

TITLE DREAM INVADERS (C) 1980; M.J. Bauer

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* SCRATCHPAD RAM ASSIGNMENTS (PAGE ZERO):

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* ARRAY OF ALIEN X-COORDS: 5 ROWS BY 8 COLS:

00C0 ALNARR EQU \$C0 ALIEN ARRAY (40 BYTES)

*

* ARRAY OF ALIEN MISSILE COORDINATES: 4 X-Y PAIRS:

00B8 MISARR EQU \$B8 ALIENS' MISSILE ARRAY

*

* POINTERS:

0090 ORG \$0090

0090 MVAPTR RMB 2 POINTS TO NEXT ALIEN TO MOVE

0092 ALAPTR RMB 2 GENERAL-PURPOSE PTR TO ALNARR

0094 MISPTR RMB 2 POINTS TO MISARR

0096 ROW RMB 1 TEMP ROW COUNT

0097 COL RMB 1 TEMP COL COUNT

*

* FLAGS: (NON-ZERO IS 'TRUE' CONDITION)

0098 NOALFG RMB 1 NO ALIENS LEFT

0099 LFLAG RMB 1 ALIEN MISSILE HAS BEEN LAUNCHED

009A DROPFG RMB 1 ALIEN DROPPED TO LOWER ROW

009B NGFLG RMB 1 NO GUN TURRETS LEFT

009C ALNDFG RMB 1 ALIEN LANDED

009D KMOVE RMB 1 ALIEN MOVE COMPLETED

*

* VARIABLES:

00A0 ORG \$00A0

00A0 ALIENX RMB 1 GENERAL ALIEN COORDS

00A1 ALIENY RMB 1

00A2 AMISX RMB 1 GENERAL MISSILE COORDS

00A3 AMISY RMB 1

00A4 GMISX RMB 1 GUN MISSILE COORDS

00A5 GMISY RMB 1

00A6 GUNPOS RMB 1 GUN-TURRET POSITION (X)

00A7 SCORE RMB 1 NO. OF ALIENS EXTERMINATED

00A8 KSTEP RMB 1 ALIEN STEPS BEFORE DIR'N CHANGES

00A9 NMOVE RMB 1 MAX. KMOVE PER CYCLE

00AA ALSTEP RMB 1 ALIEN STEP (+1 RIGHT; -1 LEFT)

00AB KALIEN RMB 1 ALIENS ON SCREEN COUNTER

00AC KGUNS RMB 1 GUN-TURRETS LEFT COUNT

00AD QUOT RMB 1 DIV QUOTIENT (TEMP)

00AE KMISS RMB 1 ALIEN'S ACTIVE-MISSILE COUNT

00AF NMISS RMB 1 MAX. SIMULTANEOUS ALIEN MISSILES

00B0 MDELAY RMB 1 MAIN CYCLE DELAY (GAME SPEED)

00B1 CLOCK1 RMB 1 CONTROL-CYCLE TIMERS

00B2 CLOCK2 RMB 1

00B3 KSHOT RMB 1 SHOT COUNTER (used for DROP)

00B4 NDROP RMB 1 * SHOTS BEFORE ALIEN CAN DROP

00B5 ROUND RMB 1 ROUND (24 aliens per Round)

00B6 DECIM RMB 4 DECIMAL EQUIV. WORKSPACE

*

* EXTERNAL (CHIPOS) REFERENCES:

C226	SHOWX	EQU	\$C226	Show symbol @ X, @(VX,VY), B byt
C079	ERASE	EQU	\$C079	Clear screen
C132	RANDOM	EQU	\$C132	Get random byte (A)
C2E5	BTON	EQU	\$C2E5	Beeper (variable)
C287	PAINZ	EQU	\$C287	Initialize Keypad Port
C07D	FILL	EQU	\$C07D	Fill screen memory with constant
C2E1	BTONE	EQU	\$C2E1	Bleep for (B)*20 mSec.
C2C4	GETKEY	EQU	\$C2C4	Wait for input from Keypad
C3D2	DIGOUT	EQU	\$C3D2	Display digit @ X
C1E0	DECEQ	EQU	\$C1E0	Store 3-digit decimal equiv @ X
C3E0	CURS1	EQU	\$C3E0	Set display 'cursor' pos'n (A)
*				
002E	VX	EQU	\$2E	
002F	VY	EQU	\$2F	
003F	VF	EQU	\$3F	
003F	HITFLG	EQU	\$3F	'Objects collided' flag = VF
0020	TIME	EQU	\$20	
0021	TIME	EQU	\$21	
*				
0100	DISBUF	EQU	\$0100	
0200	ENDBUF	EQU	\$0200	
*				
*				
*				
8010	PIAA	EQU	\$8010	I/O PORT (KEYPAD)
8012	PIAB	EQU	\$8012	Spkr, RTC, etc.
*				
*				

