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1 .SBTTL *****
2 .SBTTL * *
3 .SBTTL *MODULE ALCOMN *
4 .SBTTL *PROGRAMMER DAVE THEURER *
5 .SBTTL *FUNCTION ALIENS CONSTANTS AND VARIABLES *
6 .SBTTL * TO BE .INCLUDED IN *
7 .SBTTL * ALGAME,ALDISP,ALHARD *
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12 .SBTTL STRICTLY PROHIBITED.
13 .SBTTL *****
14 .ENABL AMA
15 .INCLUDE HLL65
16 .PAGE
17 .RADIX 16
18
19 .NLIST CND
20 .SBTTL CONSTANTS-COUNTS
21 SPACG 0
22
23
24 SCREEN OBJECT QUANTITIES
25
26 NHISCO 8 # OF HIGH SCORES KEPT
27 NRANKS 99.
28 .IF NE,SPACG
29 NEXPLO 10
30 NENESH 4
31 NDEFSH 4
32 NSAUCE 1
33 NFORTS 4
34 NEROWS 5
35 NECOLS 8
36 NBALLS 4
37 NSHRAP 2
38 NASTER 4
39 .ENDC
40
41 .SBTTL CONSTANTS-STATE CODES
42
43 QSTATE CODES ROUTAD INDICES
44
45 CNEWGA 0
46 CNEWLI 2
47 CPLAY 4
48 CENDLI 6
49 CENDGA 8
50 CPAUSE 0A
51 CNEWAV 0C
52 CENDWAV 0E
53 CHISCHK 10
54 CDLADR 14
55 CGETINI 12
56 CNOTFOU CDLADR
57 CREQRAT CDLADR+2
58 CNEWV2 CREQRAT+2
59 CLOGO CNEWV2+2
60 CINIRAT CLOGO+2
```

LOGO INIT

1 CNWLF2 CINIRAT+2
2 CDROP CNWLF2+2 DROP MODE
3 CSYSTM CDROP+2
4 CBOOM CSYSTM+2 BOOM STATE
5
6 DISPLAY STATE CODES
7 CDPLAY 0 PLAY
8 CDSYST 2 SYSTEM CONFIGURATION
9 CDREQRA 8 REQUEST RANK
10 CDPLPL 0E PLAY PLAYER WARNING
11
12 CDGOVR 0C GAME OVER PLAYER MSG
13 CDHITB 0A HI SCORE TABLE
14 CDGETI 6 GET INITIALS
15 CDBOOM 4 BOOM DISPLAY
16 CDPRST CDPLPL+2 PRESS START
17 CD2GAM CDLOGP+2 2 GAME MIN
18 CDBOXP CDPRST+2 LOGO BOX
19 CDLOGP CDBOXP+2 LOGO ITSELF
20
21
22
23
24
25 TIMING FOR PAUSE STATE
26
27 SECOND 20. FRAMES/SECOND
28 QUASEC SECOND/4 QUARTER SECOND FACTOR
29 .PAGE
30 .IF NE,SPACG
31
32 OBJECT SIZES FOR COLLISION DETECTION
33
34 IRIE IRNGX/32. ENEMY RADIUS
35 IRIG IRIE GUN
36 IRIS IRIE SAUCER
37 IRIF 10 FORTRESS
38 IRISP IRIE/4 SPEAR
39 .PAGE
40 .SBTTL CONSTANTS-PLAYFIELD PARAMETERS
41
42
43 ENEMY COLUMNS
44 ICOLMAX IHIX- 2*IRIE MAX X WC
45 ICOLMIN ILOX+ 2*IRIE MIN X WC
46
47 ILIVES 4 INITIAL # OF LIVES GIVEN TO PLAYER
48 IESZ 80 INITIAL ENEMY HEIGHT WC
49 IGXMIN ICOLMIN+ IRIE*2 MINIMUM X VALUE FOR GUN
50 IGXMAX ICOLMAX- IRIE*2 MAXIMUM X VALUE FOR GUN
51
52 GUN
53 IGXINC IGXMAX-IGXMIN / 3*FPS X INCREMENT/FRAME
54
55 IGX IGXMAX+IGXMIN / 2 INITIAL GUN COORDINATES WC
56 IGY ILOY+ IRIG*2
57 IGZ IESZ
58
59 ISAUCY IHYI- IRIS*2 INITIAL SAUCER COORDINATES WC
60 ISAUCZ IESZ

1	IFORTX	IGXMAX-IRIG-IRIF	INITIAL FORTRESS POSITION	RIGHTMOST	WC
2	IFORTY	IGY+IRIG+IRIF+IRIE			
3	IFORTZ	IESZ			
4	IFORTS	7E	INITIAL FORT STATUS		
5	IXDFFCC	IRNGX- 2* IHIX-IFORTX	/ NFORTS-1	FORT SEPARATION	
6	IFORADI	IRIF	FORTRESS RADIUS		
7	IROWL	OFF	INITIAL ENEMY ROW STATUS		
8	IXCOLS	IFORTX	X COORDINATE	WC OF UPPER RIGHT ENEMY IN	
9	IZCOLS	IESZ	A NEWLY INITIALIZED ARRAY		
10	IYROW1	ISAUCY-IRIS-IRIE-IRIE	Y COORDINATE	WC OF UPPER RIGHT ENEMY IN	
11			A NEWLY INITIALIZED 1ST WAVE		
12	IXDEECC	IRIE*5/2	ENEMY ENEMY CENTER CENTER DELTA	X	
13	IYDEECC	IRIE*3		Y	
14	ICOLINC	1	ENEMY COLUMN	ROW INITIAL INCREMENTS	
15	IROWINC	IRIE			
16	ITIMSAU	OCO	INITIAL VAUE FOR TIMSAU		
17	ITIMEXP	1	INITIAL VALUE FOR TIMEXP		
18	ITIMXP	5	# OF FRAME UPDATES FOR EACH BANG		
19	ITIMGUP	0	INITIAL VALUE FOR TIMGUP		
20	ITAUTOF	1	INITIAL VALUE FOR TAUTOF		
21	ITIMESP	4	INITIAL VALUE FOR TIMESP		
22	FPS	30.	FRAMES/SEC		
23			SAUCER		
24	ISAXMAX	IHIX-IRIS	MAXIMUM X	WC	
25	ISAXMIN	ILOX+IRIS	MINIMUM X	WC	
