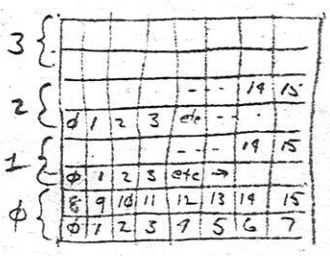
```
;SEATTLE PROGRAM - VERSION 5 - PART 1
;28 JULY 73 - JLS

        000000 .LOC    0

00000 000000           0
00001 002000 INTPT:    2000      ;INTERRUPT POINTER
00002 015000 RPT1B:    15000     ;RESON LIST POINTER "B"
00003 005700 MPT1B:    5700      ;MODIFY LIST    "    "
00004 004000 PPT1B:    4000      ;PITCH  "       "    "
00005 004400 FPT1B:    4400      ;FILTER "       "
00006 005000 EPT1B:    5000      ;ENVELOPE LIST PT # 1 "B"
00007 005000 EPT2B:    5000      ;   "        "    "  2 "B"
00010 005000 EPT3B:    5000      ;   "        "    "  3 "B"

        000040 .LOC    40

00040 010000 CSWPT:    10000     ;CURRENT SWITCH LIST PT.
00041 010100 PSWPT:    10100     ;PREVIOUS   "      "   "
00042 010200 DISPT:    10200     ;DISPLAY LIST PT.
00043 015000 RPT1A:    15000     ;
00044 005700 MPT1A:    5700
00045 004000 PPT1A:    4000
00046 004400 FPT1A:    4400      ;SOUND LIST "A" POINTERS, AS ABOVE
00047 005000 EPT1A:    5000
00050 005000 EPT2A:    5000
00051 005000 EPT3A:    5000      ;
00052 000007 ROVFL:    ~~7~~ 377 ;RESON OVERFLOW CONSTANT
00053 000007 MOVFL:    ~~7~~ 15  ;MODIFY   "       "
00054 000007 POVFL:    ~~7~~ 77  ;PITCH    "       "
00055 000007 FOVFL:    ~~7~~ 41  ;FILTER   "       "
00056 000007 EOVFL:    ~~7~~ 76  ;ENVELOPE "       "

        000060 .LOC    60

00060 001000 RDSPT:    1000      ;READ SWITCH SUBROUTINE PT
00061 001050 APT:      1050      ;ADD MODIFY SUBROUTINE PT.
00062 001060 RPT:      1060      ;RANDOM MODIFY SUBR PT.
00063 001100 SWLPT:    1100      ;SWITCH LIST SUBR PT.
00064 001164 XPT:      1164      ;XOR MODIFY SUBR PT
~~00065 001300 MODPT:  1300~~    ;(NOT USED)
00066 001400 DMAPT:    1400      ;MAP SWITCH LIST INTO DISPLAY SUBR PT.
00067 001600 COPPT:    1600      ;COPY TEMP LIST INTO LIFE LIST SUBR PT.
00070 002400 LIFPT:    2400      ;LIFE SUBR PT.
00071 000360 TPTPT:    360       ;LIFE TEST LIST PT.
00072 011200 TEMPT:    11200     ;TEMP LIST PT.
00073 006000 GPT:      6000      ;BLOB SUBR PT.
00074 000740 RANDP:    ~~740~~ 1240  ;RANDOM # GENERATOR SUBR PT.
00075 000700 BVAPT:    ~~700~~ 1200  ;CHANGE BLOB SPEED SUBR PT.
00076 006600 MMTPT:    6600      ;POINTER TO BLOB SPEED CONSTANT

        000100 .LOC    100

00100 000000 CSW0:     0         ;
00101 000000 CSW1:     0         ;  CURRENT SWITCH
00102 000000 CSW2:     0         ;    PACKED WORDS
00103 000000 CSW3:     0         ;
00104 000000 NCSW:     0         ;# CURRENT SW SET
00105 000000 NPSW:     0         ;# PREVIOUS  "   "
00106 000000 NDISP:    0         ;# IN DISP LIST
```



```
~~00107 000000 NSND:   0~~                    ;(NOT USED)
~~00110 000000 NRES:   0~~                    ;(NOT USED)
00111 000000 NTEMP:   0                       ; # IN TEMP LIST
00112 000000 NTBB:    0                       ; # TO BE BORN
00113 000000 NTBA:    0                       ; # IN ABORT LIST
00114 000000 NTBK:    0                       ; # TO BE KILLED
00115 000000 NLIVE:   0                       ; # ALIVE
00116 177776 KLIV1:   177776                  ;
00117 177775 KLIV2:   177775                  ;  CONSTANTS USED IN LIFE TESTS
00120 177775 BORN1:   177775                  ;
00121 177774 BORN2:   177774                  ;
00122 000000 UPKFL:   0                       ; UNPACK SWITCHES FLAG
00123 000002 FREQ:    2                       ; REAL TIME CLOCK CONTROL (2 = 100 Hz)
00124 000000 TIM1:    0                       ;
00125 000000 TIM2:    0                       ;
00126 000000 TIM3:    0                       ;
00127 000000 TIM4:    0                       ;
00130 000000 DTIME:   0                       ;  TIMERS IN INTERRUPT ROUTINE
00131 000001 RTIME:   1                       ;
00132 000000 STIME:   0                       ;
00133 000000 XTIME:   0                       ;
00134 000000 YTIME:   0                       ;
00135 000000 ZTIME:   0                       ;
00136 000077 TMSK:    77                      ; MASK FOR TIMING
00137 000000 MRFLG:   0                       ; MODIFY RESONATOR FLAG
00140 000000 RTBUF:   0                       ; BUFFER FOR RESON DURATION ARGUMENT
00141 000000 RFLG:    0                       ; RESON FLAG
00142 000000 KMAP:    ~~0~~ ← 2034 P.3        ; CONSTANT USED IN MAPPING SWITCHES INTO
                                                  DISPLAY
~~00143 000000 RAND:   0~~                    ;
~~00144 000000 EXTAV:  0~~                    ;
00145 001000 MAPM:    1000                    ;
00146 000003 MSK3:    3                       ;
00147 000007 MSK7:    ~~7~~ 4                 ;  VARIOUS MASKS & CONSTANTS
00150 176000 MSK6:    176000                  ;
00151 002000 KRAMP:   2000                    ;
00152 000177 MMSK1:   177                     ;
00153 000377 PMSK1:   377   - PITCH MASK      ;
00154 000377 FMSK1:   377   - FILTER MASK      ;
00155 001777 MSK10:   1777                    ;
00156 000017 K17:     17                      ;

      000160 .LOC     160

00160 012000 LLPT:    12000                   ; LIVE LIST PT.
00161 014000 KLPT:    14000                   ; KILL LIST PT
00162 012400 BLPT:    12400                   ; BIRTH LIST PT
00163 013000 ALPT:    13000                   ; ABORT LIST PT.
~~00164 016000 GLPT:   16000~~                ; BLOB LIST PT (NOT USED)
00165 003000 I1PT:    3000                    ; INST 1 SUBR PT
00166 003220 I2PT:    3220                    ; INST 2 SUBR PT
00167 003500 I3PT:    3500                    ; INST 3 SUBR PT
~~00170 000000 I4PT:   0~~                    ; INST 4 SUBR PT (NOT USED)
00171 001050 MSRPT:   1050                    ; MODIFY SUBR PT

      000200 .LOC     200

~~00200 000040 MTIM1:  40~~                   ;
~~00201 000040 MTIM2:  40~~                   ;  MODE CONTROL TIMERS (NOT USED)
```

```
00300 000000 SAV0:    0
00301 000000 SAV1:    0
00302 000000 SAV2:    0
00303 000000 SAV3:    0
00304 000000 SAVC:    0
00305 000000 F1FLG:   0
00306 000000 F2FLG:   0
00307 000000 F3FLG:   0
~~00310 000000 F4FLG:   0~~
00311 000777 EMSK1:   777
00312 001760 FMSK2:   1760
00313 001777 PMSK2:   1777

      000344 .LOC     344

00344 000000 BBF:     0
00345 000000 MBF:     0
00346 000000 KBF:     0

      000360 .LOC     360

00360 000077 T1:      77
00361 007477 T2:      7477
00362 007400 T3:      7400
00363 007401 T4:      7401
00364 000001 T5:      1
00365 000401 T6:      401
00366 000400 T7:      400
00367 000477 T8:      477

      .EOT
```