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* form or used in other software product for purpose
* of distribution or commercial gain, except with
* permission from the author.
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* MAINLINE (INITIALIZATION AND CONTROL CYCLE):
*
0200                                ORG      $0200
*
0200 BD C287    MAIN0    JSR      PAINZ    Reset keypad port.
0203 86 00      LDA A    #0            CLEAR VARIABLES
0205 CE 0090      LDX      #$90
0208 A7 00      MAIN1    STA A    X
020A 08          INX
020B 8C 00C0      CPX      #$00C0
020E 26 FB      BNE      MAIN1
*
* INITIALIZE FOR NEW GAME:
0210 BD 05FA    MAIN2    JSR      ADJ2    Set initial game parameters
0213 86 04      LDA A    #4            Start with 4 guns
0215 97 AC      STA A    KGUNS
*
* INZ. FOR NEW ROUND:
0217 7C 00B5    MAIN3    INC      ROUND    Begin next round
021A 86 18      LDA A    #24          Alien count = 24
021C 97 AB      STA A    KALIEN
021E 7F 0098      CLR      NOALFG
0221 7F 00A8      CLR      KSTEP
0224 BD 02B3      JSR      INZALA    SETUP ALIEN ARRAY
0227 BD C079      JSR      ERASE
022A BD 02CC      JSR      SHOWAA    SHOW ALIEN ARRAY
022D 86 01      LDA A    #1
022F 97 AA      STA A    ALSTEP    Start with aliens stepping right
0231 86 1C      LDA A    #$1C        Start with gun centred
0233 97 A6      STA A    GUNPOS
0235 8D 6C      BSR      INZMIS    Clear the missile array
*
0237 7F 00B2    MAIN4    CLR      CLOCK2
023A 7F 00B1      CLR      CLOCK1
*
* START WITH JUST ALIENS MOVING (Insideous, isn't it?)
023D BD 02F5    MAIN5    JSR      MOVALN
0240 96 A8      LDA A    KSTEP    Move all aliens thru 8 steps
0242 81 08      CMP A    #8
0244 27 04      BEQ      MAIN6
0246 8D 45      BSR      DELAY
0248 20 F3      BRA      MAIN5
*
024A BD 0657    MAIN6    JSR      DSPGUN    Show gun turret

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* A-C-T-I-O-N !!!
*
024D 96 B1  CONTRL  LDA A    CLOCK1
024F 84 01      AND A    #$01
0251 26 07      BNE      CTRL1
0253 BD 03CA    JSR      MOVGM  Move/fire gun-missile
0256 96 98      LDA A    NOALFG Aliens depleted?
0258 26 BD      BNE      MAIN3  If so, new round.
*
025A 96 B2  CTRL1  LDA A    CLOCK2
025C 26 0A      BNE      CTRL2
025E BD 02F5    JSR      MOVVALN Move next alien in turn
0261 96 9C      LDA A    ALNDFG Alien landed?
0263 26 35      BNE      ENDGAM If so, end game
0265 BD 039C    JSR      MOVGUN Move gun
*
0268 96 B1  CTRL2  LDA A    CLOCK1
026A 84 03      AND A    #$03
026C 26 07      BNE      CTRL3
026E BD 048D    JSR      MVAMIS Move (/launch) alien-missiles
0271 96 9B      LDA A    NGFLG  Guns depleted?
0273 26 25      BNE      ENDGAM
*
0275 BD 16  CTRL3  BSR      DELAY
0277 96 B1      LDA A    CLOCK1 Adjust clocks
0279 4C          INC A
027A 81 0C      CMP A    #12
027C 26 01      BNE      *+3
027E 4F          CLR A
027F 97 B1      STA A    CLOCK1
0281 96 B2      LDA A    CLOCK2
0283 4C          INC A
0284 81 03      CMP A    #3
0286 26 01      BNE      *+3
0288 4F          CLR A
0289 97 B2      STA A    CLOCK2
028B 20 C0      BRA      CONTRL
*
*
* VARIABLE DELAY TO SET GAME SPEED: (MDELAY*100 µSec.):
028D D6 B0  DELAY  LDA B    MDELAY
028F 86 09  DEL1   LDA A    #9
0291 01      NOP
0292 01      DEL2   NOP
0293 4A      DEC A
0294 26 FC    BNE      DEL2
0296 5A      DEC B
0297 26 F6    BNE      DEL1
0299 39      RTS
*
029A BD 0582  ENDGAM JSR      STATUS Show round, score, guns
029D BD C2C4    JSR      GETKEY Wait for key to restart game
02A0 7E 0200    JMP      MAINGO
*

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* INITIALIZE MISSILE ARRAY:

02A3	CE	0088	INZMIS	LDX	*MISARR	
02A6	86	FF		LDA	A	*\$FF
02A8	97	A5		STA	A	GMISY
02AA	A7	00	INZM1	STA	A	X
02AC	08			INX		
02AD	8C	0090		CPX		*MISARR+8
02B0	26	F8		BNE		INZM1
02B2	39			RTS		

*

* INITIALIZE ALIEN ARRAY FOR NEW ROUND:

02B3	CE	00C0	INZALA	LDX	*ALNARR	point to alien array
02B6	DF	90		STX	MVAFTR	Reset 'Move Alien' pointer
02B8	4F			CLR	A	
02B9	C6	28		LDA	B	*40 Do 40 times.....
02BB	C1	10	INZA1	CMP	B	*16 Done first 24 (ie 3 rows)?
02BD	2E	02		BGT		*+4
02BF	86	FF		LDA	A	*\$FF Last 2 rows = \$FF
02C1	A7	00		STA	A	X
02C3	8B	08		ADD	A	*8 Next col.
02C5	B4	3F		AND	A	*\$3F For 64 dot wide screen.
02C7	08			INX)
02C8	5A			DEC	B) Next element
02C9	26	F0		BNE		INZA1)
02CB	39			RTS		

*

* SHOW ALIENS STORED IN ARRAY:

