA

AND #03

CMP #03

BNE ELMER

DEX

LDA #00

STA DISP,X

DEX

STX TEMP6

LDX ABSTKNO

LDY IVERB,X

BEQ 03

LDA TABLE,Y

LDX TEMP6

JSR FOLDIN

DEX

JSR INFORM

4C 3d 00 FF 4d 00

B4 C7

C9 0F

D0 4E

99 90 00

A5 EC

49 08

A6 EE

18

7d A0 03

38

E9 01

99 80 00

A5 C5

99 80

99 20 00

BC A0 03

B9 E7 1F

48

A5 EC

0A

18

69 07

AA

68

20 60 00

CA

A9 80

20 60 00

4C 5A 00 FF 4E 00

C9 0A

d0 55

A5 EC

{ B6 00
d0 03
4C 5A 00

{ A6 EB
75 73
A6 EE

OBJECT

WIRE

OTHERS

JMP ENDI

LDY GSUBJ(0)X

LDA

CMP #0F

BNE OTHERS

STA IVERB,Y

LDA WHO8

EOR #08

LDX KP

CLC

ADC DECODE,X

SEC

SBC #01

STA IOBJ,Y

LDA CLOCKL

ADC #80

STA EXECT,Y

LDY DECODE,X

LDA TABLE,Y

PHA

LDA WHO8

ASL

CLC

ADC #07

TAX

PLA

JSR FOLDIN

DEX

LDA #80

JSR FOLDIN

JMP ENDOBJ

CMP #0A

BNE TARDBJ

LDA WHO8

{ LDX FACEY
BNE 03
JMP ENDOBJ
fire

{ LDX WHO
ADC ACQT(0),X
LDX KP

report

0A

AA

A4 EE

B9 A0 03

A8

B9 E7 1F

20 60 00

A9 80

E8

20 60 00

A5 EC

49 08

A6 EE

18

7D A0 03

AA

CA

B5 1D

D0 51

A5 EC

0A

18

69 0F

AA

A0 0D FF 50 00

B9 AF 03 50 LOOP6

20 60 00

CA

88

10 50

0A4A 4C 5A 00 FF 51 00

86 EA 51 YES

A0 08

ASL

TAX

LDY KP

LDA DECODE(0),Y

TAY

DEY #01

LDA TABLE,Y

JSR FOLDIN

LDA #80

INX

JSR FOLDIN

LDA WHO8

EOR #08

LDX KP

CLC

ADC DECODE(0),X

TAX

DEX

LDA SEEN(0),X

BNE YES

LDA WHO8

not seen

ASL

CLC

ADC #0F

TAX

LDY #0D

LDA NOMESSG(0),Y

JSR FOLDIN

DEX

DEY

BPL LOOP6

JMP ENDOBJ

STX ABSTKNO

LDY #08

85 Cd			STA TEMP3
A5 EC			LDA WH08
0A			ASL
18			CLC
69 OF			ADC #0F
AA	FF 52 00		TAX
06 Cd		LOOP7	ASL TEMP3
90 53			BCC TAPE2
B9 E7 IF			LDA TABLE Y
40 02 00	FF 53 00		BNE 02 00
A9 00	FF 54 00	TAPE2	LDA #00
29 7F		TAPE3	AND #7F
0A91 9d 80 17			STA DISP, X
CA			DEX
88			DEY
D0 52			BNE LOOP7
20 61 00			JSR INFORM
4C 5A 00	FF 55 00		JMP ENDOBJ

98 EB	FF A7 00	TAROBJ	TYA
0A			ASL
0A			ASL
AA			TAX
Bd A0 17		TOOT	LDA ORDER, X
F0 A8			BEQ HOOP
E8			INX
8A			TXA
29 03			AND #03
D0 A7			BNE TOOT
4C 5A 00	FF A8 00		JMP ENDOBJ
A4 EE		HOOP	LDY KP
B9 A0 03			LDA DECODE X
A8			TAY
B9 E7 IF			LDA TABLE Y
48			PHA

CMP #08
 BNE TRAIN
 TXA
 AND #FC
 TAX
 LDA #00
 STA ORDER, X
 INX

A6 EB
B5 C9
C9 09
F0 03
4C 3d 00
B4 C7

TARBAB

LDX WHO
LDA GVERB(0),X
CMP #09
BEQ 03
JMP ENDI
LDX GSUBJ(0),X

Σ69

FF 55 00

98

TAROBJ

TYA

0A

ASL

0A

ASL

AA

TAX

A4 EE

LDX KP

B9 A0 03

LDA DECODE,Y

C9 08

CMP #08

d0 AC

BNE TRAIN

A9 FF

LDA #FF

A6 EB

LDX WHO

95 C9

STA GVERB(0),X

B5 C7

LDA GSUBJ(0),X

4C 57 00

JMP BABOO

FF AC 00

Bd A0 17

TRAIN

LDA ORDER,X

F0 A8

BEQ HOOP

E8

INX

8A

TXA

29 03

AND #03

d0 AC

BNE TRAIN

4C 5A 00

FF AB 00

JMP ENDOBJ

B9 A0 03

HOOP

LDA DECODE,Y

9d A0 17

STA ORDER,X

A8

TAY

B9 E7 1F

LDA TABLE,Y

48

PHA

8A

TXA

29 03

AND #03

85 A6

STA TEMP7

A5 EC

LDA WHO8

0A

ASL

delete

18
69 0A
65 A6
AA A
6B
20 60 00
A5 A6
C9 03
F0 5A
4C 3d 00

CLC
ADC #0A
ADC TEMP7
TAX
PLA
JSR FOLDIN
LDA TEMP7
CMP #03
BEQ ENDOBT
JMP ENDI

FF 58 00

A5 EC

58 KP7

LDA WHO8

(clear)

0A

ASL

AA

TAX

A0 10

FF 59 00

LDY #10

A9 80

~~FF 59 00~~

LOOP19

LDA #80

OAE3

20 60 00

59 ~~LOOP9~~

JSR FOLDIN

E8

INX

88

DEY

D0 59

FF 5A 00

BNE LOOP9

A9 FF

5A ENDOB3

LDA #FF

AG EB

LDX WHO

95 C9

STA GVERB(0),X

95 C7

FF 5C 00

STA GSUBJ(0),X

4C 3D 00

5C GETLST

JMP ENDI

12 08 FF 5B 00

AG EB

5B KP4

LDX WHO

B5 C7

LDA GVERB(0),X

C9 00

STA GSUBJ(0),X

0 D0 5C

BNE GETLST

0 4C 3D 00 FF 5C 00

JMP ENDI

0 4C 55 00

55 CONTIN

JMP TEROSJ

4C 1 00

JMP ENDI

ENDOB3

SUBROUTINE OUTPOS

FF 5E 00

A5 CE
 20 5F 00
 A5 CF
 20 5F 00
 60

5E OUTPOS

LDA TEMP4
 JSR OUTPOS1
 LDA TEMP5
 JSR OUTPOS1
 RTS

FF 5F 00

85 A2
 A9 00
 85 A3 < 86 CD
 20 68 00 < A6 CD
 A5 CB FF 95 00
 48
 29 0F
 A8
 B9 E7 1F
 20 60 00
 CA
 68
 4A
 4A
 4A
 4A
 A8
 B9 E7 1F
 20 60 00
 CA
 60

5F OUTPOS1

95 OUTPOS2

STA HEXL
 LDA #00
 STA HEXH < STX TEMP3
 JSR HEXDEC < LDX TEMP3
 LDA TEMP1
 PHA
 AND #0F
 TAY
 LDA TABLE,Y
 JSR FOLDIN
 DEX
 PLA
 BSR
 LSR
 LSR
 LSR
 TAY
 LDA TABLE,Y
 JSR FOLDIN
 DEX
 RTS

SUBROUTINE FOLDIN

FF 60 00

85 3E
BD 80 17
09 7F
25 3E
9D 80 17
60

60 FOLDIN

STA TEMPB
LDA DISP,X
ORA #7F
AND TEMPB
STA DISP,X
RTS

this Folds in a character
into a display space without
disturbing the decimal point

SUBROUTINE INFORM

Purpose: to put out the first eight digits in the appropriate display
 ABSTKNO: # of tank to be reported on [X]; digit to start putting it in.

0B3B 86 CD
 AG EA
 B4 00
 B9 E7 IF
 A6 CD
 20 60 00

~~AG EA~~
~~B4 90~~
~~B9 BD 03~~
~~A6 CD~~

CA < A9 80
 20 60 00

CA
 A4 EA
 B9 40 00
 85 CF
 B9 50 00

85 CE < 85 CF
 20 5E 00 < A9 80
 A9 80

20 60 00
 CA
 A5 EA

29 07
 AB < CB
 B9 E7 IF
 20 60 00
 60

61 INFORM

STX TEMP3
 LDX ABSTANKO
 LDX FAC, X
 LDA TABLE, Y
 LDX TEMP3
 JSR FOLDIN

~~DEX~~

~~LDX ABSTANKO~~
~~LDY IVERB, X~~
~~LDA HIGLE, Y~~
~~LDX TEMP3~~

DEX < LDA #80
 JSR FOLDIN

DEX
 LDX ABSTKNO
 LDA XPOS, Y
 STA TEMP5

LDA YPOS, Y
 STA TEMP4 < X TEMP3

JSR OUTPOS
 LDA #00 80 < X TEMP3

JSR FOLDIN
 DEX
 LDA ABSTKNO

~~LDA~~

AND #07

TAY < INY
 LDA TABLE, Y

JSR FOLDIN
 RTS

ENDGAME ROUTINE

FF 62 00

A9 50		62 ENDGAME	LDA #50	
85 B5			STA BRANGE	
A2 0F			LDX #0F	
86 EA			STX ABSTKNO	
A5 E1			LDA STARGX	
85 E3			STA FROMX	
A5 E2			LDA STARGY	set up ranging
85 E4	FF 63 00		STA FROMY	
20 91 00		63 LOOP16	JSR LDTO	