INTERRUPT SAVES AC's + C HERE

FUNCTION FLAGS

STAG.: @ 314 ← 743
LXMT.: @ 315 ← 764

PATCH POINTERS

CONTROL FLAGS FOR BLOB

| | |
|---|---|
| 0, -1 | |
| -1, -1 | |
| -1, 0 | |
| -1, +1 | OFFSETS for LIFE TESTS |
| 0, +1 | |
| +1, +1 | |
| +1, 0 | |
| +1, -1 | |

```
00202 000040 KMTIM:   ~~40~~ 2000      ;KMTIM CONTROLS RATE of MODE CHANGE
00203 000000 I1FLG:   0       FLAG
00204 000000 I2FLG:   0
00205 000000 I3FLG:   0
00206 000000 I4FLG:   0
00207 000000 MFLG1:   0
00210 000000 MFLG2:   0
00211 000000 ESTP1:   0       STEP (AMOUNT of DISP)
00212 000000 ESTP2:   0
00213 000000 ESTP3:   0
00214 000000 ESTP4:   0
00215 000000 ETOT1:   0       TOTAL (STEP COUNT)
00216 000000 ETOT2:   0                ; INSTRUMENT BUFFERS MASKS, ETC.
00217 000000 ETOT3:   0
00220 000000 ETOT4:   0
00221 000777 ESPD1:   777     EVENT RATE MASKS
00222 000377 ESPD2:   377
~~00223 000777 ESPD3:   1777~~ 777
~~00224 000000 ESPD4:   0~~
00225 000000 PNEW1:   0
00226 000000 PNEW2:   0                ESPD2 = 337
00227 000000 PNEW3:   0
00230 000000 PNEW4:   0       OUTPUT DATA BUFFERS
00231 000000 FNEW1:   0
00232 000000 FNEW2:   0
00233 000000 ENEW1:   0
00234 000000 ENEW2:   0
00235 000000 ENEW3:   0
00236 000000 E2BSE:   0

      000240 .LOC     240

00240 000000 PAD1:    0       PITCH 1
00241 002000 PAD2:    2000    PITCH 2
00242 004000 PAD3:    4000    PITCH 3
00243 006000 PAD4:    6000    PITCH 4   ; INSTRUMENT OUTPUT ADDRESSES
00244 012000 FFAD1:   12000   FILT 1
00245 016000 FFAD2:   16000   FILT 2
00246 030000 EAD1:    30000   ENV 1
00247 040000 EAD2:    40000   ENV 2
00250 050000 EAD3:    50000   ENV 3
00251 000037 KSTAG:   ~~37~~  777
00252 000177 LMXT:    ~~177~~ 3777
  253 000000 JRAND:   0  <-----  254 <- 3054  K3054:
      000260 .LOC     260        255 <- 2020  K2020:

00260 000000 F1BSE:   0
00261 000000 F2BSE:   0
00262 000000 F3BSE:   0
~~00263 000000 F4BSE:   0~~
00264 000000 F1DSP:   0
00265 000000 F2DSP:   0                ; FUNCTION CONTROL ROUTINES IN
00266 000000 F3DSP:   0                  INTERRUPT USE THESE
~~00267 000000 F4DSP:   0~~              LOCATIONS FOR PASSING
00270 000000 F1TOT:   0                  ARGUMENTS FROM ENVELOPE
00271 000000 F2TOT:   0                  PART OF INSTRUMENT ROUTINES
00272 000000 F3TOT:   0
~~00273 000000 F4TOT:   0~~

      000300 .LOC     300
```

```
                    ;INITIALIZATION AND EXECUTIVE ROUTINE

                    000400 .LOC    400

00400 102440 START: SUBO   0,0                          CLEAR AC + ZERO
00401 126400        SUB    1,1                              ↓
00402 152400        SUB    2,2
00403 176400        SUB    3,3
00404 040344 101000 STA    0,BBF        MOV 0,0
00405 040345        STA    0,MBF
00406 040346        STA    0,KBF
# 00407 040341 040341 STA    0,NBLIV
# 00410 040342 040342 STA    0,NBDIS
00411 040115        STA    0,NLIVE
00412 040111        STA    0,NTEMP
00413 040106        STA    0,NDISP
00414 040104        STA    0,NCSW
00415 040105        STA    0,NPSW
00416 040107        STA    0,NSND
00417 040110        STA    0,NRES
00420 040122        STA    0,UPKFL
00421 040137        STA    0,MRFLG
00422 040203        STA    0,I1FLG
00423 040204        STA    0,I2FLG
00424 040205        STA    0,I3FLG
00425 040206        STA    0,I4FLG
00426 040207        STA    0,MFLG1
00427 040210        STA    0,MFLG2
00430 040305        STA    0,F1FLG
00431 040306        STA    0,F2FLG
00432 040307        STA    0,F3FLG
00433 040310        STA    0,F4FLG
00434 040124        STA    0,TIM1
00435 040125        STA    0,TIM2
00436 040126        STA    0,TIM3
00437 040127        STA    0,TIM4
00440 040130        STA    0,DTIME
00441 040132        STA    0,STIME
00442 040133        STA    0,XTIME