26	ISAXINC	ISAXMAX-ISAXMIN / 5*FPS	X INCREMENT/FRAME		
27			SPEARS		
28	IDSXMIN	ISAXMIN			
29	IDSXMAX	ISAXMAX			
30	IDSXINC	4			
31	IESXRA	2	X,Y,Z RADU FOR EACH OBJECT TYPE		
32	IESYRA	7			
33	IESZRA	2			
34	IDSXRA	1			
35	IDSYRA	4			
36	IDSZRA	1			
37	ISAXRA	OC			
38	ISAYRA	8			
39	ISAZRA	08			
40	IENXRA	6			
41	IENYRA	8			
42	IENZRA	6			
43	IASXRA	5			
44	IASYRA	7			
45	IASZRA	5			
46	IDSYMAX	ISAUCY+IRIS	DEFENSIVE SPEAR MAX Y	WC	
47	IESYMIN	IGY	ENEMY SPEAR MIN Y	WC	
48	IDSYINC	IDSYMAX-IESYMIN / 1*FPS	DEF SPEAR INCREMENT/FRAME		
49	IESYINC	IDSYINC/2	ENEMY SPEAR INCREMENT/FRAME		
50			ASTEROIDS		
51	IASXMAX	IHIX-IASXRA-2			
52	IASXMIN	IASXRA+3			
53	IASZMAX	IHIY-IASZRA-2			
54	IASZMIN	IASZRA+3			

```
1      EYE
2 IEYL      20      WORLD COORDINATE Y  NEGATIVE
3 IEZL      080     WORLD COORDINATE Z
4
5 IEYEFAC   2      EYE FACTOR POWER OF 2 MULTIPLIER
6 IXDOTD    8      X,Y,  Z DELTA BETWEEN DOTS IN CUBE
7 IYDOTD    8
8 IZDOTD    8
9      .ENDC
10     .PAGE
11     .SBTTL  CONSTANTS-PICTURES
12     .IF NE,SPACG
13
14          DYNAMIC PICTURE CODES  INDEX ANITAB
15 CGUPIC    0
16 CSAUCPI   1
17 CESPIC    3
18 CDSPIC    2
19 CEXPIC    4
20 CBAPIC    0
21 CSHPIC    5
22 CASPIC    6
23
24     .SBTTL  CONSTANTS-EXPLOSION CODES
25
26          EXPLOSION CODES
27 CBNGSS    0      SPEAR SPEAR
28 CBNGSC    1      SPEAR SAUCER
29 CBNGEN    2      SPEAR ENEMY
30 CBNGUN    3      SPEAR GUN
31     .ENDC
32     .SBTTL  BOOM
33 NPARTI    10     # OF PARTICLES
34          PARTICLE DECELERATIONS
35          FRACTIONAL
36 PARLXA    20
37 PARLYA    20
38 PARLZA    20
39 PARTXA    0      INTEGER  POSITIVE
40 PARTYA    0
41 PARTZA    0
42     .PAGE
43 LEDOFF    MLED1 MLED2
44 NROMS     12.
45     .MACRO LAH ...X
46     LDA I,0
47     . .-1
48     .ENABL M68
49     .WORD ...X
50     .DSABL M68
51     . .-1
52     .ENDM
53     .MACRO LXL ...X
54     LDX I,0
55     . .-1
56     .WORD ...X
57     . .-1
58     .ENDM
59     .PAGE
60     .SBTTL  HARDWARE DEFINITIONS
```

1	COLPORT	800	COLOR RAM
2			
3	IN1	0C00	INPUT BYTE 1
4	MCOINR	01	RIGHT COIN MECH
5	MCOINC	02	CENTER COIN MECH
6	MCOINL	04	LEFT COIN MECH
7	\$LMBIT	8	SLAM
8	MTEST	10	SELF TEST
9	MDITES	20	DIAGNOSTIC TEST SWITCH
10	MHALT	40	VG HALT
11	M3KHTI	80	3 KHZ TIMER
12			
13	INOPO	0D00	OPTION SWITCH 0
14	INOP1	0E00	OPTION SWITCH 1
15			
16	VECRAM	2000	VECTOR RAM
17	ROMSTART	3000	ROM START VECTOR ROM
18			
19	OUTO	4000	OUTPUT BYTE 0
20	MRCCNT	01	RIGHT COIN COUNTER
21	MMCCNT	02	CENTER
22	MLCCNT	04	LEFT
23	MVINX	08	VIDEO INVERT X
24	MVINY	10	VIDEO INVERT Y
25			
26	VGSTART	4800	VG START
27	WTCHDG	5000	WATCH DOG CLEAR
28	INTACK	WTCHDG	
29	VGSTOP	5800	VG RESET
30	HARDWA	6000	AUX BOARD IO BASE ADDRESS
31	PROG	09000	PROGRAM ROM
32			
33	AUX BOARD		
34			
35	EAIN	HARDWA+50	EAROM READ PORT
36	EADAL	HARDWA	EAROM WRITE BASE ADDRESS
37	EACTL	HARDWA+40	EAROM CONTROL
38			
39	POKEY	HARDWA+0C0	POKEY 1
40	POKEY2	HARDWA+0D0	POKEY 2
41			
42	OUTANK	HARDWA+0E0	OUTPUT BYTE 1
43	MLED1	2	LED 1
44	MLED2	1	LED 2
45	MFLIP	4	FLIP 1 FOR PLAYER 2
46			
47			MATH BOX
48	MYLOW	HARDWA+60	READ LOW
49	MYHIGH	HARDWA+70	READ HIGH
50	MSTAT	HARDWA+40	STATUS
51	MBSTAR	HARDWA+80	START SIGNS ANALYSIS
52	MAL	MBSTAR	
53	MAH	MBSTAR+1	
54	MBL	MBSTAR+2	
55	MBH	MBSTAR+3	
56	MEL	MBSTAR+4	
57	MEH	MBSTAR+5	
58	MFL	MBSTAR+6	
59	MFH	MBSTAR+7	
60	MXL	MBSTAR+8	

1	MXH	MBSTAR+9
2	MNL	MBSTAR+0C
3	MZLL	MBSTAR+0D
4	MZLH	MBSTAR+0E