20 76 00			JSR RANGE	get range
A5 EA			LDA ABSTKNO	
A8			TAY	
4A			LSR	
4A			LSR	
4A			LSR	
AA			TAX	WHO
A5 E9			LDA RANGE	
C5 B5			CMP BRANGE	
B0 64			BCS GRASS	if not better, keep going
			PHA	
B9 00 00			LDA FACE(0),Y	
F0 64			BEQ GRASS	if he's dead he doesn't count
A5 E9			LDA RANGE	
85 B5			STA BRANGE	
86 B6	FF 64 00		STX BWHO	
38		64 GRASS	SEC	
B5 C0			LDA PTSL(0),X	
E5 E9			SBC RANGE	
95 C0			STA PTSL(0),X	
B5 C2			LDA PTSH(0),X	

E9 00

95 C2

C6 EA

A5 EA

AA

10 63

A6 B6

A9 0A

18

75 C0

95 C0

B5 C2

69 00

95 C2

• A9 06

85 CE

85 CF

A0 0F

FF 65 00

98

65 LOOP17

4A

4A

4A

49 01

AA

B9 00 00

• 00 66

• F6 CE FF 66 00

88

66 ONWA

10 65

~~A5 CE~~~~18~~

SBC #00

STA PTSH(0),X

DEC ABSTKNO

LDA ABSTKNO

TAX

BPL LOOP16

LDX BWHO

LDA #0A

CLC

ADC PTSL(0),X

STA PTSL(0),X

LDA PTSH(0),X

ADC #00

STA PTSH(0),X

LDA #00

STA TEMP4

STA TEMP5

LDY #0F

TYA

LSR

LSR

LSR

EOR #01

TAX

LDA FACE(0),Y

~~BALE~~ ONWA

INC TEMP4,X

DEY

BPL LOOP17

~~LDA TEMP4~~~~CLC~~~~ADC PTSL(0)~~~~STA PTSL(0)~~~~LDA PTSH(0)~~

subtract out points for range

ok, range pts done, now let's
award 10 pts to closest playerset up kill points
registers

other player

if dead, don't halve pts
halve points

if not done, next tank

add in points for kills

A2 01 FF 94 00

86 EB

B5 CE

0A 0A 0A 0A

94 LOOP21

0C33 18

75 C0

95 C0

85 A2
B5 C2

69 00

95 C2

85 ~~C3~~ A3

20 68 00

A6 EB

A5 CC

95 C2

A5 CB

95 C0

CA

10 94

A5 C2

C5 C3

d0 72

A5 C0

C5 C1

F8

90 0A

E5 C1

C9 10

B0 72

A5 C0

85 C1

38

A5 C1

E5 C0

C9 10

LDX #01

STX WHO

LDA TEMP4, X < ASL, ASL, ASL, ASL

CLC

ADC PTSL(0), X

STA PTSL(0), X < STA HEXL

LDA PTSH(0), X

ADC #00

STA PTSH(0), X

STA HEXH

JSR HEXDEC

LDX WHO

LDA TEMP2

STA PTSH(0), X

LDA TEMP1

STA PTSL(0), X

DEX

BPL LODP21

LDA PTSH(0)

CMP PTSH(1)

BNE BEOUT

LDA PTSL(0)

CMP PTSL(1)

SED

BCC BEBOP

SBC PTSL(1)

CMP #10

BCS BEOUT

LDA PTSL(0)

STA PTSL(1)

SEC

LDA PTSL(1)

SBC PTSL(0)

CMP #10

BPL 04
LDA #00
STA HEXL
Correction
for negative point10 04
A9 00
85 A2

BEBOP

B0 42
A5 C1
85 C0 FF 72 00
dB

FF 72 00
FF 67 00

BEOOT

BCS BEOUT
LDA PTSL(1)
STA PTSL(0)
CLD

A2 0F
A9 00
9D 80 17

67 LOOP19
A1 BEGUP

LDX #1F
LDA #00
STA DISP(0),X

Same as PTsOUT

CA
10 A4
A2 05
A5 C0
20 95 00
A5 C2
20 95 00
A2 15
A5 C1
20 95 00
A5 C3
20 95 00

DEX
BPL BEGUP
LDX #05
LDA PTSL(0)
JSR OUTPOS2
LDA PTSH(0)
JSR OUTPOS2
LDX #15
LDA PTSL(1)
JSR OUTPOS2
LDA PTSH(1)
JSR OUTPOS2
LDX #0F
~~LDA PTSL(1)~~
~~JSR OUTPOS2~~
~~LDA PTSH(1)~~
~~JSR OUTPOS2~~
LDX #07
~~LDA PTSL(0)~~
~~JSR OUTPOS2~~
~~LDA PTSH(0)~~
~~JSR OUTPOS2~~
~~JMP GLASS~~

A9 00
85 B3
A2 FF
9A
A2 10
4C 0d 00

LDA #00
STA HAT
LDX #FF
TXS
LDX #10
JMP LOOP

SUBROUTINE HEXDEC

Hexadecimal to decimal conversion

Input in (HEXL, HEXH): output in (TEMP1, TEMP2)

A9 00	FF 68 00	68 HEXDEC LDA #00
85 CB		STA TEMP1
85 CC		STA TEMP2
F8		SED
A2 00	FF 69 00	LDX #00
46 A3	69 LOOP18	LSR HEXH
66 A2		ROR HEXL
90 6A		BCC OVER2
BD E6 03		LDA DECTAB,X
18		ELC
65 CB		ADC TEMP1
85 CB		STA TEMP1
BD 90 03		LDA #00 DECTAB,X
65 CC		ADC TEMP2
85 CC	FF 6A 00	STA TEMP2
E8	6A OVER2	INX
E0 0A		CPX #0A
D0 69		BNE LOOP18
		LDA TEMP2
		STA HEXH
		LDA TEMP1 CLD
		STA HEXL
		RTS

DECTAB: 01, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536, 131072, 262144, 524288, 1048576, 2097152, 4194304, 8388608, 16777216, 33554432, 67108864, 134217728, 268435456, 536870912, 1073741824, 2147483648, 4294967296, 8589934592, 17179869184, 34359738368, 68719476736, 137438953472, 274877906944, 549755813888, 1099511627776, 2199023255552, 4398046511104, 8796093022208, 17592186044416, 35184372088832, 70368744177664, 140737488355328, 281474976710656, 562949953421312, 1125899906842624, 2251799813685248, 4503599627370496, 9007199254740992, 18014398509481984, 36028797018963968, 72057594037927936, 144115188075855872, 288230376151711744, 576460752303423488, 1152921504606846976, 2305843009213693952, 4611686018427387904, 9223372036854775808, 18446744073709551616, 36893488147419103232, 73786976294838206464, 147573952589676412928, 295147905179352825856, 590295810358705651712, 1180591620717411303424, 2361183241434822606848, 4722366482869645213696, 9444732965739290427392, 18889465931478580854784, 37778931862957161709568, 75557863725914323419136, 151115727451828646838272, 302231454903657293676544, 604462909807314587353088, 1208925819614629174706176, 2417851639229258349412352, 4835703278458516698824704, 9671406556917033397649408, 19342813113834066795298816, 38685626227668133590597632, 77371252455336267181195264, 154742504910672534362390528, 309485009821345068724781056, 618970019642690137449562112, 1237940039285380274899124224, 2475880078570760549798248448, 4951760157141521099596496896, 9903520314283042199192993792, 19807040628566084398385987584, 39614081257132168796771975168, 79228162514264337593543950336, 158456325028528675187087900672, 316912650057057350374175801344, 633825300114114700748351602688, 1267650600228229401496703205376, 2535301200456458802993406410752, 5070602400912917605986812821504, 10141204801825835211973625643008, 20282409603651670423947251286016, 40564819207303340847894502572032, 81129638414606681695789005144064, 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452312848583266388373324160190187140051835877600158453279131187530910662656, 904625697166532776746648320380374280103671755200316906558262375061821325312, 1809251394333065553493296640760748560207343510400633813116524750123642650624, 3618502788666131106986593281521497120414687020801267626233049500247285301248, 7237005577332262213973186563042994240829374041602535252466099000494570602496, 14474011154664524427946373126085988481658748083205070504932198000989141204992, 28948022309329048855892746252171976963317496166410141009864396001978282409984, 57896044618658097711785492504343953926634992332820282019728792003956564819968, 115792089237316195423570985008687907853269984665640564039457584007913129639936, 231584178474632390847141970017375815706539969331281128078915168015826259279872, 463168356949264781694283940034751631413079938662562256157830336031652518559744, 926336713898529563388567880069503262826159877325124512315660672063305037119488, 1852673427797059126777135760139006525652319754650249024631321344126610074238976, 3705346855594118253554271520278013051304639509300498049262642688253220148477952, 7410693711188236507108543040556026102609279018600996098525285376506440296955904, 14821387422376473014217086081112052205218558037201992197050570753012880593911808, 29642774844752946028434172162224104410437116074403984394101141506025761187823616, 59285549689505892056868344324448208820874232148807968788202283012051522375647232, 118571099379011784113736688648896417641748464297615937576404566024103044751294464, 2371421987580235682274733772977928352834969285952

SUBROUTINE TERR

FF 6B 00

Look up terrain in Hex (Jumpx, Jumpy)

