```
                ;
                ;       Copyright 1981, 1982, 1983
                ;       Jay R. Jaeger
                ;       Madison, WI
                ;
= 0030          ver     equ     '0'
= 0032          rvs     equ     '2'
= 0034          serial  equ     '4'
                ;
                ;       set boot switch
                ;
= 0001          boot    set     1                       isantic
= 2000          dosorg  equ     $2000 ;for dos version
                ;
                ;       link in code
                ;
                        link    d:spwequ.mac
                        link    d:spwdlist.mac
                        link    d:spwinit.mac   if isantic
                        link    d:spwopts.mac   link spwantic.mac
                        link    d:spwvbi.mac    else
                        link    d:spwdraw.mac
                        link    d:spwscore.mac
                        link    d:spwgrav.mac
                        link    d:spwutil.mac
                        link    d:spwvce.mac
                        link    d:spwsnd.mac
                        link    d:spwdata.mac
```

```
0000                ;
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                    ;       Madison, WI
                    ;
                    ;
                    ; PAGE 0
                    ;
      = 00FE        TW2     EQU     $FE
      = 00FC        tw3     equ     $fc
                    ;
                    ; ENTRY POINT
                    ;
      = 0001                if      boot
0000  = 0700                org     $700
0700  00            begin   db      0
0701  41                    db      [pend-begin+127]/128
0702  0007                  dw      begin
0704  0907                  dw      pinit
0706  4C4510                jmp     bootc
0709  60            pinit   rts
                            else
   -                        ORG     dosorg
   -                begin   JMP     GO
                            endif
                    ;
                    ;       gravity table
                    ;
      = 0030        gtlen   equ     48
070A  = 0900        gtable  ds      gtlen*gtlen
                    ;
                    ;       id block
                    ;
100A  436F707972            db      'Copyright 1983 '
1019  4A61792052            db      'Jay R. Jaeger '
1027  5665727369            db      'Version ',ver,' '
1031  5265766973            db      'Revision ',rvs,' '
103C  5365726961            db      'Serial ',serial,' '
                    ;
                    ;       boot continuation
                    ;
      = 0001                if      boot
      = 1045        bootc   equ     *
1045  A93C                  lda     #$3c
1047  8D02D3                sta     pactl   ;cassette off.
104A  A924                  lda     #low[restrt]
104C  8D0A00                sta     dosvec
104F  A911                  lda     #high[restrt]
1051  8D0B00                sta     dosvec+1
1054  A9FA                  lda     #low[memend]
```

```
1056  8DE702          sta     memlo
1059  8D0E00          sta     appmhi
105C  A93B            lda     #high[memend]
105E  8DE802          sta     memlo+1
1061  8D0F00          sta     appmhi+1
1064  18              clc
1065  60              rts
                      endif
                ;
                ; SCREEN DEFINITION
                ;
    = 004A      ROWS    EQU     74
    = 0044      NUMSTARS        EQU     68
                ;
                ; PLAYER SCREEN LIMITS
                ;
    = 002C      MINX    EQU     44
    = 00CC      MAXX    EQU     204
    = 001D      MINY    EQU     29
    = 00E5      MAXY    EQU     229
    = 002C      minmx   equ     minx
    = 0015      minmy   equ     miny-8
    = 00D4      maxmx   equ     maxx+8
    = 00E5      maxmy   equ     maxy
    = 0032      p1ix    equ     50
    = 0038      p1iy    equ     56
    = 00C8      p2ix    equ     200
    = 00D0      p2iy    equ     208
    = 007A      sunx    equ     122
    = 0086      suny    equ     134
                ;
                ; OS EQUATES
                ;
    = 022F      SDMCTL  EQU     $22F
    = 026F      GPRIOR  EQU     $26F
    = 0011      PRIORV  EQU     $11
    = 004D      atract  equ     $4d
    = 02FC      ch      equ     $2fc
    = 000A      dosvec  equ     $a
    = 02E7      memlo   equ     $2e7
    = 000E      appmhi  equ     $e
                ;
                ; COLOR SHADOW EQUATES
                ;
    = 02C4      COLOR0  EQU     $2C4
    = 02C5      COLOR1  EQU     $2C5
    = 02C6      COLOR2  EQU     $2C6
    = 02C7      COLOR3  EQU     $2C7
    = 02C8      COLOR4  EQU     $2C8
    = 02C0      PCOLR0  EQU     $2C0
```

```
= 02C1      PCOLR1  EQU     $2C1
= 02C2      PCOLR2  EQU     $2C2
= 02C4      PCOLR3  EQU     $2C4
            ;
            ; HARDWARE EQUATES
            ;
= D200      POKEY   EQU     $D200
= D20A      RANDOM  EQU     POKEY+10
= D01F      consol  equ     $d01f
= D208      audctl  equ     $d208
= D20F      skctl   equ     $d20f
= 0232      sskctl  equ     $232
= D302      pactl   equ     $d302
= D407      PMBASE  EQU     $D407
= D01D      GRACTL  EQU     $D01D
= D000      HPOSP0  EQU     $D000
= D001      HPOSP1  EQU     $D001
= D002      HPOSP2  EQU     $D002
= D003      HPOSP3  EQU     $D003
= D004      HPOSM0  EQU     $D004
= D005      HPOSM1  EQU     $D005
= D006      HPOSM2  EQU     $D006
= D007      HPOSM3  EQU     $D007
= D008      m0pl    equ     $d008
= D009      m1pl    equ     $d009
= D00A      m2pl    equ     $d00a
= D00B      m3pl    equ     $d00b
= D00C      p0pl    equ     $d00c
= D01E      hitclr  equ     $d01e
            ;
            ; DISPLAY LIST EQUATES
            ;
= 0070      DLBLK8  EQU     $70
= 0001      DLJMP   EQU     $1
= 0041      DLJVB   EQU     $41
= 0040      DLLMS   EQU     $40
= 0230      SDLSTL  EQU     $230
= 0231      SDLSTH  EQU     $231
            ;
            ; VERTICAL BLANK EQUATES
            ;
= E45C      SETVBV  EQU     $E45C
= E462      XITVBV  EQU     $E462
            ;
            ; JOYSTICK EQUATES
            ;
= 0278      STICK0  EQU     $278
= 0279      STICK1  EQU     $279
= 0001      STICKU  EQU     1
= 0002      STICKD  EQU     2
```

```
= 0004      STICKL  EQU     4
= 0008      STICKR  EQU     8
= 0284      STRIG0  EQU     $284
= 0285      STRIG1  EQU     $285
            ;
            ; MISSLE EQUATES
            ;
= 0002      M0LEN   EQU     2
= 0002      M1LEN   EQU     M0LEN
= 0002      M2LEN   EQU     M0LEN
= 0002      M3LEN   EQU     M0LEN
= 0003      M0      EQU     $03
= 000C      M1      EQU     $0C
= 0030      M2      EQU     $30
= 00C0      M3      EQU     $C0
            ;
            ;  I/O system equates
            ;
= 0342      iccom   equ     $342
= 0344      icbal   equ     $344
= 0345      icbah   equ     $345
= 0348      icbll   equ     $348
= 0349      icblh   equ     $349
= 034A      icaux1  equ     $34a
= 034B      icaux2  equ     $34b
= E456      ciov    equ     $e456
= 0003      open    equ     3
= 0007      getchr  equ     7
= 000B      putchr  equ     $b
= 000C      close   equ     12
= 0004      opnin   equ     4
            ;
            ;   Screen mode 1 equates
            ;
= 0054      rowcrs  equ     $54
= 0055      colcrs  equ     $55
= 0001      s1gold  equ     $1
= 0000      s1green equ     $0
= 0003      s1red   equ     $3
= 0002      s1blue  equ     $2
            ;
            ;       player color equates
            ;
= 0088      p1cv    equ     $88   ; blue
= 0046      p2cv    equ     $46   ; red
```

```
1066                ;
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                    ;
                    ;
                    ; DISPLAY LIST
                    ;
      = 1066        DLIST   EQU     *
1066  707070                DB      DLBLK8,DLBLK8,DLBLK8
1069  46                    DB      6+DLLMS
106A  0030                  DW      SCREEN
106C  0D0D0D0D0D0D          DB      13,13,13,13,13,16,13,13
1074  0D0D0D100D            DB      13,13,13,16,13,13,13,13
107C  0D100D0D0D            DB      13,16,13,13,13,13,13,16
1084  0D0D0D0D0D0D          DB      13,13,13,13,13,16,13,13
108C  0D0D0D100D            DB      13,13,13,16,13,13,13,13
1094  0D100D0D0D            DB      13,16,13,13,13,13,13,16
109C  0D0D0D0D0D0D          DB      13,13,13,13,13,16,13,13
10A4  0D0D0D100D            DB      13,13,13,16,13,13,13,13
10AC  0D100D0D0D            DB      13,16,13,13,13,13,13,16
10B4  0D0D0D0D0D0D          DB      13,13,13,13,13,16,13,13
10BC  0D0D0D100D            db      13,13,13,16,13,13,13,13
10C4  06                    DB      6
10C5  41                    DB      DLJVB
10C6  6610                  DW      DLIST
```

```
10C8                ;
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                    ;       Madison, WI
                    ;
                    ;
                    ; EXECUTION REALLY STARTS HERE
                    ;
      = 10C8        GO      EQU     *
                    ;
                    ; Read in gravity table...
                    ;
      = FFFE                if      not boot
10C8  AD4A27                lda     gravflg
10CB  F003 ↑10D0            beq     dordgr
10CD  4C2411                jmp     nordgr
      = 10D0        dordgrav        equ     *
10D0  A901                  lda     #1
10D2  8D4A27                sta     gravflg
10D5  A210                  ldx     #$10
10D7  A90C                  lda     #close
10D9  9D4203                sta     iccom,x
10DC  2056E4                jsr     ciov
10DF  A210                  ldx     #$10
10E1  A903                  lda     #open
10E3  9D4203                sta     iccom,x
10E6  A904                  lda     #opnin
10E8  9D4A03                sta     icaux1,x
10EB  A955                  lda     #low[gfname]
10ED  9D4403                sta     icbal,x
10F0  A927                  lda     #high[gfname]
10F2  9D4503                sta     icbah,x
10F5  2056E4                jsr     ciov
10F8  30FE ↑10F8            bmi     *
10FA  A210                  ldx     #$10
10FC  A907                  lda     #getchr
10FE  9D4203                sta     iccom,x
1101  A90A                  lda     #low[gtable]
1103  9D4403                sta     icbal,x
1106  A907                  lda     #high[gtable]
1108  9D4503                sta     icbah,x
110B  A900                  lda     #low[gtlen*gtlen]
110D  9D4803                sta     icbll,x
1110  A909                  lda     #high[gtlen*gtlen]
1112  9D4903                sta     icblh,x
1115  2056E4                jsr     ciov
1118  30FE ↑1118            bmi     *
111A  A210                  ldx     #$10
111C  A90C                  lda     #close
111E  9D4203                sta     iccom,x
```

```
1121  2056E4                jsr     ciov
      = 1124        nordgr  equ     *
                            endif
                    ;
                    ; Restart entry point
                    ;
      = 1124        restrt  equ     *
                    ;
                    ; disable vbi
                    ;
1124  A2E4                  ldx     #high[xitvbv]
1126  A062                  ldy     #low[xitvbv]
1128  A907                  lda     #7
112A  205CE4                jsr     setvbv
                    ;
                    ; turn off p/m
                    ;
112D  A900                  lda     #0
112F  8D1DD0                sta     gractl
1132  8D00D0                sta     hposp0
1135  8D01D0                sta     hposp1
1138  8D02D0                sta     hposp2
113B  8D03D0                sta     hposp3
113E  8D04D0                sta     hposm0
1141  8D05D0                sta     hposm1
1144  8D06D0                sta     hposm2
1147  8D07D0                sta     hposm3
114A  A922                  lda     #$22
114C  8D2F02                sta     sdmctl
                    ;
                    ; Set up parameter default values
                    ;
114F  AD4927                lda     first
1152  D023 ↑1177            bne     notfrs
1154  A901                  lda     #1
1156  8D4927                sta     first
1159  A901                  lda     #1  ;positive gravity
115B  8D5027                sta     gmode
115E  A900                  lda     #0  ;normal strength
1160  8D4F27                sta     gstren
1163  A900                  lda     #0  ;wrap mode
1165  8D4027                sta     bounce
1168  A901                  lda     #1  ;normal speed
116A  8D4327                sta     spdix
116D  A902                  lda     #2
116F  8D5127                sta     nplayer ;2 player
1172  A9FF                  lda     #$ff
1174  8D5227                sta     maxscore ;no max
      = 1177        notfrs  equ     *
                    ;
```

```
                    ;       sound inits
                    ;
1177  A900                  lda     #0
1179  8D08D2                sta     audctl
117C  A903                  lda     #3
117E  8D3202                sta     sskctl
1181  8D0FD2                sta     skctl
1184  A900                  lda     #0
1186  8DE423                sta     v1trig
1189  8DE123                sta     v2cont
118C  8DE623                sta     v3trig
118F  8DE723                sta     v4trig
                    ;
                    ;       go process user options
                    ;
1192  20E913                jsr     options
                    ;
                    ; INIT SCREEN AND P/M TO 00
                    ;
1195  AD0125                LDA     SPMLEN
1198  8D1E27                STA     TW1
119B  AD0225                LDA     SPMLEN+1
119E  8D1F27                STA     TW1+1
11A1  A900                  LDA     #PMAREA&$FF
11A3  85FE                  STA     TW2
11A5  A928                  LDA     #PMAREA/256
11A7  85FF                  STA     TW2+1
11A9  A200                  LDX     #0
      = 11AB        INISC1  EQU     *
11AB  A900                  LDA     #0
11AD  81FE                  STA     (TW2,X)
11AF  E6FE                  INC     TW2
11B1  D002 ↑11B5            BNE     INISC2
11B3  E6FF                  INC     TW2+1
      = 11B5        INISC2  EQU     *
11B5  CE1E27                DEC     TW1
11B8  AD1E27                LDA     TW1
11BB  C9FF                  CMP     #$FF
11BD  D003 ↑11C2            BNE     INISC3
11BF  CE1F27                DEC     TW1+1
      = 11C2        INISC3  EQU     *
11C2  A900                  LDA     #0
11C4  CD1E27                CMP     TW1
11C7  D0E2 ↑11AB            BNE     INISC1
11C9  CD1F27                CMP     TW1+1
11CC  D0DD ↑11AB            BNE     INISC1
                    ;
                    ; SET UP DISPLAY COLORS AND
                    ; THE DISPLAY LIST
                    ;
```

```
11CE  A900                LDA     #0
11D0  8D2F02              STA     SDMCTL  ;STOP ANTIC
11D3  A900                LDA     #0      ;BLACK
11D5  8DC402              STA     COLOR0  ;MAP MODE 0
11D8  8DC802              STA     COLOR4  ;CHAR BKGND
11DB  A988                LDA     #p1cv   ; score
11DD  8DC502              STA     COLOR1
11E0  A946                LDA     #p2cv   ; score, stars
11E2  8DC602              STA     COLOR2
11E5  A994                LDA     #$94    ; missles, title
11E7  8DC702              STA     COLOR3
11EA  A966                LDA     #DLIST&$FF      ;DISPLAY LIST
11EC  8D3002              STA     SDLSTL
11EF  A910                LDA     #DLIST/256
11F1  8D3102              STA     SDLSTH
11F4  A911                LDA     #PRIORV
11F6  8D6F02              STA     GPRIOR
11F9  A922                LDA     #$22    ;TURN ANTIC BACK ON
11FB  8D2F02              STA     SDMCTL
                    ;
                    ; FILL IN THE STAR FIELD
                    ;
11FE  A944                LDA     #NUMSTARS
1200  8D2027              STA     TB1
      = 1203        STARS1  EQU     *
1203  AD0AD2              LDA     RANDOM  ;GET BYTE FOR STAR
1206  8D2127              STA     M8161
1209  A990                LDA     #ROWS*40&$FF
120B  8D2227              STA     M8162
120E  A90B                LDA     #ROWS*40/256
1210  8D2327              STA     M8162+1
1213  203822              JSR     M816
1216  18                  CLC
1217  A914                LDA     #SFIELD&$FF
1219  6D2527              ADC     M816P+1
121C  85FE                STA     TW2
121E  A930                LDA     #SFIELD/256
1220  6D2627              ADC     M816P+2
1223  85FF                STA     TW2+1
1225  AD0AD2              LDA     RANDOM  ;DECIDE ON 2 BIT PIXEL
1228  2903                AND     #3
122A  AA                  TAX
122B  E8                  INX
122C  A903                LDA     #3
      = 122E        STARS2  EQU     *
122E  CA                  DEX
122F  F005 ↑1236          BEQ     STARS3
1231  18                  CLC
1232  2A                  ROL     A
1233  2A                  ROL     A
```

```
1234  D0F8 ↑122E          BNE     STARS2
      = 1236      STARS3  EQU     *
1236  A200                LDX     #0
1238  81FE                STA     (TW2,X)
123A  CE2027              DEC     TB1
123D  D0C4 ↑1203          BNE     STARS1
                  ;
                  ; INIT P/M GRAPHICS
                  ;
123F  204313              jsr     clrpm
1242  A928                LDA     #PMAREA/256
1244  8D07D4              STA     PMBASE
1247  A93E                LDA     #$3E ;1 LINE PM STD PF
1249  8D2F02              STA     SDMCTL
                  ; wait for vert blank
124C  A514                lda     $14
      = 124E      waitvb  equ     *
124E  C514                cmp     $14
1250  F0FC ↑124E          beq     waitvb
1252  A903                LDA     #3 ;ENABLE P/M
1254  8D1DD0              STA     GRACTL
1257  A97A                LDA     #sunx
1259  8D00D0              STA     HPOSP0
125C  A91C                LDA     #$1C     ;BRIGHT GOLD
125E  8DC002              STA     PCOLR0
1261  8DC402              STA     PCOLR3
                  ;
                  ;  entry for a new game...
                  ;
      = 1264      newgam  equ     *
                  ;
                  ; COPY GAME TITLE TO SCREEN
                  ;
1264  A014                LDY     #LENTITLE
      = 1266      MTITL2  EQU     *
1266  B9D624              LDA     TITLE2-1,Y
1269  38                  SEC
126A  E920                SBC     #$20
126C  F002 ↑1270          beq     tt2blk
126E  09E0                ORA     #7 shl 5
      = 1270      tt2blk  equ     *
1270  99A33B              STA     STITL2-1,Y
1273  88                  DEY
1274  D0F0 ↑1266          BNE     MTITL2
                  ;
                  ; set up initial score line
                  ;
1276  A930                lda     #'0'
1278  8DD424              sta     rscore
127B  8DD524              sta     rscore+1
```

```
127E  8DC424                sta     lscore
1281  8DC524                sta     lscore+1
1284  20D91D                jsr     putscore
                    ;
                    ; entry after a killed player...