5	MZHL	MBSTAR+0F
6	MZHH	MBSTAR+10
7	SYM	MBSTAR+12
8	MSZXD	MBSTAR+14
9	MXPL	MBSTAR+15
10	MXPH	MBSTAR+16
11	MDYPL	MBSTAR+18

POKEY DEFINITIONS

15	AUDF1	POKEY
16	AUDC1	POKEY+1
17	AUDCTL	POKEY+8
18	ALLPOT	POKEY+8
19	RANDOM	POKEY+0A
20	POTGO	POKEY+0B
21	SKCTL	POKEY+0F
22	AUDF2	POKEY2
23	AUDC2	POKEY2+1
24	AUD2CTL	POKEY2+8
25	ALLP02	POKEY2+8
26	RAND02	POKEY2+0A
27	POTGO2	POKEY2+0B
28	SKCTL2	POKEY2+0F

INPUT BYTE 0 POKEY2 FASTPOT
CONTROLLED BY FLIP

32	MSTRT1	20	START 1
33	MSTRT2	40	START 2
34	MSUZA	8	SUPPERZAPPER
35	MFIRE	10	FIRE
36	MFAKE	80	FAKE INPUT
37	MOPT13	07	SPECIAL OPTIONS

INPUT BYTE 2 POKEY 1 FASTPOT
CONTROLLED BY FLIP

41	COCKTA	10	1 IF COCKTAIL
42	MOPT14	20	SPECIAL OPTION

D0-D3 POT READ

OPTIONS

47	OM2GAM	1	2 GAME MIN OPTION MASK
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COLORS

51	BLUE	6
52	BLUET	7
53	GREEN	5
54	RED	3
55	YELLOW	1
56	WHITE	0
57	PURPLE	2
58	TURQOI	4
59	WELCOL	BLUE
60	CURCOL	YELLOW

WELL
CURSOR

1	ICHCOL	WHITE	ENEMY SHOTS
2	PCHCOL	YELLOW	PLAYER SHOTS
3	INVCOL	RED	INVADERS
4	LETCOL	GREEN	LETTERS
5	DEPCOL	WELCOL	
6	EXPCOL	WHITE	EXPLOSION
7	FLICOL	RED	FLIPPERS
8	TANCOL	PURPLE	TANKER
9	TRACOL	GREEN	TRALERS
10	ZAPCOL	WHITE	SUPER ZAP
11	FRED	0C	
12	FBLUE	0B	
13	FGREEN	07	
14	HRED	0D	
15	ZWHITE	FRED FBLUE FGREEN	
16	ZYELLO	FRED FGREEN	
17	ZPURPL	FRED FBLUE	
18	ZRED	FRED	
19	ZTURQOI	FGREEN FBLUE	
20	ZGREEN	FGREEN	
21	ZBLUE	FBLUE	
22	ZBLACK	0F	
23	PSHCTR	8	PLAYER SOT CENTER
24	PDIWHI	9	PLAYER DEATH EXPLOSION COLORS
25	PDIYEL	10.	
26	PDIRED	11.	
27	NYMCOL	12.	NYMPHE
28	FLASH	15.	CHANGES EVERY 4 MO.
29		.PAGE	
30		.SBTTL	VARIABLES-CONTROL
31		.ASECT	
32		. 0	
33			
34	CONTROL	TIMING VARIABLES	
35			
36	QSTATE	.BLKB 1	CONTAINS CODE FOR STATE ROUTINE INDEX INTO ROUTAD
37	QDSTATE	.BLKB 1	DISPLAY STATE
38	QNXTSTA	.BLKB 1	NEXT STATE CODE TO EXECUTE AFTER PAUSE
39	QFRAME	.BLKB 1	FRAME COUNTER WRAPS AT FF
40	QTMPAUS	.BLKB 1	PAUSE TIMER IN SECOND UNITS
41	QSTATUS	.BLKB 1	STATUS FLAGS
42	MATRACT	80	D7 0 ATTRACT 1 GAME
43	MGTMOD	40	D6 0 NO TIME START ALLOWED
44			1GAME TIMER RUNNING
45			PRESS START NOT ALLOWED
46			
47	OTHER OVERHEAD		
48			
49	\$\$CRDT	.BLKB 1	# OF CREDITS
50	\$INTCT	.BLKB 1	INTERRUPT COUNT
51	\$TEST		
52	\$LAM		
53	\$COINA	.BLKB 1	COIN MECHS
54	\$CMODE		
55	OPTIN1	.BLKB 1	OPTIONS
56	OPTIN2	.BLKB 1	
57	TSLAMR	.BLKB 1	SLAM SOUND TIMER
58	\$LMTIM	.BLKB 1	SLAM INDICATION
59	MECHS	3	
60	EMCTRS	3	

1	\$CNSTT	.BLKB	MECHS	
2	\$PSTSL	.BLKB	MECHS	
3	\$CCTIM	.BLKB	EMCTRS	
4	\$BCCNT	.BLKB	1	
5	\$CNCT	.BLKB	1	
6	\$BC	.BLKB	1	
7	COLRAM	.BLKB	10	COLOR RAM
8		.PAGE		
9		.SBTTL	VARIABLES-WORK	
10				
11	TEMPO	.BLKB	1	
12	TEMP1			
13	TEMPL	.BLKB	1	
14	TEMP2	.BLKB	1	
15	TEMP3	.BLKB	1	
16	TEMP4	.BLKB	1	
17	TEMPX	.BLKB	1	
18	TEMPY	.BLKB	1	
19	TEMPZ	.BLKB	1	
20	MTEMP	.BLKB	4	MACRO USE ONLY
21	SAVEX	.BLKB	1	
22	SAVEY	.BLKB	1	
23	INDEX1	.BLKB	1	
24	INDEX2	.BLKB	1	
25	INDEX3	.BLKB	1	
26	INDEX4	.BLKB	1	
27	INDYLO	.BLKB	1	USE FOR INDIRECT Y
28	INDYHI	.BLKB	1	
29				
30		.SBTTL	VARIABLES-PLAYERS	
31				
32	PLAYER	ARRAYS		
33				
34	PLAYUP	.BLKB	1	PLAYER UP 0 LEFT, 1 RIGHT
35	NUMPLA	.BLKB	1	# OF PLAYERS -1
36	NEWPLA	.BLKB	1	# OF NEXT PLAYER FROM END WAVE TO NEW WAVE
37	LSCORL	.BLKB	1	SCORE ARRAY
38	LSCORM	.BLKB	1	TRIPLE PRECISION BCD
39	LSCORH	.BLKB	1	
40	RSCORL	.BLKB	1	
41	RSCORM	.BLKB	1	
42	RSCORH	.BLKB	1	
43				
44	WAVEN1	.BLKB	1	# OF ENEMY WAVE WHICH PLAYER IS BATTLING -1