0cA0

A5 A5

0A ^{3B}
E9 01

0A

0A

0A

85 BD

A9 02

69 00

85 BE

A5 A4 ^{3B}
E9 01

4A

AB

B1 BD

B0 6C

4A

4A

4A

4A FF 6C 00

29 0F

60

6B TERR

LDA JUMPY

ASL

ASL

ASL

ASL

STA BOWL

LDA #02

ADC #00

STA BOWH

LDA JUMPX

LSR

TAY

LDA [BOWL, BOWH], Y

BCS BOP

LSR

LSR

LSR

LSR

AND #0F

RTS

← SEC
SBC #01

← SEC
SBC #01

~~BCC BOP~~

6C BOP

SUBROUTINE HOP

FF 6D 00

Move from (Jumpx, Jumpy) in direction DIR to new
(Jumpx, Jumpy)

0C8D	A6 B2	6D HOP	LDX DIR	get direction
	B5 37		LDA XADCD,X	get special add-code
	18		CLC	
	65 A4		ADC JUMPX	add it to start hex
	10 02		BPL 02	BNE 02
	A9 00		LDA #00	LDA #01
	C9 20		CMP #20	CMP #21
	90 02		BCC 02	BNE BEQ 02
	A9 1F		LDA #1F	LDA #20
	85 A4		STA JUMPX	
	-29 01		AND #01	
	D0 70		BNE DOG	BEQ DOG
	E0 01		CPX #01	
	F0 70		BEQ DOG	
	E0 04		CPX #04	
	F0 70		BEQ DOG	
	C6 A5	FF 70 00	DEC JUMPY	INC JUMPY
0CB1	B5 CF	70 DOG	LDA YADCD,X	
	18		CLC	
	65 A5		ADC JUMPY	
	10 02		BPL 02	BNE 02
	A9 00		LDA #00	LDA #01
	C9 16		CMP #16	CMP #189
	90 02		BCC 02	BNE 02
	A9 14		LDA #14	LDA #18
0CC0	85 A5		STA JUMPY	
	60		RTS	

SUBROUTINE PLNCHK

FF 73 00

Put down tanks + check their position for forbidden, stacking, + range

20 8B 00

A6 EA

A5 E7

95 40

85 E3

A5 E8

95 50

85 E4

20 76 00

A5 E9

C9 03

B0 73

A6 EA

FF 74 00

CA

8A

29 07

C9 07

F0 75

A5 E3

D5 40

D0 74

A5 E4

D5 50

D0 74

F0 73

FF 75 00

EG EA

0C93

A5 EA

29 07

D0 73

60

73 PLNCHK

74 NECHK

75 NETK

JSR CHEX

LDX ABSTKNO

LDA CHEXX

STA XPOS(0),X

STA FROMX

LDA CHEXY

STA YPOS(0),X

STA FROMY

JSR RANGE

LDA RANGE

CMP #03

BCS PLNCHK

LDX ABSTKNO

DEX

TXA

AND #07

CMP #07

BEQ NETK

LDA FROMX

CMP XPOS(0),X

BNE NECHK

LDA FROMY

CMP YPOS(0),X

BNE NECHK

BEQ PLNCHK

INC ABSTKNO

LDA ABSTKNO

AND #07

BNE PLNCHK

RTS

choose a hex, any hex

get absolute tank number in X

get random hex x-coordinate

plunk that tank down by
stuff x-coordinate in FROMX ^{storing x.}

get random hex y-coordinate

plunk down y-coordinate

stuff y-coordinate in FROMY

check distance to mother tank

get range to mother tank
too far?

if so, try again (branch up)

if not,

check previous tank

by the way,

are we

out of other tanks?

if so, let's go on to the next guy

if not,

compare our tank's position
with that of

his predecessors.

if same, try again;

otherwise check previous
predecessor

next tank

done? (out of tanks?)
yes; out!

SUBROUTINE RANGE

Conversions to new po map
in red:

0C9A

FF 76 00
RANGELDA TOY
SEC
SBC FROMY
STA DELTAY
BPL PARBLA
EOR #FF
CLC Δy FF 77 00
PARBLAADC #01
STA L
LDA TOX
SEC $|\Delta y|$

A5 E6

38

E5 E4

85 dB

10 77

49 FF

18

69 01

85 dd

A5 E5

38

E5 E3

85 dA

10 78

49 FF

18

69 01

85 dE

A5 dA

10 7A

A5 dB

10 79

A9 05

10 7C

A9 06

10 7C

A5 dB

10 7B

A9 03

10 7C

A9 02

85 d6

A5 dE

4A

C5 dd

B0 7E

FF 78 00
HYPBLAADC #01
STA S $|\Delta x|$ FF 79 00
SPHERELDA #05
BPL SPACE
LDA #06

LDA #06

FF 7A 00
CUBELDA #06
BPL SPACE
LDA ~~#02~~ DELTAY

LDA #05

FF 7B 00

BPL SPACE

LDA #02

FF 7C 00
SQUARE
SPACELDA #02
STA NX

LDA #03

LDA S

LSR

CMP L

BCS CYCLD

A5 dE		LDA S	
85 dC		STA JX	
A5 dd		LDA L	
46 dE		LSR S	
38		SEC	
E5 dE		SBC S	
85 dF		STA JY	
A2 01		LDX #01	LDX #04
A5 dB		LDA DELTAY	
10 7d		BPL SPIRAL	
A2 04	FF 7d 00	LDX #04	LDX #01
86 d9	< A9 80 SPIRAL	STX NY	< LDA #80 LDA #00
20 81 00		JSR IFFY	
90 7F		BCC HYPO	
C6 dF		DEC JY	
4C 7F 00	FF 7E 00	JMP HYPO	
A6 d6	CYCLD	LDX NX	
Bd d5 03		LDA YDIR,X	
85 d9		STA NY	
A5 dE		LDA S	
4A		LSR	
18		CLC	
65 dd		ADC L	
85 dC		STA JX	
A5 dE		LDA S	
38		SEC	
E5 dC		SBC JX	
85 dF	< A9 80	STA JY	< LDA #80 LDA #80
20 81 00		JSR IFFY	
90 7F		BCC BASE HYPO	
E6 dC	FF 7F 00	INC JX	
A5 dC	HYPO	LDA JX	
18		CLC	
65 dF		ADC JY	
85 E9		STA RANGE	
A5 dC		LDA JX	
C5 dF		CMP JY	
90 80		BCC DODECA	

85	dd	STA	L
A5	dF	LDA	JY
85	dE	STA	S
A5	d6	LDA	NX
85	d7	STA	NL
A5	d9	LDA	NY
85	d8	STA	NS

0ddb

60		FF 80 00	RTS
85	dE	DODECA	STA S
A5	dF		LDA JY
85	dd		STA L
A5	d6		LDA NX
85	d8		STA NS
A5	d9		LDA NY
85	d7		STA NL
60			RTS

odd

FF 81 00

85 d7

1FF4

STA NL

A5 dA

LDA DELTAX

4A

LSR

38

90 9E

BCC NO

63

A5 d6

LDA NX

4A

LSR

90 03

BCC 03

02C 57 1C 11 21 0

BIT 1C57

set V=1

A5 E3

WEN

LDA FROMX

4A

LSR

A5 d7

LDA NL

we now have V + C set; this sets N

10 9d

BPL BR2

logic: V set $\Rightarrow$ NX=3 v NX=5

70 A2

FF 82 00

BVS PORKY

C set $\Rightarrow$ FROMX odd

90 9F

PINE

BCC YES

N set $\Rightarrow$ Branch 1

B0 9E

FF A2 00

BCS NO

90 9E

PORKY

BCC NO

B0 9F

FF 9d 00

BCS YES

70 82

BR2

BVS PINE

50 A2

FF 9E 00

BVC PORKY

18

NO

CLC

60

FF 9F 00

RTS

38

YES

SEC

C6 dF

DEC JY

60

RTS

SUBROUTINE SIGHT

FF 83 00

0004	20 76 00	83	SIGHT	JSR RANGE
	A5 DE			LDA S
	85 AC			STA DIVSR
	A5 E9			LDA RANGE
	0A			ASL
	0A			ASL
	0A			ASL
	85 AB			STA DIVOND
	20 8F 00			JSR DIVIDE
	A5 AD			LDA QUOTNT
	85 BF			STA FIGURE
	A5 D7			LDA NL
	85 A7			STA PUSH
	A5 E3			LDA FROMX
	85 A4			STA JUMPX
	A5 E4			LDA FROMY
	85 A5			STA JUMPY
	A9 00			LDA #00
	85 B4			STA BLOCK
	85 A0			STA NUM
	A9 01			LDA #01
	85 A1	EF 84 00		STA DENOM
	A5 A7	84	TRACE	LDA PUSH
0E01	85 B2			STA DIR
	20 6D 00			JSR HOP
	20 87 00			JSR EVAL
	A5 AD			LDA NUM
	85 AC			STA DIVSR
	A5 A1 0A 0A 0A			LDA DENOM ASL,ASL,ASL
	85 AB			STA DIVDND
	20 8F 00			JSR DIVIDE
	A5 BF			LDA FIGURE

OE19

C5 Ad

B0 85

E6 A0

A5 D8

4C 86 00

A5 D7

85 A7

E6 A1

A5 E9

C5 A1

B0 84

60

FF 85 00

FF 86 00 ROUTE

CRAW

CMP QUOTNT

BCS ROUTE

INC NUM

LDA NS

JMP CRAW

LDA NL

STA PUSH

INC DENOM

LDA RANGE

CMP DENOM

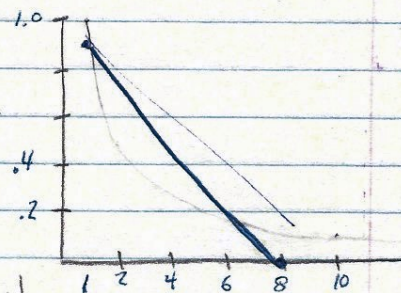
BCS TRACE

RTS

SUBROUTINE EVAL

The purpose of this subroutine is to determine whether a particular hex blocks the LDS. The algorithm is

$$\frac{\#}{32} - \text{range} > 0 \Rightarrow \text{see through}$$



terrain code ABCD where A: forbidden B: road
C: blocked into D: block through

FF 87 00

0d75

20 6B 00

87 EVAL JSR TERR

code for
get terrain in hex

4A AA

LSR TAX

shift bit D into carry bit, save the rest

error here → 90 88

BCC PIMNTD

if carry is clear, hop ahead

A5 A4

LDA JUMPX

blocked through; get x-coord

C5 E5

CMP TOX

compare to destination x-coord

D0 89

BNE CHAP

if different, blocked!; evaluate blockage

A5 A5

LDA JUMPY

if same, compare ^{present} y-coord

C5 E6

CMP TOY

with destination y-coord

D0 89

FF 88 00

BNE CHAP

if different, blocked!