                    ;
      = 1287        postkill        equ     *
1287  204313                jsr     clrpm
                    ;
                    ; INIT THE SUN PLAYER AREA
                    ;
128A  A20B                  LDX     #SUNLEN
128C  A086                  LDY     #suny
      = 128E        ISUN    EQU     *
128E  BD0225                LDA     SUNI-1,X
1291  99FF2B                STA     P0AREA-1,Y
1294  88                    DEY
1295  CA                    DEX
1296  D0F6 ↑128E            BNE     ISUN
1298  AD3527                LDA     SUNRATE
129B  8D3627                STA     SUNCTR
129E  A900                  LDA     #0
12A0  8D3727                STA     SUNINT
                    ;
                    ; INIT PLAYERS 1 AND 2
                    ;
12A3  A988                  LDA     #p1cv
12A5  8DC102                STA     PCOLR1
12A8  A932                  LDA     #p1ix
12AA  8DBB3B                STA     PXH+P1OFF
12AD  A938                  LDA     #p1iy
12AF  8DB93B                STA     PYH+P1OFF
12B2  A900                  LDA     #0
12B4  8DBA3B                STA     PXL+P1OFF
12B7  8DB83B                STA     PYL+P1OFF
12BA  8DBE3B                STA     PVXL+P1OFF
12BD  8DBF3B                STA     PVXH+P1OFF
12C0  8DBC3B                STA     PVYL+P1OFF
12C3  8DBD3B                STA     PVYH+P1OFF
12C6  8DC03B                sta     pcip+p1off
12C9  8DC13B                sta     pcctr+p1off
12CC  8DC23B                sta     pdead+p1off
12CF  8D3127                STA     M0A
12D2  8D3227                STA     M1A
12D5  8D04D0                STA     HPOSM0
12D8  8D05D0                STA     HPOSM1
12DB  A908                  LDA     #8          ;UPSIDE DOWN
12DD  8D2C27                STA     P1R
12E0  203A1B                JSR     DRWP1
12E3  A946                  LDA     #p2cv
```

```
12E5  8DC202          STA     PCOLR2
12E8  A9C8            LDA     #p2ix
12EA  8DC63B          STA     PXH+P2OFF
12ED  A9D0            LDA     #p2iy
12EF  8DC43B          STA     PYH+P2OFF
12F2  A900            LDA     #0
12F4  8DC53B          STA     PXL+P2OFF
12F7  8DC93B          STA     PVXL+P2OFF
12FA  8DCA3B          STA     PVXH+P2OFF
12FD  8DC33B          STA     PYL+P2OFF
1300  8DC73B          STA     PVYL+P2OFF
1303  8DC83B          STA     PVYH+P2OFF
1306  8DCB3B          sta     pcip+p2off
1309  8DCC3B          sta     pcctr+p2off
130C  8DCD3B          sta     pdead+p2off
130F  8D2D27          STA     P2R
1312  8D3327          STA     M2A
1315  8D3427          STA     M3A
1318  8D06D0          STA     HPOSM2
131B  8D07D0          STA     HPOSM3
131E  AD3827          LDA     ROTRATE
1321  8D3C27          STA     ROTCTR
1324  206C1B          JSR     DRWP2
                ;
                ;       other initialization
                ;
1327  A900            lda     #0
1329  8D3F27          sta     sleping
132C  8D4827          sta     pause
132F  8D5327          sta     wnwgam
1332  A9FF            lda     #$ff
1334  8DFC02          sta     ch
                ;
                ; INIT VERTICAL BLANK INT
                ;
1337  A218            LDX     #VBI/256
1339  A08F            LDY     #VBI&$FF
133B  A907            LDA     #7
133D  205CE4          JSR     SETVBV
1340  4C7B13          jmp     backgnd
                ;
                ; routine to init p/m area to 0
                ;
      = 1343    clrpm   equ     *
1343  A900            lda     #low[2048]
1345  8D1E27          sta     tw1
1348  A908            lda     #high[2048]
134A  8D1F27          sta     tw1+1
134D  A900            lda     #low[pmarea]
134F  85FC            sta     tw3
```

```
1351  A928                  lda     #high[pmarea]
1353  85FD                  sta     tw3+1
1355  A200                  ldx     #0
      = 1357        clrpm0  equ     *
1357  A900                  lda     #0
1359  81FC                  sta     (tw3,x)
135B  E6FC                  inc     tw3
135D  D002 ↑1361            bne     clrpm1
135F  E6FD                  inc     tw3+1
      = 1361        clrpm1  equ     *
1361  CE1E27                dec     tw1
1364  AD1E27                lda     tw1
1367  C9FF                  cmp     #$ff
1369  D003 ↑136E            bne     clrpm2
136B  CE1F27                dec     tw1+1
      = 136E        clrpm2  equ     *
136E  A900                  lda     #0
1370  CD1E27                cmp     tw1
1373  D0E2 ↑1357            bne     clrpm0
1375  CD1F27                cmp     tw1+1
1378  D0DD ↑1357            bne     clrpm0
137A  60                    rts
                    ;
                    ;       background task
                    ;
      = 137B        backgnd equ     *
137B  AD1FD0                lda     consol
137E  2906                  and     #6
1380  C906                  cmp     #6
1382  D062 ↑13E6            bne     newopt
1384  ADFC02                lda     ch
1387  C921                  cmp     #$21
1389  D00D ↑1398            bne     bgnops
138B  AD4827                lda     pause
138E  4901                  eor     #1
1390  8D4827                sta     pause
1393  A9FF                  lda     #$ff
1395  8DFC02                sta     ch
      = 1398        bgnops  equ     *
1398  AD3F27                lda     sleping
139B  C902                  cmp     #2
139D  D006 ↑13A5            bne     bgnosl
139F  20D91D                jsr     putscore
13A2  4C8712                jmp     postkill
      = 13A5        bgnosl  equ     *
13A5  AD5327                lda     wnwgam
13A8  F0D1 ↑137B            beq     backgnd
                    ;       let explosion(s) finish
      = 13AA        bwexp   equ     *
13AA  AD3F27                lda     sleping
```

```
13AD  C902                cmp     #2
13AF  D0F9 ↑13AA          bne     bwexp
                  ;       put up end of game message
13B1  20D91D              jsr     putscore
                  ;       wait for trigger release
13B4  20D622              jsr     trigoff
                  ;       wait for start or trigger
      = 13B7      bwb     equ     *
13B7  20CD22              jsr     anytrig
13BA  F01A ↑13D6          beq     newgm1
13BC  AD1FD0              lda     consol
13BF  2907                and     #7
13C1  C907                cmp     #7
13C3  F0F2 ↑13B7          beq     bwb
13C5  2901                and     #1
13C7  D01D ↑13E6          bne     newopt
13C9  A900                lda     #0
13CB  8514                sta     $14
      = 13CD      bwstrt  equ     *
13CD  A514                lda     $14
13CF  C91E                cmp     #30
13D1  D0FA ↑13CD          bne     bwstrt
13D3  4CE313              jmp     newgm2
                  ;       trigger restart debounce
      = 13D6      newgm1  equ     *
13D6  A980                lda     #$80
13D8  20F015              jsr     sleep
13DB  20D622              jsr     trigoff
13DE  A910                lda     #$10
13E0  20F015              jsr     sleep
      = 13E3      newgm2  equ     *
13E3  4C6412              jmp     newgam
      = 13E6      newopt  equ     *
13E6  4C2411              jmp     restrt
```

```
13E9                ;
                    ;   Copyright 1982, 1983
                    ;   Jay R. Jaeger
                    ;   Madison, WI
                    ;
      = 13E9        options equ     *
13E9                        proc
      = 00F4        :table  equ     $fc-8
      = 00FA        :opten  equ     $fc-2
      = 00F8        :selen  equ     $fc-4
      = 0018        :enlen  equ     24
      = 00F6        :field  equ     $fc-6
      = 0001        :option equ     1
      = 0002        :select equ     2
      = 0000        :end    equ     0
                    ;
                    ;       set up sounds only vbi
                    ;
13E9  A213                  ldx     #high[:optvbi]
13EB  A0F5                  ldy     #low[:optvbi]
13ED  A907                  lda     #7
13EF  205CE4                jsr     setvbv
13F2  4CFB13                jmp     :pastvbi
                    ;
                    ;       sound only vbi for options
                    ;
      = 13F5        :optvbi equ     *
13F5  20DC22                jsr     voices
13F8  4C62E4                jmp     xitvbv
                    ;
                    ;       init ptr to table
                    ;
      = 13FB        :pastvbi        equ     *
13FB  A90D                  lda     #low[opttbl]
13FD  85F4                  sta     :table
13FF  A916                  lda     #high[opttbl]
1401  85F5                  sta     :table+1
                    ;       close and open S:
1403  A260                  ldx     #$60
1405  A90C                  lda     #close
1407  9D4203                sta     iccom,x
140A  2056E4                jsr     ciov
140D  A260                  ldx     #$60
140F  A903                  lda     #open
1411  9D4203                sta     iccom,x
1414  A908                  lda     #$08
1416  9D4A03                sta     icaux1,x
1419  A902                  lda     #2
141B  9D4B03                sta     icaux2,x
141E  A964                  lda     #low[sfname]
```

```
1420  9D4403              sta     icbal,x
1423  A927                lda     #high[sfname]
1425  9D4503              sta     icbah,x
1428  2056E4              jsr     ciov
142B  30FE ↑142B          bmi     *
                  ;       display title and copyright
142D  A266                ldx     #low[:title]
142F  A018                ldy     #high[:title]
1431  207215              jsr     :disen
1434  A276                ldx     #low[:copyr]
1436  A018                ldy     #high[:copyr]
1438  207215              jsr     :disen
                  ;       display current options
143B  20EB14              jsr     :frstopt
      = 143E      :ddno   equ     *
143E  A6FA                ldx     :opten
1440  A4FB                ldy     :opten+1
1442  207215              jsr     :disen
1445  A6F8                ldx     :selen
1447  A4F9                ldy     :selen+1
1449  207215              jsr     :disen
144C  200815              jsr     :nxtopt
144F  D0ED ↑143E          bne     :ddno
                  ;       set current option to top
      = 1451      :dofo   equ     *
1451  20EB14              jsr     :frstopt
                  ;       display arrow by option
      = 1454      :donxto equ     *
1454  A6FA                ldx     :opten
1456  A4FB                ldy     :opten+1
1458  207215              jsr     :disen
145B  20F915              jsr     :dbnce
                  ;       wait for user to hit button
                  ;       or for trigger start
      = 145E      :dowb   equ     *
145E  A901                lda     #1
1460  8DEA14              sta     :trigst
1463  AD1FD0              lda     consol
1466  2907                and     #7
1468  C907                cmp     #7
146A  D007 ↑1473          bne     :dohitb
146C  20CD22              jsr     anytrig
146F  F046 ↑14B7          beq     :donots
1471  D0EB ↑145E          bne     :dowb
      = 1473      :dohitb equ     *
1473  8DE914              sta     :contmp
1476  A900                lda     #0
1478  8DEA14              sta     :trigst
147B  ADE914              lda     :contmp
147E  2904                and     #4
```

also antic 10/11/84

```
1480  D00D ↑148F          bne     :donto
1482  A901                lda     #1
1484  8DEA23              sta     v4rtrig
1487  200815              jsr     :nxtopt
148A  D0C8 ↑1454          bne     :donxto
148C  4C5114              jmp     :dofo
                  ;       button, but not option
      = 148F      :donto  equ     *
148F  ADE914              lda     :contmp
1492  2902                and     #2
1494  D021 ↑14B7          bne     :donots
                  ;       select button pressed
1496  A901                lda     #1
1498  8DE823              sta     v1rtrig
149B  203E15              jsr     :nxtsel
149E  D003 ↑14A3          bne     :donsnf
14A0  20FA14              jsr     :frstsel ; wrap to top
      = 14A3      :donsnf equ     *
14A3  A6F8                ldx     :selen
14A5  A4F9                ldy     :selen+1
14A7  207215              jsr     :disen
14AA  A001                ldy     #1
14AC  B1F8                lda     (:selen),y
14AE  88                  dey
14AF  91F6                sta     (:field),y
14B1  20F915              jsr     :dbnce
14B4  4C5E14              jmp     :dowb
                  ;       start button pressed
      = 14B7      :donots equ     *
                  ;
                  ;       process speed option
                  ;
14B7  AD4327              lda     spdix
14BA  18                  clc
14BB  2A                  rol     a
14BC  2A                  rol     a
14BD  AA                  tax
14BE  BD0E27              lda     spdtbl,x
14C1  8D4127              sta     speed
14C4  BD0F27              lda     spdtbl+1,x
14C7  8D4627              sta     maxpvx
14CA  8D4727              sta     maxpvy
14CD  BD1027              lda     spdtbl+2,x
14D0  8D4427              sta     minpvx
14D3  8D4527              sta     minpvy
                  ;
                  ;       give guy who hit START
                  ;       a fighting chance...
                  ;
14D6  A900                lda     #0
```

```
14D8  8514                  sta     $14
14DA  ADEA14                lda     :trigst
14DD  D006 ↑14E5            bne     :trigrts
      = 14DF        :wstrt  equ     *
14DF  A514                  lda     $14
14E1  C91E                  cmp     #30
14E3  D0FA ↑14DF            bne     :wstrt
      = 14E5        :trigrts        equ     *
14E5  20D622                jsr     trigoff
14E8  60                    rts
14E9  = 0001        :contmp ds      1
14EA  = 0001        :trigst ds      1
                    ;
                    ;   routine to reset to first option
                    ;
      = 14EB        :frstopt        equ     *
14EB  A5F4                  lda     :table
14ED  85FA                  sta     :opten
14EF  A5F5                  lda     :table+1
14F1  85FB                  sta     :opten+1
14F3  203015                jsr     :dofld
14F6  205515                jsr     :srchsel
14F9  60                    rts
                    ;
                    ;   routine to reset to first select
                    ;   within a given option
                    ;
      = 14FA        :frstsel        equ     *
14FA  18                    clc
14FB  A5FA                  lda     :opten
14FD  6918                  adc     #:enlen
14FF  85F8                  sta     :selen
1501  A5FB                  lda     :opten+1
1503  6900                  adc     #0
1505  85F9                  sta     :selen+1
1507  60                    rts
                    ;
                    ;   routine to advance to next option
                    ;   return z if no more options
                    ;
      = 1508        :nxtopt equ     *
1508  A6FA                  ldx     :opten
150A  A4FB                  ldy     :opten+1
150C  207A15                jsr     :eraen
      = 150F        :nxto2  equ     *
150F  18                    clc
1510  A5FA                  lda     :opten
1512  6918                  adc     #:enlen
1514  85FA                  sta     :opten
1516  A5FB                  lda     :opten+1
```

```
1518  6900                  adc     #0
151A  85FB                  sta     :opten+1
151C  A000                  ldy     #0
151E  B1FA                  lda     (:opten),y
1520  D001 ↑1523            bne     :note1  ; not end
1522  60                    rts
      = 1523        :note1  equ     *
1523  C901                  cmp     #:option
1525  D0E8 ↑150F            bne     :nxto2  ; not option
1527  203015                jsr     :dofld  ; set fld ptr
152A  205515                jsr     :srchsel ; set sel ptr
152D  A901                  lda     #:option
152F  60                    rts
                    ;
                    ;   routine to set field ptr for
                    ;   a given option
                    ;
      = 1530        :dofld  equ     *
1530  A001                  ldy     #1
1532  B1FA                  lda     (:opten),y
1534  85F6                  sta     :field
1536  C8                    iny
1537  B1FA                  lda     (:opten),y
1539  85F7                  sta     :field+1
153B  A901                  lda     #:option
153D  60                    rts
                    ;
                    ;   routine to advance to next select
                    ;   within a given option.
                    ;   return z set if no more left
                    ;
      = 153E        :nxtsel equ     *
153E  18                    clc
153F  A5F8                  lda     :selen
1541  6918                  adc     #:enlen
1543  85F8                  sta     :selen
1545  A5F9                  lda     :selen+1
1547  6900                  adc     #0
1549  85F9                  sta     :selen+1
154B  A000                  ldy     #0
154D  B1F8                  lda     (:selen),y
154F  D001 ↑1552            bne     :note2  ; not end
1551  60                    rts
      = 1552        :note2  equ     *
1552  C901                  cmp     #:option ;nz if select
1554  60                    rts
                    ;
                    ;   routine to search all select
                    ;   entries for a given option for
                    ;   value currently in field
```

```
                        ;
      = 1555            :srchsel        equ     *
1555  A000                      ldy     #0
1557  B1F6                      lda     (:field),y
1559  8D7115                    sta     :sst1
155C  20FA14                    jsr     :frstsel  ;to start
      = 155F            :ssn    equ     *
155F  A001                      ldy     #1
1561  B1F8                      lda     (:selen),y
1563  CD7115                    cmp     :sst1
1566  F008 ↑1570                beq     :ssd   ;found it
1568  203E15                    jsr     :nxtsel
156B  D0F2 ↑155F                bne     :ssn
156D  4C6D15                    jmp     *  ;ERROR - not there!