45	WAVEN2	.BLKB	1	
46	LIVES1	.BLKB	1	# OF BASES PLAYER HAS LEFT
47	LIVES2	.BLKB	1	
48				
49		.SBTTL	VARIABLES-SWITCHES	
50				
51				SWITCHES
52	INPUT	.BLKB	1	ROUGH INPUT 0 ON
53		.BLKB	1	UNUSED
54	DBSW	.BLKB	1	LAST ROUGH INPUT 0 ON
55	SWSTRT			
56	SWSTAT	.BLKB	1	DEBOUNCED INPUT 0 ON
57	SWFINA	.BLKB	1	LATCHED INPUT 1 ON CLEARED BY GAME
58	SWRELE	.BLKB	1	OLD SWSTAT READING
59	TBHD	.BLKB	1	TRACK BALL VARIABLES
60	CURSP0	.BLKB	1	


```
1 OTB .BLKB 1
2 .IF NE,SPACG
3
4 .SBTTL VARIABLES-OBJECT TIMERS, INCREMENTS
5
6 ATGUND .BLKB 1 AUTO GUN DIRECTION -LEFT +RIGHT
7 TAUOF .BLKB 1 AUTO FIRE GUN TIMER
8 SAUCDR .BLKB 1 SAUCER DIRECTION
9 TIMGUP .BLKB 1 GUN UPDATE TIMER
10 TIMSAU .BLKB 1 SAUCER TIMER
11 TIMEXP .BLKB 1 EXPLOSION UPDATE TIMER
12 TIMEPO .BLKB 1 ENEMY POSITION UPDATE TIMER
13 .PAGE
14 .SBTTL VARIABLES-ENEMY
15
16 ENEMY STATUS BITS 0 DEAD, 1 ALIVE
17 2 BYTES/ROW
18 D0 - D7 LEFT TO RIGHT IN ROW
19 ROWL - ROWL+5 BOTTOM TO TOP ROW
20
21 TROWL .BLKB 1 TEMP STORAGE FOR ROWL
22 FONSCR .BLKB 1 FLAG FOR ENEMY ON SCREEN IN ROW
23 ANISEQ .BLKB 1 ENEMY POSITION 0,1,2 OR 3 -USED TO DEDUCE
24 WHICH PICTURE TO DISPLAY
25
26 ROWLOR .BLKB 1 OR D ROWL ARRAYS
27
28 FORTST .BLKB NFORTS*4 FORTRESS STATII
29
30
31
32 NUENSH .BLKB 1 # ENEMY SHOTS IN AIR
33 NUMBNG .BLKB 1 # EXPLOSIONS
34
35 .ENDC
36
37 .PAGE
38 .SBTTL VARIABLES-DISPLAY
39
40 FRTIMR .BLKB 1 VG FRAME DISPLAY TIMER
41 BUFRDY .BLKB 1 BUFFER STATUS 0-DISPLAY IT, 0 BUILD IT
42 OBJIND .BLKB 1 INDEX INTO OBJECT ARRAYS OCNT....
43 PXL .BLKB 1 TEMP STORAGE FOR POINT S COORDINATES
44 PYL .BLKB 1 WORLD
45 PZL .BLKB 1
46
47
48 LINSCA .BLKB 1 LINEAR SCALE W3DSUP
49 BINSKA .BLKB 1 BINARY SCALE W3DSUP
50 EYH .BLKB 1 EYE POSITION SIGNED HI BYTE
51 EYLL .BLKB 1 EYE POSITION FRACTIONAL
52 EYLDES .BLKB 1 EYE DESTINATION Y
53 EXL .BLKB 1 LOCATION OF EYE WORLD COORD
54 EYL .BLKB 1
55 EZL .BLKB 1
56
57 SXL .BLKB 1 TEMP STORAGE FOR POINT S COORD
58 SXH .BLKB 1 SCREEN
59 SZL .BLKB 1
60 SZH .BLKB 1
```

1	EYEFAC	.BLKB 1	EYE SCREEN DISTANCE	1
2	XADJL	.BLKB 2		2
3	ZADJL	.BLKB 2	SCREEN Z VANISH PT	3
4			DRAW SUBROUTINE VARIABLES	4
5	CURNTX	.BLKB 2	CURRENT BEAM POSITION	5
6	CURNTY	.BLKB 2		6
7	XCOMP	.BLKB 4	X COMPONENT FOR VECTOR DELTA	7
8	YCOMP	XCOMP+2		8
9	VGSIZE	.BLKB 1	SCALING SIZE	9
10	VGBRIT	.BLKB 1	VECTOR BRIGHTNESS	10
11	VGLIST	.BLKB 2	VECTOR LIST POINTER	11
12	SVGLIST	.BLKB 2		12
13	CBUF1	.	FOLLOWING BUFFER MAY BE USED FOR OTHER PURPOSES	13
14	X0L	.BLKB 1	USED WITHIN ONELIN IN ALDISP TO	14
15	X1L	.BLKB 1	STORE UNIT VECTORS X 0 7 X AND Z	15
16	X2L	.BLKB 1		16
17	X3L	.BLKB 1		17
18	X4L	.BLKB 1		18
19	X5L	.BLKB 1		19
20	X6L	.BLKB 1		20
21	X7L	.BLKB 1		21
22	X0H	.BLKB 1		22
23	X1H	.BLKB 1		23
24	X2H	.BLKB 1		24
25	X3H	.BLKB 1		25
26	X4H	.BLKB 1		26
27	X5H	.BLKB 1		27
28	X6H	.BLKB 1		28
29	X7H	.BLKB 1		29
30				30
31	Z0L	.BLKB 1		31
32	Z1L	.BLKB 1		32
33	Z2L	.BLKB 1		33
34	Z3L	.BLKB 1		34
35	Z4L	.BLKB 1		35
36	Z5L	.BLKB 1		36
37	Z6L	.BLKB 1		37
38	Z7L	.BLKB 1		38
39	Z0H	.BLKB 1		39
40	Z1H	.BLKB 1		40
41	Z2H	.BLKB 1		41
42	Z3H	.BLKB 1		42
43	Z4H	.BLKB 1		43
44	Z5H	.BLKB 1		44
45	Z6H	.BLKB 1		45
46	Z7H	.BLKB 1		46
47		.IF NE,SPACG		47
48	THSZL	.BLKB 1	GRID DISPLAY TEMP SZL H FOR FAR ENDPT	48
49	THSZH	.BLKB 1		49
50	CONTR1	.BLKB 1	COUNTERS	50
51	CONTR2	.BLKB 1		51
52	RANGEX	.BLKB 1	RANGE FOR COLLISION	52
53	RANGEY	.BLKB 1		53
54	RANGEZ	.BLKB 1		54