C	CE	00C0	SHOWAA	LDX	*ALNARR	
LF	7F	00A1		CLR	ALIENY	First row; alien-y = 0
02D2	C6	05		LDA	B	*5 For 5 rows.....
02D4	37		SHAA1	PSH	B	
02D5	C6	08		LDA	B	*8 For 8 cols.....
02D7	37		SHAA2	PSH	B	
02D8	DF	92		STX	ALAPTR	
02DA	A6	00		LDA	A	X Get x-coord
02DC	2B	05		BMI	SHAA3	Null, forget it
	97	A0		STA	A	ALIENX
02E0	BD	0667		JSR	DSPAL	Show alien
02E3	DE	92	SHAA3	LDX	ALAPTR)
02E5	08			INX)
02E6	33			PUL	B) Next col.
02E7	5A			DEC	B)
02E8	26	ED		BNE		SHAA2
02EA	96	A1		LDA	A	ALIENY)
	8B	05		ADD	A	*5)
	97	A1		STA	A	ALIENY) Next row.
02F0	33			PUL	B)
02F1	5A			DEC	B)
02F2	26	E0		BNE		SHAA1)
02F4	39			RTS		

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* MOVE NEXT ALIEN IN SEQUENCE:
02F5 7F 009D    MOVALN CLR      KMOVE
02F8 DE 90      MVA2   LDX      MVAPTR
02FA A6 00              LDA A   X      Fetch alien-x
02FC 97 A0              STA A   ALIENX
02FE 2B 23              BMI     MVA7   Skip if null.
0300 96 B3              LDA A   KSHOT  Check if OK to drop down
0302 91 B4              CMP A   NDROP
0304 2D 06              BLT     MVA4   NO
0306 8D 4D              BSR     DROP  Attempt to drop down 1 row
0308 96 9A              LDA A   DROPEG Success?
030A 26 14              BNE     MVA6   YES
030C 8D 29      MVA4   BSR     CALCY  Compute alien y-coord
030E BD 0667        JSR     DSPAL  Erase alien at old coords
0311 DE 90              LDX      MVAPTR Point to alien array
0313 A6 00              LDA A   X
0315 9B AA              ADD A   ALSTEP Step x-coord
0317 84 3F              AND A   *$3F
0319 A7 00              STA A   X
031B 97 A0              STA A   ALIENX
031D BD 0667        JSR     DSPAL  Show alien at new coords
0320 7C 009D      MVA6   INC      KMOVE  Bump counter
0323 DE 90      MVA7   LDX      MVAPTR Bump pointer
0325 08              INX
0326 8C 00EB        CPX      *ALNARR+40 Done?
0329 26 05              BNE     MVA8
032B 8D 18              BSR     DIRECT Set direction of alien movement
032D CE 00C0        LDX      *ALNARR Reset pointer
0330 DF 90      MVA8   STX      MVAPTR
0332 96 9D              LDA A   KMOVE  Move completed ?
0334 27 C2              BEQ     MVA2
0336 39              RTS

*
* CALCULATE ROW (B) AND Y-COORD (A) FROM POINTER:
0337 96 91      CALCY  LDA A   MVAPTR+1
0339 44              LSR A
033A 44              LSR A
033B 44              LSR A      A = row count
033C 84 07        AND A   *$7
033E 16              TAB      B = ROW
033F 48              ASL A
0340 48              ASL A
0341 1B              ABA      Y = ROW*5 (=A)
0342 97 A1        STA A   ALIENY
0344 39              RTS

*
* SET DIRECTION OF ALIEN MOVEMENT:
0345 96 AB      DIRECT LDA A   KSTEP  Incr. step counter
0347 4C              INC A
0348 97 AB        STA A   KSTEP
034A 81 60        CMP A   *96      Reverse if all aliens done 96
034C 26 06        BNE     DIR1
034E 7F 00AB      CLR      KSTEP
0351 70 00AA      NEG      ALSTEP
0354 39      DIR1   RTS

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*
* ATTEMPT TO DROP ALIEN DOWN TO LOWER ROW:
0355 7F 009A DROP CLR DROPFG Clear 'alien dropped' flag
0358 8D DD BSR CALCY Compute ROW (= B)
035A C1 04 CMP B #4 This alien on row 4 ?
035C 27 2D BEQ DROP6 Yes; alien just landed! (End)
035E 96 91 LDA A MVAPTR+1 NO, check for clear below
0360 8B 08 ADD A #8
0362 97 93 STA A ALAPTR+1
0364 DE 92 LDX ALAPTR Look at next row down
0366 A6 00 LDA A X
0368 B1 FF CMP A #$FF Is there a vacant slot ?
036A 26 1E BNE DROP4 No; forget it.
036C DE 90 DROP2 LDX MVAPTR Make null entry in old row
036E 86 FF LDA A #$FF
0370 A7 00 STA A X
0372 BD 0667 JSR DSPAL Remove alien from old row
0375 DE 92 LDX ALAPTR Store x-coord in new row.
0377 96 A0 LDA A ALIENX
0379 A7 00 STA A X
037B 96 A1 DROP3 LDA A ALIENY calc. y-coord in new row
037D 8B 05 ADD A #5
037F 97 A1 STA A ALIENY
0381 BD 0667 JSR DSPAL Show alien in new row
0384 7F 00B3 CLR KSHOT Reset shot counter
0387 7C 009A INC DROPFG Set 'alien dropped' flag
0389 A 39 DRDP4 RTS

*
* ALIEN LANDED; FLAG END OF GAME:
038B 7C 009C DROP6 INC ALNDFG Set 'alien landed' flag
038E BD 0667 JSR DSPAL Remove old alien
0391 BD EB BSR DROP3 Show it in new row
0393 BD 069A JSR DSBL0T Blot it
0396 C6 64 LDA B #100 Bleep 2 sec
0398 BD C2E1 JSR BTONE
0399 39 RTS