8A

88 PIMNTD

TXA

if same, no block; get terrain ^{present} nybble

4A

LSR

shift bit C into carry ^{back}

90 8A

BCC BYOND

if C is clear, no blockage

A5 A4

LDA JUMPX

blocked into

C5 E5

CMP TOX

compare present

D0 8A

BNE BYOND

position with

A5 A5

LDA JUMPY

destination; if same, blocked

C5 E6

CMP TOY

if different, no blockage.

D0 8A

FF 89 00

BNE BYOND

20 81 ~~00~~

89 CHAP

JSR RAND

blockage exists; throw dice

29 07

AND #07

0 ≤ Random # ≤ 7

38

SEC

E5 A1

SBC DENOM

Random # — range to this hex

BD 8A

BCS BYOND

if positive result, no block

E6 B4

FF 8A 00

INC BLOCK

if negative, blocked

60 3F 00

BYOND

RTS

4A

5 AD

SUBROUTINE CHEX picks a hex randomly

			FF 8B 00		
0dB5	20	8d 00	CHEX	JSR RAND	get a random #
	29	1F		AND #1F	cut it down to ^{the} range 0 → 31
	18			CLC	add
	69	01		ADC #01	One; range is now 1 → 32
	85	E7	FF 8C 00	STA CHEXX	that's our x-coordinate
	85	A4	FF 8C 00	STA JUMPX	put it in JUMPX for terrain evaluation
	20	8d 00	HORAT	JSR RAND	get a random #
	29	1F		AND #1F	cut it down to range 0 → 31
	C9	18		CMP #18	is it bigger than 23?
	B0	8C		BCS HORAT	if so, do it over
	69	01		ADC #01	if not, add one (^{the} range is now 1-24)
	85	E8		STA CHEXY	that's our y-coordinate
	85	A5		STA JUMPY	put that in JUMPY for terrain evaluation
	20	6B 00		JSR TERR	evaluate terrain (get terrain nybble in Acc)
	29	0B		AND #0B	isolate "forbidden hex" bit
	d0	8B		BNE CHEX	if there's a bit left on, try again
	60			RTS	not a forbidden hex! good, done!

SUBROUTINE RAND

			FF 8d 00		generates a random #
	38			SEC	
	Ad	d1 03		LDA RND+1	
	6d	d4 03		ADC RND+4	
	6d	d5 03		ADC RND+5	
	8d	d0 03		STA RND	
	A2	04	FF 8E 00	LDX #04	
	Bd	d0 03	CHI	LDA RND,X	
	9d	d1 03		STA RND+1,X	
	CA			DEX	
	10	8E		BPL CHI	
	60			RTS	

SUBROUTINE DIVIDE

Divides DIVDND by DIVSR to get QUOTNT

FF 8F 00

~~EA3~~ CE39

A9 FF

DIVIDE

LDA #FF

initialize QUOTNT

85 Ad

STA QUOTNT

24 AC

BIT DIVSR

check DIVSR, if it

F0 98

BEQ OUTDIV

is zero, get out!

A5 AB

LDA DIVDND

get DIVDND

38

LOOP20

SEC

E6 Ad

INC QUOTNT

add one to quotnt

E5 AC

SBC DIVSR

subtract DIVSR from DIVDND

watch this →

B0 F9

FF 98 00

BCC LOOP20

if result positive, loop back

60

OUTDIV

RTS

done

SUBROUTINE BTU

FF 5C 00

A0	00	BTU	LDY #00
8A			TXA
29	07		AND #07
F0	05		BEQ BTOUT
94	00		STY FACE,X
E8			INX
d0	5C		BNE BTU
60		BTOUT	RTS

SUBROUTINE LDFROM, LDTO

FF 90 00

B5 40	90 LDFROM	LDA XPOS(0), X
85 E3		STA FROMX
B5 50		LDA YPOS(0), X
85 E4		STA FROMY
60		RTS

FF 91 00

B5 40	91 LDTO	LDA XPOS(0), X
85 E5		STA TOX
B5 50		LDA YPOS(0), X
85 E6		STA TOY
60		RTS

24
18

SYMBOL TABLE

00	BEGIN	20	NEDY	40	PUNKT	60	FOLDIN
01	BEGIN	21	POOP00	41	LOOP12	61	INFORM
02	defume	22	RIM	42	LOOP2	62	ENDGAME
03	" "	23	LOOKSEE	43	OUT0	63	LOOP16
04	L	24	EDGE	44	KP1	64	GRASS
05	PUNKT	25	HPLAN	45	LOOP13	65	LOOP17
06	LOOP12	26	PRUNE	46	LOOP3	66	ONWA
07	LOOP13	27	PJUMP	47	KP2	67	LOOP19
08	LOOP10	28	PJUMP	48	LOOP1	68	HEXDEC
09	LOOP5	29	RES15	49	OUT2	69	LOOP18
0A	LOOP16	2A	CHL	4A	KP3	6A	OVER2
0B	RESTORE	2B	STDIR	4B	LOOP4	6B	TERR
0C	ADJ	2C	PSEARCH	4C	KP5	6C	BOP
0D	LOOP	2D	CPLAN	4D	OBJECT	6D	HOP
0E	BOOK	2E	POWER	4E	OTHERS	6E	TURN
0F	MOVE	2F	RING	4F	SOTHER	6F	TURP
10	PAPER	30	DODOT	50	LOOP6	70	DOS
11	CHITLN	31	VOLTS	51	YES	71	FOR
12	OUT	32	FLIP	52	LOOP7	72	BEOUT
13	SEARCH	33	TRAY	53	TAPE2	73	PLNCHK
14	LOOP10	34	SLITHER	54	TAPE3	74	NECHK
15	KEN	35	MODE5	55	TAROBJ	75	NETK
16	UP	36	NTRAY	56	LOOP8	76	RANGE
17	COVER	37	ARM	57	BABOO	77	SPHERE
18	CAP	38	HARD	58	KP7	78	CUBE
19	FIRE	39	LEG	59	LOOP9	79	SQUARE
1A	NOSEE	3A	MODE3	5A	ENDOBJ	7A	SPACE
1B	NKEAR	3B	MODE4	5B	TABBAB	7B	TRIANG
1C	SIDE	3C	GLASS	5C	BTU	7C	PENGON
1D	SHOOT	3D	ENDI	5D	DEHEX	7D	DODECA
1E	MISS	3E	KEYIN	5E	OUTPOS	7E	CIRCLE
1F	OPSTE	3F	LOOP11	5F	OUTPOS1	7F	RHOMB

80	TRAPZ	A1	BEGUP
81	ELLIPS	A2	TRAPZ PORKY
82	PINE	A3	NUKE
83	SIGHT	A4	AVOCAD
84	TRACE	A5	PRSMN
85	ROUTE	A6	EHPLN
86	CRAW	A7	TOOT
87	EVAL	A8	HOOP
88	PIMNTO	A9	ELMER
89	CHAP	AA	FUDD
8A	BYOND	AB	
8B	CHEX	AC	TRAIN
8C	HORAT	AD	PAST
8D	RAND		
8E	CHI		
8F	DIVIDE		
90	LDFROM		
91	LDTO		
92	LOOPO		
93	PREP		
94	LOOP21		
95	OUTPOS2		
96	BANG1		
97	BANG2		
98	OUTDIV		
99			
9A	WART		
9B	CHIP		
9C			
9D	BRZ		
9E	NO		
9F	YES		
A0			

ZERO PAGE ALLOCATIONS

	1 O/1	2 2/3	3 4/5	4 6/7	5 8/9	6 A/B	7 C/D	8 E/F	9
0	FACE(0)	EXECT(0)	XPOS(0)	LKP(0)	TOBJ(0)	NUM	PTSL(0)	GAME	0
1				LKP(1)		DENOM	PTSL(1)	STARX	1
2				LCKPL(0)		HEXL	PTSH(0)	STARGY	2
3				LCKPB(1)		HEXH	PTSH(1)	FROMX	3
4				LCKPH(0)		JUMPX	DIGIT	FROMY	4
5				LCKPH(1)		JUMPY	CLOCKL	TOX	5
6				TEMPB		TEMPZ	CLOCKH	TOY	6
7				THANDCP(0) oo		PUSH	GSUBJ(0)	CHEXX	7
8				THANDCP(1) oo		LOOK	GSUBJ(1)	CHEYX	8
9				LINST(0)		SEE	GVERB(0)	RANGE	9
A				LINST(1)		LOTEMP	GVERB(1)	ABSTKNO	A
B				KOUNTR		DIVDND	TEMP1	WHO	B
C				GAMENO		DIVSR	TEMP2	WHOB	C
D				RFAC(0)		QUOTNT	TEMP3	ACTANK	D
E				RFAC(1)		'AGUN	TEMP4	KP	E
F	FACE(F)	EXECT(F)	XPOS(F)	SFAC(0)	TOBJ(F)	'BGUN	TEMP5		F
0	SEEN(0)	TOBJ(0)	YPOS(0)	SFAC(1)	IVERB(0)	WGTS	YADCD(0) 01		0
1				FFAC(0)		WGTL	01		1
2				FFAC(1)		DIR	00		2
3				ACQT(0)		HAT	FF		3
4				ACQT(1)		BLOCK	00		4
5						BRANGE	YADCD(5) 01	Reserved	5
6						BWHO	NX	for	6
7						FACTAB(0) 04	NL	KIM	7
8		TOBJ(7)				05	NS		8
9		YADCD(0) 00				06	NY		9
A		01				01	DELTAX		A
B		00				02	DELTAY		B
C		FF				03	JX		C
D		YADCD(5) FF				BOWL	L (1dy1)		D
E		TEMP6				BOWH	S (1dx1)		E
F	SEEN(F)	DEAD	YPOS(F)		IVERB(F)	FIGURE	JY		F