00443 040134        STA    0,YTIME
00444 040135        STA    0,ETIME
00445 040141        STA    0,RFLG
00446 101000 101400 MOV    0,0          INC 0,0          ; AC 0 ← 1 + SET
00447 101000 040131 MOV    0,0          STA 0,RTIME          ↓
00450 101000 042314 MOV    0,0          STA 0,@STAG.
00451 101000 042315 MOV    0,0          STA 0,@LXMT.
00452 101400 101000 INC    0,0              MOV 0,0
00453 040131 040344 STA    0,RTIME      STA 0,BBF
00454 020202        LDA    0,KMTIM  }   MODE CHANGE
00455 040200        STA    0,MTIM1  }
00456 040201        STA    0,MTIM2  }
00457 101000        MOV    0,0
00460 101000        MOV    0,0
00461 101000        MOV    0,0
00462 101000        MOV    0,0
00463 062677        IORST                            ; CLEAR ALL I/O FLAGS

00464 020123 SETC:  LDA    0,FREQ
00465 061114        DOAS   0,RTC                     ; SET RTC TO 100 Hz
00466 060177        INTEN                            ; TURN ON INT
```

```
00467 020115 BEGIN:  LDA     0,NLIVE          ; RFLG ← NTIME
00470 040141         STA     0,RFLG             SET IF ANY LIFE
00471 101000         MOV     0,0
00472 101000         MOV     0,0
00473 ~~101000~~ ~~020134~~  ~~MOV~~  ~~0,0~~   LDA 0 YTIME
                     1Ø1123
00474 ~~014200~~ ~~TT1:~~    ~~DSZ~~  ~~MTIM1~~ MOVZL 0,0,SNC   ; IS Y TIME NEG?
00475 000571         JMP     CALL               ; NO, DO SUBROUTINES
                     Ø2Ø2Ø2
00476 ~~014201~~ ~~TT2:~~    ~~DSZ~~  ~~MTIM2~~  LDA 0,KMTIM    ; YES, RELOAD YTIME
00477 ~~000404~~ ~~040134~~  ~~JMP~~  ~~SET1~~   STA 0,YTIME
00500 ~~000002~~ ~~000406~~  ~~LDA~~  ~~0,KMTIM~~ JMP FLINC    ; CHANGE MODES
00501 040201         STA     0,MTIM2
00502 000404         JMP     FLINC

00503 020202 SET1:   LDA     0,KMTIM
00504 040200         STA     0,MTIM1
00505 000561         JMP     CALL

00506 020207 FLINC:  LDA     0,MFLG1   STARTS VAL=0   ; INCREMENTS (AND MASKS)
00507 024146         LDA     1,MSK3    =03              MODIFY FLAG - INSTRUMENT
00510 101400         INC     0,0       SET TO 1         ROUTINES USE FLAG TO
00511 123400         AND     1,0                        DETERMINE MODIFY STATE
00512 040207         STA     0,MFLG1
                     Ø1Ø21Ø
00513 ~~000210~~ ~~MINC:~~   ~~LDA~~  ~~0,MFLG2~~        ISZ MFLG2
00514 ~~101005~~ 000402      ~~MOV~~  ~~0,0,SNR~~       JMP .+2
00515 000412         JMP     MODE0
00516 ~~024147~~ 024210      ~~LDA~~  ~~1,MSK7~~ ;MSK7=7   LDA 0, MFLG2
00517 ~~107405~~ 024147      ~~AND~~  ~~0,1,SNR~~       LDA 1, MSK7 (MSK7 = 4)
00520 ~~000500~~ 107404      ~~JMP~~  ~~MODE4~~         AND 0,1, SZR
00521 ~~101103~~ 000502      ~~MOVZL~~ ~~0,0,SNC~~      JMP MODE4
00522 ~~000424~~ 101223      ~~JMP~~  ~~MODE1~~         MOVZR 0,0,SNC
00523 ~~101103~~ 000442      ~~MOVZL~~ ~~0,0,SNC~~      JMP MODE2
00524 ~~000441~~ 101223      ~~JMP~~  ~~MODE2~~         MOVZR 0,0,SNC
00525 ~~000402~~ 000421      ~~JMP~~  ~~MODE0~~         JMP MODE1
                     000456
00526 ~~000467~~ ~~BACK:~~   ~~BEGIN~~                  JMP MODE3

00527 102440 MODE0:  SUBO    0,0
00530 040204         STA     0,I2FLG   } ; CLEAR
00531 040205         STA     0,I3FLG   }   THESE FLAGS
00532 040137         STA     0,MRFLG   }
00533 101000         MOV     0,0
00534 101000         MOV     0,0
00535 101000         MOV     0,0
00536 102520         SUBEL   0,0
00537 040203         STA     0,I1FLG   ; SET THIS FLAG
00540 101000         MOV     0,0
00541 101000         MOV     0,0
00542 101000         MOV     0,0
00543 101000         MOV     0,0
00544 101000         MOV     0,0
00545 000475         JMP     EMODE

00546 102440 MODE1:  SUBO    0,0
00547 040205         STA     0,I3FLG
00550 101000         MOV     0,0
00551 101000         MOV     0,0
```