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* MOVE GUN (If left or right key closed):
039C 86 01      MOVGUN LDA A    **$01    Check for LEFT key closed.
039E B5 8010    BIT A    PIAA
03A1 26 10      BNE      MVG2
03A3 BD 0657    JSR      DSPGUN    Erase gun at old x.
03A6 96 A6      LDA A    GUNPOS
03A8 81 02      CMP A    **$02    (Don't want GUNPOS = 0 or 1)
03AA 27 03      BEQ      MVG1      Skip if hard left
03AC 4A         DEC A          Move left
03AD 97 A6      STA A    GUNPOS
03AF BD 0657    MVG1  JSR      DSPGUN    Show gun at new x.
03B2 39         RTS

*
03B3 86 02      MVG2  LDA A    **$02
03B5 B5 8010    BIT A    PIAA      Check for RIGHT key closed.
03B8 26 0F      BNE      MVG4
03BA BD 0657    JSR      DSPGUN
03BD 96 A6      LDA A    GUNPOS
03BF 81 3B      CMP A    **$3B    Skip if gun is hard right
03C1 2C 03      BGE      MVG3      Move right
03C3 4C         INC A
03C4 97 A6      STA A    GUNPOS
03C6 BD 0657    MVG3  JSR      DSPGUN
03C9 39         MVG4  RTS

*
*MOVE GUN MISSILE; TEST FOR HIT:
03CA 96 A5      MOVGM  LDA A    GMISY    See if missile active
03CC 2B 10      BMI      MGM2
03CE 27 16      BEQ      DISAGM    Disable if top of screen.
03D0 BD 063C    JSR      DSPGM      Move up 1 unit.
03D3 7A 00A5    DEC      GMISY
03D6 BD 063C    JSR      DSPGM
03D9 96 3F      LDA A    HITFLG    Hit anything?
03DB 26 22      BNE      MGM4      Yes.
03DD 39         RTS
03DE 86 08      MGM2  LDA A    **$08    FIRE button pressed?
03E0 B5 8010    BIT A    PIAA
03E3 27 09      BEQ      FIREGM
03E5 39         RTS

*
* DISABLE GUN MISSILE:
03E6 BD 063C    DISAGM JSR      DSPGM    Erase missile
03E9 86 FF      DGM1  LDA A    **$FF
03EB 97 A5      STA A    GMISY    Store null code.
03ED 39         RTS

*
* FIRE GUN MISSILE:
03EE 96 A6      FIREGM LBA A    GUNPOS
03F0 8B 02      ADD A    *2          = centre of gun
03F2 97 A4      STA A    GMISX
03F4 86 1B      LDA A    **$1B
03F6 97 A5      STA A    GMISY
03F8 BD 063C    JSR      DSPGM    Show missile
03FB 7C 00B3    INC      KSHOT      Bump shot counter
03FE 39         RTS

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* DETERMINE WHAT GUN MISSILE INTERCEPTED:
03FF CE 0088   MGM4   LDX      *MISARR   Was it an alien missile?
0402 A6 00     MGM5   LDA A    X
0404 91 A4           CMP A    GMISX   Compare missile coords.
0406 26 06           BNE      MGM6
0408 A6 01           LDA A    1,X
040A 91 A5           CMP A    GMISY
040C 27 0A           BEQ      MGM8     Yes, hit missile.
040E 08           MGM6   INX      No, try next missile.
040F 08           INX
0410 8C 0090      CPX      *MISARR+8
0413 26 ED           BNE      MGM5
0415 8D 0D           BSR      HITALN   Must have hit alien
0417 39           RTS

*
* GUN MISSILE HITS ALIEN MISSILE:
0418 B6 FF   MGM8   LDA A    *$FF   Kill alien missile
041A A7 00           STA A    0,X
041C A7 01           STA A    1,X
041E BD 06B1        JSR      DISMIS   Display missile collision
0421 8D C6           BSR      DGM1    Disable gun missile
0423 39           RTS

*
* SEARCH ALIEN ARRAY FOR X-COORD OF HIT ALIEN:
0424 96 A5   HITALN LDA A    GMISY   Get gun missile y-coord.
0426 C6 05           LDA B    *5
0428 BD 062B        JSR      DIV      A=A/5 = row #
042A 16           TAB      Alien-y-coord = row x 5
042C 48           ASL A
042D 48           ASL A
042E 1B           ABA
042F 97 A1        STA A    ALIENY
0431 17           TBA      Compute array pointer
0432 48           ASL A
0433 48           ASL A
0434 48           ASL A
0435 BA C0        ORA A    *$C0
0437 97 93        STA A    ALAPTR+1   Search this row....
0439 C6 08           LDA B    *8      For 8 columns.....
043B DE 92   HIT2   LDY      ALAPTR
043D A6 00           LDA A    X       Get alien-x
043F 2B 0B           BMI      HIT3    Skip if null
0441 96 A4           LDA A    GMISX   Get gun missile x-coord.
0443 A0 00           SUB A    X       Subtract alien missile x.
0445 2A 01           BPL      *+3     Convert to absolute value
0447 40           NEG A
0448 B1 04           CMP A    *4      Diff (= 4 ?
044A 2F 07           BLE      HIT4    Yes, found the sucker!
044C 7C 0093        INC      ALAPTR+1 No, try next col.
044F 5A           DEC B
0450 26 E9           BNE      HIT2
0452 39           RTS      Search failed; forget it.