PAGE THREE ALLOCATIONS

	1 0/1	2 2/3	3 4/5	4 6/7	5 8/9	6 A/B	7 C/D	8 E/F
0	1	MPCOL(10,0)	MPCOL(12,0)	MPCOL(14,0)	MPCOL(16,0)	TDLAY(0) 60	DECODE(0) 0E	AMMO(0)
1	2					CO 01	09	D0
2	3					EO 02	08	F8
3	4					FF 03	07	CO
4	5					30 04	0E	RMESG(7) D8
5	6					60 05	06	MMESG(0) B7
6	7					70 06	05	BF
7	8					TDLAY(7) 80	04	DE
8	9					COV(0) 0	08	F9
9	10					02 09	03	CO
A	11					03 0A	02	MMESG(5) D3
B	12					02 0B	01	TMESG(0) dE
C	13					01 0C	0B	d0
D	14					02 0D	0A	dE
E	15					03 0E	09	F9
F	16					COV(7) 02	DECODE(E) 0D	d0
0	17	MPCOL(11,0)	MPCOL(13,0)	MPCOL(15,0)	MPCOL(17,0)	DECTABH(0) 00	NOMESG(0) D3	Ed
1	18					00	RAND(0)	CO
2	19					00	D3	CO
3	20					00	D3	D3
4	21					00	80	D3
5	22					00	D3	TMESG(A) D8
6	23					00	D3	TMESG(B) D3
7	24					00	D3	DECTABL(0) 01
8	25					01	D3	02
9	26					02	D8	04
A	27					DECTABH(9) 05	D3	08
B	28					FMESG(0) F1	D3	16
C	29					86	D3	32
D	30					d0	NOMESG(0) D3	64
E	31					F9	F9	28
F	32					CO	F3	56
	33					FMESG(5) 13	BF	DECTABL(9) 12
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							
	49							
	50							

Subroutine RAND

This subroutine generates random numbers, placing the result in A. Registers X and Y are unaffected. Uses zero page locations E0 → E5.

1091	8A		TXA
	48		PHA
	38		SEC
	A5 E1		LDA RND(1)
	65 E4		ADC RND(4)
	65 E5		ADC RND(5)
	85 E0		STA RND
	A2 04		LDX #04
	B5 E0	CHI	LDA RND,X
10A0	95 E1		STA RND(1),X
	CA		DEX
	10 F9		BPL CHI
	68		PLA
	AA		TAX
	A5 E0		LDA RND(0)
10A9	60		RTS

Subroutine FOLDIN

This subroutine folds a 7-bit character (bit 7 assumed = 1) into the display space denoted by X into that space. Register Y is unaffected. Uses temporary register TEMPA

10AA	85 EC	STA TEMPA
	Bd 80 17	LDA DISP,X
	09 7F	ORA #7F
10B1	25 EC	AND TEMPA
	9d 80 17	STA DISP,X
10B6	60	RTS

EPROM Programming Routine

Zero Page Registers:

EE cycle count CYC
 EC, ED Ending Address (low, high) EAL, EAH
 EA, EB Starting Address (low, high) SAL, SAH
 EB, EQ Data Pointer (low, high) DPL, DPH
 E7 Dummy counting address DUM

3C00	A0	00		BURN	LDY #00
3C02	A9	64			LDA #64
3C04	85	EE			STA CYC
3C06	A9	FF			LDA #FF
3C08	8d	02	17		STA 1702
	8d	01	17		STA 1701
	A9	EF			LDA #EF
	8d	03	17		STA 1703
	A9	F5		A1	LDA #F5
	8d	02	17		STA 1702
	20	6E	3C		JSR MOV
	B1	E8		A2	LDA (DP), Y
	20	77	3C		JSR PRGM
	20	90	3C		JSR INCA
	90	F6			BCC A2
	d0	F4			BNE A2
3C27	A9	10		A3	LDA #10
	2C	02	17		BIT 1702
	F0	07			BEQ A4
	C6	EE			DEC CYC
	d0	E1			BNE A1
	4C	3d	3C		JMP VRFY
3C35	A9	FF		A4	LDA #FF
	20	77	3C		JSR PRGM

4C	27	3C		JMP A3
A9	00		VREF	LDA #00
8d	01	17		STA 1701
A9	Fd			LDA #Fd
8d	02	17		STA 1702
20	6E	3C		JSR MOV
Ad	00	17		LDA 1700
d1	E8		B1	CMP (P),Y
d0	12			BNE B2
A9	FF			LDA #FF
8d	02	17		STA 1702
CE	02	17		DEC 1702
20	90	3C		JSR INCA
90	EC			BCC B1
d0	EA			BNE B1
4C	4F	1C		JMP OUT
A5	EB		B2	LDA DPL
85	FA			STA FA
A5	E9			LDA DPH
85	FB			STA FB
4C	4F	1C		JMP OUT

A5	EA		MOV	LDA SAL
85	E8			STA DPL
A5	EB			LDA SAH
85	E9			STA DPH
60				RTS

8d	00	17	PRGM	STA 1700
E6	E7			INC DVM
A9	03			LDA #03
8d	02	17		STA 1702

20 8A 3C
A9 06
8d 02 17

60

A2 FB

CA

d0 Fd

60

RTS

LDX #FB

C1 DEX

BNE C1

RTS

3C90

E6 E8

INCA

INC DPL

d0 02

BNE D1

E6 E9

INC DPH

A5 E9

D1

LDA DPH

C5 Ed

CMP EAH

90 04

BCC D2

A5 E8

LDA DPL

C5 EC

CMP EAL

3CA0

60

D2

RTS

3CA1

A9 00

PEEK

8d 01 17

A9 FF

8d 02 17

CE 02 17

A9 00

85 FA

A9 17

85 FB

3CB6

4C 4F 1c

SWEETS INFO

Zero Page Location	Value	Needs to be set?
these must be initialized	E0	BEGAD low
	E1	BEGAD+1 high
	E2	ENDAD
	E3	ENDAD+1
	E4	CURAD
	E5	CURAD+1
	E6	MOVAD
	E7	MOVAD+1
	E8	BYTES
	E9	TEMP
	EA	COUNT
	EB	LABELS
	EC	TABLE (low)
	Ed	TABLE (high)
	EE	

Editor at 3CEA

Assembler at 3d54

SWEETS

This is an editor/assembler by Dave Fylstra, modified by CC. For reference, see Feb 78 Byte. Location of editor: 10EA. Assembler: 1154. Uses zero page locations E0→EE.

3CC0	20 CC 3E	GOKEY	JSR RDBYTE
	10 28		BPL GCMD
	85 FB		STA POINTH
	20 CC 3E		JSR RDBYTE
	10 21		BPL GCMD
	85 FA		STA POINTL
	20 E5 3E		JSR BEGIN
30B1	A0 00	GOLOOP	LDY #00
	B1 E4		LDA (CURAD),Y
	C5 FB		CMP POINTH
	d0 07		BNE GONEXT
	C8		INY
	B1 E4		LDA (CURAD),Y
	C5 FA		CMP POINTL
	F0 0A		BEQ CMD
3CE0	20 43 3E	GONEXT	JSR DETLEN
	20 21 3E		JSR ADVANC
	F0 15		BEQ ERROR
	d0 E7		BNE GOLOOP
	20 CA 3E	CMD	JSR SCAN
	C9 10		CMP #10
	F0 2B		BEQ ADKEY
3CF1	C9 11		CMP #11
	F0 1E		BEQ DAKEY
	C9 12		CMP #12
	F0 13		BEQ STPKEY

	C9	13		CMP #13
	F0	C3		BEQ GOKEY
	A9	EE	ERROR	LDA #EE
	85	F9		STA INH
3d01	85	FA		STA POINTL
	85	FB		STA POINTH
	20	1F	1F	ERR1 JSR SCANDS
	d0	FB		BNE ERR1
	F0	dE		BEQ CMD
	20	21	3E	STPKEY JSR ADVANC
	10	EC		BPL ERROR
3d11	30	D7		BMI CMD
	20	7A	3E	DAKEY JSR MOVEUP
	20	EE	3F	JSR REDEND
	B8			CLV
	50	CE		BVC CMD
	20	CC	3F	ADKEY JSR RDBYTE
	10	CC		BPL GCMD
3d21	85	FB		STA POINTH
	20	47	3E	JSR DETLN1
	84	EA		STY COUNT
	C6	EA		DEC COUNT
	F0	12		BEQ ADSET
	20	CC	3F	JSR RDBYTE
	10	BC		BPL GCMD
3d31	85	FA		STA POINTL
	C6	EA		DEC COUNT
	F0	07		BEQ ADSET
	20	CC	3F	JSR RDBYTE
	10	B1		BPL GCMD
	85	F9		STA INH
	20	A0	3E	ADSET JSR MVDOWN