      = 1570            :ssd    equ     *
1570  60                        rts
1571  = 0001            :sst1   ds      1
                        ;
                        ;   routine to display title for
                        ;   an option or select table entry
                        ;   x,y -> entry
                        ;
      = 1572            :disen  equ     *
1572  A900                      lda     #0
1574  8DE515                    sta     :eraflg
1577  4C7F15                    jmp     :disdo
      = 157A            :eraen  equ     *
157A  A901                      lda     #1
157C  8DE515                    sta     :eraflg
      = 157F            :disdo  equ     *
157F  86FE                      stx     tw2
1581  84FF                      sty     tw2+1
1583  A003                      ldy     #3   ;offset to r,c
1585  B1FE                      lda     (tw2),y
1587  8554                      sta     rowcrs
1589  C8                        iny
158A  B1FE                      lda     (tw2),y
158C  8555                      sta     colcrs
158E  A900                      lda     #0
1590  8556                      sta     colcrs+1
1592  C8                        iny
1593  B1FE                      lda     (tw2),y
1595  8DE715                    sta     :color
      = 1598            :disnxt equ     *
1598  C8                        iny
1599  ADE515                    lda     :eraflg
159C  F009 ↑15A7                beq     :dischr
159E  B1FE                      lda     (tw2),y
15A0  F041 ↑15E3                beq     :disdun
15A2  A920                      lda     #' '
```

```
15A4  4CAB15                jmp     :dochr
      = 15A7        :dischr equ     *
15A7  B1FE                  lda     (tw2),y   ;get char
15A9  F038 ↑15E3            beq     :disdun   ;0 is done
      = 15AB        :dochr  equ     *
15AB  8DE615                sta     :discv
15AE  8CE415                sty     :dist1    ;save y
                    ;       translate to mode 1/2 code
15B1  A200                  ldx     #0
15B3  C940                  cmp     #$40
15B5  9002 ↑15B9            bcc     :dna
15B7  A204                  ldx     #4
      = 15B9        :dna    equ     *
15B9  8A                    txa
15BA  18                    clc
15BB  6DE715                adc     :color
15BE  AA                    tax
15BF  ADE615                lda     :discv
15C2  293F                  and     #$3f
15C4  1DE815                ora     :colct,x
15C7  A8                    tay
15C8  A260                  ldx     #$60
15CA  A90B                  lda     #putchr
15CC  9D4203                sta     iccom,x
15CF  A900                  lda     #0
15D1  9D4803                sta     icbll,x
15D4  9D4903                sta     icblh,x
15D7  98                    tya
15D8  2056E4                jsr     ciov
15DB  30FE ↑15DB            bmi     *
15DD  ACE415                ldy     :dist1    ;restore y
15E0  4C9815                jmp     :disnxt   ;next char
      = 15E3        :disdun equ     *
15E3  60                    rts
15E4  = 0001        :dist1  ds      1
15E5  = 0001        :eraflg ds      1
15E6  = 0001        :discv  ds      1
15E7  = 0001        :color  ds      1
15E8  0020A080      :colct  db      $00,$20,$a0,$80
15EC  6040C0E0              db      $60,$40,$c0,$e0
                    ;
                    ;   sleep loop, x = count
                    ;
      = 15F0        sleep   equ     *
      = 15F0        :sleep  equ     *
15F0  A0FF                  ldy     #$ff
      = 15F2        :slpy   equ     *
15F2  88                    dey
15F3  D0FD ↑15F2            bne     :slpy
15F5  CA                    dex
```

```
15F6  D0F8 ↑15F0          bne     :sleep
15F8  60                  rts
                  ;
                  ;   console button debounce
                  ;
      = 15F9      :dbnce  equ     *
15F9  A280                ldx     #$80
15FB  20F015              jsr     :sleep
      = 15FE      :dbcb   equ     *
15FE  AD1FD0              lda     consol
1601  2907                and     #7
1603  C907                cmp     #7
1605  D0F7 ↑15FE          bne     :dbcb
1607  A210                ldx     #$10
1609  20F015              jsr     :sleep
160C  60                  rts
                  ;
                  ;   option table
                  ;
      = 160D      opttbl  equ     *
160D  01                  db      :option
160E  5127                dw      nplayer
1610  0501002A00          db      5,1,sigreen,'*',0
1615  = 0010              ds      16
                  ;
1625  02                  db      :select
1626  0200                dw      2
1628  050300              db      5,3,sigreen
162B  3220504C41          db      '2 PLAYERS',0
1635  = 0008              ds      8
                  ;
163D  02                  db      :select
163E  0100                dw      1
1640  050301              db      5,3,sigold
1643  5052414354          db      'PRACTICE ',0
164D  = 0008              ds      8
                  ;
1655  01                  db      :option
1656  5227                dw      maxscore
1658  0601002A00          db      6,1,sigreen,'*',0
165D  = 0010              ds      16
                  ;
166D  02                  db      :select
166E  FFFF                dw      -1
1670  060300              db      6,3,sigreen
1673  4E4F204C49          db      'NO LIMIT      ',0
1682  = 0003              ds      3
                  ;
1685  02                  db      :select
1686  0A00                dw      10
```

```
1688  060301          db      6,3,slgold
168B  313020504F      db      '10 POINT LIMIT',0
169A  = 0003          ds      3
                ;
169D  02              db      :select
169E  1500            dw      21
16A0  060303          db      6,3,slred
16A3  323120504F      db      '21 POINT LIMIT',0
16B2  = 0003          ds      3
                ;
16B5  01              db      :option
16B6  4F27            dw      gstren
16B8  0701002A00      db      7,1,slgreen,'*',0
16BD  = 0010          ds      16
                ;
16CD  02              db      :select
16CE  0000            dw      0
16D0  070300          db      7,3,slgreen
16D3  4E4F524D41      db      'NORMAL     ',0
16DF  = 0006          ds      6
                ;
16E5  02              db      :select
16E6  0100            dw      1
16E8  070303          db      7,3,slred
16EB  5354524F4E      db      'STRONG     ',0
16F7  = 0006          ds      6
                ;
16FD  02              db      :select
16FE  0200            dw      2
1700  070303          db      7,3,slred
1703  5645525920      db      'VERY STRONG',0
170F  = 0006          ds      6
                ;
1715  02              db      :select
1716  FFFF            dw      -1
1718  070301          db      7,3,slgold
171B  5745414B20      db      'WEAK       ',0
1727  = 0006          ds      6
                ;
172D  02              db      :select
172E  FEFF            dw      -2
1730  070301          db      7,3,slgold
1733  5645525920      db      'VERY WEAK  ',0
173F  = 0006          ds      6
                ;
1745  01              db      :option
1746  5027            dw      gmode
1748  0801002A00      db      8,1,slgreen,'*',0
174D  = 0010          ds      16
                ;
```

```
175D  02                  db      :select
175E  0100                dw      1
1760  080303              db      8,3,slred
1763  4752415649          db      'GRAVITY     ',0
1770  = 0005              ds      5
                    ;
1775  02                  db      :select
1776  0000                dw      0
1778  080300              db      8,3,slgreen
177B  4E4F204752          db      'NO GRAVITY  ',0
1788  = 0005              ds      5
                    ;
178D  02                  db      :select
178E  FFFF                dw      -1
1790  080301              db      8,3,slgold
1793  414E544920          db      'ANTI GRAVITY',0
17A0  = 0005              ds      5
                    ;
17A5  01                  db      :option
17A6  4027                dw      bounce
17A8  0901002A00          db      9,1,slgreen,'*',0
17AD  = 0010              ds      16
                    ;
17BD  02                  db      :select
17BE  0000                dw      0
17C0  090300              db      9,3,slgreen
17C3  5752415020          db      'WRAP  ',0
17CA  = 000B              ds      11
                    ;
17D5  02                  db      :select
17D6  0100                dw      1
17D8  090303              db      9,3,slred
17DB  424F554E43          db      'BOUNCE',0
17E2  = 000B              ds      11
                    ;
17ED  01                  db      :option
17EE  4327                dw      spdix
17F0  0A01002A00          db      10,1,slgreen,'*',0
17F5  = 0010              ds      16
                    ;
1805  02                  db      :select
1806  0100                dw      1
1808  0A0300              db      10,3,slgreen
180B  4E4F524D41          db      'NORMAL SPEED',0
1818  = 0005              ds      5
                    ;
181D  02                  db      :select
181E  0000                dw      0
1820  0A0303              db      10,3,slred
1823  4641535420          db      'FAST        ',0
```

```
1830  = 0005              ds      5
                    ;
1835  02                  db      :select
1836  0200                dw      2
1838  0A0301              db      10,3,slgold
183B  534C4F5720          db      'SLOW      ',0
1848  = 0005              ds      5
                    ;
184D  02                  db      :select
184E  0300                dw      3
1850  0A0301              db      10,3,slgold
1853  5645525920          db      'VERY SLOW   ',0
1860  = 0005              ds      5
                    ;
1865  00                  db      0
                    ;
      = 1866        :title  equ     *
1866  0000000105          db      0,0,0,1,5,slgold,'SPACE WAR',0
      = 1876        :copyr  equ     *
1876  0000000301          db      0,0,0,3,1,slblue,'(C) J. JAEGER 1983',0
                          eproc
```

```
188F                ;
                    ;       Copyright 1982, 1982, 1983
                    ;       Jay R. Jaeger
                    ;       Madison, WI
                    ;
      = 188F        VBI     EQU     *
                    ;
                    ;       assume no sounds
                    ;
188F  A900                  lda     #0
1891  8DE123                sta     v2cont
1894  8DE923                sta     v3rtrig
1897  8DE823                sta     v1rtrig
189A  8DEA23                sta     v4rtrig
                    ;
                    ;       do pulsing sun
                    ;
189D  CE3627                DEC     SUNCTR
18A0  D016 ↑18B8            BNE     NOSUN
18A2  AD3527                LDA     SUNRATE
18A5  8D3627                STA     SUNCTR
18A8  AD3727                LDA     SUNINT
18AB  18                    CLC
18AC  6902                  ADC     #2
18AE  2906                  AND     #$6
18B0  8D3727                STA     SUNINT
18B3  0910                  ORA     #$10
18B5  8DC002                STA     PCOLR0
      = 18B8        NOSUN   EQU     *
                    ;
                    ;       sleep if required
                    ;
18B8  AD3F27                lda     sleping
18BB  F009 ↑18C6            beq     noslep
18BD  20B722                jsr     slepnxt
18C0  20DC22                jsr     voices
18C3  4C62E4                jmp     xitvbv
      = 18C6        noslep  equ     *
                    ;
                    ;       quit if pause flag on
                    ;
18C6  AD4827                lda     pause
18C9  F003 ↑18CE            beq     nopause
18CB  4C62E4                jmp     xitvbv
      = 18CE        nopause equ     *
                    ;
                    ;   rotate speed mask bit
                    ;
18CE  AD4227                lda     spdmsk
18D1  6A                    ror     a
```

```
18D2  AD4227                lda     spdmsk
18D5  6A                    ror     a
18D6  8D4227                sta     spdmsk
                    ;
                    ;   handle rotation every N vbi
                    ;
18D9  CE3C27                DEC     ROTCTR
18DC  D006 ↑18E4            BNE     NOROT
18DE  AD3827               LDA     ROTRATE
18E1  8D3C27                STA     ROTCTR
      = 18E4        NOROT   EQU     *
                    ;
                    ; HANDLE PLAYER 1
                    ;
18E4  ADC23B                lda     pdead+p1off
18E7  F003 ↑18EC            beq     livp1
18E9  4C8D19                jmp     donep1
      = 18EC        livp1   equ     *
18EC  ADC03B                lda     pcip+p1off
18EF  F006 ↑18F7            beq     nocp1
18F1  209E1B                jsr     expp1
18F4  4C8D19                jmp     donep1
      = 18F7        nocp1   equ     *
18F7  AD5327                lda     wnwgam
18FA  F003 ↑18FF            beq     noegp1
18FC  4C8D19                jmp     donep1
      = 18FF        noegp1  equ     *
18FF  20B81C                jsr     clrp1
1902  AD3C27               LDA     ROTCTR
1905  CD3827               CMP     ROTRATE
1908  D014 ↑191E            BNE     NOTR1
190A  AD7802                lda     stick0
190D  2904                  AND     #STICKL
190F  D003 ↑1914            BNE     NOTL1
1911  CE2C27                DEC     P1R
      = 1914        NOTL1   EQU     *
1914  AD7802                lda     stick0
1917  2908                  and     #stickr
1919  D003 ↑191E            bne     notr1
191B  EE2C27                INC     P1R
      = 191E        NOTR1   EQU     *
191E  AD2C27                LDA     P1R
1921  290F                  AND     #$f
1923  8D2C27                STA     P1R
1926  AD7802                LDA     stick0
1929  2901                  AND     #STICKU
192B  D008 ↑1935            BNE     NOAP1
192D  AD2C27                LDA     P1R
1930  A200                  LDX     #P1OFF
1932  209421                JSR     ACCEL
```

```
      = 1935      NOAP1   EQU     *
1935  A200                lda     #ploff
1937  20611E              jsr     grav
193A  18                  clc
193B  ADBC3B              lda     pvyl+ploff
193E  6D4D27              adc     ygal
1941  8DBC3B              sta     pvyl+ploff
1944  ADBD3B              lda     pvyh+ploff
1947  6D4E27              adc     ygah
194A  8DBD3B              sta     pvyh+ploff
194D  18                  clc
194E  ADBE3B              lda     pvxl+ploff
1951  6D4B27              adc     xgal
1954  8DBE3B              sta     pvxl+ploff
1957  ADBF3B              lda     pvxh+ploff
195A  6D4C27              adc     xgah
195D  8DBF3B              sta     pvxh+ploff
1960  A900                LDA     #0
1962  8D2F27              STA     MOVEM
1965  A200                LDX     #P1OFF
1967  204E20              JSR     MOVE
196A  203A1B              JSR     DRWP1
196D  AD3C27              LDA     ROTCTR
1970  CD3827              CMP     ROTRATE
1973  D018 ↑198D          BNE     NOMP1
1975  AD8402              lda     strig0
1978  D013 ↑198D          BNE     NOMP1
197A  AD3127              LDA     M0A
197D  D006 ↑1985          BNE     M0AA
197F  20481D              JSR     STRTM0
1982  4C8D19              JMP     NOMP1
      = 1985      M0AA    EQU     *
1985  AD3227              LDA     M1A
1988  D003 ↑198D          BNE     NOMP1
198A  205C1D              JSR     STRTM1
      = 198D      NOMP1   EQU     *
      = 198D      donep1  equ     *
                  ;
                  ; HANDLE PLAYER 2
                  ;
198D  ADCD3B              lda     pdead+p2off
1990  F003 ↑1995          beq     livp2
1992  4C611A              jmp     donep2
      = 1995      livp2   equ     *
1995  ADCB3B              lda     pcip+p2off
1998  F006 ↑19A0          beq     nocp2
199A  20E11B              jsr     expp2
199D  4C611A              jmp     donep2
      = 19A0      nocp2   equ     *
19A0  AD5327              lda     wnwgam
```

```
19A3  F003 ↑19A8          beq     negp2
19A5  4C611A              jmp     donep2
      = 19A8      negp2   equ     *
19A8  20CE1C              jsr     clrp2
19AB  AD5127              lda     nplayer
19AE  C902                cmp     #2
19B0  F006 ↑19B8          beq     n21a
19B2  AD7802              lda     stick0 ;autopilot
19B5  4CBB19              jmp     n21b
      = 19B8      n21a    equ     *
19B8  AD7902              lda     stick1 ;2 players
      = 19BB      n21b    equ     *
19BB  8D5427              sta     p2stick
19BE  AD3C27              LDA     ROTCTR
19C1  CD3827              CMP     ROTRATE
19C4  D014 ↑19DA          BNE     NOTR2
19C6  AD5427              lda     p2stick
19C9  2904                AND     #STICKL
19CB  D003 ↑19D0          BNE     NOTL2
19CD  CE2D27              DEC     P2R
      = 19D0      NOTL2   EQU     *
19D0  AD5427              LDA     p2stick
19D3  2908                AND     #STICKR
19D5  D003 ↑19DA          BNE     NOTR2
19D7  EE2D27              INC     P2R
      = 19DA      NOTR2   EQU     *
19DA  AD2D27              LDA     P2R
19DD  290F                AND     #$f
19DF  8D2D27              STA     P2R
19E2  AD5427              LDA     p2stick
19E5  2901                AND     #STICKU
19E7  D008 ↑19F1          BNE     NOAP2
19E9  AD2D27              LDA     P2R
19EC  A20B                LDX     #P2OFF
19EE  209421              JSR     ACCEL
      = 19F1      NOAP2   EQU     *
19F1  A20B                ldx     #p2off
19F3  20611E              jsr     grav
19F6  18                  clc
19F7  ADC73B              lda     pvyl+p2off
19FA  6D4D27              adc     ygal
19FD  8DC73B              sta     pvyl+p2off
1A00  ADC83B              lda     pvyh+p2off
1A03  6D4E27              adc     ygah
1A06  8DC83B              sta     pvyh+p2off
1A09  18                  clc
1A0A  ADC93B              lda     pvxl+p2off
1A0D  6D4B27              adc     xgal
1A10  8DC93B              sta     pvxl+p2off
1A13  ADCA3B              lda     pvxh+p2off
```

```
1A16  6D4C27                adc     xgah
1A19  8DCA3B                sta     pvxh+p2off
1A1C  A900                  LDA     #0
1A1E  8D2F27                STA     MOVEM
1A21  A20B                  LDX     #P2OFF
1A23  204E20                JSR     MOVE
1A26  206C1B                JSR     DRWP2
1A29  AD3C27                LDA     ROTCTR
1A2C  CD3827                CMP     ROTRATE
1A2F  D030 ↑1A61            BNE     NOMP2
1A31  AD5127                lda     nplayer
1A34  C902                  cmp     #2
1A36  D006 ↑1A3E            bne     n21c
1A38  AD8502                lda     strig1 ;2 players
1A3B  4C4C1A                jmp     n21d
      = 1A3E        n21c    equ     *
1A3E  AD0AD2                lda     random ;random fire
1A41  C9BF                  cmp     #191
1A43  9005 ↑1A4A            bcc     n21ca
1A45  A900                  lda     #0
1A47  4C4C1A                jmp     n21d
      = 1A4A        n21ca   equ     *
1A4A  A901                  lda     #1
      = 1A4C        n21d    equ     *
1A4C  D013 ↑1A61            BNE     NOMP2
1A4E  AD3327                LDA     M2A
1A51  D006 ↑1A59            BNE     M2AA
1A53  20701D                JSR     STRTM2
1A56  4C611A                JMP     NOMP2
      = 1A59        M2AA    EQU     *
1A59  AD3427                LDA     M3A
1A5C  D003 ↑1A61            BNE     NOMP2
1A5E  20841D                JSR     STRTM3
      = 1A61        NOMP2   EQU     *
      = 1A61        donep2  equ     *
                    ;
                    ;   end of speed dependent code
                    ;
      = 1A61        spddone equ     *
                    ;
                    ; HANDLE MISSLE 0
                    ;
1A61  AD3127                LDA     M0A
1A64  F02F ↑1A95            BEQ     ENDM0
1A66  20E41C                JSR     CLRM0
1A69  A901                  LDA     #1
1A6B  8D2F27                STA     MOVEM
1A6E  A216                  LDX     #M0OFF
1A70  204E20                JSR     MOVE
1A73  AED13B                ldx     pxh+m0off
```

```
1A76  ACCF3B                ldy     pyh+m0off
1A79  201520                jsr     p2col
1A7C  D012 ↑1A90            bne     nom0a
1A7E  AD08D0                lda     m0pl
1A81  2903                  and     #%11
1A83  D00B ↑1A90            bne     nom0a
1A85  AD2E27                LDA     KILLM
1A88  D006 ↑1A90            BNE     NOM0A
1A8A  20241C                JSR     DRWM0
1A8D  4C951A                JMP     ENDM0
      = 1A90        NOM0A   EQU     *
1A90  A900                  LDA     #0
1A92  8D3127                STA     M0A
      = 1A95        ENDM0   EQU     *
                    ;
                    ; HANDLE MISSLE 1
                    ;
1A95  AD3227                LDA     M1A
1A98  F02F ↑1AC9            BEQ     ENDM1
1A9A  20FD1C                JSR     CLRM1
1A9D  A901                  LDA     #1
1A9F  8D2F27                STA     MOVEM
1AA2  A221                  LDX     #M1OFF
1AA4  204E20                JSR     MOVE
1AA7  AEDC3B                ldx     pxh+m1off
1AAA  ACDA3B                ldy     pyh+m1off
1AAD  201520                jsr     p2col
1AB0  D012 ↑1AC4            bne     nom1a
1AB2  AD09D0                lda     m1pl
1AB5  2903                  and     #%11
1AB7  D00B ↑1AC4            bne     nom1a
1AB9  AD2E27                LDA     KILLM
1ABC  D006 ↑1AC4            BNE     NOM1A
1ABE  20491C                JSR     DRWM1
1AC1  4CC91A                JMP     ENDM1
      = 1AC4        NOM1A   EQU     *
1AC4  A900                  LDA     #0
1AC6  8D3227                STA     M1A
      = 1AC9        ENDM1   EQU     *
                    ;
                    ; HANDLE MISSLE 2
                    ;
1AC9  AD3327                LDA     M2A
1ACC  F02F ↑1AFD            BEQ     ENDM2
1ACE  20161D                JSR     CLRM2
1AD1  A901                  LDA     #1
1AD3  8D2F27                STA     MOVEM
1AD6  A22C                  LDX     #M2OFF
1AD8  204E20                JSR     MOVE
1ADB  AEE73B                ldx     pxh+m2off