55	ASTOLA	.BLKB 1	# OF ASTEROIDS TO BE LAUNCHED	55
56	SENEMR	.BLKB 1	ROW COLUMN # OF ENEMY IN SMART TARGET WINDOW	56
57	SENEMC	.BLKB 1	- IF NONE	57
58	SENEMY	.BLKB 1	INDEX OF ENEMY OBJECT IN SMART TARGET WINDOW	58
59	DELTX	.BLKB 1		59
60	DELTY	.BLKB 1		60

1 DELTZ .BLKB 1
2 DELTXL .BLKB 1
3 DELTYL .BLKB 1
4 DELTZL .BLKB 1
5 ABSZDE .BLKB 1
6 ABSXDE .BLKB 1
7 .PAGE
8 .SBTTL VARIABLES-OBJECT WORLD COORDINATES, PICTURES
9
10 .ASECT
11 . 100
12 OCNTXL
13 GX .BLKB 1
14 SAUCX .BLKB NSAUCE
15 ESX .BLKB NENESH
16 DSX .BLKB NDEFSH
17 EXPLX .BLKB NEXPLO
18 BALLX .BLKB NBALLS
19 SHX .BLKB NSHRAP
20 ASX .BLKB NASTER
21 FORTX .BLKB NFORTS
22
23 OCNTYL
24 GY .BLKB 1
25 SAUCY .BLKB NSAUCE
26 ESY .BLKB NENESH
27 DSY .BLKB NDEFSH
28 EXPLY .BLKB NEXPLO
29 BALLY .BLKB NBALLS
30 SHY .BLKB NSHRAP
31 ASY .BLKB NASTER
32 FORTY .BLKB NFORTS
33
34 OCNTZL
35 GZ .BLKB 1
36 SAUCZ .BLKB NSAUCE
37 ESZ .BLKB NENESH
38 DSZ .BLKB NDEFSH
39 EXPLZ .BLKB NEXPLO
40 BALLZ .BLKB NBALLS
41 SHZ .BLKB NSHRAP
42 ASZ .BLKB NASTER
43 FORTZ .BLKB NFORTS
44
45 OBJPIC
46 GPIC .BLKB 1
47 SAUCPIC .BLKB NSAUCE
48 ESPIC .BLKB NENESH
49 DSPIC .BLKB NDEFSH
50 EXPLPI .BLKB NEXPLO
51 BALLPI .BLKB NBALLS
52 SHPIC .BLKB NSHRAP
53 ASPIC .BLKB NASTER
54 .ENDC
55
56
57 INTENS .BLKB 1 OBJECT INTENSITY D7-D5
58 SUBCOU .BLKB 1 POINT COUNTER
59 UNITXL .BLKB 1 UNIT VECTORS
60 UNITXH .BLKB 1

1	UNITZL	.BLKB 1	
2	UNITZH	.BLKB 1	
3	COLOR	.BLKB 1	
4	CURWAV	.BLKB 1	CURRENT WAVE
5	YDEUNI	.BLKB 1	Y DELTA FOR UNIT SCALE
6	TNKOUT	.BLKB 1	START LEDS, ETC. FOR DUTANK
7	TCMFLG	.BLKB 1	2 GAME MIN FLAG 80 NOT 2 YET
8	NEWAIT	.BLKB 1	
9	OFRTIM	.BLKB 1	
10	OCURSL	.BLKB 1	OLD CURSOR POSITION LINE #
11	ESHCOU	.BLKB 1	ENEMY SOT COUNT
12	CHACHA	.BLKB 1	CHARGE CHARGE DELTA
13	CHAINV	.BLKB 1	CHARGE INVADER DELTA
14	VGY	.BLKB 1	INDEX INTO VGLIST
15	OLDLLO	.BLKB 1	OLD ENEMY LINE BUFFER START ADDRESS
16	OLDLHI	.BLKB 1	
17	LITRAL	.BLKB 2	LANGUAGE TABLE
18	ZPNLOC	.BLKB 1	USED BY DIGITS
19	ZPOFFS	.BLKB 1	USED BY DIGITS
20	RUNGVG	.BLKB 2	RUNG VG PTR.
21	PUCHDE	.BLKB 1	PULSAR CHASE DELAY # FRAMES BEFORE FLIP
22	WTTFRA	.BLKB 1	# OF FLIP SECTIONS TO TAKE/FRACTION FOR TOP FLIPPERS
23	TOUTO	.BLKB 1	SCREEN FLIP STATUS FOR IO
24	QT1	.BLKB 1	SECURITY
25	SECUVG	.BLKB 2	SECURITY PTR.
26	BD-BE	EAROM	
27	BF-FF	SOUNDS	
28			
29	COMMON BUFFER REUSAGE		
30			
31		. CBUF1	
32			
33			
34			
35	BFACTR	.BLKB 1	USED IN SCAPIC - BINARY PART OF SCALE FACTOR
36	SCFL	.BLKB 2	USED IN SCAPIC - SCALE FACTOR
37	LEFSID	.BLKB 1	REQUEST RATE DISPLAY LEFT SIDE
38	RITSID	.BLKB 1	RRD-RIGHT SIDE
39		.PAGE	
40		. 100	
41	NGAMES	.BLKB 1	# GAMES FOR RANKING
42	NPLAYR	.BLKB 1	# PLAYERS
43	BONUS	.BLKB 2	BONUS CODE FOR STARTING AT ADVANCED WAVE
44	CURSVL	.BLKB 1	CURSOR ACCELERATION DOWN WELL
45	CURSVH	.BLKB 1	
46	CURMOD	.BLKB 1	CURSOR MODE - DROPPING
47	CURSYL	.BLKB 1	CURSOR POSITION FRACTIONAL
48	INMCOU	.BLKB 1	# OF INVADERS ON LINES
49	INCCOU	.BLKB 1	# OF INVADERS CHASING CURSOR
50	EXICAM	.BLKB 1	INVADER CAN EXIT FLAG
51	CAMPC	.BLKB 1	INVADER CAM PC
52	CAMSTA	.BLKB 1	CAM STATUS
53	BOOMFL	.BLKB 1	BOOM ACTIVE FLAG 0 NOT ACTIVE
54	BOOMTI	.BLKB 1	BOOM TIMER 1/5 SECONDS
55	LEVELY	.BLKB 2	
56	WELTYP	.BLKB 1	WELL TYPE 0 CLOSED,-1 OPEN
57	WELLID	.BLKB 1	WELL CODE
58	ROTFLG	.BLKB 1	MSB OF BUILT SUBR BUFFER IF 0 THEN NOT READY
59	ROTDIS	.BLKB 1	BUILD WELL REQUEST NOT 0
60	PLAGRO	.BLKB 1	STAR FIELD STATUS