INCREMENTS MODE FLAG & TESTS for 0, 1, 2, 3, or 4, GOES TO APPROPRIATE MODE ROUTINE TO SET AND/OR CLEAR INSTRUMENT FLAGS AND MODIFY CONDITIONS

MODE 0 : INST 1 ONLY

MODE 1 : INSTS 1 & 2, MODIFY RESONATOR FLAG SET

```
00552 101000            MOV     0,0
00553 101000            MOV     0,0
00554 101000            MOV     0,0
00555 102520            SUBZL   0,0
00556 040203            STA     0,I1FLG
00557 040204            STA     0,I2FLG
00560 040137 161000     STA     0,MRFLG     MOV ϕ,ϕ
00561 101000            MOV     0,0
00562 101000            MOV     0,0
00563 101000            MOV     0,0
00564 000456            JMP     EMODE

00565 102440 MODE2:     SUBO    0,0
00566 040137            STA     0,MRFLG
00567 101000            MOV     0,0
00570 101000            MOV     0,0
00571 101000            MOV     0,0
00572 101000            MOV     0,0
00573 101000            MOV     0,0
00574 102520            SUBZL   0,0
00575 040203            STA     0,I1FLG
00576 040204            STA     0,I2FLG
00577 040205            STA     0,I3FLG
00600 101000            MOV     0,0
00601 101000            MOV     0,0
00602 101000            MOV     0,0
00603 000437            JMP     EMODE

00604 102440 MODE3:     SUBO    0,0
00605 040204            STA     0,I2FLG
00606 101000            MOV     0,0
00607 101000            MOV     0,0
00610 101000            MOV     0,0
00611 101000            MOV     0,0
00612 101000            MOV     0,0
00613 102520            SUBZL   0,0
00614 040203            STA     0,I1FLG
00615 040205            STA     0,I3FLG
00616 040137 161000     STA     0,MRFLG     MOV ϕ,ϕ
00617 101000            MOV     0,0
00620 101000            MOV     0,0
00621 101000            MOV     0,0
00622 000420            JMP     EMODE

00623 102440 MODE4:     SUBO    0,0
00624 040210 ϕ40137     STA     0,MFLG2     STA ϕ, MRFLG
00625 040137 126000     STA     0,MRFLG     ADC 1,1     ; SET MODE FLAG
00626 101000 ϕ44210     MOV     0,0         STA 1, MFLG2    TO -1
00627 101000            MOV     0,0                         FOR NEXT
00630 101000            MOV     0,0                         INCREMENT
00631 101000            MOV     0,0
00632 102520            SUBZL   0,0
NNN00633 044000 ϕ4ϕ2ϕ3 STA     0,I1FLG ϕ,I1FLG
00634 040204            STA     0,I2FLG
00635 040205            STA     0,I3FLG
00636 101000            MOV     0,0
00637 101000            MOV     0,0
00640 101000            MOV     0,0
00641 000401            JMP     EMODE
```