```

```
1ADE  ACE53B                ldy     pyh+m2off
1AE1  20DC1F                jsr     plcol
1AE4  D012 ↑1AF8            bne     nom2a
1AE6  AD0AD0                lda     m2pl
1AE9  2905                  and     #%101
1AEB  D00B ↑1AF8            bne     nom2a
1AED  AD2E27                LDA     KILLM
1AF0  D006 ↑1AF8            BNE     NOM2A
1AF2  206E1C                JSR     DRWM2
1AF5  4CFD1A                JMP     ENDM2
      = 1AF8        NOM2A   EQU     *
1AF8  A900                  LDA     #0
1AFA  8D3327                STA     M2A
      = 1AFD        ENDM2   EQU     *
                    ;
                    ; HANDLE MISSLE 3
                    ;
1AFD  AD3427                LDA     M3A
1B00  F02F ↑1B31            BEQ     ENDM3
1B02  202F1D                JSR     CLRM3
1B05  A901                  LDA     #1
1B07  8D2F27                STA     MOVEM
1B0A  A237                  LDX     #M3OFF
1B0C  204E20                JSR     MOVE
1B0F  AEF23B                ldx     pxh+m3off
1B12  ACF03B                ldy     pyh+m3off
1B15  20DC1F                jsr     plcol
1B18  D012 ↑1B2C            bne     nom3a
1B1A  AD0BD0                lda     m3pl
1B1D  2905                  and     #%101
1B1F  D00B ↑1B2C            bne     nom3a
1B21  AD2E27                LDA     KILLM
1B24  D006 ↑1B2C            BNE     NOM3A
1B26  20931C                JSR     DRWM3
1B29  4C311B                JMP     ENDM3
      = 1B2C        NOM3A   EQU     *
1B2C  A900                  LDA     #0
1B2E  8D3427                STA     M3A
      = 1B31        ENDM3   EQU     *
                    ;
                    ;       make any sounds needed
                    ;
      = 1B31        vbivce  equ     *
1B31  20DC22                jsr     voices
                    ;
                    ; clear hit register
                    ;
1B34  8D1ED0                sta     hitclr
1B37  4C62E4                JMP     XITVBV
```

```
1B3A                ;
                    ;       Copyright 1981, 1982, 1983
                    ;       Jay R. Jaeger
                    ;       Madison, WI
                    ;
                    ; ROUTINE TO DRAW PLAYER 1
                    ;
      = 1B3A        DRWP1   EQU     *
1B3A  AD2C27                LDA     P1R
1B3D  0A                    ASL     A
1B3E  0A                    ASL     A
1B3F  0A                    ASL     A
1B40  690D                  ADC     #[P1I-1]&$FF
1B42  85FE                  STA     TW2
1B44  A925                  LDA     #[P1I-1]/256
1B46  6900                  ADC     #0
1B48  85FF                  STA     TW2+1
1B4A  ADBA3B                lda     pxl+p1off
1B4D  2A                    rol     a
1B4E  ADBB3B                LDA     PXH+P1OFF
1B51  6900                  adc     #0
1B53  8D01D0                STA     HPOSP1
1B56  A008                  LDY     #P1LEN
1B58  ADB83B                lda     pyl+p1off
1B5B  2A                    rol     a
1B5C  ADB93B                lda     pyh+p1off
1B5F  6900                  adc     #0
1B61  AA                    tax
      = 1B62        DRWP11  EQU     *
1B62  B1FE                  LDA     (TW2),Y
1B64  9D002D                STA     P1AREA,X
1B67  CA                    DEX
1B68  88                    DEY
1B69  D0F7 ↑1B62            BNE     DRWP11
1B6B  60                    RTS
                    ;
                    ; ROUTINE TO DRAW PLAYER 2
                    ;
      = 1B6C        DRWP2   EQU     *
1B6C  AD2D27                LDA     P2R
1B6F  0A                    ASL     A
1B70  0A                    ASL     A
1B71  0A                    ASL     A
1B72  698D                  ADC     #[P2I-1]&$FF
1B74  85FE                  STA     TW2
1B76  A925                  LDA     #[P2I-1]/256
1B78  6900                  ADC     #0
1B7A  85FF                  STA     TW2+1
1B7C  ADC53B                lda     pxl+p2off
1B7F  2A                    rol     a
```

```
1B80  ADC63B                LDA     PXH+P2OFF
1B83  6900                  adc     #0
1B85  8D02D0                STA     HPOSP2
1B88  A008                  LDY     #P2LEN
1B8A  ADC33B                lda     pyl+p2off
1B8D  2A                    rol     a
1B8E  ADC43B                lda     pyh+p2off
1B91  6900                  adc     #0
1B93  AA                    tax
      = 1B94        DRWP21  EQU     *
1B94  B1FE                  LDA     (TW2),Y
1B96  9D002E                STA     P2AREA,X
1B99  CA                    DEX
1B9A  88                    DEY
1B9B  D0F7 ↑1B94            BNE     DRWP21
1B9D  60                    RTS
                    ;
                    ;       routine to explode player 1
                    ;
      = 1B9E        exppl   equ     *
1B9E  ADC03B                lda     pcip+ploff
1BA1  F03D ↑1BE0            beq     explend
1BA3  CEC13B                dec     pcctr+ploff
1BA6  D038 ↑1BE0            bne     explend
1BA8  20B81C                jsr     clrpl
1BAB  AD3927                lda     colrate
1BAE  8DC13B                sta     pcctr+ploff
1BB1  ADC03B                lda     pcip+ploff
1BB4  0A                    asl     a
1BB5  0A                    asl     a
1BB6  0A                    asl     a
1BB7  690D                  adc     #low[expi-1]
1BB9  85FE                  sta     tw2
1BBB  A926                  lda     #high[expi-1]
1BBD  6900                  adc     #0
1BBF  85FF                  sta     tw2+1
1BC1  ADBB3B                lda     pxh+ploff
1BC4  8D01D0                sta     hpospl
1BC7  A008                  ldy     #explen
1BC9  AEB93B                ldx     pyh+ploff
      = 1BCC        exppll  equ     *
1BCC  B1FE                  lda     (tw2),y
1BCE  9D002D                sta     plarea,x
1BD1  CA                    dex
1BD2  88                    dey
1BD3  D0F7 ↑1BCC            bne     exppll
1BD5  CEC03B                dec     pcip+ploff
1BD8  D006 ↑1BE0            bne     explend
1BDA  EEC23B                inc     pdead+ploff
1BDD  209A22                jsr     slepstrt
```

```
      = 1BE0      explend equ     *
1BE0  60                  rts
                  ;
                  ;       routine to explode player 2
                  ;
      = 1BE1      expp2   equ     *
1BE1  ADCB3B              lda     pcip+p2off
1BE4  F03D ↑1C23          beq     exp2end
1BE6  CECC3B              dec     pcctr+p2off
1BE9  D038 ↑1C23          bne     exp2end
1BEB  20CE1C              jsr     clrp2
1BEE  AD3927              lda     colrate
1BF1  8DCC3B              sta     pcctr+p2off
1BF4  ADCB3B              lda     pcip+p2off
1BF7  0A                  asl     a
1BF8  0A                  asl     a
1BF9  0A                  asl     a
1BFA  690D                adc     #low[expi-1]
1BFC  85FE                sta     tw2
1BFE  A926                lda     #high[expi-1]
1C00  6900                adc     #0
1C02  85FF                sta     tw2+1
1C04  ADC63B              lda     pxh+p2off
1C07  8D02D0              sta     hposp2
1C0A  A008                ldy     #explen
1C0C  AEC43B              ldx     pyh+p2off
      = 1C0F      expp21  equ     *
1C0F  B1FE                lda     (tw2),y
1C11  9D002E              sta     p2area,x
1C14  CA                  dex
1C15  88                  dey
1C16  D0F7 ↑1C0F          bne     expp21
1C18  CECB3B              dec     pcip+p2off
1C1B  D006 ↑1C23          bne     exp2end
1C1D  EECD3B              inc     pdead+p2off
1C20  209A22              jsr     slepstrt
      = 1C23      exp2end equ     *
1C23  60                  rts
                  ;
                  ; ROUTINE TO DRAW MISSLE 0
                  ;
      = 1C24      DRWM0   EQU     *
1C24  ADD03B              lda     pxl+m0off
1C27  2A                  rol     a
1C28  ADD13B              LDA     PXH+M0OFF
1C2B  6900                adc     #0
1C2D  8D04D0              STA     HPOSM0
1C30  A002                LDY     #M0LEN
1C32  ADCE3B              lda     pyl+m0off
1C35  2A                  rol     a
```

```
1C36  ADCF3B                lda     pyh+m0off
1C39  6900                  adc     #0
1C3B  AA                    tax
      = 1C3C        DRWM01  EQU     *
1C3C  BD002B                LDA     MAREA,X
1C3F  0903                  ORA     #M0
1C41  9D002B                STA     MAREA,X
1C44  CA                    DEX
1C45  88                    DEY
1C46  D0F4 ↑1C3C            BNE     DRWM01
1C48  60                    RTS
                      ;
                      ; ROUTINE TO DRAW MISSLE 1
                      ;
      = 1C49        DRWM1   EQU     *
1C49  ADDB3B                lda     pxl+m1off
1C4C  2A                    rol     a
1C4D  ADDC3B                LDA     PXH+M1OFF
1C50  6900                  adc     #0
1C52  8D05D0                STA     HPOSM1
1C55  A002                  LDY     #M1LEN
1C57  ADD93B                lda     pyl+m1off
1C5A  2A                    rol     a
1C5B  ADDA3B                lda     pyh+m1off
1C5E  6900                  adc     #0
1C60  AA                    tax
      = 1C61        DRWM11  EQU     *
1C61  BD002B                LDA     MAREA,X
1C64  090C                  ORA     #M1
1C66  9D002B                STA     MAREA,X
1C69  CA                    DEX
1C6A  88                    DEY
1C6B  D0F4 ↑1C61            BNE     DRWM11
1C6D  60                    RTS
                      ;
                      ; ROUTINE TO DRAW MISSLE 2
                      ;
      = 1C6E        DRWM2   EQU     *
1C6E  ADE63B                lda     pxl+m2off
1C71  2A                    rol     a
1C72  ADE73B                LDA     PXH+M2OFF
1C75  6900                  adc     #0
1C77  8D06D0                STA     HPOSM2
1C7A  A002                  LDY     #M2LEN
1C7C  ADE43B                lda     pyl+m2off
1C7F  2A                    rol     a
1C80  ADE53B                lda     pyh+m2off
1C83  6900                  adc     #0
1C85  AA                    tax
      = 1C86        DRWM21  EQU     *
```

```
1C86  BD002B              LDA     MAREA,X
1C89  0930                ORA     #M2
1C8B  9D002B              STA     MAREA,X
1C8E  CA                  DEX
1C8F  88                  DEY
1C90  D0F4 ↑1C86          BNE     DRWM21
1C92  60                  RTS
                  ;
                  ; ROUTINE TO DRAW MISSLE 3
                  ;
      = 1C93      DRWM3   EQU     *
1C93  ADF13B              lda     pxl+m3off
1C96  2A                  rol     a
1C97  ADF23B              LDA     PXH+M3OFF
1C9A  6900                adc     #0
1C9C  8D07D0              STA     HPOSM3
1C9F  A002                LDY     #M3LEN
1CA1  ADEF3B              lda     pyl+m3off
1CA4  2A                  rol     a
1CA5  ADF03B              lda     pyh+m3off
1CA8  6900                adc     #0
1CAA  AA                  tax
      = 1CAB      DRWM31  EQU     *
1CAB  BD002B              LDA     MAREA,X
1CAE  09C0                ORA     #M3
1CB0  9D002B              STA     MAREA,X
1CB3  CA                  DEX
1CB4  88                  DEY
1CB5  D0F4 ↑1CAB          BNE     DRWM31
1CB7  60                  RTS
                  ;
                  ; ROUTINE TO CLEAR PLAYER 1
                  ;
      = 1CB8      CLRP1   EQU     *
1CB8  A008                LDY     #P1LEN
1CBA  ADB83B              lda     pyl+p1off
1CBD  2A                  rol     a
1CBE  ADB93B              lda     pyh+p1off
1CC1  6900                adc     #0
1CC3  AA                  tax
1CC4  A900                LDA     #0
      = 1CC6      CLRP11  EQU     *
1CC6  9D002D              STA     P1AREA,X
1CC9  CA                  DEX
1CCA  88                  DEY
1CCB  D0F9 ↑1CC6          BNE     CLRP11
1CCD  60                  RTS
                  ;
                  ; ROUTINE TO CLEAR PLAYER 2
      = 1CCE      CLRP2   EQU     *
```

```
1CCE  A008                LDY     #P2LEN
1CD0  ADC33B              lda     pyl+p2off
1CD3  2A                  rol     a
1CD4  ADC43B              lda     pyh+p2off
1CD7  6900                adc     #0
1CD9  AA                  tax
1CDA  A900                LDA     #0
      = 1CDC      CLRP21  EQU     *
1CDC  9D002E              STA     P2AREA,X
1CDF  CA                  DEX
1CE0  88                  DEY
1CE1  D0F9 ↑1CDC          BNE     CLRP21
1CE3  60                  RTS
                  ;
                  ; ROUTINE TO CLEAR MISSLE 0
                  ;
      = 1CE4      CLRM0   EQU     *
1CE4  A002                LDY     #M0LEN
1CE6  ADCE3B              lda     pyl+m0off
1CE9  2A                  rol     a
1CEA  ADCF3B              lda     pyh+m0off
1CED  6900                adc     #0
1CEF  AA                  tax
      = 1CF0      CLRM01  EQU     *
1CF0  BD002B              LDA     MAREA,X
1CF3  29FC                AND     #$FF-M0
1CF5  9D002B              STA     MAREA,X
1CF8  CA                  DEX
1CF9  88                  DEY
1CFA  D0F4 ↑1CF0          BNE     CLRM01
1CFC  60                  RTS
                  ;
                  ; ROUTINE TO CLEAR MISSLE 1
                  ;
      = 1CFD      CLRM1   EQU     *
1CFD  A002                LDY     #M1LEN
1CFF  ADD93B              lda     pyl+m1off
1D02  2A                  rol     a
1D03  ADDA3B              lda     pyh+m1off
1D06  6900                adc     #0
1D08  AA                  tax
      = 1D09      CLRM11  EQU     *
1D09  BD002B              LDA     MAREA,X
1D0C  29F3                AND     #$FF-M1
1D0E  9D002B              STA     MAREA,X
1D11  CA                  DEX
1D12  88                  DEY
1D13  D0F4 ↑1D09          BNE     CLRM11
1D15  60                  RTS
                  ;
```

```
                        ; ROUTINE TO CLEAR MISSLE 2
                        ;
      = 1D16            CLRM2   EQU     *
1D16  A002                        LDY     #M2LEN
1D18  ADE43B                      lda     pyl+m2off
1D1B  2A                          rol     a
1D1C  ADE53B                      lda     pyh+m2off
1D1F  6900                        adc     #0
1D21  AA                          tax
      = 1D22            CLRM21  EQU     *
1D22  BD002B                      LDA     MAREA,X
1D25  29CF                        AND     #$FF-M2
1D27  9D002B                      STA     MAREA,X
1D2A  CA                          DEX
1D2B  88                          DEY
1D2C  D0F4 ↑1D22                  BNE     CLRM21
1D2E  60                          RTS
                        ;
                        ; ROUTINE TO CLEAR MISSLE 3
                        ;
      = 1D2F            CLRM3   EQU     *
1D2F  A002                        LDY     #M3LEN
1D31  ADEF3B                      lda     pyl+m3off
1D34  2A                          rol     a
1D35  ADF03B                      lda     pyh+m3off
1D38  6900                        adc     #0
1D3A  AA                          tax
      = 1D3B            CLRM31  EQU     *
1D3B  BD002B                      LDA     MAREA,X
1D3E  293F                        AND     #$FF-M3
1D40  9D002B                      STA     MAREA,X
1D43  CA                          DEX
1D44  88                          DEY
1D45  D0F4 ↑1D3B                  BNE     CLRM31
1D47  60                          RTS
                        ;
                        ; ROUTINE TO START MISSLE 0
                        ;
      = 1D48            STRTM0  EQU     *
1D48  A901                        LDA     #1
1D4A  8D3127                      STA     M0A
1D4D  AD2C27                      LDA     P1R
1D50  0A                          ASL     A
1D51  8D3027                      STA     MR
1D54  A200                        LDX     #P1OFF
1D56  A016                        LDY     #M0OFF
1D58  20691F                      JSR     STRTM
1D5B  60                          RTS
                        ;
                        ; ROUTINE TO START MISSLE 1
```

```
                        ;
        = 1D5C          STRTM1  EQU     *
1D5C    A901                    LDA     #1
1D5E    8D3227                  STA     M1A
1D61    AD2C27                  LDA     P1R
1D64    0A                      ASL     A
1D65    8D3027                  STA     MR
1D68    A200                    LDX     #P1OFF
1D6A    A021                    LDY     #M1OFF
1D6C    20691F                  JSR     STRTM
1D6F    60                      RTS
                        ;
                        ; ROUTINE TO START MISSLE 2
                        ;
        = 1D70          STRTM2  EQU     *
1D70    A901                    LDA     #1
1D72    8D3327                  STA     M2A
1D75    AD2D27                  LDA     P2R
1D78    0A                      ASL     A
1D79    8D3027                  STA     MR
1D7C    A20B                    LDX     #P2OFF
1D7E    A02C                    LDY     #M2OFF
1D80    20691F                  JSR     STRTM
1D83    60                      RTS
                        ;
                        ; ROUTINE TO START MISSLE 3
                        ;
        = 1D84          STRTM3  EQU     *
1D84    A901                    LDA     #1
1D86    8D3427                  STA     M3A
1D89    AD2D27                  LDA     P2R
1D8C    0A                      ASL     A
1D8D    8D3027                  STA     MR
1D90    A20B                    LDX     #P2OFF
1D92    A037                    LDY     #M3OFF
1D94    20691F                  JSR     STRTM
1D97    60                      RTS
```

```
1D98                ;
                    ;  Copyright 1983
                    ;  Jay R. Jaeger
                    ;  Madison, WI
                    ;
                    ;
                    ; bump left score
                    ;
      = 1D98        bumpl   equ     *
1D98  A9C4                  lda     #low[lscore]
1D9A  85FE                  sta     tw2
1D9C  A924                  lda     #high[lscore]
1D9E  85FF                  sta     tw2+1
1DA0  20B61D                jsr     bumpsco
1DA3  201E1E                jsr     tstsco
1DA6  60                    rts
                    ;
                    ; bump right score
                    ;
      = 1DA7        bumpr   equ     *
1DA7  A9D4                  lda     #low[rscore]
1DA9  85FE                  sta     tw2
1DAB  A924                  lda     #high[rscore]
1DAD  85FF                  sta     tw2+1
1DAF  20B61D                jsr     bumpsco
1DB2  201E1E                jsr     tstsco
1DB5  60                    rts
                    ;
                    ; bump score routine
                    ; tw2 -> first byte of score
                    ;
      = 1DB6        bumpsco equ     *
1DB6  18                    clc
1DB7  A001                  ldy     #1
1DB9  B1FE                  lda     (tw2),y
1DBB  6901                  adc     #1
1DBD  91FE                  sta     (tw2),y
1DBF  C93A                  cmp     #'9'+1
1DC1  D015 ↑1DD8            bne     bumpdun
1DC3  A930                  lda     #'0'
1DC5  91FE                  sta     (tw2),y
1DC7  A000                  ldy     #0
1DC9  18                    clc
1DCA  B1FE                  lda     (tw2),y
1DCC  6901                  adc     #1
1DCE  91FE                  sta     (tw2),y
1DD0  C93A                  cmp     #'9'+1
1DD2  D004 ↑1DD8            bne     bumpdun
1DD4  A930                  lda     #'0'
1DD6  91FE                  sta     (tw2),y
```

```
      = 1DD8      bumpdun equ     *
1DD8  60                  rts
                  ;
                  ; routine to put score line on screen
                  ;
      = 1DD9      putscore        equ     *
1DD9  A900                lda     #0
1DDB  8D0030              sta     stitl1
1DDE  8D1330              sta     stitl1+19
1DE1  ADC424              lda     lscore
1DE4  38                  sec
1DE5  E920                sbc     #$20
1DE7  0940                ora     #1 shl 6
1DE9  8D0130              sta     stitl1+1
1DEC  ADC524              lda     lscore+1
1DEF  38                  sec
1DF0  E920                sbc     #$20
1DF2  0940                ora     #1 shl 6
1DF4  8D0230              sta     stitl1+2
1DF7  A00E                ldy     #14
      = 1DF9      mtitl1  equ     *
1DF9  B9C524              lda     title1+2,y
1DFC  38                  sec
1DFD  E920                sbc     #$20
1DFF  09C0                ora     #3 shl 6
1E01  990230              sta     stitl1+2,y
1E04  88                  dey
1E05  D0F2 ↑1DF9          bne     mtitl1
1E07  ADD424              lda     rscore
1E0A  38                  sec
1E0B  E920                sbc     #$20
1E0D  0980                ora     #2 shl 6
1E0F  8D1130              sta     stitl1+17
1E12  ADD524              lda     rscore+1
1E15  38                  sec
1E16  E920                sbc     #$20
1E18  0980                ora     #2 shl 6
1E1A  8D1230              sta     stitl1+18
1E1D  60                  rts
                  ;
                  ; test score routine - tests for
                  ; end of game
                  ; tw2 -> first byte of score
                  ;
1E1E                      proc
      = 1E1E      tstsco  equ     *
1E1E  AD5227              lda     maxscore
1E21  C9FF                cmp     #$ff ;no limit
1E23  F023 ↑1E48          beq     :tstend
1E25  A000                ldy     #0
```

```
1E27  B1FE                  lda     (tw2),y
1E29  290F                  and     #$f
1E2B  0A                    asl     a ;*10
1E2C  8D2027                sta     tb1
1E2F  0A                    asl     a
1E30  0A                    asl     a
1E31  6D2027                adc     tb1
1E34  8D2027                sta     tb1
1E37  C8                    iny
1E38  18                    clc
1E39  B1FE                  lda     (tw2),y
1E3B  290F                  and     #$f
1E3D  6D2027                adc     tb1
1E40  CD5227                cmp     maxscore
1E43  D003 ↑1E48            bne     :tstend
1E45  20491E                jsr     endgam
      = 1E48        :tstend equ     *
1E48  60                    rts
                            eproc
                    ;
                    ; routine to move in end of game
                    ; message......