1	EXPCOU	.BLKB 1	# OF EXPLOSIONS
2	COCTAL	.BLKB 1	COCKTAIL FLAG
3			
4		.SBTTL	VARIABLES - PLAY
5			SKILL LEVEL CONTOURING VARIABLES
6			
7	WCHARIN	.BLKB 1	INVADER CHARGE INC/FRAME
8	WCHARFR	.BLKB 1	INVADER CHARGE FREQUENCY FIRE
9	WCHAMX	.BLKB 1	MAX # OF INVADER CHARGES ON GIRD-1
10	QT6	.BLKB 1	
11	WINVMX	.BLKB 1	MAX # OF INVADERS-1
12	WINVJM	.BLKB 1	INVAER JUMP FREQ JUMP IF
13			RANDOM AND WINVJM 0
14	WNYMMX	.BLKB 1	# OF NYMPHS
15	QT5	.BLKB 1	
16	WCHARL	.BLKB 1	FRACTION CHARGE INC
17	ZADEST	.BLKB 2	ZADJL DEST.
18	ELICNT	.BLKB 1	ENEMY LINE COUNTER D7 1 WARNING REQUEST
19	BOFLASH	.BLKB 1	BONUS FLASH TIMER
20	SUZTIM	.BLKB 1	SUPERZAP TIMER
21	HIWAVE	.BLKB 1	HIGHEST WAVE REACHED IN LAST GAME
22	HIRATE	.BLKB 1	HIGHEST LEVEL-1/2 ALLOWED IN RATE TABLE
23	INTIME	.BLKB 1	TIME SNCE LAST GAME 13 SECOND UNITS
24	WFLMIN	.BLKB 1	MINIMUM # OF TYPE ON WELL
25	WPUMIN	.BLKB 1	
26	WTAMIN	.BLKB 1	
27	WSPMIN	.BLKB 1	
28	WFUMIN	.BLKB 1	
29	WFLMAX	.BLKB 1	MAX # OF TYPE ON WELL
30	WPUMAX	.BLKB 1	
31	WTAMAX	.BLKB 1	
32	WSPMAX	.BLKB 1	
33	WFUMAX	.BLKB 1	
34	SPARE3	.BLKB 2	
35	CHACOU	.BLKB 1	# OF CHARGES
36	WTFMAX	.BLKB 1	TANKER + FLIPPER MAX
37		.BLKB 2	SPACER
38			SPECIAL EXPLOSION PLAYER DEATH
39	SPLINE	.BLKB 1	LINEAR SCALE VALUABLE
40	SPBINA	.BLKB 1	BINARY SCALE VARIABLE
41	SPXIND	.BLKB 1	INDEX
42	SPFTIM	.BLKB 1	TIMER
43	OPFLIP	.BLKB 1	OPENINGS FOR EACH TYPE
44	OPPULS	.BLKB 1	
45	OPTANK	.BLKB 1	
46	OPSPIN	.BLKB 1	
47	OPFUSE	.BLKB 1	
48	FLIPCO	.BLKB 1	
49	PULSCO	.BLKB 1	COUNT OF EACH TYPE
50	TANKCO	.BLKB 1	
51	SPINCO	.BLKB 1	
52	FUSECO	.BLKB 1	
53	PULTIM	.BLKB 1	PULSE TIMER INCREMENT
54	PULSON	.BLKB 1	PULSE STATUS MINUS OFF
55	WTACAR	.BLKB 4	TANK CONTENTS 4 POSSIBILITIES
56	NEARY	.BLKB 1	VORTEX LOGO
57	FARY	.BLKB 1	
58	NEOFLI	.BLKB 1	NYMPHS OFF LIMIT ZONE FLAGS
59	OLOFLI	.BLKB 1	
60	ENSIZE	.BLKB 5	COLLISION RANGE FOR EACH INVADER TYPE

1	BLIFIN	.BLKB 1	BONUS LIFE INTERVAL
2	PULPOT	.BLKB 1	HEIGHT AT WHICH PULEARS BECOME POTENT
3			CHARGE IF RANDOM # WCHARFR
4	LVSGAM	.BLKB 1	LIVES/GAME
5	WFUSCH	.BLKB 1	FUSE CHASE PLAYER FLAG D7 FOR TOP D6 FOR TUBE
6	NWTELI	.BLKB 1	NEW WAVE ENEMY LINE HEIGHT
7	NWNYMC	.BLKB 1	NEW WAVE NYMPH COUNT
8	WPULCAM	.BLKB 1	PULSAR CAM FOR WAVE
9	WFLICAM	.BLKB 1	FLIPPER CAM FOR USAVE
10	TYPCOD	.BLKB 1	
11	WFUFRQ	.BLKB 1	FUSE LANE CHANGE PCNT OF 256.
12	WINVIL	.BLKB 5	INVADER SPEED FRAC FOR EACH TYPE
13	WINVIN	.BLKB 5	INVADER SPEED INT
14	WFUSIL	WINVIL+ZABFUS	
15	WFUSIH	WINVIN+ZABFUS	
16	OPTIN3	.BLKB 1	OPTION SWITCH 3 BANK OF 4
17	PSCALE	.BLKB 1	PAUSE SEALER
18	QT2	.BLKB 1	SECURITY
19	WPULFI	.BLKB 1	PULSAR FIRE FLAG
20	SECUVY	.BLKB 1	SECURITY COUNTER

1C6- 1CF EAROM

.PAGE

.SBTTL CONSTANTS-COUNTS

NPLANE 8

NINVAD 7

NLINE 16.

NNYMPH 64.