MODE 2: INSTS 1, 2, + 3

MODE 3: INSTS 1 + 3 + MODIFY RESONATORS

MODE 4: INST 1, 2, + 3

```
00642 006075 EMODE:  JSR    @BVAPT      ; ALL MODES EXIT TO HERE, MODIFY BLOB SPEED
00643 125120         MOVZL  1,1
00644 125120         MOVZL  1,1
00645 125120         MOVZL  1,1
00646 125120         MOVZL  1,1
00647 125120         MOVZL  1,1
00650 020156 020155  LDA    0,K17 MSK1Ø  ; PMSK1 = 377
00651 107000 010400  ADD AND 0,1
00652 044222         STA    1,ESPD2      ; SET INST 2 EVENT SPEED
00653 006074 020000  JSR    @RANDP
00654 020130 024254  LDA    0,DTIME      LDA Ø,Ø
00655 024145 030255  LDA    1,MAPM       LDA 1,K3Ø54
00656 107404 123400  AND    0,1,SZR      LDA 2,K2Ø2Ø
00657 000407 143000  JMP    CALL         AND 1,Ø   } SET NEW MAPPING OF LIFE DISPLAY
00660 020000 101000  LDA    0,0          ADD 2,Ø
00661 101000         MOV    0,0          MOV Ø,Ø
00662 101000         MOV    0,0
00663 101000         MOV    0,0
00664 040142         STA    0,KMAP
00665 000401         JMP    CALL

00666 102440 CALL:   SUBO   0,0         ; HERE BEGINS THE SERIES OF SUBR CALLS ; CALL
00667 006060         JSR    @RDSPT       READ SWITCH, AND IF UPKFL
00670 102440         SUBO   0,0          GETS SET, CALL SWITCH LIST.
00671 020122         LDA    0,UPKFL
00672 101004         MOV    0,0,SZR
00673 006063         JSR    @SWLPT

00674 102440 CONT1:  SUBO   0,0         ; MAP SWITCH LIST TO TEMP SUBR
00675 006066         JSR    @DMAPT

00676 102440 CONT2:  SUBO   0,0         ; COPY TEMP TO LIFE SUBR
00677 006067         JSR    @COPPT

00700 102440 CONT3:  SUBO   0,0         ; RUN A LIFE GENERATION SUBR * NOTE: AT THIS POINT FIRST LAMP DATA IS AVAILABLE TO INTERRUPT
00701 006070         JSR    @LIFPT

00702 102440 CONT4:  SUBO   0,0         ; RUN A BLOB GENERATION
00703 006073         JSR    @GPT

00704 102440 CONT5:  SUBO   0,0         ; DO INST 1
00705 006165         JSR    @I1PT

00706 102440 CONT6:  SUBO   0,0         ; DO INST 2
00707 006166         JSR    @I2PT

00710 102440 CONT7:  SUBO   0,0         ; DO INST 3
00711 006167         JSR    @I3PT

00712 102440 CONT8:  SUBO   0,0
00713 000401         JMP    BREAK

      034115
00714 020115 BREAK:  LDA    3,NLIVE      ; THIS ROUTINE SEES IF NLIVE = PREVIOUS NLIVE FOR KSTAG # OF TIMES (777) KILLS LIFE WHEN STATIC PATTERNS ARE LEFT
00715 101005 175005  MOV    3,3,SNR
00716 000610 002447  JMP    @BACK
00717 024425         LDA    1,NREF
00720 130400         NEG    1,2
00721 113004 133004  ADD    3,2,SZR
00722 000416         JMP    LCSET
00723 014420         DSZ    STAGC
```

```
                00724 000412            JMP     IGNOR

                00725 102440 LKILL:     SUBO    0,0             ; KILLS LIFE AND STARTS
                00726 040416            STA     0,NREF              BLOB AGAIN
                00727 040115            STA     0,NLIVE
                00730 040106            STA     0,NDISP
                00731 040345            STA     0,MBF
                00732 040346            STA     0,KBF
                00733 102520            SUBEL   0,0
                00734 040344            STA     0,BBF
                00735 000403            JMP     LCSET
                      054406
                00736 040406 IGNOR:     STA     3,0,NREF
                00737 000406            JMP     LIMIT

                00740 020251 LCSET:     LDA     0,KSTAG             ; RESET
                00741 040402            STA     0,STAGC
                00742 000774            JMP     LIMIT       ;JMP IGNOR

                00743 000000 STAGC:     0 1
                00744 000000 NREF:      0

                00745 020346 LIMIT:     LDA     0,KBF           ; THIS ROUTINE KILLS LIFE
                00746 101005            MOV     0,0,SNR             IF BREAK DOESNT WORK -
                00747 002416            JMP     @BACK               IN CASE OSCILLATING PATTERNS
                00750 014414            DSZ     LMXTC               DEVELOP, AND JUST FOR
                00751 002414            JMP     @BACK               GOOD MEASURE EVERY LMXTC
                00752 102440            SUBO    0,0                 (3777) GENERATIONS
                00753 040115            STA     0,NLIVE
                00754 040106            STA     0,NDISP         ; KILLS LIFE + STARTS
                00755 040345            STA     0,MBF               BLOB
                00756 040346            STA     0,KBF
                00757 102520            SUBEL   0,0
                00760 040344            STA     0,BBF
                00761 020252            LDA     0,LMXT
                00762 040402            STA     0,LMXTC
                00763 002402            JMP     @BACK

                00764 000000 LMXTC:     0 1
                00765 000467 BACK :     BEGIN



                        .LOC    1200

                ;SUBROUTINE TO VARY BLOB SPEED

1200            00760 054410 BVARY:     STA     3,BVSAV         ; SAVE RETURN
   1            00761 020000            LDA     0,0             ; LOAD LAST INT RETURN ADD
   2            00762 024407            LDA     1,VMSK          ; MASK LAST 5 BITS
   3            00763 107400            AND     0,1
   4            00764 030406            LDA     2,KVAR          ; ATTACH LEADING 1'S
   5            00765 147000            ADD     2,1
   6            00766 046076            STA     1,@MMTPT        ; STORE AT 6600 (BLOB SPEED
   7            00767 002401            JMP     @BVSAV                  CONSTANT)

1210            00770 000000 BVSAV:     0
   1            00771 000037 VMSK:      37
   2            00772 177740 KVAR:      177740
```

~~000740 .LOC 740~~ 1240

```
                ;SUBROUTINE TO READ RANDOM FROM ANALOG INPUT

1240  00740 054412 RRAND:  STA     3,RNDSV
   1  00741 102440         SUBO    0,0
   2  00742 101140         MOVOL   0,0
   3  00743 101120         MOVZL   0,0
   4  00744 101140         MOVOL   0,0     ;SETS AC0=5
   5  00745 061076         DOA     0,76
   6  00746 064476         DIA     1,76
   7  00747 044143         STA     1,RAND
  10  00750 061476         DIB     0,76    ;START NEXT A/D CONVERT
   1  00751 002401         JMP     @RNDSV

   2  00752 000000 RNDSV:  0
```