                    ;
1E49                        proc
      = 1E49        endgam  equ     *
1E49  A014                  ldy     #lentitle
      = 1E4B        :endg1  equ     *
1E4B  B9EA24                lda     title3-1,y
1E4E  38                    sec
1E4F  E920                  sbc     #$20
1E51  F002 ↑1E55            beq     :endgblk
1E53  09E0                  ora     #7 shl 5
      = 1E55        :endgblk        equ     *
1E55  99A33B                sta     stitl2-1,y
1E58  88                    dey
1E59  D0F0 ↑1E4B            bne     :endg1
1E5B  A901                  lda     #1
1E5D  8D5327                sta     wnwgam
1E60  60                    rts
                            eproc
```

```
1E61                ;
                    ;       Copyright 1983
                    ;       Jay R. Jaeger
                    ;       Madison, WI
                    ;
                    ;
                    ; Compute gravity routine
                    ; Enter with x=player offset
                    ; Results left in xgal,xgah,ygal,ygah
                    ;
      = 1E61        grav    equ     *
1E61                        proc
1E61  AD5027                lda     gmode
1E64  F03A ↑1EA0            beq     :nograv
1E66  AD4227                lda     spdmsk
1E69  2D4127                and     speed
1E6C  F032 ↑1EA0            beq     :nograv
1E6E  38                    sec
1E6F  BDBB3B                lda     pxh,x
1E72  E97A                  sbc     #sunx
1E74  8DDC1E                sta     :delx
1E77  B004 ↑1E7D            bcs     :dxpos
1E79  49FF                  eor     #$ff
1E7B  6900                  adc     #0
      = 1E7D        :dxpos  equ     *
1E7D  8DDE1E                sta     :adelx
1E80  38                    sec
1E81  BDB93B                lda     pyh,x
1E84  E986                  sbc     #suny
1E86  8DDD1E                sta     :dely
1E89  B004 ↑1E8F            bcs     :dypos
1E8B  49FF                  eor     #$ff
1E8D  6900                  adc     #0
      = 1E8F        :dypos  equ     *
1E8F  8DDF1E                sta     :adely
1E92  ADDE1E                lda     :adelx
1E95  C960                  cmp     #2*gtlen
1E97  B007 ↑1EA0            bcs     :nograv
1E99  ADDF1E                lda     :adely
1E9C  C960                  cmp     #2*gtlen
1E9E  900F ↑1EAF            bcc     :dograv
      = 1EA0        :nograv equ     *
1EA0  A900                  lda     #0
1EA2  8D4B27                sta     xgal
1EA5  8D4C27                sta     xgah
1EA8  8D4D27                sta     ygal
1EAB  8D4E27                sta     ygah
1EAE  60                    rts
      = 1EAF        :dograv equ     *
1EAF  ADDE1E                lda     :adelx
```

```
1EB2  4A                  lsr     a
1EB3  AA                  tax
1EB4  ADDF1E              lda     :adely
1EB7  4A                  lsr     a
1EB8  A8                  tay
1EB9  ADDC1E              lda     :delx
1EBC  20E01E              jsr     gtlook
1EBF  8E4B27              stx     xgal
1EC2  8C4C27              sty     xgah
1EC5  ADDF1E              lda     :adely
1EC8  4A                  lsr     a
1EC9  AA                  tax
1ECA  ADDE1E              lda     :adelx
1ECD  4A                  lsr     a
1ECE  A8                  tay
1ECF  ADDD1E              lda     :dely
1ED2  20E01E              jsr     gtlook
1ED5  8E4D27              stx     ygal
1ED8  8C4E27              sty     ygah
1EDB  60                  rts
1EDC  = 0001      :delx   ds      1
1EDD  = 0001      :dely   ds      1
1EDE  = 0001      :adelx  ds      1
1EDF  = 0001      :adely  ds      1
                          eproc
                  ;
                  ; Gravity acceleration table lookup
                  ; x = row, y=col, a = sign of delta
                  ; Return with x=low y=high of accel
                  ;
      = 1EE0      gtlook  equ     *
1EE0                      proc
1EE0  86FE                stx     tw2
1EE2  8D681F              sta     :del
1EE5  A900                lda     #0
1EE7  85FF                sta     tw2+1
                  ; mul by 48 to get right row
1EE9  A204                ldx     #4  ; mul by 16
      = 1EEB      :shft   equ     *
1EEB  06FE                asl     tw2
1EED  26FF                rol     tw2+1
1EEF  CA                  dex
1EF0  D0F9 ↑1EEB          bne     :shft
1EF2  98                  tya       ;save y on stack
1EF3  48                  pha
1EF4  A6FE                ldx     tw2
1EF6  A4FF                ldy     tw2+1
1EF8  18                  clc
1EF9  A5FE                lda     tw2
1EFB  65FE                adc     tw2
```

```
1EFD  85FE                sta     tw2
1EFF  A5FF                lda     tw2+1
1F01  65FF                adc     tw2+1
1F03  85FF                sta     tw2+1
1F05  8A                  txa
1F06  65FE                adc     tw2
1F08  85FE                sta     tw2
1F0A  98                  tya
1F0B  65FF                adc     tw2+1
1F0D  85FF                sta     tw2+1
1F0F  68                  pla
1F10  A8                  tay        ;restore y
1F11  18                  clc
1F12  A90A                lda     #low[gtable]
1F14  65FE                adc     tw2
1F16  85FE                sta     tw2
1F18  A907                lda     #high[gtable]
1F1A  65FF                adc     tw2+1
1F1C  85FF                sta     tw2+1
1F1E  B1FE                lda     (tw2),y
1F20  85FE                sta     tw2
1F22  A900                lda     #0
1F24  85FF                sta     tw2+1
1F26  AE4F27              ldx     gstren  ; g option
1F29  F01A ↑1F45          beq     :nosh2  ;normal g
1F2B  300A ↑1F37          bmi     :lowgr  ; - mult.
      = 1F2D      :shft2  equ     *       ; + mult.
1F2D  06FE                asl     tw2     ; >> x
1F2F  26FF                rol     tw2+1
1F31  CA                  dex
1F32  D0F9 ↑1F2D          bne     :shft2
1F34  4C451F              jmp     :nosh2
1F37  38            :lowgr sec
1F38  8A                  txa             ; << x
1F39  49FF                eor     #$ff
1F3B  6900                adc     #0
1F3D  AA                  tax
      = 1F3E      :shft3  equ     *
1F3E  46FF                lsr     tw2+1
1F40  66FE                ror     tw2
1F42  CA                  dex
1F43  D0F9 ↑1F3E          bne     :shft3
      = 1F45      :nosh2  equ     *
1F45  A6FE                ldx     tw2
1F47  A4FF                ldy     tw2+1
1F49  AD5027              lda     gmode
1F4C  1007 ↑1F55          bpl     :pgrav  ; gravity
1F4E  AD681F              lda     :del    ; anti-grav
1F51  1014 ↑1F67          bpl     :done
1F53  3005 ↑1F5A          bmi     :gcmpl
```

```
      = 1F55      :pgrav  equ     *
1F55  AD681F              lda     :del
1F58  300D ↑1F67          bmi     :done
      = 1F5A      :gcmpl  equ     *
1F5A  8A                  txa
1F5B  49FF                eor     #$ff
1F5D  18                  clc
1F5E  6901                adc     #1
1F60  AA                  tax
1F61  98                  tya
1F62  49FF                eor     #$ff
1F64  6900                adc     #0
1F66  A8                  tay
      = 1F67      :done   equ     *
1F67  60                  rts
1F68  = 0001      :del    ds      1
                          eproc
```

```
1F69                ;
                    ;       Copyright 1981, 1982, 1983
                    ;       Jay R. Jaeger
                    ;       Madison, WI
                    ;
                    ; GENERAL START MISSLE ROUTINE
                    ;
      = 1F69        STRTM   EQU     *
1F69  8E2027                STX     TB1
1F6C  A901                  lda     #1
1F6E  8DE823                sta     vlrtrig
1F71  18                    CLC
1F72  BDB93B                LDA     PYH,X
1F75  AE3027                LDX     MR
1F78  7DAF26                ADC     MSPTABL+1,X
1F7B  99B93B                STA     PYH,Y
1F7E  18                    CLC
1F7F  AE2027                LDX     TB1
1F82  BDBB3B                LDA     PXH,X
1F85  AE3027                LDX     MR
1F88  7DAE26                ADC     MSPTABL,X
1F8B  99BB3B                STA     PXH,Y
1F8E  AD3027                lda     mr
1F91  0A                    asl     a
1F92  8D3027                sta     mr
1F95  18                    CLC
1F96  AE2027                ldx     tb1
1F99  BDBC3B                lda     pvyl,x
1F9C  AE3027                ldx     mr
1F9F  7DD026                adc     msvtabl+2,x
1FA2  99BC3B                sta     pvyl,y
1FA5  AE2027                LDX     TB1
1FA8  BDBD3B                LDA     PVYH,X
1FAB  AE3027                LDX     MR
1FAE  7DD126                ADC     MSVTABL+3,X
1FB1  99BD3B                STA     PVYH,Y
1FB4  18                    CLC
1FB5  AE2027                ldx     tb1
1FB8  BDBE3B                lda     pvxl,x
1FBB  AE3027                ldx     mr
1FBE  7DCE26                adc     msvtabl,x
1FC1  99BE3B                sta     pvxl,y
1FC4  AE2027                LDX     TB1
1FC7  BDBF3B                LDA     PVXH,X
1FCA  AE3027                LDX     MR
1FCD  7DCF26                ADC     MSVTABL+1,X
1FD0  99BF3B                STA     PVXH,Y
1FD3  A900                  LDA     #0
1FD5  99B83B                STA     PYL,Y
1FD8  99BA3B                STA     PXL,Y
```

```
1FDB  60                    RTS
                    ;
                    ; missle/player collision routines
                    ;
1FDC                        proc
      = 1FDC        plcol   equ     *
1FDC  8A                    txa
1FDD  38                    sec
1FDE  EDBB3B                sbc     pxh+ploff
1FE1  7019 ↑1FFC            bvs     :noplc
1FE3  3017 ↑1FFC            bmi     :noplc
1FE5  C908                  cmp     #8
1FE7  B013 ↑1FFC            bcs     :noplc
1FE9  98                    tya
1FEA  38                    sec
1FEB  EDB93B                sbc     pyh+ploff
1FEE  700C ↑1FFC            bvs     :noplc
1FF0  100A ↑1FFC            bpl     :noplc
1FF2  C9F9                  cmp     #-7
1FF4  9006 ↑1FFC            bcc     :noplc
1FF6  20FF1F                jsr     stplex
1FF9  A901                  lda     #1
1FFB  60                    rts
      = 1FFC        :noplc  equ     *
1FFC  A900                  lda     #0
1FFE  60                    rts
                    ;
                    ;   start player 1 explosion
                    ;
      = 1FFF        stplex  equ     *
1FFF  ADC03B                lda     pcip+ploff
2002  D010 ↑2014            bne     :plcip
2004  A90B                  lda     #collen
2006  8DC03B                sta     pcip+ploff
2009  A901                  lda     #1
200B  8DC13B                sta     pcctr+ploff
200E  8DE923                sta     v3rtrig
2011  20A71D                jsr     bumpr
      = 2014        :plcip  equ     *
2014  60                    rts
                    ;
                    ;       player 2
                    ;
      = 2015        p2col   equ     *
2015  8A                    txa
2016  38                    sec
2017  EDC63B                sbc     pxh+p2off
201A  7019 ↑2035            bvs     :nop2c
201C  3017 ↑2035            bmi     :nop2c
201E  C908                  cmp     #8
```

```
2020  B013 ↑2035          bcs     :nop2c
2022  98                  tya
2023  38                  sec
2024  EDC43B              sbc     pyh+p2off
2027  700C ↑2035          bvs     :nop2c
2029  100A ↑2035          bpl     :nop2c
202B  C9F9                cmp     #-7
202D  9006 ↑2035          bcc     :nop2c
202F  203820              jsr     stp2ex
2032  A901                lda     #1
2034  60                  rts
      = 2035      :nop2c  equ     *
2035  A900                lda     #0
2037  60                  rts
                  ;
                  ;   start player 2 explosion
                  ;
      = 2038      stp2ex  equ     *
2038  ADCB3B              lda     pcip+p2off
203B  D010 ↑204D          bne     :p2cip
203D  A90B                lda     #collen
203F  8DCB3B              sta     pcip+p2off
2042  A901                lda     #1
2044  8DCC3B              sta     pcctr+p2off
2047  8DE923              sta     v3rtrig
204A  20981D              jsr     bumpl
      = 204D      :p2cip  equ     *
204D  60                  rts
                  ;
                  ; ROUTINE TO MOVE A PLAYER/MISSLE
                  ; X = PLAYER/MISSLE OFFSET
                  ;
      = 204E      MOVE    EQU     *
204E  A900                lda     #0
2050  8D2E27              sta     killm
2053  AD4227              lda     spdmsk
2056  2D4127              and     speed
2059  D003 ↑205E          bne     mvspdok
205B  4C5D21              jmp     mvdun
      = 205E      mvspdok equ     *
205E  18                  CLC
205F  BDBA3B              LDA     PXL,X
2062  7DBE3B              ADC     PVXL,X
2065  9DBA3B              STA     PXL,X
2068  BDBB3B              LDA     PXH,X
206B  7DBF3B              ADC     PVXH,X
206E  9DBB3B              STA     PXH,X
2071  AD2F27              lda     movem
2074  F003 ↑2079          beq     nmvm1
2076  4CCF20              jmp     noxh
```

```
      = 2079      nmvm1   equ     *
2079  BDBB3B              lda     pxh,x
207C  C92C                CMP     #MINX
207E  B024 ↑20A4          BCS     NOXL
2080  AD4027              lda     bounce
2083  F015 ↑209A          beq     noxlb
2085  A92C                lda     #minx
2087  9DBB3B              sta     pxh,x
208A  A900                lda     #0
208C  9DBA3B              sta     pxl,x
208F  BDBF3B              lda     pvxh,x
2092  1010 ↑20A4          bpl     noxl
2094  205E21              jsr     mcxv
2097  4CA420              jmp     noxl
      = 209A      noxlb   equ     *
209A  A900                LDA     #0
209C  9DBA3B              STA     PXL,X
209F  A9CC                LDA     #MAXX
20A1  9DBB3B              STA     PXH,X
      = 20A4      NOXL    EQU     *
20A4  BDBB3B              lda     pxh,x
20A7  C9CD                CMP     #MAXX+1
20A9  9024 ↑20CF          BCC     NOXH
20AB  AD4027              lda     bounce
20AE  F015 ↑20C5          beq     noxhb
20B0  A9CC                lda     #maxx
20B2  9DBB3B              sta     pxh,x
20B5  A9FF                lda     #$ff
20B7  3DBA3B              sta     pxl,x
20BA  BDBF3B              lda     pvxh,x
20BD  3010 ↑20CF          bmi     noxh
20BF  205E21              jsr     mcxv
20C2  4CCF20              jmp     noxh
      = 20C5      noxhb   equ     *
20C5  A900                LDA     #0
20C7  9DBA3B              STA     PXL,X
20CA  A92C                LDA     #MINX
20CC  9DBB3B              STA     PXH,X
      = 20CF      NOXH    EQU     *
20CF  18                  CLC
20D0  BDB83B              LDA     PYL,X
20D3  7DBC3B              ADC     PVYL,X
20D6  9DB83B              STA     PYL,X
20D9  BDB93B              LDA     PYH,X
20DC  7DBD3B              ADC     PVYH,X
20DF  9DB93B              STA     PYH,X
20E2  AD2F27              lda     movem
20E5  F003 ↑20EA          beq     nmvm2
20E7  4C4121              jmp     mvtstm
      = 20EA      nmvm2   equ     *
```

```
20EA  BDB93B              lda     pyh,x
20ED  C91D                CMP     #MINY
20EF  B024 ↑2115          BCS     NOYL
20F1  AD4027              lda     bounce
20F4  F015 ↑210B          beq     noylb
20F6  A91D                lda     #miny
20F8  9DB93B              sta     pyh,x
20FB  A900                lda     #0
20FD  9DB83B              sta     pyl,x
2100  BDBD3B              lda     pvyh,x
2103  1010 ↑2115          bpl     noyl
2105  207921              jsr     mcyv
2108  4C1521              jmp     noyl
      = 210B      noylb   equ     *
210B  A900                LDA     #0
210D  9DB83B              STA     PYL,X
2110  A9E5                LDA     #MAXY
2112  9DB93B              STA     PYH,X
      = 2115      NOYL    EQU     *
2115  BDB93B              lda     pyh,x
2118  C9E6                CMP     #MAXY+1
211A  9024 ↑2140          BCC     NOYH
211C  AD4027              lda     bounce
211F  F015 ↑2136          beq     noyhb
2121  A9E5                lda     #maxy
2123  9DB93B              sta     pyh,x
2126  A9FF                lda     #$ff
2128  9DB83B              sta     pyl,x
212B  BDBD3B              lda     pvyh,x
212E  3010 ↑2140          bmi     noyh
2130  207921              jsr     mcyv
2133  4C4021              jmp     noyh