NPCHARG 8

NICHARG 4

NCHARG NPCHARG+NICHARG

NEXPLO 8

.SBTTL CONSTANTS-PLAYFIELD

ILINDDY 0F0

ILINLIY 010

.SBTTL VARIABLES-OBJECT COUNTERS

.ASECT

. 200

.PAGE

.SBTTL VARIABLES-OBJECT LOCATION + STATUS

CURSOR

CURSL1 .BLKB 1

ONE END LINE #

CURSL2 .BLKB 1

OTHER END LINE # CCW TO CURSL1

80 MEANS PLAYER IS DEAD

CURSY .BLKB 1

CURSOR DEPTH

NYMPHS

NYMPL .BLKB NNYMPH

NYPY .BLKB NNYMPH

INVADERS

```
1 INVAC1 .BLKB NINVAD INVADER STATUS BYTE 1
2 INVABI 7
3
4 ZABFLI 0 APPEARANCE 0 FLIPPER
5 ZABPUL 1 1 PULSAR
6 ZABTAN 2 2 TANKER
7 ZABTRA 3 3 TRALER
8 ZABFUS 4 4 FUSE
9 5-7 UNUSED
10 INVSEQ 18
11 INVMOT 80
12 ZMOTMO 0 MOTION 0 NOT FLIPPING/LEAPING
13 ZMOTJM INVMOT 1 FLIPPER/LEAPING
14 INVROT 40
15 ZROTCW 0 ROTATIONAL DIRECTION 0 CW
16 ZROCCW INVROT
17
18 INVAC2 .BLKB NINVAD INVADER STATUS BYTE 2
19 INVCAR 3
20 ZCARNO 0 CARRIER 0 NOTHING
21 ZCARFL 1 1 FLIPPERS
22 ZCARPU 2 2 PULSARS
23 ZCARFU 3 3 FUSES
24
25 INVFIR 40 FIREPOWER 0 NO FIRE, 1 FIRE
26 ZFIRNO 0
27 ZFIRYE INVFIR
28 INVDIR 80 DIRECTION 0 UP, 1 DOWN
29 ZDIRUP 0
30 ZDIRDO INVDIR
31 INVCAM .BLKB NINVAD
32 INVLOO .BLKB NINVAD
33 INVAYL .BLKB NINVAD Y POSITION FRACTIONAL
34 INVACT .BLKB NINVAD TIME SINCE LAST CHARGE LAUNCH
35 FOR LEAPERS INVAL1,2 CURRENT X Z POSITION OF LEAPER CENTER
36 INVACT D3-D0 DEST. LINE #
37 D4 1 MEANS GO TO CENTER FIRST
38
39 CHARGES
40
41 CHARL1 .BLKB NCHARG ONE END LINE #
42 INVAL1 .BLKB NINVAD LINE # FOR 1 LEG INVADERS
43 CHARL2 .BLKB NCHARG OTHER END LINE # CCW TO CHARL1
44 INVAL2 .BLKB NINVAD LINE # FOR CCW LEG JUMPS SEG.IF-
45 CHARY .BLKB NCHARG Y POSITION 0 INACTIVE
46 INVAY .BLKB NINVAD Y POSITION FOR LEGS INVADERS
47 CHARYL .BLKB NCHARG Y POSITION FRACTION
48 CHARCO .BLKB NPCHARG CHARGE COLLISION COUNTER
49 PCVELO 9 PLAYER SHOT VELOCITY I
50 PULVEL 0FEA0 PULSAR VELOCITY IF
51
52 EXPLOSIONS
53
54 EXPLOL .BLKB NEXPLO EXPLOSION LINE # CW LEG
55 EXPLOT .BLKB NEXPLO EXPLOSION TYPE
56 EXPLOY .BLKB NEXPLO EXPLOSION DEPTH WORLD Y
57 EXPLOS .BLKB NEXPLO EXPLOSION SEQUENCES
58
59 LINES SCREEN COORDINATES
60
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1	LINSXH	.BLKB NLINES	NEAR PT.	1
2	LINSXL	.BLKB NLINES		2
3	LINSZH	.BLKB NLINES		3
4	LINSZL	.BLKB NLINES		4
5	LIFSXH	.BLKB NLINES	FAR PT.	5
6	LIFSXL	.BLKB NLINES		6
7	LIFSZH	.BLKB NLINES		7
8	LIFSZL	.BLKB NLINES		8
9	LINSTA	.BLKB NLINES	ENEMY LINE STATUS D7 1 NEW NEAR PT. D6 1 SHATTERE	9
10				10
11			DATA SAVED FROM PLAYER TO PLAYER	11
12				12
13	ACTIP		ACTIVE PLAYER DATA	13
14	SUZCNT	.BLKB 1	SUPERZAPPER USE COUNTER	14
15	NYMCOU	.BLKB 1	# OF NYMPHS	15
16	LINEY	.BLKB NLINES	ENEMY LINE HEIGHTS	16
17	SAVEP		STANDBY PLAYER DATA	17
18		.BLKB SAVEP-ACTIP		18
19	SAVEND		DUMMY	19
20	LINEX	.BLKB NLINES		20
21	LINEZ	.BLKB NLINES		21
22	LINANG	.BLKB NLINES	INDEX ANGLE FROM GRID LINE TO NEXT CCW LINE	22
23	PLANEY	.BLKB NPLANE	STAR FIELD PLANES	23
24	BOOKKS		BOOKKEEPING	24
25	SECOUL	.BLKB 1	GAME UP TIMER	25
26	SECOUM	.BLKB 1		26
27	SECOUH	.BLKB 1		27
28	SECOPL	.BLKB 1	GAME PLAY TIMER	28
29	SECOPM	.BLKB 1		29
30	SECOPH	.BLKB 1		30
31	NGAMIL	.BLKB 1	# OF GAMES	31
32	NGAMIH	.BLKB 1		32
33	NGAMEO	.BLKB 1		33
34	NGAM2L	.BLKB 1	# OF 2 PLAYER GAMES	34
35	NGAM2H	.BLKB 1		35
36	NGAM2O	.BLKB 1		36
37	BOOKKE			37
38	NGAVGL	.BLKB 1	ORIG GAME TIME	38
39	NGAVGH	.BLKB 1		39
40	NGAVGZ	.BLKB 1		40
41	BUFACT	.BLKB 10	ACTIVE/AVAILABLE BUFFER	41
42	SPOKST	.BLKB NLINES	SPOKE STATUS PULEARS	42
43	LINEXM	.BLKB NLINES	HALF WAY BETWEEN LINES COORDINATES	43
44	LINEZM	.BLKB NLINES		44
45	QT3	.BLKB 1	SECURITY	45
46		. NYMPL	***WARNING OVERLAY***	46
47			PARTICLES	47
48				48
49	PARLIX	.BLKB NPARTI*2	FRACTIONAL POSITION	49
50	PARLIY	.BLKB NPARTI*2		50
51	PARLIZ	.BLKB NPARTI*2		51
52	PARTIX	.BLKB NPARTI*2	INTEGER POSITION 80 CENTER	52
53	PARTIY	.BLKB NPARTI*2		53
54	PARTIZ	.BLKB NPARTI*2		54
55	PARLXV	.BLKB NPARTI*2	FRACTIONAL VELOCITY	55
56	PARLYV	.BLKB NPARTI*2		56
57	PARLZV	.BLKB NPARTI*2		57
58	PARTXV	.BLKB NPARTI*2	INTEGER VELOCITY SIGNED	58
59	PARTYV	.BLKB NPARTI*2		59
60	PARTZV	.BLKB NPARTI*2		60