~~.EOT~~

NOT USED

```
                ;SUBROUTINE TO READ TOUCHPLATE SWITCHES

        001000 .LOC     1000

01000 054444 RDSW:  STA     3,RTNRD
01001 102440        SUBO    0,0         ;AC0=UPKFLG AC
01002 126400        SUB     1,1         ;AC1=ENABLE AC
01003 152400        SUB     2,2         ;AC2=SWAP AC
01004 176400        SUB     3,3         ;AC3=INPUT AC

01005 065076 RD0:   DOA     1,76
01006 030100        LDA     2,CSW0
01007 074476        DIA     3,76
01010 156414        SUB#    2,3,SER
01011 101400        INC     0,0
01012 054100        STA     3,CSW0

01013 125400 RD1:   INC     1,1
01014 065076        DOA     1,76
01015 030101        LDA     2,CSW1
01016 074476        DIA     3,76
01017 156414        SUB#    2,3,SER
01020 101400        INC     0,0
01021 054101        STA     3,CSW1

01022 125400 RD2:   INC     1,1
01023 065076        DOA     1,76
01024 030102        LDA     2,CSW2
01025 074476        DIA     3,76
01026 156414        SUB#    2,3,SER
01027 101400        INC     0,0
01030 054102        STA     3,CSW2

01031 125400 RD3:   INC     1,1
01032 065076        DOA     1,76
01033 030103        LDA     2,CSW3
01034 074476        DIA     3,76
01035 156414        SUB#    2,3,SER
01036 101400        INC     0,0
01037 054103        STA     3,CSW3

01040 101004 TSTFL: MOV     0,0,SER
01041 010122        ISE     UPKFL
01042 002402        JMP     @RTNRD
01043 002401        JMP     @RTNRD

01044 000000 RTNRD: 0

                ;SUBROUTINE TO UNPACK AND LIST SWITCH COORDINATES

        001100 .LOC     1100

01100 054453 SWLST: STA     3,RTNSW ;POINTER AND TOTAL SWAP
01101 020040        LDA     0,CSWPT
01102 024041        LDA     1,PSWPT
01103 030104        LDA     2,NCSW
01104 050105        STA     2,NPSW
01105 044040        STA     1,CSWPT
01106 040041        STA     0,PSWPT
01107 152440        SUBO    2,2         ;COORDINATE AC
```

```
01110 050104          STA     2,NCSW  ;ZEROES

01111 044020 SETUP:   STA     1,20

01112 020100 GET:     LDA     0,CSW0    ; GET FIRST SW WORD
01113 004412          JSR     UPK
01114 020101          LDA     0,CSW1
01115 004410          JSR     UPK
01116 020102          LDA     0,CSW2
01117 004406          JSR     UPK
01120 020103          LDA     0,CSW3
01121 004404          JSR     UPK
01122 102440          SUBO    0,0
01123 040122          STA     0,UPKFL ;CLEARS
01124 002427          JMP     @RTNSW

01125 054427 UPK:     STA     3,UPKSV
01126 126440          SUBO    1,1     ;
01127 125520          INCZL   1,1     ; AC1 ← 1, CARRY CLEAR
01130 044425          STA     1,XCNT  ;SET XCNT=2
01131 125120          MOVZL   1,1
01132 125120          MOVZL   1,1
01133 044423          STA     1,YCNT  ;SET YCNT=8

01134 101123 ROT:     MOVZL   0,0,SNC ;TEST A BIT (SHIFT LEFT, SKIP IF SET)
01135 000403          JMP     SERV
01136 052020          STA     2,@20   ;LIST A COORDINATE PAIR *
01137 010104          ISZ     NCSW    ; TALLY THIS PAIR

01140 151400 SERV:    INC     2,2     ; INCREMENTS AC2 IN Y
01141 014415          DSZ     YCNT
01142 000772          JMP     ROT
01143 044413          STA     1,YCNT  ;RESET YCNT=8
01144 024413          LDA     1,KX    ;KX=400
01145 133000          ADD     1,2     ;INCREMENT X BYTE
01146 034412          LDA     3,YMSK  ;YMSK=3400
01147 173400          AND     3,2     ;CLEARS Y BYTE

01150 014405 LAST:    DSZ     XCNT
01151 000763          JMP     ROT
01152 002402          JMP     @UPKSV

01153 000000 RTNSW:   0
01154 000000 UPKSV:   0
01155 000000 XCNT:    0
01156 000000 YCNT:    0
01157 000400 KX:      400
01160 003400 YMSK:    3400

              .EOT
```