      = 2136      noyhb   equ     *
2136  A900                LDA     #0
2138  9DB83B              STA     PYL,X
213B  A91D                LDA     #MINY
213D  9DB93B              STA     PYH,X
      = 2140      NOYH    EQU     *
2140  60                  RTS
                  ;
      = 2141      mvtstm  equ     *
2141  BDBB3B              lda     pxh,x
2144  C92C                cmp     #minmx
2146  9010 ↑2158          bcc     mvkillm
2148  C9D5                cmp     #maxmx+1
214A  B00C ↑2158          bcs     mvkillm
214C  BDB93B              lda     pyh,x
214F  C915                cmp     #minmy
2151  9005 ↑2158          bcc     mvkillm
2153  C9E6                cmp     #maxmy+1
```

```
2155  B001 ↑2158          bcs     mvkillm
2157  60                  rts
      = 2158      MVKILLM EQU     *
2158  A901                LDA     #1
215A  8D2E27              STA     KILLM
      = 215D      mvdun   equ     *
215D  60                  RTS
                  ;
                  ;   velocity complement routines used
                  ;   to implement bounce
                  ;
      = 215E      mcxv    equ     *
215E  A901                lda     #1
2160  8DEA23              sta     v4rtrig
2163  BDBE3B              lda     pvxl,x
2166  49FF                eor     #$ff
2168  18                  clc
2169  6901                adc     #1
216B  9DBE3B              sta     pvxl,x
216E  BDBF3B              lda     pvxh,x
2171  49FF                eor     #$ff
2173  6900                adc     #0
2175  9DBF3B              sta     pvxh,x
2178  60                  rts
                  ;
      = 2179      mcyv    equ     *
2179  A901                lda     #1
217B  8DEA23              sta     v4rtrig
217E  BDBC3B              lda     pvyl,x
2181  49FF                eor     #$ff
2183  18                  clc
2184  6901                adc     #1
2186  9DBC3B              sta     pvyl,x
2189  BDBD3B              lda     pvyh,x
218C  49FF                eor     #$ff
218E  6900                adc     #0
2190  9DBD3B              sta     pvyh,x
2193  60                  rts
                  ;
                  ; ACCELERATION ROUTINE
                  ; A=ROTATION X=PLAYER OFFSET
                  ;
      = 2194      ACCEL   EQU     *
2194  0A                  ASL     A
2195  0A                  ASL     A
2196  A8                  TAY
2197  A901                lda     #1
2199  8DE123              sta     v2cont
219C  A900                lda     #0
219E  854D                sta     atract
```

```
21A0  AD4227              lda     spdmsk
21A3  2D4127              and     speed
21A6  D003 ↑21AB          bne     acspdok
21A8  4C3722              jmp     noaccel
      = 21AB      acspdok equ     *
21AB  18                  CLC
21AC  BDBE3B              LDA     PVXL,X
21AF  796E26              ADC     ATABLE,Y
21B2  9DBE3B              STA     PVXL,X
21B5  BDBF3B              LDA     PVXH,X
21B8  796F26              ADC     ATABLE+1,Y
21BB  9DBF3B              STA     PVXH,X
21BE  38                  sec
21BF  ED4627              sbc     maxpvx
21C2  F013 ↑21D7          beq     nomxvx
21C4  7004 ↑21CA          bvs     chkop1
21C6  1004 ↑21CC          bpl     mxvx
21C8  300D ↑21D7          bmi     nomxvx
21CA  100B ↑21D7  chkop1  bpl     nomxvx
21CC  A900        mxvx    LDA     #0
21CE  9DBE3B              STA     PVXL,X
21D1  AD4627              LDA     MAXPVX
21D4  9DBF3B              STA     PVXH,X
      = 21D7      NOMXVX  EQU     *
21D7  BDBF3B              lda     pvxh,x
21DA  38                  sec
21DB  ED4427              sbc     MINPVX
21DE  7004 ↑21E4          bvs     chkop2
21E0  3004 ↑21E6          bmi     mnvx
21E2  100D ↑21F1          bpl     nomnvx
21E4  300B ↑21F1  chkop2  bmi     nomnvx
21E6  A900        mnvx    LDA     #0
21E8  9DBE3B              STA     PVXL,X
21EB  AD4427              LDA     MINPVX
21EE  9DBF3B              STA     PVXH,X
      = 21F1      NOMNVX  EQU     *
21F1  18                  CLC
21F2  BDBC3B              LDA     PVYL,X
21F5  797026              ADC     ATABLE+2,Y
21F8  9DBC3B              STA     PVYL,X
21FB  BDBD3B              LDA     PVYH,X
21FE  797126              ADC     ATABLE+3,Y
2201  9DBD3B              STA     PVYH,X
2204  38                  sec
2205  ED4727              sbc     maxpvy
2208  F013 ↑221D          beq     nomxvy
220A  7004 ↑2210          bvs     chkop3
220C  1004 ↑2212          bpl     mxvy
220E  300D ↑221D          bmi     nomxvy
2210  100B ↑221D  chkop3  bpl     nomxvy
```

```
2212  A900          mxvy     LDA     #0
2214  9DBC3B                 STA     PVYL,X
2217  AD4727                 LDA     MAXPVY
221A  9DBD3B                 STA     PVYH,X
      = 221D        NOMXVY   EQU     *
221D  BDBD3B                 lda     pvyh,x
2220  38                     sec
2221  ED4527                 sbc     minpvy
2224  7004 ↑222A             bvs     chkop4
2226  3004 ↑222C             bmi     mnvy
2228  100D ↑2237             bpl     nomnvy
222A  300B ↑2237   chkop4    bmi     nomnvy
222C  A900          mnvy     LDA     #0
222E  9DBC3B                 STA     PVYL,X
2231  AD4527                 LDA     MINPVY
2234  9DBD3B                 STA     PVYH,X
      = 2237        NOMNVY   EQU     *
      = 2237        noaccel  equ     *
2237  60                     RTS
                    ;
                    ; 8 BY 16 BIT MULTIPLY
                    ;
      = 2238        M816     EQU     *
2238  AD2127                 LDA     M8161
223B  8D2727                 STA     M81
223E  AD2227                 LDA     M8162
2241  8D2827                 STA     M82
2244  207422                 JSR     M8
2247  AD2927                 LDA     M8P
224A  8D2427                 STA     M816P
224D  AD2A27                 LDA     M8P+1
2250  8D2527                 STA     M816P+1
2253  AD2127                 LDA     M8161
2256  8D2727                 STA     M81
2259  AD2327                 LDA     M8162+1
225C  8D2827                 STA     M82
225F  207422                 JSR     M8
2262  AD2927                 LDA     M8P
2265  6D2527                 ADC     M816P+1
2268  8D2527                 STA     M816P+1
226B  AD2A27                 LDA     M8P+1
226E  6900                   ADC     #0
2270  8D2627                 STA     M816P+2
2273  60                     RTS
                    ;
                    ; 8 BY 8 BIT MULTIPLY
                    ;
      = 2274        M8       EQU     *
2274  8E2B27                 STX     M8X       ;SAVE
2277  A900                   LDA     #0
```

```
2279  8D2A27                STA     M8P+1
227C  A208                  LDX     #8
      = 227E        M8SHIFT EQU     *
227E  0A                    ASL     A
227F  2E2A27                ROL     M8P+1
2282  0E2727                ASL     M81
2285  9009 ↑2290            BCC     M8COUNT
2287  18                    CLC
2288  6D2827                ADC     M82
228B  9003 ↑2290            BCC     M8COUNT
228D  EE2A27                INC     M8P+1
      = 2290        M8COUNT EQU     *
2290  CA                    DEX
2291  D0EB ↑227E            BNE     M8SHIFT
2293  8D2927                STA     M8P
2296  AE2B27                LDX     M8X
2299  60                    RTS
                    ;
                    ;       routine to start sleeping
                    ;
      = 229A        slepstrt        equ     *
229A  AD3A27                lda     sleprat
229D  8D3D27                sta     slepctr
22A0  AD3B27                lda     sleprat+1
22A3  8D3E27                sta     slepctr+1
22A6  A900                  lda     #0
22A8  8DE423                sta     v1trig
22AB  8DE123                sta     v2cont
22AE  8DE723                sta     v4trig
22B1  A901                  lda     #1
22B3  8D3F27                sta     sleping
22B6  60                    rts
                    ;
                    ;       routine to sleep 1 tic
                    ;
      = 22B7        slepnxt equ     *
22B7  CE3D27                dec     slepctr
22BA  D010 ↑22CC            bne     slepndn
22BC  AD3E27                lda     slepctr+1
22BF  F006 ↑22C7            beq     slepdn
22C1  CE3E27                dec     slepctr+1
22C4  4CCC22                jmp     slepndn
      = 22C7        slepdn  equ     *
22C7  A902                  lda     #2
22C9  8D3F27                sta     sleping
      = 22CC        slepndn equ     *
22CC  60                    rts
                    ;
                    ; routine to return 0 on either trig
                    ;
```

```
22CD                        proc
     = 22CD       anytrig   equ     *
22CD  AD8402                lda     strig0
22D0  F003 ↑22D5            beq     :done
22D2  AD8502                lda     strig1
     = 22D5       :done     equ     *
22D5  60                    rts
                            eproc
                  ;
                  ; routine to wait for trigger rlse
                  ;
22D6                        proc
     = 22D6       trigoff   equ     *
22D6  20CD22                jsr     anytrig
22D9  F0FB ↑22D6            beq     trigoff
22DB  60                    rts
                            eproc
```

```
22DC                ;
                    ;       Copyright 1983
                    ;       Jay R. Jaeger
                    ;       Madison, WI
                    ;
22DC                        proc
      = 22DC        voices  equ     *
                    ;
                    ;       voice 1
                    ;
22DC  ADE823                lda     v1rtrig
22DF  F00C ↑22ED            beq     :ckv1
22E1  A200                  ldx     #0
22E3  8EDC23                stx     :v1ctr
22E6  8EE823                stx     v1rtrig
22E9  E8                    inx
22EA  8EE423                stx     v1trig
      = 22ED        :ckv1   equ     *
22ED  ADE023                lda     v1cont
22F0  D00D ↑22FF            bne     :dov1
22F2  ADE423                lda     v1trig
22F5  D008 ↑22FF            bne     :dov1
22F7  A900                  lda     #0
22F9  8D01D2                sta     audc1
22FC  4C2023                jmp     :nov1
      = 22FF        :dov1   equ     *
22FF  AEDC23                ldx     :v1ctr
2302  BDEC23                lda     v1freq,x
2305  8D00D2                sta     audf1
2308  BDF023                lda     v1audc,x
230B  8D01D2                sta     audc1
230E  E8                    inx
230F  8EDC23                stx     :v1ctr
2312  8A                    txa
2313  CDEB23                cmp     v1count
2316  D008 ↑2320            bne     :nov1
2318  A900                  lda     #0
231A  8DE423                sta     v1trig
231D  8DDC23                sta     :v1ctr
      = 2320        :nov1   equ     *
                    ;
                    ;       voice 2
                    ;
2320  ADE123                lda     v2cont
2323  D00D ↑2332            bne     :dov2
2325  ADE523                lda     v2trig
2328  D008 ↑2332            bne     :dov2
232A  A900                  lda     #0
232C  8D03D2                sta     audc2
232F  4C5323                jmp     :nov2
```

```
      = 2332      :dov2   equ     *
2332  AEDD23              ldx     :v2ctr
2335  BDF523              lda     v2freq,x
2338  8D02D2              sta     audf2
233B  BDF623              lda     v2audc,x
233E  8D03D2              sta     audc2
2341  E8                  inx
2342  8EDD23              stx     :v2ctr
2345  8A                  txa
2346  CDF423              cmp     v2count
2349  D008 ↑2353          bne     :nov2
234B  A900                lda     #0
234D  8DE523              sta     v2trig
2350  8DDD23              sta     :v2ctr
      = 2353      :nov2   equ     *
                  ;
                  ;       voice 3
                  ;
2353  ADE923              lda     v3rtrig
2356  F00C ↑2364          beq     :ckv3
2358  A200                ldx     #0
235A  8EDE23              stx     :v3ctr
235D  8EE923              stx     v3rtrig
2360  E8                  inx
2361  8EE623              stx     v3trig
      = 2364      :ckv3   equ     *
2364  ADE223              lda     v3cont
2367  D00D ↑2376          bne     :dov3
2369  ADE623              lda     v3trig
236C  D008 ↑2376          bne     :dov3
236E  A900                lda     #0
2370  8D05D2              sta     audc3
2373  4C9723              jmp     :nov3
      = 2376      :dov3   equ     *
2376  AEDE23              ldx     :v3ctr
2379  BDF823              lda     v3freq,x
237C  8D04D2              sta     audf3
237F  BD4F24              lda     v3audc,x
2382  8D05D2              sta     audc3
2385  E8                  inx
2386  8EDE23              stx     :v3ctr
2389  8A                  txa
238A  CDF723              cmp     v3count
238D  D008 ↑2397          bne     :nov3
238F  A900                lda     #0
2391  8DE623              sta     v3trig
2394  8DDE23              sta     :v3ctr
      = 2397      :nov3   equ     *
                  ;
                  ;       voice 4
```

```
                        ;
2397  ADEA23                    lda     v4rtrig
239A  F00C ↑23A8                beq     :ckv4
239C  A200                      ldx     #0
239E  8EDF23                    stx     :v4ctr
23A1  8EEA23                    stx     v4rtrig
23A4  E8                        inx
23A5  8EE723                    stx     v4trig
      = 23A8            :ckv4   equ     *
23A8  ADE323                    lda     v4cont
23AB  D00D ↑23BA                bne     :dov4
23AD  ADE723                    lda     v4trig
23B0  D008 ↑23BA                bne     :dov4
23B2  A900                      lda     #0
23B4  8D07D2                    sta     audc4
23B7  4CDB23                    jmp     :nov4
      = 23BA            :dov4   equ     *
23BA  AEDF23                    ldx     :v4ctr
23BD  BDA724                    lda     v4freq,x
23C0  8D06D2                    sta     audf4
23C3  BDB524                    lda     v4audc,x
23C6  8D07D2                    sta     audc4
23C9  E8                        inx
23CA  8EDF23                    stx     :v4ctr
23CD  8A                        txa
23CE  CDA624                    cmp     v4count
23D1  D008 ↑23DB                bne     :nov4
23D3  A900                      lda     #0
23D5  8DE723                    sta     v4trig
23D8  8DDF23                    sta     :v4ctr
      = 23DB            :nov4   equ     *
23DB  60                        rts
                        ;
                        ;       data
                        ;
23DC  00                :v1ctr  db      0
23DD  00                :v2ctr  db      0
23DE  00                :v3ctr  db      0
23DF  00                :v4ctr  db      0
                        ;
23E0  00                v1cont  db      0
23E1  00                v2cont  db      0
23E2  00                v3cont  db      0
23E3  00                v4cont  db      0
                        ;
23E4  00                v1trig  db      0
23E5  00                v2trig  db      0
23E6  00                v3trig  db      0
23E7  00                v4trig  db      0
                        ;
```

```
23E8  00          v1rtrig db      0
23E9  00          v3rtrig db      0
23EA  00          v4rtrig db      0
                  ;
      = D201      audc1   equ     $d201
      = D203      audc2   equ     $d203
      = D205      audc3   equ     $d205
      = D207      audc4   equ     $d207
                  ;
      = D200      audf1   equ     $d200
      = D202      audf2   equ     $d202
      = D204      audf3   equ     $d204
      = D206      audf4   equ     $d206
                          eproc
23EB  04          V1COUNT DB      4
      = 23EC      V1FREQ  EQU     *
23EC  080C1014            DB      8,12,16,20
      = 23F0      V1AUDC  EQU     *
23F0  E6E6E6E6            DB      230,230,230,230
23F4  01          V2COUNT DB      1
      = 23F5      V2FREQ  EQU     *
23F5  18                  DB      24
      = 23F6      V2AUDC  EQU     *
23F6  82                  DB      130
23F7  57          V3COUNT DB      87
      = 23F8      V3FREQ  EQU     *
23F8  1014181C18          DB      16,20,24,28,24,28,28,32
2400  24201C2024          DB      36,32,28,32,36,32,28,28
2408  18201C1418          DB      24,32,28,20,24,20,24,20
2410  10100C1014          DB      16,16,12,16,20,24,24,20