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* EXTERMINATE HIT ALIEN:
0453 A6 00      HIT4   LDA A   X           Get its x-coord.
0455 97 A0      STA A   ALIENX
0457 86 FF      LDA A   *$FF
0459 A7 00      STA A   X           Deposit null code in array.
045B BD 03E6    JSR     DISAGM        Disable sun missile.
045E C6 01      LDA B   *1
0460 BD 05E4    JSR     PAUSE         Wait for RTC tick
0463 BD 069A    JSR     DSBL0T        Blot alien
0466 C6 03      LDA B   *3
0468 BD C2E1    JSR     BTONE         Bleep for 60 mSec
046B BD 069A    JSR     DSBL0T        Remove blot
046E BD 0667    JSR     DSPAL         Remove alien

*
* ADJUST SCORE, DIFFICULTY LEVEL, ETC:
0471 BD 05F1    HIT5   JSR     ADJUST
0474 7A 00AB    DEC     KALIEN
0477 27 01      BEQ     HIT6
0479 39         RTS

*
* ALL ALIENS DEPLETED:      END OF ROUND:
047A 7C 0098    HIT6   INC     NDALFG   Set 'aliens depleted' flag
047D 96 B5      LDA A   ROUND        Add bonus 2 guns at....
047F 81 0A      CMP A   *10         ....end of round 10
0481 26 06      BNE     *+8
0483 7C 00AC    INC     KGUNS
0486 7C 00AC    INC     KGUNS
0489 BD 0582    JSR     STATUS        Show round, score, guns.
048C 39         RTS

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* ALIEN MISSILE MANAGEMENT:  MOVE ALIEN MISSILES:
048D 7F 0099  MVAMIS CLR      LFLAG  Reset 'launch' flag.
0490 CE 0088      LDX      *MISARR
0493 D6 AF      LDA B    NMIS    For (N) missiles.....
0495 D7 AE      MVM1 STA B    KMISS
0497 DF 94      STX      MISPTR
0499 A6 00      LDA A    X        Get missile(I) x-coord.
049B 97 A2      STA A    AMISX
049D 2B 2C      BMI      MVM4      Null; try a launch.
049F A6 01      LDA A    1,X      Get missile(I) y-coord.
04A1 97 A3      STA A    AMISY
04A3 B1 1F      CMP A    *$1F     Is it at bottom of screen?
04A5 27 30      BEQ      MVM8
04A7 BD 064F    MVM2 JSR      DSPALM  Erase from old pos'n.
04AA DE 94      LDX      MISPTR
04AC 7C 00A3    INC      AMISY     Show in new pos'n.
04AF 96 A3      LDA A    AMISY
04B1 A7 01      STA A    1,X
04B3 BD 064F    JSR      DSPALM
04B6 96 3F      LDA A    HITFLG   Hit anything?
04B8 27 07      BEQ      MVM3     if not.
04BA BD 04E7    JSR      DSTROY   if so; destroy it.
04BD 96 9B      LDA A    NGFLG    Guns depleted?
04BF 26 09      BNE      MVMR     If so, return
04C1 DE 94      MVM3 LDX      MISPTR )
04C3 08         INX          )
04C4 08         INX          ) next missile
04C5 D6 AE      LDA B    KMISS    )
04C7 5A         DEC B        )
04C8 26 CB      BNE      MVM1     )
04CA 39         MVMR RTS
*
* TEST FOR 'CLEAR-TO-LAUNCH' CONDITION:
04CB 96 99      MVM4 LDA A    LFLAG  Already launched 1 this cycle?
04CD 26 F2      BNE      MVM3     Yes; next I.
04CE 96 B1      LDA A    CLOCK1  Launch every 12th control cycle
04CF 26 EE      BNE      MVM3
04D1 8D 5B      BSR      LAUNCH
04D5 20 EA      BRA      MVM3     Next missile.
*
* DE-ACTIVATE ALIEN MISSILE:
04D7 8D 02      MVM8 BSR      KILALM
04D9 20 E6      BRA      MVM3
*
04DB D 064F    KILALM JSR      DSPALM  Erase it
04DE IE 94      KIL1  LDX      MISPTR
04E0 86 FF      LDA A    *$FF
04E2 A7 00      STA A    0,X      Store null code.
04E4 A7 01      STA A    1,X
04E6 39         RTS

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* DESTROY OBJECT HIT BY ALIEN MISSILE:
04E7 96 A4  DSTROY LDA A  GMISX  Check for missile/missile hit.
04E9 91 A2      CMP A  AMISX
04EB 26 0F      BNE     DST1
04ED 96 A5      LDA A  GMISY
04EF 91 A3      CMP A  AMISY
04F1 26 09      BNE     DST1  No; try sun
04F3 8D E9      BSR     KIL1   Yes; kill missiles.
04F5 BD 0681     JSR     DISMIS Show missiles exploding.
04F8 BD 03E9     JSR     DGM1   Disable sun missile.
04FB 39      RTS

*
04FC 96 A3  DST1  LDA A  AMISY  Check for sun-turret hit
04FE 81 1C      CMP A  **$1C
0500 2C 01      BGE     KILGUN
0502 39      RTS

*
* DESTROY GUN-TURRET:
0503 8D D6  KILGUN BSR     KILALM First remove alien missile
0505 BD 06AC      JSR     DSPCLD Show 'cloud' on dead sun-tu. et
0508 BD 06CB      JSR     INVERT FLASH, ETC
050B C6 64      LDA B  **$100
050D D7 21      STA B  TONE
050F C6 40      LDA B  **$40
0511 BD C2E5     JSR     BTON   Make sound
0514 7A 00AC     DEC     KGUNS  Decrement sun count
0517 2E 04      BGT     KILG1
0519 7C 009B     INC     NGFLG  If no suns, set flas.
051C 39      RTS