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1 .SBTTL VARIABLES - PAGE 1
2 .ASECT
3 . 600
4 RANKS .BLKB 2 RANK FOR ACH PLAYER 0 NO RANK
5 TBLIND .BLKB 1 INDEX INTO INITIAL OF NEW INITIAL
6 FLGNHI .BLKB 1 FLAG FOR HIS SCORE FOUND
7 ININDX .BLKB 1 NEW INITIALS LEFT-1 COUNTER
8 TIMHIS .BLKB 1 TIMER UNTIL INITIAL ENTRY IS ABORTED
9 INITAL .BLKB 3* NHISCO
10 HRANKL .BLKB 3*58. + 2*41.
11 HRANKM HRANKL+1
12 HRANKH HRANKM+1
13 HSCORL HRANKL+ 2*41. + 3*50.
14 HSCORM HSCORL+1
15 HSCORH HSCORM+1
16
17 GAMOP1 .BLKB 1 GAME PLAY OPTIONS SWITCH 1
18 GAMOP3 .BLKB 1 SWITCH 3
19 QT4 .BLKB 1 SECURITY
20 .IF NE,SPACG
21 SFORTS .BLKB NFORTS*4*2 SAVE AREA FOR EACH PLAYER S FORTSTATUS
22 .ASECT
23 . 2A0
24 BUFR8 .BLKB 8 BUFFER
25 INDEX0 .BLKB 1
26 SDOT .BLKB 8*8 DOT STATUS
27 XDOT .BLKB 8 X PLANE LOCS
28 YDOT .BLKB 8 Y PLANE LOCS
29 ZDOT .BLKB 8 Z PLANE LOCS
30 RIGHT .BLKB 1
31 LEFT .BLKB 1
32 HIGH .BLKB 1
33 LOW .BLKB 1
34 XHIVIS .BLKB 1 HIGHEST VISIBLE PX FOR GIVEN P4
35 XLOVIS .BLKB 1 LOWEST VISIBLE PX FOR GIVEN P4
36 ZHIVIS .BLKB 1 HIGHEST VISIBLE PZ FOR GIVEN P4
37 ZLOVIS .BLKB 1 LOWEST VISIBLE PZ FOR GIVEN P4
38 RITDLT PNTTBL SX,SZ VECTOR FOR MOVING RIGHT
39 LEFDLT PNTTBL+4 SX,SZ VECTOR FOR MOVING LEFT
40 UPDLT PNTTBL+8 SX,SZ VECTOR FOR MOVING UP
41 .ASECT
42 . 2A0
43 ASXINL .BLKB NASTER
44 ASXIN .BLKB NASTER
45 ASYINL .BLKB NASTER
46 ASYIN .BLKB NASTER
47 ASZINL .BLKB NASTER
48 ASZIN .BLKB NASTER
49 ASTYPE .BLKB 1
50 DSTYPE .BLKB NDEF SH DEF SPEAR TYPE
51 FF NO TARGET
52 D7 0 D6-D0 INDEX #
53 D7 1 D2-D0 ROW #
54 D5-D3 COLUMN #
55 D6 0
56 ASXL .BLKB NASTER
57 ASYL .BLKB NASTER
58 ASZL .BLKB NASTER
59 .ASECT
60 . 320
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1 FZCOLS .BLKB NECOLS
2 FXCOLS .BLKB NECOLS          FRACTIONAL POSITION
3 FYROWS .BLKB NEROWS
4 FZROWS .BLKB NEROWS
5 ROTCNT .BLKB 1
6 XRCNTR .BLKB 1          ROTATION CENTER
7 YRCNTR .BLKB 1
8 ZRCNTR .BLKB 1
9 PLAYST
10 ZDEECC .BLKB 1
11 XDEECC .BLKB 1
12 ZCOLS .BLKB NECOLS
13 ZROWS .BLKB NEROWS
14 XCOLS .BLKB NECOLS
15 YROWS .BLKB NEROWS
16 ROWL .BLKB NEROWS
17 COLINC .BLKB 1
18 ROWINC .BLKB 1
19 NUMENE .BLKB 1
20 PLAYEND
21 SAVEST .BLKB PLAYEND-PLAYST  SAVE AREA FOR PLAYER WAITING
22 .ENDC
23 .PAGE
24 .IF NE,SPACG
25 .SBTTL MACROS ARITHMETIC
26
27 .MACRO APBCDD AA,BB,CC  A+B TO C  DOUBLE PREC
28
29     LDA AA
30     CLC
31     ADC BB
32     STA CC
33     LDA AA+1
34     ADC BB+1
35     STA CC+1
36
37 .ENDM
38
39 .MACRO AMBCDD AA,BB,CC  A-B TO C  DOUBLE PREC
40
41     LDA AA
42     SEC
43     SBC BB
44     STA CC
45     LDA AA+1
46     SBC BB+1
47     STA CC+1
48
49 .ENDM
50 .MACRO APBCSD AA,BB,CC  A+B- C  S+S- D
51     LDA AA
52     CLC
53     ADC BB
54     STA CC
55     LDA I,0
56     ADC I,0
57     STA CC+1
58
59 .ENDM
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1  .MACRO APBCSS AA,BB,CC  A+B - C SINGLE PREC
2  LDA AA
3  CLC
4  ADC BB
5  STA CC
6
7  .ENDM
8
9  .MACRO AMBCSS AA,BB,CC  A-B - C SINGLE PREC
10
11  LDA AA
12  SEC
13  SBC BB
14  STA CC
15
16  .ENDM
17
18
19  A+B - A A MAX IF A+B MAX
20  CC IF AT LIMIT
21
22  .MACRO APBMAX AA,BB,MAX
23  LDA AA
24  CLC
25  ADC I,BB
26  CMP I,MAX
27  IFCS
28  LDA I,MAX
29  CLC
30  ELSE
31  SEC
32  ENDIF
33  STA AA
34  .ENDM
35
36  A-B - A A MIN IF A-B MIN
37  CC IF AT LIMIT
38
39  .MACRO AMBMIN AA,BB,MIN
40  LDA AA
41  SEC
42  SBC I,BB
43  CMP I,MIN
44  IFCC
45  LDA I,MIN
46  ENDIF
47  STA AA
48  .ENDM
49  .ENDC
50  .PAGE
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