* AC2 CARRIES THE APPROPRIATE RUNNING TOTAL IN X,Y OF THE BIT BY BIT UNPACKING OF THE 4 SWITCH WORDS

** .LOC 1200 BVARY: ; SUBR, PREV PAGE.

```
                ;SUBROUTINE TO MOVE SW ARRAY (TEST 4)

        001400 .LOC    1400

01400 054431 DMAP1:  STA    3,RDMP1     ;SAVE RETURN
01401 020104         LDA    0,NCSW      ; ANY IN CURRENT SW LIST ?
01402 101005         MOV    0,0,SNR
01403 000424         JMP    EXITM       ; NO, RETURN
01404 104400         NEG    0,1       ;AC1=LOOP COUNT
01405 102440         SUBO   0,0         ;
01406 040425         STA    0,NDSPM     }
01407 020040         LDA    0,CSWPT     } INITIALIZE LISTS & POINTERS
01410 040020         STA    0,20        }
01411 020072         LDA    0,TEMPT     }
01412 040021         STA    0,21        }

01413 034417 TRANS:  LDA    3,RDMSK ;RDMSK=7477
01414 030142         LDA    2,KMAP    ; KMAP = OFFSET ADDED TO EACH LOC
                                         TO MOVE SW ARRAY INTO LAMP ARRAY
01415 151000         MOV    2,2
01416 151000         MOV    2,2
01417 173400         AND    3,2     ; RDMSK ELIMINATES CARRY OUTS IN X,Y

01420 022020 MLOOP:  LDA    0,@20       ;
01421 143000         ADD    2,0         }
01422 042021         STA    0,@21       } TRANSFER LOOP
01423 010410         ISE    NDSPM       }
01424 125404         INC    1,1,SER     }
01425 000773         JMP    MLOOP       }
01426 020405         LDA    0,NDSPM     }

01427 040111 EXITM:  STA    0,NTEMP     ; CLEAR NTEMP IF NCSW = ϕ
01430 002401         JMP    @RDMP1          OTHERWISE LOAD WITH TOTAL

01431 000000 RDMP1:  0
01432 006074 RDMSK:  6074
01433 000000 NDSPM:  0

                ;SUBROUTINE TO COPY MAPPED SWLIST INTO LIVELIST

        001600 .LOC    1600

01600 054425 COPY:   STA    3,COPSV     ; SAVE RETURN
01601 020111         LDA    0,NTEMP     ; ANY IN TEMP LIST ?
01602 101005         MOV    0,0,SNR     ;
01603 002422         JMP    @COPSV      ; NO, RETURN
01604 020115         LDA    0,NLIVE     ; ANY NLIVE ?
01605 101005         MOV    0,0,SNR
01606 000437         JMP    NOLIV       ; IF NLIVE = ϕ, TEMP LIST IS
                                            COPIED DIRECTLY
01607 020072 CMPR:   LDA    0,TEMPT     ; NLIVE ≠ ϕ, THEN LOOK FOR
01610 040020         STA    0,20            EACH TEMP LIST ENTRY IN
01611 020160         LDA    0,LLPT          LIVE LIST, IF PRESENT DO NOT
01612 024115         LDA    1,NLIVE   }     LIST, ONLY LIST IF NOT
01613 107000         ADD    0,1       }     ALREADY IN LIVE LIST
01614 044022         STA    1,22      }
01615 020111         LDA    0,NTEMP   }   ; SET A POINTER TO BOTTOM OF LIVE
01616 100400         NEG    0,0       }       LIST

01617 032020 SAME:   LDA    2,@20       ; GET FIRST TEMP LOC.
```

```
01620 150400          NEG     2,2
01621 004405          JSR     DUPL      ; AC2 CARRIES NEGATIVE OF LOCATION
01622 101404          INC     0,0,SZR       TO BE COMPARED
01623 000774          JMP     SAME

01624 002401 ALL:     JMP     @COPSV

01625 000000 COPSV:   0

01626 054416 DUPL:    STA     3,DSAV    ; SAVE RETURN — THIS SUBR
01627 024160          LDA     1,LLPT        DOES THE ACTUAL COMPARISON
01630 044021          STA     1,21
01631 024115          LDA     1,NLIVE
01632 124400          NEG     1,1

01633 036021 SLOOP:   LDA     3,@21     ; GET FIRST LIVE LOC.
01634 157005          ADD     2,3,SNR   ; SAME AS TEMP LOC UNDER TEST ?
01635 002407          JMP     @DSAV     ; YES, FOUND, EXIT
01636 125404          INC     1,1,SZR   ; NO, LOOK AGAIN
01637 000774          JMP     SLOOP

01640 150400 NOTIN:   NEG     2,2       ; NOT IN LIST.
01641 052022          STA     2,@22     ; LOAD AT BOTTOM OF LIVE LIST.
01642 010115          ISZ     NLIVE     ; NLIVE ← NLIVE + 1
01643 002401          JMP     @DSAV     ; RETURN

01644 000000 DSAV:    0

01645 020160 NOLIV:   LDA     0,LLPT    ; NLIVE = ¢, SET PT TO HEAD OF
01646 040021          STA     0,21          LIVELIST
01647 020072          LDA     0,TEMPT   ; SET PT TO HEAD OF TEMP LIST
01650 040020          STA     0,20
01651 020111          LDA     0,NTEMP   ; SETUP COUNTER = -(NTEMP)
01652 100400          NEG     0,0

01653 026020 DUP:     LDA     1,@20     ;
01654 046021          STA     1,@21     }  TRANSFER LOOP
01655 010115          ISZ     NLIVE     }
01656 101404          INC     0,0,SZR   ;
01657 000774          JMP     DUP       ; DONE, RETURN
01660 002745          JMP     @COPSV

                      .EOT
```

```
                ;INTERRUPT ROUTINE - FREQ 100 HZ

        002000 .LOC    2000

02000 063614 INT:    SKPDN   RTC       ;EXIT IF CLOCK DID NOT CAUSE
02001 ~~000767~~ 000000 JMP   @RET.     INTERRUPT

02002 040300 SAVE:   STA     0,SAV0    ;
02003 044301         STA     1,SAV1
02004 050302         STA     2,SAV2    } SAVE AC 0-3 AND CARRY
02005 054303         STA     3,SAV3
02006 102560         SUBCL   0,0
02007 040304         STA     0,SAVC

02010 014124 TICK:   DSE     TIM1      ;
02011 060076         NIO     76
02012 014125         DSE     TIM2
02013 060076         NIO     76
02014 014126         DSE     TIM3
02015 060076         NIO     76
02016 014127         DSE     TIM4      INCREMENT OR DECREMENT
02017 060076         NIO     76        TIMERS, AS APPROPRIATE
02020 010130         ISE     DTIME
02021 060076         NIO     76          TIM1 - TIM4 - INSTRUMENT