*
051D BD 0582  KILG1 JSR     STATUS Show score, pause.
0520 BD C079      JSR     ERASE  Clear screen
0523 BD 02A3      JSR     INZMIS Remove missiles.
0526 BD 02CC      JSR     SHOWAA Replace aliens
0529 BD 0657      JSR     DSPGUN Replace sun
052C 39      RTS

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052D BD C132      * LAUNCH ALIEN MISSILE; CHOOSE AT RANDOM;
LAUNCH JSR      RANDOM Select random col.
0530 C6 08        LDA B      #8      For 8 columns.....
0532 37          AML1 PSH B
0533 84 07        AND A      #7
0535 97 97        STA A      COL
0537 86 20        LDA A      ##20
0539 C6 05        LDA B      #5      For 5 rows (max).....
053B 37          AML2 PSH B
053C 97 96        STA A      ROW      Compute pointer from ROW,COL.
053E 9A 97        DRA A      COL
0540 8A C0        DRA A      ##C0
0542 97 93        STA A      ALAPTR+1
0544 DE 92        LDX        ALAPTR
0546 A6 00        LDA A      X      Fetch alien x (or null)
0548 2A 18        BPL        AML3     If not $ff, we have alien to fir
054A 96 96        LDA A      ROW      )
054C 80 08        SUB A      #8      )
054E 33          PUL B      ) next ROW up...
054F 5A          DEC B      )
0550 26 E9        BNE        AML2
0552 96 97        LDA A      COL
0554 D6 B3        LDA B      KSHOT Try next col left or right....
0556 C4 01        AND B      #$01 ...depending on KSHOT' ...
0558 27 02        BEQ        #+4     ... (figure that one out !!)
055A 4A          DEC A
055B 4A          DEC A
055C 4C          INC A      )
055D 33          PUL B      ) next column
055E 5A          DEC B      )
055F 26 D1        BNE        AML1     )
0561 39          RTS      Search failed; forget it.

*
0562 33          AML3 PUL B      Re-adjust stack
0563 33          PUL B
0564 BB 02        ADD A      #2      Missile-x is centre of alien
0565 97 A2        STA A      AMISX
0566 DE 94        LDX        MISPTR
056A A7 00        STA A      X      Store new missile in array
056C 96 96        LDA A      ROW
056E 44          LSR A
056F 44          LSR A
0570 44          LSR A
0571 16          TAB        Mult. A by 5 giving y-coord.
0572 48          ASL A
0573 48          ASL A
0574 1B          ABA *
0575 BB 03        ADD A      #3      ..... + 3.
0577 97 A3        STA A      AMISY
0579 A7 01        STA A      1,X
057B BD 064F      JSR        DSPALM Show alien missile here.
057D 7C 0099      INC        LFLAG Set 'launch' flag
057E 39          RTS

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* SHOW STATUS --- ROUND, SCORE, GUNS:
0582 4F          STATUS CLR A          Make display 'window'
0583 CE 01C0      LDX      *DISBUF+192
0586 BD C07D      JSR      FILL
0589 43          COM A
058A CE 01C8      LDX      *DISBUF+200
058D BD C07D      JSR      FILL
0590 86 10        LDA A    **10      Put gaps in window (3 fields)
0592 BD 06BD      JSR      DSPCAP
0595 86 2C        LDA A    **2C
0597 BD 06BD      JSR      DSPCAP

*
059A 86 04        LDA A    *4
059C BD C3E0      JSR      CURS1      Set 'invisible cursor' posn
059F 96 B5        LDA A    ROUND     Convert ROUND to decimal
05A1 CE 00B6      LDX      *DECIM     Point to workspace
05A4 BD C1E0      JSR      DECEQ
05A7 CE 00B7      LDX      *DECIM+1
05AA 8D 40        BSR      DISDIG     Show 'tens'
05AC 08          INX
05AD 8D 3D        BSR      DISDIG     Show 'units'
05AF 86 18        LDA A    **18      Convert & show SCORE x 10
05B1 BD C3E0      JSR      CURS1
05B4 96 A7        LDA A    SCORE
05B6 CE 00B6      LDX      *DECIM
05B9 BD C1E0      JSR      DECEQ
05BC 4F          CLR A
05BD A7 00        STA A    X
05BF CE 00B6      LDX      *DECIM
05C2 C6 04        LDA B    *4
05C4 37          STAT2 PSH B
05C5 8D 25        BSR      DISDIG
05C7 08          INX
05C8 33          PUL B
05C9 5A          DEC B
05CA 26 F8        BNE      STAT2
05CC 86 33        LDA A    **33      Show guns remaining
05CE BD C3E0      JSR      CURS1
05D1 CE 00AC      LDX      *KGUNS
05D4 8D 16        BSR      DISDIG
05D6 86 39        LDA A    **39      Show gun symbol
05D8 97 2E        STA A    VX
05DA CE 06DB      LDX      *GUN
05DD C6 04        LDA B    *4
05DF BD C226      JSR      SHOWX
05E2 C6 C8        LDA B    *200      Pause for 4 seconds...