2418  100C141418          DB      16,12,20,20,24,20,28,24
2420  1C201C2024          DB      28,32,28,32,36,32,36,40
2428  242C2C2830          DB      36,44,44,40,48,44,52,52
2430  383C383438          DB      56,60,56,52,56,64,68,64
2438  3834403C44          DB      56,52,64,60,68,80,88,96
2440  6468686860          DB      100,104,104,104,96,92,92,96
2448  64605C5850          DB      100,96,92,88,80,64,48
      = 244F      V3AUDC  EQU     *
244F  0E0C0C0C0C          DB      14,12,12,12,12,12,12,12
2457  0C0C0C0C0A          DB      12,12,12,12,10,10,10,10
245F  0A0A0A0A0A          DB      10,10,10,10,10,10,10,10
2467  0A0A0A0808          DB      10,10,10,8,8,8,8,8
246F  0808080808          DB      8,8,8,8,8,8,8,8
2477  0808080806          DB      8,8,8,8,6,6,6,6
247F  0606060606          DB      6,6,6,6,6,6,6,6
2487  0606060606          DB      6,6,6,6,6,6,6,6
248F  0606060404          DB      6,6,6,4,4,4,4,4
2497  0404040404          DB      4,4,4,4,4,4,4,4
249F  0404040404          DB      4,4,4,4,4,4,4
24A6  0E          V4COUNT DB      14
```

```
      = 24A7      V4FREQ  EQU     *
24A7  281C140C08          DB      40,28,20,12,8,0,0,28
24AF  140C080000          DB      20,12,8,0,0,0
      = 24B5      V4AUDC  EQU     *
24B5  E6E8E8E8E0          DB      230,232,232,232,224,224,224,228
24BD  E4E4E4E0E0          DB      228,228,228,224,224,224
```

```
24C3                ;
                    ;       Copyright 1981, 1982, 1983
                    ;       Jay R. Jaeger
                    ;       Madison, WI
                    ;
                    ; DATA AREAS
                    ;
24C3  20            TITLE1  DB      ' '
24C4  3030          lscore  db      '00'
24C6  2020202053            db      '    SCORE    '
24D4  3030          rscore  db      '00'
24D6  20                    db      ' '
                    ;
24D7  2020202020    TITLE2  DB      '     SPACE WAR     '
                    ;
24EB  2020202020    title3  db      '     GAME OVER     '
                    ;
      = 0014        LENTITLE        EQU     20
24FF  B80B          SCRNLEN DW      SCRNEND-SCREEN
2501  B813          SPMLEN  DW      SCRNEND-PMAREA
                    ;
                    ; SUN IMAGE
                    ;
      = 2503        suni    equ     *
2503  1092543838            db      $10,$92,$54,$38,$38,$fe,$38,$38,$54,$92,$10
      = 000B        SUNLEN  EQU     *-SUNI
                    ;
                    ; player 1 image
                    ;
      = 250E        p1i     equ     *
250E  000808081C            db      0,8,8,8,$1c,$3e,0,0
2516  0004081838            db      0,4,8,$18,$38,$18,8,0
251E  00000C7870            db      0,0,$c,$78,$70,$30,$10,0
2526  0020263C30            db      0,$20,$26,$3c,$30,$30,$20,0
252E  0020303C3C            db      0,$20,$30,$3c,$3c,$30,$20,0
2536  002030303C            db      0,$20,$30,$30,$3c,$26,$20,0
253E  0010307078            db      0,$10,$30,$70,$78,$c,0,0
2546  0008183818            db      0,8,$18,$38,$18,8,4,0
254E  00003E1C08            db      0,0,$3e,$1c,8,8,8,0
2556  0010181C18            db      0,$10,$18,$1c,$18,$10,$20,0
255E  00080C0E1E            db      0,8,$c,$e,$1e,$30,0,0
2566  00040C0C3C            db      0,4,$c,$c,$3c,$64,4,0
256E  00040C3C3C            db      0,4,$c,$3c,$3c,$c,4,0
2576  0004643C0C            db      0,4,$64,$3c,$c,$c,4,0
257E  0000301E0E            db      0,0,$30,$1e,$e,$c,8,0
2586  002010181C            db      0,$20,$10,$18,$1c,$18,$10,0
                    ;
                    ; player 2 image
                    ;
      = 258E        p2i     equ     *
```

```
258E  080808081C          db      8,8,8,8,$1c,$1c,0,0
2596  0404080838          db      4,4,8,8,$38,8,8,0
259E  00040C1870          db      0,4,$c,$18,$70,$60,$20,0
25A6  0000273C30          db      0,0,$27,$3c,$30,$20,0,0
25AE  0000203E3E          db      0,0,$20,$3e,$3e,$20,0,0
25B6  000020303C          db      0,0,$20,$30,$3c,$27,0,0
25BE  0020607018          db      0,$20,$60,$70,$18,$c,4,0
25C6  0008083808          db      0,8,8,$38,8,8,4,4
25CE  00001C1C08          db      0,0,$1c,$1c,8,8,8,8
25D6  0008080E08          db      0,8,8,$e,8,8,$10,$10
25DE  0004060E18          db      0,4,6,$e,$18,$30,$20,0
25E6  0000040C3C          db      0,0,4,$c,$3c,$e4,0,0
25EE  0000047C7C          db      0,0,4,$7c,$7c,4,0,0
25F6  0000E43C0C          db      0,0,$e4,$3c,$c,4,0,0
25FE  002030180E          db      0,$20,$30,$18,$e,6,4,0
2606  101008080E          db      $10,$10,8,8,$e,8,8,0
      = 0008      P1LEN   EQU     8
      = 0008      P2LEN   EQU     8
                  ;
                  ;       explosion image
                  ;
      = 260E      expi    equ     *
260E  0000000000          db      0,0,0,0,0,0,0,0
2616  0000000000          db      0,0,0,0,0,0,0,0
261E  8900008011          db      $89,0,0,$80,$11,0,0,$91
2626  9142004812          db      $91,$42,0,$48,$12,0,$4a,$81
262E  C3C3001818          db      $c3,$c3,0,$18,$18,0,$c3,$c3
2636  FFE7C39999          db      $ff,$e7,$c3,$99,$99,$c3,$e7,$ff
263E  7E7EE7C3C3          db      $7e,$7e,$e7,$c3,$c3,$e7,$7e,$7e
2646  3C7EFFE7E7          db      $3c,$7e,$ff,$e7,$e7,$ff,$7e,$3c
264E  00183C7E7E          db      0,$18,$3c,$7e,$7e,$3c,$18,0
2656  0000183C3C          db      0,0,$18,$3c,$3c,$18,0,0
265E  0000001818          db      0,0,0,$18,$18,0,0,0
2666  0000182424          db      0,0,$18,$24,$24,$18,0,0
      = 0008      explen  equ     8
      = 000B      collen  equ     [*-expi]/explen-1
                  ;
                  ; ROTATION/ACCELERATION TABLE
                  ;
      = 000A      av0     equ     10
      = 0004      av1     equ     4
      = 0007      av2     equ     7
      = 0009      av3     equ     9
                  ;
      = 266E      ATABLE  EQU     *
266E  0000F6FF            dw      0,0-av0
2672  0400FCFF            dw      av1,0-av1
2676  0700F9FF            dw      av2,0-av2
267A  0900FCFF            dw      av3,0-av1
267E  0A000000            dw      av0,0
```

```
2682  09000400            dw      av3,av1
2686  07000700            dw      av2,av2
268A  04000900            dw      av1,av3
268E  00000A00            dw      0,av0
2692  FCFF0900            dw      0-av1,av3
2696  F9FF0700            dw      0-av2,av2
269A  F7FF0400            dw      0-av3,av1
269E  F6FF0000            dw      0-av0,0
26A2  F7FFFCFF            dw      0-av3,0-av1
26A6  F9FFF9FF            dw      0-av2,0-av2
26AA  FCFFF7FF            dw      0-av1,0-av3
                  ;
                  ; MISSLE INIT OFFSET TABLE
                  ;
      = 26AE      MSPTABL EQU     *
26AE  04F6                db      4,0-10
26B0  05F7                db      5,0-9
26B2  08F8                db      8,0-8
26B4  0AFB                db      10,0-5
26B6  09FC                db      9,0-4
26B8  0AFF                db      10,0-1
26BA  0701                db      7,1
26BC  0703                db      7,3
26BE  0404                db      4,4
26C0  0203                db      2,3
26C2  0102                db      1,2
26C4  FEFE                db      0-2,0-2
26C6  FFFC                db      0-1,0-4
26C8  FEFB                db      0-2,0-5
26CA  00F8                db      0,0-8
26CC  02F7                db      2,0-9
                  ;
                  ; MISSLE INIT VEL. TABLE
                  ;
      = 0400      mv0     equ     $0400
      = 0187      mv1     equ     $0187
      = 02D3      mv2     equ     $02d3
      = 03B2      mv3     equ     $03b2
                  ;
      = 26CE      MSVTABL EQU     *
26CE  000000FC            dw      0,0-mv0
26D2  87014EFC            dw      mv1,0-mv3
26D6  D3022DFD            dw      mv2,0-mv2
26DA  B20379FE            dw      mv3,0-mv1
26DE  00040000            dw      mv0,0
26E2  B2038701            dw      mv3,mv1
26E6  D302D302            dw      mv2,mv2
26EA  8701B203            dw      mv1,mv3
26EE  00000004            dw      0,mv0
26F2  79FEB203            dw      0-mv1,mv3
```

```
26F6  2DFDD302            dw      0-mv2,mv2
26FA  4EFC8701            dw      0-mv3,mv1
26FE  00FC0000            dw      0-mv0,0
2702  4EFC79FE            dw      0-mv3,0-mv1
2706  2DFD2DFD            dw      0-mv2,0-mv2
270A  79FE4EFC            dw      0-mv1,0-mv3
                    ;
                    ;       speed processing table
                    ;
      = 270E        spdtbl  equ     *
270E  FF04FC00            db      %11111111,4,-4,0
2712  EE05FB00            db      %11101110,5,-5,0
2716  AA08F800            db      %10101010,8,-8,0
271A  920BF500            db      %10010010,11,-11,0
                    ;
                    ; TEMPORARIES
                    ;
271E  = 2720        TW1     ORG     *+2
2720  = 0001        TB1     DS      1
2721  = 0001        M8161   DS      1
2722  = 0002        M8162   DS      2
2724  = 0003        M816P   DS      3
2727  = 0001        M81     DS      1
2728  = 0001        M82     DS      1
2729  = 0002        M8P     DS      2
272B  = 0001        M8X     DS      1
                    ;
                    ; other data
                    ;
272C  = 0001        P1R     DS      1
272D  = 0001        P2R     DS      1
272E  = 0001        KILLM   DS      1
272F  = 0001        MOVEM   DS      1
2730  = 0001        MR      DS      1
2731  = 0001        M0A     DS      1
2732  = 0001        M1A     DS      1
2733  = 0001        M2A     DS      1
2734  = 0001        M3A     DS      1
2735  03            SUNRATE DB      3
2736  = 0001        SUNCTR  DS      1
2737  = 0001        SUNINT  DS      1
2738  04            ROTRATE DB      4
2739  06            colrate db      6
273A  3000          sleprat dw      48
273C  = 0001        ROTCTR  DS      1
273D  = 0002        slepctr DS      2
273F  = 0001        sleping DS      1
2740  00            bounce  db      0
2741  FF            speed   db      $ff
2742  01            spdmsk  db      1
```

```
2743  00          spdix    db      0
2744  = 0001      minpvx   ds      1
2745  = 0001      minpvy   ds      1
2746  = 0001      maxpvx   ds      1
2747  = 0001      maxpvy   ds      1
2748  00          pause    db      0
2749  00          first    db      0
274A  00          gravflag          db      0
274B  = 0001      xgal     ds      1
274C  = 0001      xgah     ds      1
274D  = 0001      ygal     ds      1
274E  = 0001      ygah     ds      1
274F  FF          gstren   db      -1
2750  01          gmode    db      1
2751  02          nplayer  db      2
2752  FF          maxscore          db      $ff
2753  00          wnwgam   db      0
2754  00          p2stick  db      0
2755  44313A4752  gfname   db      'D1:GRAVITY.TBL',$9b
2764  533A9B      sfname   db      'S:',$9b
                  ;
                  ;        end of booted area
                  ;
      = 2767      pend     equ     *
                           assert [pend-begin]<$2100
                  ;
                  ;        dynamically allocated area
                  ;
      = 2800      PMAREA   EQU     [*+$7ff]&$f800
      = 2B00      MAREA    EQU     PMAREA+768
      = 2C00      P0AREA   EQU     PMAREA+1024
      = 2D00      P1AREA   EQU     P0AREA+256
      = 2E00      P2AREA   EQU     P1AREA+256
      = 2F00      P3AREA   EQU     P2AREA+256
      = 3000      SCREEN   EQU     [pmarea+2048+$fff]&$f000
      = 3000      STITL1   EQU     SCREEN
      = 3014      SFIELD   EQU     STITL1+20
      = 3BA4      STITL2   EQU     40*ROWS+SFIELD
      = 3BB8      SCRNEND  EQU     STITL2+20
                  ;
                  ; PLAYER PARAMETER AREA
                  ;
      = 3BB8      PYL      EQU     scrnend
      = 3BB9      PYH      EQU     PYL+1
      = 3BBA      PXL      EQU     PYH+1
      = 3BBB      PXH      EQU     PXL+1
      = 3BBC      PVYL     EQU     PXH+1
      = 3BBD      PVYH     EQU     PVYL+1
      = 3BBE      PVXL     EQU     PVYH+1
      = 3BBF      PVXH     EQU     PVXL+1
```

```
      = 3BC0      pcip     equ      pvxh+1
      = 3BC1      pcctr    equ      pcip+1
      = 3BC2      pdead    equ      pcctr+1
      = 000B      PSIZE    EQU      pdead-pyl+1
      = 0000      P1OFF    EQU      0
      = 000B      P2OFF    EQU      PSIZE
      = 0016      M0OFF    EQU      2*PSIZE
      = 0021      M1OFF    EQU      3*PSIZE
      = 002C      M2OFF    EQU      4*PSIZE
      = 0037      M3OFF    EQU      5*PSIZE
      = 3BFA      memend   equ      pyl+6*psize
2767                       END      go


no ERRORs,  511 Labels, $16C6 free.
```

```
ACCEL   2194    28/54   30/39   54#47
ACSPDO  21AB    55/ 7   55# 9
ANYTRI  22CD    15/13   17/46   58# 6   58/18
APPMHI  000E     3/ 6    3/ 9    3#45
ATABLE  266E    55/12   55/15   55/43   55/46   65#49
ATRACT  004D     3#41   54/54
AUDC1   D201    59/28   59/35   62# 9
AUDC2   D203    59/53   60/10   62#10
AUDC3   D205    60/36   60/43   62#11
AUDC4   D207    61/19   61/26   62#12
AUDCTL  D208     4#14    9/ 8
AUDF1   D200    59/33   62#14
AUDF2   D202    60/ 8   62#15
AUDF3   D204    60/41   62#16
AUDF4   D206    61/24   62#17
AV0     000A    65#44   65/50   65/54   66/ 8   66/12
AV1     0004    65#45   65/51   65/51   65/53   65/55   66/ 7   66/ 9
                66/11   66/13   66/15
AV2     0007    65#46   65/52   65/52   66/ 6   66/ 6   66/10   66/10
                66/14   66/14
AV3     0009    65#47   65/53   65/55   66/ 7   66/ 9   66/11   66/13
                66/15
BACKGN  137B    13/44   14#30   14/51
BEGIN   0700     2#20    2/21    2/22   68/29
BGNOPS  1398    14/37   14#43
BGNOSL  13A5    14/46   14#49
BOOT    0001     1#16    2/18    2/46    7/17
BOOTC   1045     2/24    2#47
BOUNCE  2740     8/46   25/24   52/ 9   52/28   53/ 8   53/27   67#52
BUMPDU  1DD8    42/43   42/52   42#55
BUMPL   1D98    42#13   51/30
```

```
  BUMPR   1DA7     42#24   50/42
  BUMPSC  1DB6     42/18   42/29   42#36
  BWB     13B7     15#12   15/18
  BWEXP   13AA     14#53   15/ 6
  BWSTRT  13CD     15#23   15/26
  CH      02FC      3#42   13/36   14/35   14/42
  CHKOP1  21CA     55/20   55#23
  CHKOP2  21E4     55/32   55#35
  CHKOP3  2210     55/51   55#54
  CHKOP4  222A     56/13   56#16
  CIOV    E456      5#30    7/27    7/37    7/50    7/55   16/46   17/ 8
                   22/33
  CLOSE   000C      5#34    7/25    7/53   16/44
  CLRM0   1CE4     31/49   39#21
  CLRM01  1CF0     39#28   39/34
  CLRM1   1CFD     32/24   39#39
  CLRM11  1D09     39#46   39/52
  CLRM2   1D16     32/49   40# 7
  CLRM21  1D22     40#14   40/20
  CLRM3   1D2F     33/24   40#25
  CLRM31  1D3B     40#32   40/38
  CLRP1   1CB8     28/32   35/29   38#38
  CLRP11  1CC6     38#46   38/50
  CLRP2   1CCE     30/ 8   36/15   38#54
  CLRP21  1CDC     39#12   39/16
  CLRPM   1343     11/14   12/12   13#48
  CLRPM0  1357     14# 8   14/23   14/25
  CLRPM1  1361     14/12   14#14
  CLRPM2  136E     14/18   14#20
  COLCRS  0055      5#40   21/42   21/44
  COLLEN  000B     50/37   51/25   65#40
  COLOR0  02C4      3#49   10/ 8
  COLOR1  02C5      3#50   10/11
  COLOR2  02C6      3#51   10/13
  COLOR3  02C7      3#52   10/15
  COLOR4  02C8      3#53   10/ 9
  COLRAT  2739     35/30   36/16   67#47
  CONSOL  D01F      4#13   14/31   15/15   17/42   23/14
  DLBLK8  0070      4#37    6/14    6/14    6/14
  DLIST   1066      6#13    6/30   10/16   10/18
n DLJMP   0001      4#38
  DLJVB   0041      4#39    6/29
  DLLMS   0040      4#40    6/15
  DONEP1  198D     28/21   28/26   28/30   29#41
  DONEP2  1A61     29/47   29/52   30/ 6   31#39
  DORDGR  10D0      7/19    7#21
n DOSORG  2000      1#17
  DOSVEC  000A      2/51    2/53    3#43
  DRWM0   1C24     32/13   36#46
  DRWM01  1C3C     37# 8   37/14
```

DRWM1	1C49	32/38	37#19					
DRWM11	1C61	37#31	37/37					
DRWM2	1C6E	33/13	37#42					
DRWM21	1C86	37#54	38/10					
DRWM3	1C93	33/38	38#15					
DRWM31	1CAB	38#27	38/33					
DRWP1	1B3A	12/53	29/26	34#12				
DRWP11	1B62	34#33	34/38					
DRWP2	1B6C	13/27	31/11	34#43				
DRWP21	1B94	35#14	35/19					
ENDGAM	1E49	44/20	44#29					
ENDM0	1A95	31/48	32/14	32#18				
ENDM1	1AC9	32/23	32/39	32#43				
ENDM2	1AFD	32/48	33/14	33#18				
ENDM3	1B31	33/23	33/39	33#43				
EXP1EN	1BE0	35/26	35/28	35/52	35#55			
EXP2EN	1C23	36/12	36/14	36/38	36#41			
EXPI	260E	35/36	35/38	36/22	36/24	65#26	65/40	
EXPLEN	0008	35/43	36/29	65#39	65/40			
EXPP1	1B9E	28/25	35#24					
EXPP11	1BCC	35#45	35/50					
EXPP2	1BE1	29/51	36#10					