3d41	20	37	3E		JSR ADVEND
	A0	00			LDY #00
	A2	02			LDX #02
	B5	F9		INSERT	LDA INH, X
	91	E4			STA (CURAD), Y
	CA				DEX
	C8				INY
	C4	E8			CPY BYTES
3d50	d0	F6			BNE INSERT
	F0	96			BEQ CMD
3d54	20	E5	3F	ASSEM	JSR BEGIN
	18				CLC
	A5	E2			LDA ENDAD
	69	06			ADC #06
	85	EC			STA TABLE
	85	E9			STA ITABLE
3d60	A9	FF			LDA #FF
	85	EB			STA LABELS
	65	E3			ADC ENDAD+1
	85	Ed			STA TABLE+1
	85	EA			STA ITABLE+1
	20	43	3E	ASLOOP	JSR DETLEN
	A0	00			LDY #00
	B1	E4			LDA (CURAD), Y
3d71	C9	FF			CMP #FF
	d0	27			BNE ASNEXT
	C8				INY
	B1	E4			LDA (CURAD), Y
	A4	EB			LDY LABELS
	91	EC			STA (TABLE), Y
	88				DEY
	A5	E5			LDA CURAD+1

	91 EC		STA (TABLE),Y
3d81	88		DEY
	d0 03		BNE OVER3
	20 15 3E		JSR DEE3
	A5 E4	OVER3	LDA CURAD
	91 EC		STA (TABLE),Y
	88		DEY
	d0 03		BNE OVER
	20 18 3E		JSR DEE2
3d91	84 EB	OVER	STY LABELS
	20 7A 3E		JSR MOVEUP
	20 EE 3F		JSR REDEND
	B8		CLV
	50 (Cd) ?! ? CE 3/6/79		BVC ASLOOP
	20 21 3E ASNEXT		JSR ADVANC
	90 (CB) ?! ? C9 3/6/79		BCC ASLOOP
3dA1	20 E5 3F		JSR BEGIN
	20 43 3E RSLOOP		JSR DETLEN
	A0 00		LDY #00
	B1 E4		LDA (CURAD),Y
	C9 20		CMP #20
	F0 04		BEQ JMPJSR
	C9 4C		CMP #4C
3dB1	d0 0E		BNE CHKBR
	CB	JMPJSR	INY
	20 dd 3d		JSR FINDLB
	F0 1C		BEQ RSNEXT
	91 E4		STA (CURAD),Y
	8A		TXA
	CB		INY
	91 E4		STA (CURAD),Y
	d0 14		BNE RSNEXT

3dC1	29	IF	CHKBR	AND #IF
	C9	10		CMP #10
	d0	0E		BNE RSNEXT
	C8			INY
	20	dd 3d		JSR FINDLB
	F0	08		BEQ RSNEXT
	38			SEC
	E5	E4		SBC CURAD
3dd0	38			SEC
	E9	02		SBC #02
	91	E4		STA (CURAD),Y
	20	21 3E	RSNEXT	JSR ADVANC
	90	CA		BCC RSL00P
	4C	4F 1C		JMP START
	A5	E9	FINDLB	LDA ITABLE
	85	EC		STA TABLE
3dE1	A5	EA		LDA ITABLE+1
	85	Ed		STA TABLE+1
	B1	E4		LDA (CURAD),Y
	A0	FF		LDY #FF
	C4	EB	FDL00P	CPY LABELS
	F6	17		BEQ FDRET
	d1	EC		CMP (TABLE),Y
	d0	14		BNE FDNEXT
3dF1	88			DEY
	d0	03		BNE OVER4
	20	15 3E		JSR DEE3
	B1	EC	OVER4	LDA (TABLE),Y
	AA			TAX
	88			DEY
	d0	03		BNE OVER5
	20	18 3E		JSR DEE2

3E00	B1	EC		OVER5	LDA (TABLE),Y
	A0	01			LDY #01
	60			FDRET	RTS
	88			FDNEXT	DEY
	88				DEY
	d0	03			BNE OVER6
	20	15	3E		JSR DEE3
	88			OVER6	DEY
	d0	dA			BNE FDLLOOP
	20	18	3E		JSR DEE2
3E12	4C	E9	3d		JMP FDLLOOP
	88			DEE3	DEY
	E6	EC			INC TABLE
	88			DEE2	DEY
	88				DEY
	E6	EC			INC TABLE
	E6	EC			INC TABLE
	C6	Ed			DEC TABLE+1
3E20	60				RTS

	18			ADVANC	CLC
	A5	E4			LDA CURAD
	65	E8			ADC BYTES
	85	E4			STA CURAD
	A5	E5			LDA CURAD+1
	69	00			ADC #00
	85	E5			STA CURAD+1
	C5	E3			CMP ENDAD+1
3E30	90	04			BCC ADRET
	A5	E4			LDA CURAD
	C5	E2			CMP ENDAD
	60			ADRET	RTS

	18		ADVEND	CLC
	A5	E2		LDA ENDAD
	65	E8		ADC BYTES
	85	E2		STA ENDAD
	90	02		BCC ADRET1
BE40	E6	E3		INC ENDAD+1
	60		ADRET1	RTS

	A0	00	DETLEN	LDY #00
	B1	E4		LDA (CURAD),Y
	A0	01	DETLEN1	LDY #01
	C9	00		CMP #00
	F0	1A		BEQ DETERM
	C9	40		CMP #40
	F0	16		BEQ DETERM
BE51	C9	60		CMP #60
	F0	12		BEQ DETERM
	A0	03		LDY #03
	C9	20		CMP #20
	F0	0C		BEQ DETERM
	29	1F		AND #1F
	C9	19		CMP #19
	F0	06		BEQ DETERM
BE61	29	0F		AND #0F
	AA			TAX
	BC	6A 3E		LDY LENTB,X
	84	E8	DETERM	STY BYTES
	60			RTS

BE6A	02, 02, 02		LENTB
	01 02 02		
BE70	02 01 01		
	02 01 01		
	03 03 03 03		

	A5	E4	MOVEUP	LDA CURAD
	85	E6		STA MOVAD
	A5	E5		LDA CURAD+1
3E80	85	E7		STA MOVAD+1
	A4	E8	UPL00P	LDY BYTES
	B1	E6		LDA (MOVAD),Y
	A0	00		LDY #00
	91	E6		STA (MOVAD),Y
	A5	E6		LDA MOVAD
	A6	E7		LDX MOVAD+1
	C5	E2		CMP ENDAD
3E90	d0	04		BNE INCMOV
	E4	E3		CPX ENDAD+1
	F0	09		BEQ MVURET
	E6	E6	INCMOV	INC MOVAD
	d0	E8		BNE UPL00P
	E6	E7		INC MOVAD+1
	B8			CLV
	50	E3		BVC UPL00P
	60		MVURET	RTS

3EAO	A5	E2	MVDOWN	LDA ENDAD
	85	E6		STA MOVAD
	A5	E3		LDA ENDAD+1
	85	E7		STA MOVAD+1
	A0	00	MVLOOP	LDY #00
	B1	E6		LDA (MOVAD),Y
	A4	E8		LDY BYTES
	91	E6		STA (MOVAD),Y
3EB0	A5	E6		LDA MOVAD
	A6	E7		LDX MOVAD+1
	C5	E4		CMP CURAD

	d0	04		BNE	DECMOV
	E4	E5		CPX	CURAD+1
	F0	0d		BEQ	MVDRET
	38			SEC	
	E9	01		SBC	#01
	85	E6		STA	MOVAD
3EC1	8A			TXA	
	E9	00		SBC	#00
	85	E7		STA	MOVAD+1
	B8			CLV	
	50	dF		BVC	MVLOOP
	60			RTS	

	20	43	3E	SCAN	JSR	DETLEN
	A0	00			LDY	#00
	A6	E8			LDX	BYTES
3Ed1	B1	E4		SCOPY	LDA	(CURAD),Y
	95	F8			STA	INH-1,X
	C8				INY	
	CA				DEX	
	d0	F8			BNE	SCOPY

	20	EC	3E	SCAN1	JSR	SCAN3
	d0	F8			BNE	SCAN1

	20	EC	3E	SCAN2	JSR	SCAN3
3EE1	F0	FB			BEQ	SCAN2

	20	EC	3E		JSR	SCAN3
	F0	F6			BEQ	SCAN2

	20	GA	1F		JSR	GETKEY
	60				RTS	

	A4	E8		SCAN3	LDY	BYTES
	A2	09			LDX	#09

BEFO	A9	7F		LDA #7F
	8d	41	17	STA PADD
	20	28	1F	JSR SCAND1
	60			RTS

HYPERTAPE

This is a tape recording program. beginning at 3F00.
 Uses locations 17E0→17E3

3F00	A9	Ad		DUMPT	LDA #Ad
	8d	EC	17		STA VEB
	20	32	19		JSR INTVEB
	A9	27			LDA #27
	8d	E1	17		STA GANG
	A9	BF			LDA #BF
130F	8d	43	17		STA PBDD
	A2	64			LDX #64
	A9	16			LDA #16
	20	62	3F		JSR HIC
	A9	2A			LDA #2A
	20	8B	3F		JSR OUTCHT
	Ad	F9	17		LDA ID
1321	20	73	3F		JSR OUTBT
	Ad	F5	17		LDA SAL
	20	70	3F		JSR OUTBTC
	Ad	F6	17		LDA SAH
	20	70	3F		JSR OUTBTC
1330	20	EC	17	DUMPT4	JSR VEB
	20	70	3F		JSR OUTBTC
	20	EA	19		JSR INCVEB
	Ad	Ed	17		LDA VEB+1
	Cd	F7	17		CMP EAL

133F	Ad	EE	17	LDA	VEB+2
	Ed	F8	17	SBC	EAH
	90	E9		BCC	DUMPT4
	A9	2F		LDA	#2F
	20	8B	3F	JSR	OUTCHT
	Ad	E7	17	LDA	CHKL
	20	73	3F	JSR	OUTBT
1352	Ad	E8	17	LDA	CHKH
	20	73	3F	JSR	OUTBT
	A2	02		LDX	#02
	A9	04		LDA	#04
	20	62	3F	JSR	HIC
135F	4C	5C	18	JMP	DISPZ