*
* PAUSE: Wait for the Nth RTC interrupt (N = B-reg):
05E4 D7 20        PAUSE STA B    TIME
05E6 7D 0020      PSE1  TST      TIME
05E9 26 FB        BNE      PSE1
05EB 39          RTS

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* DISPLAY BCD DIGIT (LSD) OF BYTE @ X:
05EC A6 00 DISDIG LDA A X
05EE 7E C3D2 JMP DIGOUT Use monitor display routine
*
* ADJUST DIFFICULTY LEVEL OF PLAY:
05F1 96 A7 ADJUST LDA A SCORE Bump score
05F3 81 FA CMP A #250 Stop at 250 !
05F5 27 03 BEQ ADJ2
05F7 7C 00A7 INC SCORE
*
* COMPUTE MDELAY = MDMAX - SCORE/(255/(MDMAX-MDMIN)):
*
05FA C6 28 ADJ2 LDA B ##28 [ Maximum-Minimum delay ]
05FC 86 FF LDA A #255
05FE BD 062B JSR DIV
0601 16 TAB
0602 96 A7 LDA A SCORE
0604 BD 062B JSR DIV
0607 16 TAB
0608 86 40 LDA A ##40 [ Maximum delay ]
060A 10 SBA
060B 97 B0 STA A MDELAY
*
* COMPUTE DROP RATE; NDROP = (250 - SCORE)/64 + 1:
060D 86 FA LDA A #250
060F 90 A7 SUB A SCORE
0611 C6 40 LDA B #64
0613 BD 062B JSR DIV
0616 8B 01 ADD A #1
0618 97 B4 STA A NDROP
*
* COMPUTE NMISS = 2, 3 OR 4; depending on which round:
061A 86 04 LDA A #4
061C D6 B5 LDA B ROUND
061E C1 06 CMP B #6
0620 2C 06 BGE ADJ3
0622 4A DEC A
0623 C1 03 CMP B #3
0625 2C 01 BGE ADJ3
0627 4A DEC A
0628 97 AF ADJ3 STA A NMISS
062A 39 RTS

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* DIVIDE A BY B; 8-BITS UNSIGNED; (SLOW):
0628 7F 00AD  DIV      CLR      QUOT
062E 5D          TST B
062F 27 08          BEQ      DIV2      Dividing by 0 !!!?
0631 10          DIV1     SBA          Compare A with B, (A-B)
0632 25 05          BCS     DIV2      Branch if A was LOWER (unsigned)
0634 7C 00AD          INC      QUOT
0637 20 FB          BRA      DIV1
0639 96 AD          DIV2     LDA A     QUOT
063B 39          RTS

*
*
* DISPLAY/ERASE GUN MISSILE:
063C 96 A4  DSPGM   LDA A     GMISX
063E 97 2E          STA A     VX
0640 96 A5          LDA A     GMISY
0642 97 2F  DSPM1   STA A     VY
0644 C6 01          LDA B     #1
0646 CE 06D7        LDX      *MISILE
0649 7F 003F        CLR      HITFLG  Reset 'overlap' flag.
064C 7E C226        JMP      SHOWX   Jump to CHIPDS show routine

*
* DISPLAY/ERASE ALIEN MISSILE:
064F 96 A2  DSPALM  LDA A     AMISX
0651 97 2E          STA A     VX
0653 96 A3          LDA A     AMISY
0655 20 EB          BRA      DSPM1

*
* DISPLAY/ERASE GUN-TURRET:
0657 96 A6  DSPGUN  LDA A     GUNPOS
0659 97 2E          STA A     VX
065B 86 1C          LDA A     **1C
065D 97 2F          STA A     VY
065F C6 04          LDA B     #4
0661 CE 06D8        LDX      *GUN
0664 7E C226        JMP      SHOWX

*
* DISPLAY/ERASE ALIEN:
0667 C6 04  DSPAL   LDA B     #4
0669 96 A1          LDA A     ALIENY
066B 97 2F          STA A     VY
066D 96 A0          LDA A     ALIENX
066F 97 2E          STA A     VX
0671 84 01          AND A     #1      Test for odd or even x count
0673 27 06          BEQ      DSPAL1
0675 CE 06E0        LDX      *ALIEN2
0678 7E C226        JMP      SHOWX   Show alien type 1 (odd x)
067B CE 06DC        DSPAL1  LDX      *ALIEN1
067E 7F C226        JMP      SHOWX   Show alien type 2 (even x)

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* DISPLAY MISSILE/MISSILE COLLISION:

0681	BD	05	DISMIS	BSR	DISM1	Show fragments
0683	C6	02		LDA B	#2	
0685	BD	05E4		JSR	PAUSE	Delay 20 - 40 mSec.
0688	96	A4	DISM1	LDA A	GMISX	Use gun missile coords
068A	4A			DEC A		
068B	97	2E		STA A	VX	
068D	96	A5		LDA A	GMISY	
068F	4A			DEC A		
0690	97	2F		STA A	VY	
0692	C6	03		LDA B	#3	
0694	CE	06EA		LDX	*FRAGM	
0697	7E	C226		JMP	SHOWX	

*

* DISPLAY/ERASE 'BLOT' ON DECEASED ALIEN:

069A	96	A0	DSBLOT	LDA A	ALIENX
069C	4A			DEC A	
069D	97	2E		STA A	VX
069F	96	A1		LDA A	ALIENY
06A1	4A			DEC A	
06A2	97	2F		STA A	VY
06A4	C6	06		LDA B	#6
06A6	CE	06E4		LDX	*BLOT
06A9	7E	C226		JMP	SHOWX

*

* DISPLAY/ERASE 'CLOUD' OVER HIT GUN-TURRET:

06B0	96	A6	DSPCLD	LDA A	GUNPOS
06B2	4A			DEC A	
06B3	97	2E		STA A	VX
06B5	86	1B		LDA A	*\$1B
06B7	97	2F		STA A	VY
06B9	C6	05		LDA B	#5
06BB	CE	06ED		LDX	*CLOUD
06BD	7E	C226		JMP	SHOWX

*

* SHOW GAP IN DISPLAY WINDOW:

06C0	97	2E	DSPGAP	STA A	VX
06C2	86	19		LDA A	*\$19
06C4	97	2F		STA A	VY
06C6	C6	07		LDA B	#7
06C8	CE	06F2		LDX	*GAP
06CA	7E	C226		JMP	SHOWX