EXPP21	1C0F	36#31	36/36					
FIRST	2749	8/37	8/40	68#11				
GETCHR	0007	5#32	7/40					
GFNAME	2755	7/33	7/35	68#23				
GMODE	2750	8/42	24/51	45/17	47/50	68#18		
GO	10C8	7#13	69/16					
GPRIOR	026F	3#39	10/21					
GRACTL	D01D	4#19	8/23	11/25				
GRAV	1E61	29/ 7	30/42	45#15				
GRAVFL	274A	7/18	7/23	68#12				
GSTREN	274F	8/44	24/16	47/28	68#17			
GTABLE	070A	2#34	7/42	7/44	47/18	47/21		
GTLEN	0030	2#33	2/34	2/34	7/46	7/46	7/48	7/48
		45/41	45/44					
GTLOOK	1EE0	46/11	46/21	46#35				
HITCLR	D01E	4#33	33/52					
HPOSM0	D004	4#24	8/28	12/49	36/51			
HPOSM1	D005	4#25	8/29	12/50	37/24			
HPOSM2	D006	4#26	8/30	13/23	37/47			
HPOSM3	D007	4#27	8/31	13/24	38/20			
HPOSP0	D000	4#20	8/24	11/27				
HPOSP1	D001	4#21	8/25	34/26	35/42			
HPOSP2	D002	4#22	8/26	35/ 7	36/28			
HPOSP3	D003	4#23	8/27					
ICAUX1	034A	5#28	7/32	16/51				
ICAUX2	034B	5#29	16/53					
ICBAH	0345	5#25	7/36	7/45	17/ 7			
ICBAL	0344	5#24	7/34	7/43	16/55			

ICBLH	0349	5#27	7/49	22/31				
ICBLL	0348	5#26	7/47	22/30				
ICCOM	0342	5#23	7/26	7/30	7/41	7/54	16/45	16/49
		22/28						
INISC1	11AB	9#33	9/48	9/50				
INISC2	11B5	9/37	9#39					
INISC3	11C2	9/43	9#45					
ISUN	128E	12#18	12/23					
KILLM	272E	32/11	32/36	33/11	33/36	51/39	54/ 9	67#36
LENTIT	0014	11/38	44/30	64#22				
LIVP1	18EC	28/20	28#22					
LIVP2	1995	29/46	29#48					
LSCORE	24C4	11/55	12/ 6	42/14	42/16	43/14	43/19	64#13
M0	0003	5#16	37/10	39/30				
M0A	2731	12/47	29/32	31/47	32/17	40/45	67#39	
M0AA	1985	29/33	29#36					
M0LEN	0002	5#12	5/13	5/14	5/15	36/52	39/22	
M0OFF	0016	31/52	31/54	31/55	36/47	36/49	36/53	36/55
		39/23	39/25	40/50	69#11			
M0PL	D008	4#28	32/ 8					
M1	000C	5#17	37/33	39/48				
M1A	2732	12/48	29/37	32/22	32/42	41/ 8	67#40	
M1LEN	0002	5#13	37/25	39/40				
M1OFF	0021	32/27	32/29	32/30	37/20	37/22	37/26	37/28
		39/41	39/43	41/13	69#12			
M1PL	D009	4#29	32/33					
M2	0030	5#18	38/ 6	40/16				
M2A	2733	13/21	31/30	32/47	33/17	41/21	67#41	
M2AA	1A59	31/31	31#34					
M2LEN	0002	5#14	37/48	40/ 8				
M2OFF	002C	32/52	32/54	32/55	37/43	37/45	37/49	37/51
		40/ 9	40/11	41/26	69#13			
M2PL	D00A	4#30	33/ 8					
M3	00C0	5#19	38/29	40/34				
M3A	2734	13/22	31/35	33/22	33/42	41/34	67#42	
M3LEN	0002	5#15	38/21	40/26				
M3OFF	0037	33/27	33/29	33/30	38/16	38/18	38/22	38/24
		40/27	40/29	41/39	69#14			
M3PL	D00B	4#31	33/33					
M8	2274	56/32	56/41	56#52				
M81	2727	56/29	56/38	57/10	67#27			
M816	2238	10/36	56#27					
M8161	2721	10/31	56/28	56/37	67#24			
M8162	2722	10/33	10/35	56/30	56/39	67#25		
M816P	2724	10/39	10/42	56/34	56/36	56/43	56/44	56/47
		67#26						
M82	2728	56/31	56/40	57/13	67#28			
M8COUN	2290	57/11	57/14	57#16				
M8P	2729	56/33	56/35	56/42	56/45	56/55	57/ 9	57/15
		57/19	67#29					

M8SHIF	227E	57# 7	57/18					
M8X	272B	56/53	57/20	67#30				
MAREA	2B00	37/ 9	37/11	37/32	37/34	37/55	38/ 7	38/28
		38/30	39/29	39/31	39/47	39/49	40/15	40/17
		40/33	40/35	68#34				
MAXMX	00D4	3#27	53/49					
MAXMY	00E5	3#28	53/54					
MAXPVX	2746	18/45	55/18	55/26	68# 8			
MAXPVY	2747	18/46	55/49	56/ 7	68# 9			
MAXSCO	2752	8/52	23/43	43/51	44/18	68#20		
MAXX	00CC	3#22	3/27	52/22	52/26	52/30		
MAXY	00E5	3#24	3/28	53/21	53/25	53/29		
MCXV	215E	52/17	52/36	54#16				
MCYV	2179	53/16	53/35	54#30				
MEMEND	3BFA	2/54	3/ 7	69#15				
MEMLO	02E7	2/55	3/ 8	3#44				
MINMX	002C	3#25	53/47					
MINMY	0015	3#26	53/52					
MINPVX	2744	18/48	55/31	55/38	68# 6			
MINPVY	2745	18/49	56/12	56/19	68# 7			
MINX	002C	3#21	3/25	52/ 7	52/11	52/41		
MINY	001D	3#23	3/26	53/ 6	53/10	53/40		
MNVX	21E6	55/33	55#36					
MNVY	222C	56/14	56#17					
MOVE	204E	29/25	31/10	31/53	32/28	32/53	33/28	51#37
MOVEM	272F	29/23	31/ 8	31/51	32/26	32/51	33/26	51/52
		52/51	67#37					
MR	2730	40/48	41/11	41/24	41/37	49/18	49/24	49/27
		49/29	49/33	49/38	49/44	49/49	67#38	
MSPTAB	26AE	49/19	49/25	66#19				
MSVTAB	26CE	49/34	49/39	49/45	49/50	66#44		
MTITL1	1DF9	43#25	43/32					
MTITL2	1266	11#39	11/48					
MV0	0400	66#39	66/45	66/49	66/53	67/ 7		
MV1	0187	66#40	66/46	66/48	66/50	66/52	66/54	67/ 6
		67/ 8	67/10					
MV2	02D3	66#41	66/47	66/47	66/51	66/51	66/55	66/55
		67/ 9	67/ 9					
MV3	03B2	66#42	66/46	66/48	66/50	66/52	66/54	67/ 6
		67/ 8	67/10					
MVDUN	215D	51/43	54#10					
MVKILL	2158	53/48	53/50	53/53	53/55	54# 7		
MVSPDO	205E	51/42	51#44					
MVTSTM	2141	52/53	53#45					
MXVX	21CC	55/21	55#24					
MXVY	2212	55/52	55#55					
N21A	19B8	30/11	30#14					
N21B	19BB	30/13	30#16					
N21C	1A3E	31/17	31#20					
N21CA	1A4A	31/23	31#26					

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N21D    1A4C    31/19   31/25   31#28
NEGP2   19A8    29/55   30# 7
NEWGAM  1264    11#34   15/36
NEWGM1  13D6    15/14   15#29
NEWGM2  13E3    15/27   15#35
NEWOPT  13E6    14/34   15/20   15#37
NMVM1   2079    51/53   51#55
NMVM2   20EA    52/52   52#54
NOACCE  2237    55/ 8   56#22
NOAP1   1935    28/51   28#55
NOAP2   19F1    30/36   30#40
NOCP1   18F7    28/24   28#27
NOCP2   19A0    29/50   29#53
NOEGP1  18FF    28/29   28#31
NOM0A   1A90    32/ 7   32/10   32/12   32#15
NOM1A   1AC4    32/32   32/35   32/37   32#40
NOM2A   1AF8    33/ 7   33/10   33/12   33#15
NOM3A   1B2C    33/32   33/35   33/37   33#40
NOMNVX  21F1    55/34   55/35   55#40
NOMNVY  2237    56/15   56/16   56#21
NOMP1   198D    29/29   29/31   29/35   29/38   29#40
NOMP2   1A61    31/14   31/29   31/33   31/36   31#38
NOMXVX  21D7    55/19   55/22   55/23   55#28
NOMXVY  221D    55/50   55/53   55/54   56# 9
NOPAUS  18CE    27/47   27#49
NORDGR  1124     7/20    8# 6
NOROT   18E4    28/12   28#15
NOSLEP  18C6    27/38   27#42
NOSUN   18B8    27/23   27#33
NOTFRS  1177     8/38    8#53
NOTL1   1914    28/38   28#40
NOTL2   19D0    30/23   30#25
NOTR1   191E    28/35   28/43   28#45
NOTR2   19DA    30/20   30/28   30#30
NOXH    20CF    51/54   52/27   52/35   52/37   52#43
NOXHB   20C5    52/29   52#38
NOXL    20A4    52/ 8   52/16   52/18   52#24
NOXLB   209A    52/10   52#19
NOYH    2140    53/26   53/34   53/36   53#42
NOYHB   2136    53/28   53#37
NOYL    2115    53/ 7   53/15   53/17   53#23
NOYLB   210B    53/ 9   53#18
NPLAYE  2751     8/50   23/26   30/ 9   31/15   68#19
NUMSTA  0044     3#17   10/27
OPEN    0003     5#31    7/29   16/48
OPNIN   0004     5#35    7/31
OPTION  13E9     9/20   16#10
OPTTBL  160D    16/38   16/40   23#24
P0AREA  2C00    12/20   68#35   68/36
P0PL    D00C     4#32
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P1AREA 2D00    34/35   35/47   38/47   68#36   68/37
P1COL  1FDC    33/ 6   33/31   50#10
P1CV   0088     5#48   10/10   12/31
P1I    250E    34/17   34/19   64#34
P1IX   0032     3#29   12/33
P1IY   0038     3#30   12/35
P1LEN  0008    34/27   38/39   65#21
P1OFF  0000    12/34   12/36   12/38   12/39   12/40   12/41   12/42
               12/43   12/44   12/45   12/46   28/19   28/23   28/53
               29/ 6   29/ 9   29/11   29/12   29/14   29/16   29/18
               29/19   29/21   29/24   34/22   34/24   34/28   34/30
               35/25   35/27   35/31   35/32   35/41   35/44   35/51
               35/53   38/40   38/42   40/49   41/12   50/13   50/20
               50/35   50/38   50/40   69# 9
P1R    272C    12/52   28/39   28/44   28/46   28/48   28/52   34/13
               40/46   41/ 9   67#34
P2AREA 2E00    35/16   36/33   39/13   68#37   68/38
P2COL  2015    32/ 6   32/31   50#48
P2CV   0046     5#49   10/12   12/54
P2I    258E    34/48   34/50   64#54
P2IX   00C8     3#31   13/ 6
P2IY   00D0     3#32   13/ 8
P2LEN  0008    35/ 8   38/55   65#22
P2OFF  000B    13/ 7   13/ 9   13/11   13/12   13/13   13/14   13/15
               13/16   13/17   13/18   13/19   29/45   29/49   30/38
               30/41   30/44   30/46   30/47   30/49   30/51   30/53
               30/54   31/ 6   31/ 9   34/53   34/55   35/ 9   35/11
               36/11   36/13   36/17   36/18   36/27   36/30   36/37
               36/39   39/ 6   39/ 8   41/25   41/38   50/51   51/ 8
               51/23   51/26   51/28   69#10
P2R    272D    13/20   30/24   30/29   30/31   30/33   30/37   34/44
               41/22   41/35   67#35
P2STIC 2754    30/17   30/21   30/26   30/34   68#22
n P3AREA 2F00  68#38
PACTL  D302     2/49    4#17
PAUSE  2748    13/33   14/38   14/40   27/46   68#10
PCCTR  3BC1    12/45   13/18   35/27   35/31   36/13   36/17   50/40
               51/28   69# 6   69/ 7
PCIP   3BC0    12/44   13/17   28/23   29/49   35/25   35/32   35/51
               36/11   36/18   36/37   50/35   50/38   51/23   51/26
               68#55   69/ 6
PCOLR0 02C0     3#54   11/29   27/32
PCOLR1 02C1     3#55   12/32
PCOLR2 02C2     4# 6   12/55
PCOLR3 02C4     4# 7   11/30
PDEAD  3BC2    12/46   13/19   28/19   29/45   35/53   36/39   69# 7
               69/ 8
PEND   2767     2/21   68#28   68/29
PINIT  0709     2/23    2#25
PMAREA 2800     9/28    9/30   11/15   13/53   13/55   64/24   68#33
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                68/34   68/35   68/39
PMBASE D407      4#18   11/16
POKEY  D200      4#11    4/12
POSTKI 1287     12#11   14/48
PRIORV 0011      3#40   10/20
PSIZE  000B     69# 8   69/10   69/11   69/12   69/13   69/14   69/15
PUTCHR 000B      5#33   22/27
PUTSCO 1DD9     12/ 7   14/47   15/ 8   43#10
PVXH   3BBF     12/41   13/13   29/19   29/21   30/54   31/ 6   49/48
                49/51   51/50   52/15   52/34   54/24   54/27   55/14
                55/16   55/27   55/29   55/39   68#54   68/55
PVXL   3BBE     12/40   13/12   29/16   29/18   30/51   30/53   49/43
                49/46   51/47   54/19   54/23   55/11   55/13   55/25
                55/37   68#53   68/54
PVYH   3BBD     12/43   13/16   29/12   29/14   30/47   30/49   49/37
                49/40   52/49   53/14   53/33   54/38   54/41   55/45
                55/47   56/ 8   56/10   56/20   68#52   68/53
PVYL   3BBC     12/42   13/15   29/ 9   29/11   30/44   30/46   49/32
                49/35   52/46   54/33   54/37   55/42   55/44   56/ 6
                56/18   68#51   68/52
PXH    3BBB     12/34   13/ 7   31/54   32/29   32/54   33/29   34/24
                34/55   35/41   36/27   36/49   37/22   37/45   38/18
                45/23   49/23   49/26   50/13   50/51   51/49   51/51
                52/ 6   52/12   52/23   52/25   52/31   52/42   53/46
                68#50   68/51
PXL    3BBA     12/38   13/11   34/22   34/53   36/47   37/20   37/43
                38/16   49/54   51/46   51/48   52/14   52/21   52/33
                52/40   68#49   68/50
PYH    3BB9     12/36   13/ 9   31/55   32/30   32/55   33/30   34/30
                35/11   35/44   36/30   36/55   37/28   37/51   38/24
                38/42   39/ 8   39/25   39/43   40/11   40/29   45/32
                49/17   49/20   50/20   51/ 8   52/48   52/50   52/55
                53/11   53/22   53/24   53/30   53/41   53/51   68#48
                68/49
PYL    3BB8     12/39   13/14   34/28   35/ 9   36/53   37/26   37/49
                38/22   38/40   39/ 6   39/23   39/41   40/ 9   40/27
                49/53   52/45   52/47   53/13   53/20   53/32   53/39
                68#47   68/48   69/ 8   69/15
RANDOM D20A      4#12   10/30   10/44   31/21
RESTRT 1124      2/50    2/52    8#11   15/38
ROTCTR 273C     13/26   28/11   28/14   28/33   29/27   30/18   31/12
                67#49
ROTRAT 2738     13/25   28/13   28/34   29/28   30/19   31/13   67#46
ROWCRS 0054      5#39   21/39
ROWS   004A      3#16   10/32   10/34   68/42
RSCORE 24D4     11/53   11/54   42/25   42/27   43/33   43/38   64#15
RVS    0032      1#11    2/41
S1BLUE 0002      5#44   26/24
S1GOLD 0001      5#41   23/38   23/55   24/40   24/46   25/19   26/ 9
                26/15   26/22
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  S1GREE 0000     5#42   23/27   23/32   23/44   23/49   24/17   24/22
                  7#<3  173#66  148#65
  S1RED  0003     5#43   24/11   24/28   24/34   25/ 7   25/36   25/53
  SCREEN 3000     6/16   64/23   68#39   68/40
  SCRNEN 3BB8    64/23   64/24   68#43   68/47
n SCRNLE Z4FF    64#23
  SDLSTH 0231     4#42   10/19
  SDLSTL 0230     4#41   10/17
  SDMCTL 022F     3#38    8/33   10/ 6   10/23   11/18
  SERIAL 0034     1#12    2/42
  SETVBV E45C     4#46    8/18   13/43   16/26
  SFIELD 3014    10/38   10/41   68#41   68/42
  SFNAME 2764    16/54   17/ 6   68#24
  SKCTL  D20F     4#15    9/11
  SLEEP  15F0    15/31   15/34   22#48
  SLEPCT 273D    57/27   57/29   57/41   57/43   57/45   67#50
  SLEPDN 22C7    57/44   57#47
  SLEPIN 273F    13/32   14/44   14/54   27/37   57/35   57/49   67#51
  SLEPND 22CC    57/42   57/46   57#50
  SLEPNX 22B7    27/39   57#40
  SLEPRA 273A    57/26   57/28   67#48
  SLEPST 229A    35/54   36/40   57#25
n SPDDON 1A61    31#43
  SPDIX  2743     8/48   18/37   25/41   67#55
  SPDMSK 2742    27/53   27/55   28/ 7   45/19   51/40   54/55   67#54
  SPDTBL 270E    18/42   18/44   18/47   67#14
  SPEED  2741    18/43   45/20   51/41   55/ 6   67#53
  SPMLEN 2501     9/24    9/26   64#24
  SSKCTL 0232     4#16    9/10
  STARS1 1203    10#29   11/10
  STARS2 122E    10#49   10/55
  STARS3 1236    10/51   11# 6
  STICK0 0278     4#51   28/36   28/41   28/49   30/12
  STICK1 0279     4#52   30/15
n STICKD 0002     4#54
  STICKL 0004     4#55   28/37   30/22
  STICKR 0008     5# 6   28/42   30/27
  STICKU 0001     4#53   28/50   30/35
  STITL1 3000    43/12   43/13   43/18   43/23   43/30   43/37   43/42
                 68#40   68/41
  STITL2 3BA4    11/46   44/38   68#42   68/43
  STP1EX 1FFF    50/25   50#34
  STP2EX 2038    51/13   51#22
  STRIG0 0284     5# 7   29/30   58/ 7
  STRIG1 0285     5# 8   31/18   58/ 9
  STRTM  1F69    40/51   41/14   41/27   41/40   49#12
  STRTM0 1D48    29/34   40#43
  STRTM1 1D5C    29/39   41# 6
  STRTM2 1D70    31/32   41#19
  STRTM3 1D84    31/37   41#32
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SUNCTR	2736	12/25	27/22	27/25	67#44			
SUNI	2503	12/19	64#28	64/30				
SUNINT	2737	12/27	27/26	27/30	67#45			
SUNLEN	000B	12/16	64#30					
SUNRAT	2735	12/24	27/24	67#43				
SUNX	007A	3#33	11/26	45/24				
SUNY	0086	3#34	12/17	45/33				
TB1	2720	10/28	11/ 9	44/ 8	44/11	44/12	44/17	49/13
		49/22	49/31	49/36	49/42	49/47	67#23	
TITLE1	24C3	43/26	64#12					
TITLE2	24D7	11/40	64#18					
TITLE3	24EB	44/32	64#20					
TRIGOF	22D6	15/10	15/32	19/13	58#17	58/19		
TSTSCO	1E1E	42/19	42/30	43#50				
TT2BLK	1270	11/43	11#45					
TW1	271E	9/25	9/27	9/40	9/41	9/44	9/47	9/49
		13/50	13/52	14/15	14/16	14/19	14/22	14/24
		67#22						
TW2	00FE	2#13	9/29	9/31	9/35	9/36	9/38	10/40
		10/43	11/ 8	21/35	21/36	21/38	21/41	21/46
		21/52	22/ 7	34/18	34/21	34/34	34/49	34/52
		35/15	35/37	35/40	35/46	36/23	36/26	36/32
		42/15	42/17	42/26	42/28	42/39	42/41	42/45
		42/48	42/50	42/54	43/55	44/15	46/37	46/40
		46/44	46/45	46/50	46/51	46/53	46/54	46/55
		47/ 6	47/ 7	47/ 8	47/10	47/11	47/13	47/14
		47/19	47/20	47/22	47/23	47/24	47/25	47/27
		47/32	47/33	47/43	47/44	47/48	47/49	
TW3	00FC	2#14	13/54	14/ 6	14/10	14/11	14/13	
V1AUDC	23F0	59/34	62#22					
V1CONT	23E0	59/23	61#45					
V1COUN	23EB	59/39	62#19					
V1FREQ	23EC	59/32	62#20					
V1RTRI	23E8	18/18	27/17	49/15	59/15	59/19	61#55	
V1TRIG	23E4	9/13	57/31	59/21	59/25	59/42	61#50	
V2AUDC	23F6	60/ 9	62#27					
V2CONT	23E1	9/14	27/15	54/52	57/32	59/48	61#46	
V2COUN	23F4	60/14	62#24					
V2FREQ	23F5	60/ 7	62#25					
V2TRIG	23E5	59/50	60/17	61#51				
V3AUDC	244F	60/42	62#42					
V3CONT	23E2	60/31	61#47					
V3COUN	23F7	60/47	62#29					
V3FREQ	23F8	60/40	62#30					
V3RTRI	23E9	27/16	50/41	51/29	60/23	60/27	62# 6	
V3TRIG	23E6	9/15	60/29	60/33	60/50	61#52		
V4AUDC	24B5	61/25	63# 8					
V4CONT	23E3	61/14	61#48					
V4COUN	24A6	61/30	62#54					
V4FREQ	24A7	61/23	62#55					

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  V4RTRI 23EA     18/ 7   27/18   54/18   54/32   61/ 6   61/10   62# 7
  V4TRIG 23E7      9/16   57/33   61/12   61/16   61/33   61#53
  VBI    188F     13/40   13/41   27#10
n VBIVCE 1B31     33#47
  VER    0030      1#10    2/40
  VOICES 22DC     16/32   27/40   33/48   59#11
  WAITVB 124E     11#21   11/23
  WNWGAM 2753     13/34   14/50   28/28   29/54   44/42   68#21
  XGAH   274C     29/20   30/55   45/49   46/13   68#14
  XGAL   274B     29/17   30/52   45/48   46/12   68#13
  XITVBV E462      4#47    8/15    8/16   16/33   27/41   27/48   33/53
  YGAH   274E     29/13   30/48   45/51   46/23   68#16
  YGAL   274D     29/10   30/45   45/50   46/22   68#15
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