8E	E0	17	HIC	STX	TIC
48			HIC1	PHA	
20	8B	3F		JSR	OUTCHT
68				PLA	
CE	E0	17		DEC	TIC
d0	F6			BNE	HIC1
60				RTS	

1370	20	4C	19	OUTBTC	JSR	CHKT
	48			OUTBT	PHA	
	4A			LSR		
	4A			LSR		
	4A			LSR		
	4A			LSR		
	20	80	3F	JSR	HEXOUT	
	68			PLA		
	20	80	3F	JSR	HEXOUT	
	60			RTS		

1380	29	0F	HEX00T	AND #0F
	C9	0A		CMP #0A
	18			CLC
	30	02		BMI HEX1
	69	07		ADC #07
	69	30	HEX1	ADC #30
	A0	08	OUTCHT	LDY #08
	8C	E2 17		STY COUNT
1390	A0	02	TRY	LDY #02
	8C	E3 17		STY TRIB
	BE	C7 3E	ZON	LDX NPUL,Y
	48			PHA
	2C	47 17	ZON1	BIT CLKRDI
	10	FB		BPL ZON1
	B9	C8 3E		LDA TIMG,Y
13A1	8d	44 17		STA CLK1T
	Ad	E1 17		LDA GANG
	49	80		EOR #80
	8d	42 17		STA SBD
	8d	E1 17		STA GANG
	CA			DEX
13BD	d0	E7		BNE ZON1
	68			PLA
	CE	E3 17		DEC TRIB
	FO	05		BEQ SETZ
	30	07		BMI ROUT
	4A			LSR
	90	d8		BCC ZON
	A0	00	SETZ	LDY #00
	FO	d4		BEQ ZON
13C1	CE	E2 17	ROUT	DEC COUNT
	d0	CA		BNE TRY

60

RTS

02

NPUL

C3 03 7E

TIMG

EA

BFCC

20 d9 3E

RDBYTE

JSR SCAN1

C9 10

CMP #10

10 11

BPL RDRET

0A

ASL

0A

ASL

0A

ASL

0A

ASL

85 E9

STA TEMP

20 d9 3E

JSR SCAN1

C9 10

CMP #10

10 04

BPL RDRET

BFEO

05 E9

ORA TEMP

A2 FF

LDX #FF

60

RDRET

RTS

A5 E0

BEGIN

LDA BEGAD

85 E4

STA CURAD

A5 E1

LDA BEGAD+1

85 E5

STA CURAD+1

60

RTS

38

REDEND

SEC

A5 E2

LDA ENDAD

E5 E8

SBC BYTES

85 E2

STA ENDAD

B0 02

BCS REDRET

C6 E3

DEC ENDAD+1

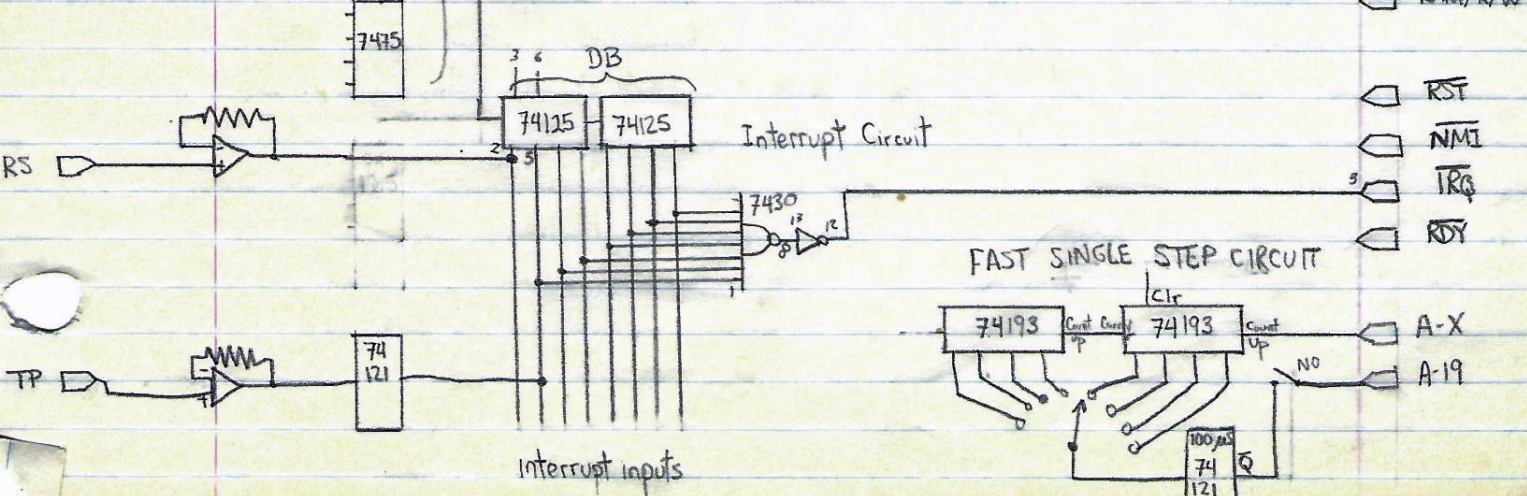
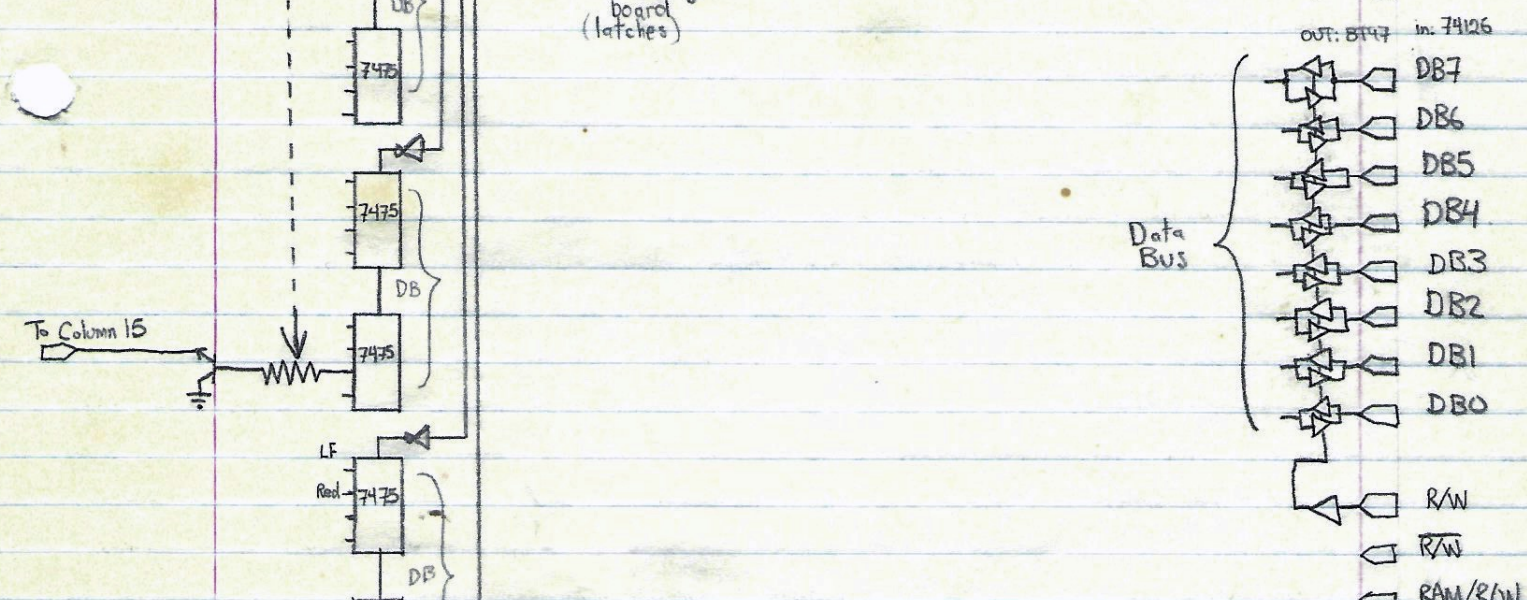
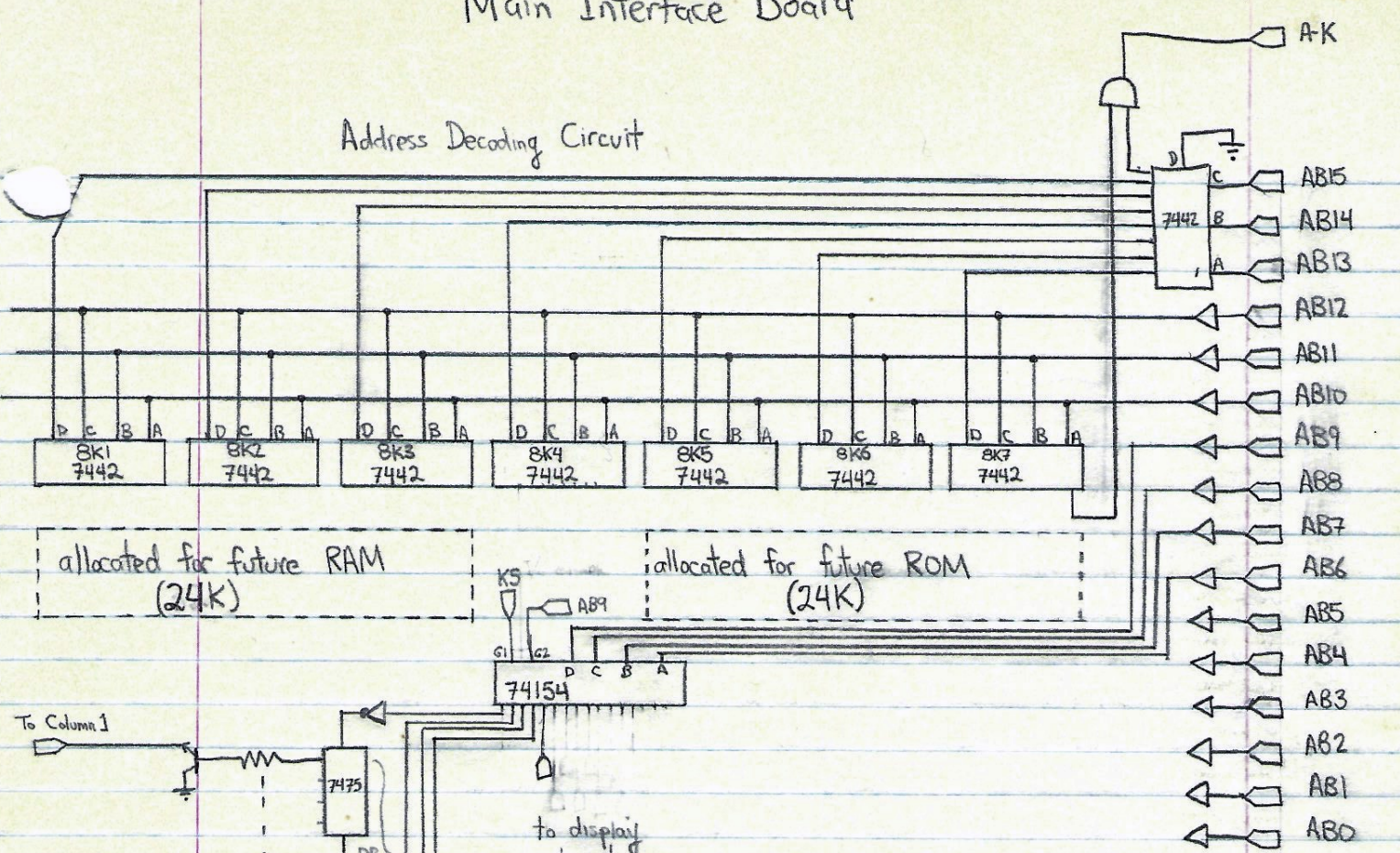
60