*

* INVERT VIDEO, FULL SCREEN:

06D0	CE	0100	INVERT	LDX	*DISBUF
06D2	63	00	INV1	COM	X
06D4	08			INX	
06D6	8C	0200		CPX	*ENDBUF
06D8	26	F8		BNE	INV1
06DA	39			RTS	

*

*

* SYMBOL PATTERNS:

06D7 80	MISILE	FCB	\$80
06D8 2070	GUN	FDB	\$2070
06DA F888		FDB	\$F888
06DC F8A8	ALIEN1	FDB	\$F8A8
06DE F850		FDB	\$F850
06E0 F8A8	ALIEN2	FDB	\$F8A8
06E2 F888		FDB	\$F888
06E4 7CFE	BLDT	FDB	\$7CFE
06E6 FEFE		FDB	\$FEFE
06E8 FE6C		FDB	\$FE6C
06EA A040	FRAGM	FDB	\$A040
06EC A0		FCB	\$A0
06ED 387C	CLOUD	FDB	\$387C
06EF FEFE		FDB	\$FEFE
06F1 FE		FCB	\$FE
06F2 F0F0	GAP	FDB	\$F0F0
06F4 F0F0		FDB	\$F0F0
06F6 F0F0		FDB	\$F0F0
06F8 F0F0		FDB	\$F0F0

*

*

*

* CHECKSUM VERIFY ROUTINE:

0700		ORG	\$0700
0700 CE 0200	VERIFY	LDX	*\$0200
0703 4F		CLR A	
0704 E6 00	VER1	LDA B	X
0706 1B		ABA	
0707 08		INX	
0708 8C 0700		CPX	*\$0700
070B 26 F7		BNE	VER1
070D 97 FF		STA A	\$00FF
070F 7E C360		JMP	\$C360

*

*

END

0200	BD	C2	87	86	00	CE	00	90	A7	00	08	8C	00	C0	26	F8	0480	04	26	06	7C	00	AC	7C	00	AC	BD	05	82	39	7F	00	97	
0210	BD	05	FA	86	04	97	AC	7C	00	B5	86	18	97	AB	7F	00	0490	CE	00	88	D6	AF	D7	AE	DF	94	A6	00	97	A2	28	2C	A6	
0220	98	7F	00	AB	BD	02	B3	BD	C0	79	BD	02	CC	86	01	97	04A0	01	97	A3	81	1F	27	30	BD	06	4F	DE	94	7C	00	A3	96	
0230	AA	86	1C	97	A6	BD	6C	7F	00	B2	7F	00	B1	BD	02	F5	04B0	A3	A7	01	BD	06	4F	96	3F	27	07	BD	04	E7	96	98	26	
0240	96	AB	81	08	27	04	BD	45	20	F3	BD	06	57	96	B1	84	04C0	09	DE	94	08	08	D6	AE	5A	26	CB	39	96	99	26	F2	96	
0250	01	26	07	BD	03	CA	96	98	26	BD	96	B2	26	04	BD	02	04D0	B1	26	EE	8D	58	20	EA	8D	02	20	E6	BD	06	4F	96	AS	91
0260	F5	96	9C	26	35	BD	03	9C	96	B1	84	03	26	07	BD	04	04E0	86	FF	A7	00	A7	01	39	96	A4	91	A2	26	0F	96	AS	91	
0270	8D	96	98	26	25	8D	16	96	B1	4C	81	0C	26	01	4F	97	04F0	A3	26	09	8D	E9	BD	06	81	BD	03	E9	39	96	A3	81	1C	
0280	B1	96	B2	4C	81	03	26	01	4F	97	B2	20	C0	D6	B0	86	0500	2C	01	39	8D	D6	BD	06	AC	BD	06	CB	C6	64	D7	21	C6	
0290	09	01	01	4A	26	FC	5A	26	F6	39	BD	05	82	BD	C2	C4	0510	40	BD	C2	E5	7A	00	AC	2E	04	7C	00	98	39	BD	05	82	
02A0	7E	02	00	CE	00	88	86	FF	97	A5	A7	00	08	8C	00	90	0520	BD	C0	79	BD	02	A3	BD	02	CC	BD	06	57	39	BD	C1	32	
02B0	26	F8	39	CE	00	C0	DF	90	4F	C6	28	C1	10	2E	02	86	0530	C6	08	37	84	07	97	97	86	20	C6	05	37	97	96	9A	97	
02C0	FF	A7	00	8B	08	84	3F	08	5A	26	F0	39	CE	00	C0	7F	0540	8A	C0	97	93	DE	92	A6	00	2A	18	96	96	80	08	33	5A	
02D0	00	A1	C6	05	37	C6	08	37	DF	92	A6	00	28	05	97	A0	0550	26	E9	96	97	D6	B3	C4	01	27	02	4A	4A	4C	33	5A	26	
02E0	BD	06	67	DE	92	08	33	5A	26	ED	96	A1	88	05	97	A1	0560	D1	39	33	33	88	02	97	A2	DE	94	A7	00	96	96	44	44	
02F0	33	5A	26	F0	39	7F	00	9D	DE	90	A6	00	97	A0	28	23	0570	44	16	48	48	18	88	03	97	A3	A7	01	BD	06	4F	7C	00	
0300	96	B3	91	B4	2D	06	8D	4D	96	9A	26	14	8D	29	BD	06	0580	99	39	4F	CE	01	C0	BD	C0	7D	43	CE	01	C8	BD	C0	7D	
0310	67	DE	90	A6	00	9B	AA	84	3F	A7	0																							