REDRT

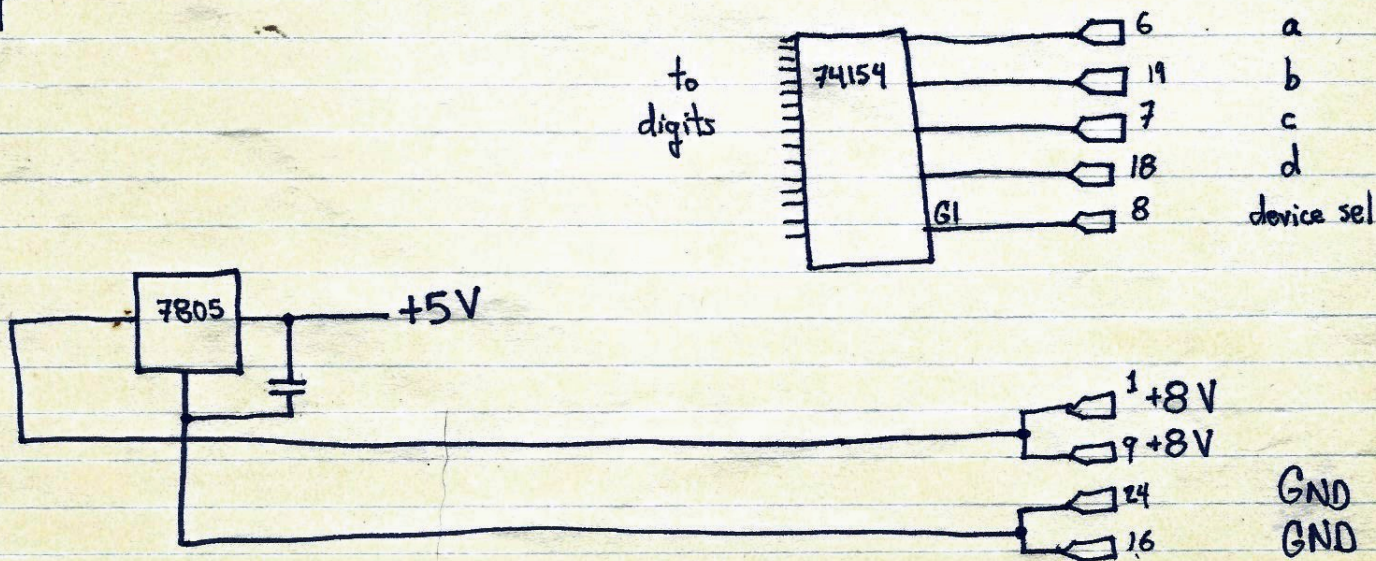
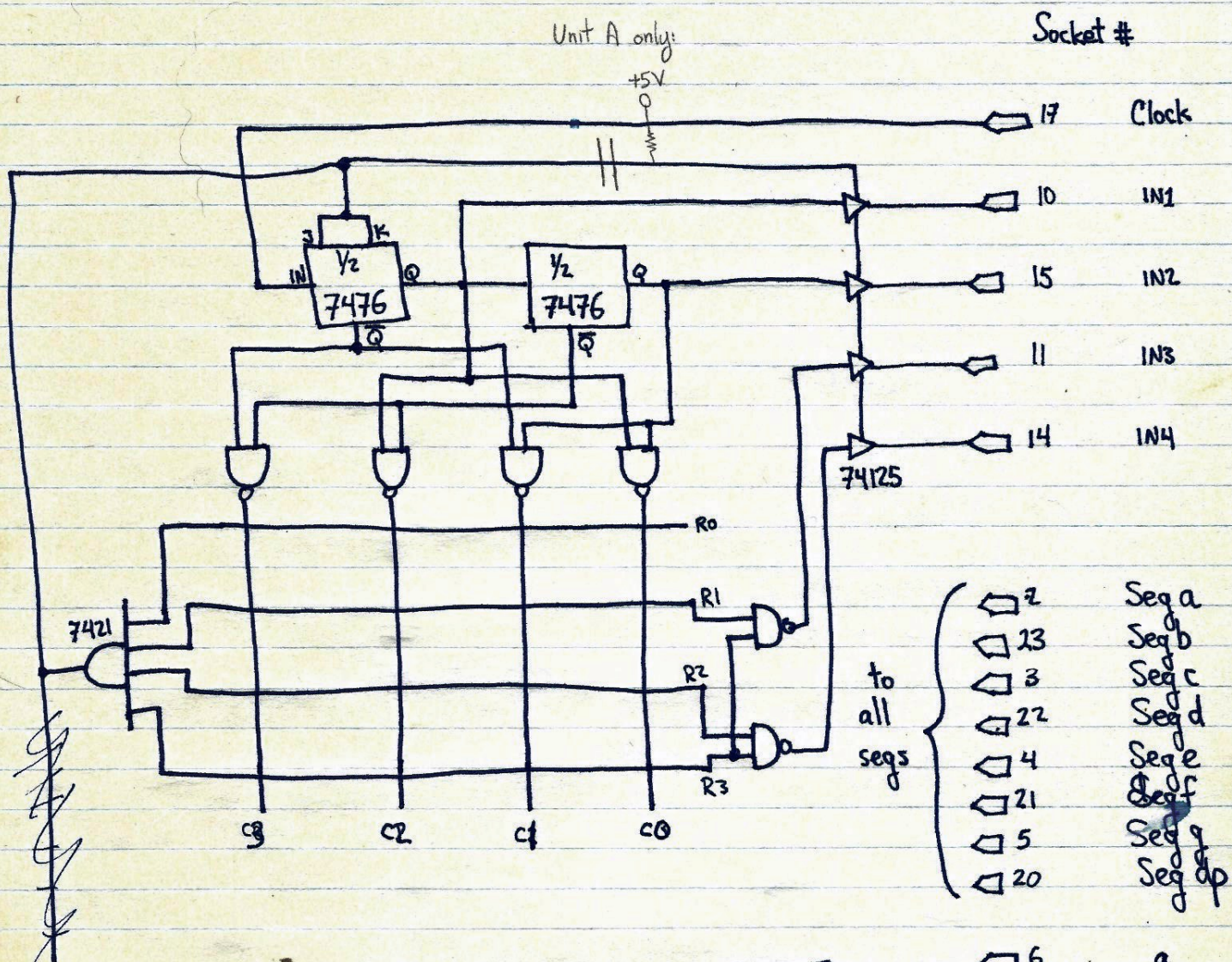
RTS

Main Interface Board

Address Decoding Circuit



New Tiny Terminals



OUTPUT JACK PINOUT - TINY TERMINALS

PIN	Old FUNCTION	New Function	PIN	Old FUNCTION	New Function
1			2		
3			4		
5			6	Digit A1	Digit Add #0
7	+5V	+8V	8	A2	Digit Add #1
9	GND	GND	10	A3	Digit Add #2
11	Seg a	Seg a	12	A4	Digit Add #3
13	Seg b	b	14	A5	154 select AG1 KBSA
15	c	c	16	A6	154 select BG1 Clock
17	d	d	18	A7	+8V
19	e	e	20	A8	*GND
21	f	f	22	Digit B1	-Clock Digit Add0
23	g	g	24	B2	Digit Add1
25	dp	dp	26	B3	Digit Add2
27	IN-A1	IN-A1	28	B4	Digit Add3
29	IN-A2	IN-A2	30	B5	154 select BG1
31	IN-A3	IN-A3	32	B6	Clock KBSB
33	IN-A4	IN-A4	34	B7	+8V
35	IN-B1	IN-B1	36	B8	GND
37	IN-B2	IN-B2	38		
39	IN-B3	IN-B2	40		IN-B4
41	IN-B4	IN-B4			