02022 010132         ISE     STIME         EVENT TIMERS
02023 060076         NIO     76
02024 010133         ISE     XTIME       DTIME - NOT USED
02025 060076         NIO     76          STIME - SOUND TIMER
02026 ~~010134~~ 014134 ~~ISE~~ DSZ YTIME  XTIME } BLOB TIMERS
02027 060076         NIO     76          ZTIME }
02030 010135         ISE     ZTIME       YTIME - MODE TIMER
02031 060076         NIO     76        INITALLY ALL 0 ?

02032 102620 DISP:   SUBER   0,0       ;SET AC0=140000
02033 101240         MOVOR   0,0       ;(ENABC)
02034 063376         DOCP    0,76      ;CLEAR DISPLAY
02035 020106         LDA     0,NDISP
02036 101005         MOV     0,0,SNR
02037 000431         JMP     RESON     ; IF NO DISP LIST ENTRIES
02040 104400         NEG     0,1
02041 102620         SUBER   0,0       ;SET AC0=040000
02042 101220         MOVER   0,0       ;(ENABL)
02043 063076         DOC     0,76
02044 020042         LDA     0,DISPT
02045 040027         STA     0,27      ; AUTOINDEX 27 ONLY USED BY INTERRUPT

02046 022027 DLOOP:  LDA     0,@27     ; GET A LAMP LOCATION (& AUTO INCREMENTING LOCATION)
02047 061076         DOA     0,76      ; OUTPUT THE LAMP LOCATION
02050 060376         NIOP    76        ; "P" PULSE TO EXECUTE, ALLOWS TIME
02051 125404         INC     1,1,SER     FOR I/O DECODING TO SETTLE
02052 000774         JMP     DLOOP     ; DONE? NO
02053 000415         JMP     RESON       YES GO ON

02054 000007 SMASK:  7
02055 000777 RMSK1:  777
02056 176000 RMSK2:  176000
02057 001777 RMSK3:  1777
02060 000040 RESD:   40
02061 000000 DELAY:  0
02062 002370 RET.:   RET               ; POINTER TO RETURN (OUT OF PC RANGE)
```

```
        002070 .LOC    2070

02070 020141 RESON:  LDA    0,RFLG       ; RFLG SET? ONLY SET IF NLINE
                                              NON ZERO
02071 101005         MOV    0,0,SNR
02072 000450         JMP    SOUND        ; NO, GO ON TO SOUND
02073 014131         DSZ    RTIME   ;RTIME (INIT = >0 — OR PROGRAM WILL
02074 000446         JMP    SOUND        ; NOT TIME      LOCK OUT FOR
02075 020043         LDA    0,RPT1A      ; SET UP POINTER  320 SECONDS)
02076 024757         LDA    1,RMSK1 ;RMSK1=777
02077 101400         INC    0,0          ; BUMP POINTER
02100 123400         AND    1,0          ; MASK IN CASE OF CARRY
02101 034052         LDA    3,ROVFL
02102 104400         NEG    0,1          ; TEST FOR NEW VALUE > ROUFL
02103 167000         ADD    3,1
02104 125122         MOVEL  1,1,SEC      ; SKIP IF LESS
02105 102440         SUBO   0,0          ; NEW PT VALUE ≥ ROUFL, SET TO 0
02106 024002         LDA    1,RPT1B      ; GET B POINTER TO HEAD OF LIST
02107 123000         ADD    1,0
02110 040043         STA    0,RPT1A      ; NEW ACTUAL POINTER VALUE
02111 022043         LDA    0,@RPT1A     ; FETCH THROUGH POINTER A RESON
                                              COMMAND
02112 024744         LDA    1,RMSK2 ;RMSK2=176000
02113 030744         LDA    2,RMSK3 ;RMSK3=1777
02114 107400         AND    0,1          ; MASK ADDRESS
02115 113400         AND    0,2          ; MASK DURATION
02116 034140         LDA    3,RTBUF      ; GET PREVIOUS DURATION
02117 175005         MOV    3,3,SNR      ; TEST FOR ZERO
02120 175400         INC    3,3          ; SET TO 1 IF ZERO
02121 020137         LDA    0,MRFLG      ; MODIFY FLAG SET?
02122 101004         MOV    0,0,SZR
02123 000406         JMP    RSHFT        ; YES, MODIFY DURATION
02124 151005         MOV    2,2,SNR      ; NO, TEST CURRENT DURATION FOR
                                              ZERO
02125 151400         INC    2,2
02126 050140         STA    2,RTBUF      ; STORE IN RTBUF
02127 050131         STA    2,RTIME      ; ALSO RESET RTIME
02130 000405         JMP    ROUT

02131 050140 RSHFT:  STA    2,RTBUF      ; PUT CURRENT DURATION IN BUFFER
02132 054131         STA    3,RTIME      ; USE OLD VALUE TO RESET RTIME
02133 137000         ADD    1,3          ; COMBINE CURRENT ADDRESS AND
02134 056043         STA    3,@RPT1A     ;    OLD DURATION AND PUT BACK
                                              IN RESON LIST

02135 102440 ROUT:   SUBO   0,0     ;SET AC0=000000
02136 063076         DOC    0,76    ;(ENABS) - TO ENABLE RESON OUTPUT
02137 102440         SUBO   0,0
02140 066376         DOBP   1,76    ; OUTPUT THE RESON COMMAND
02141 102440         SUBO   0,0          * NOTE BIT 0 MUST BE A 1
                                              OR RESON ADDRESS WILL BE
                                              INVALID
02142 020132 SOUND:  LDA    0,STIME
02143 024711         LDA    1,SMASK      ; LOOK AT LAST 3 BITS OF STIME
02144 123404         AND    1,0,SZR      ; DO SOUND IF LAST 3 BITS = 0 (EACH
02145 002404         JMP    @REST.                                  8TH TIME)
02146 102620         SUBZR  0,0     ;SET AC0=100000
02147 063076         DOC    0,76    ;(ENABX)
02150 000410         JMP    FUNC1

02151 002361 REST.:  RESTR

        002160 .LOC    2160

02160 020305 FUNC1:  LDA    0,F1FLG      ; IS FUNC1 FLAG SET? ONLY DO
                                              FUNC ROUTINE IF SET.
```

```
02161 101005          MOV     0,0,SNR
02162 000436          JMP     FUNC2       ; NOT SET, GO TO FUNC2
02163 014270          DSZ     F1TOT       ; SET, TEST FOR LAST STEP
02164 000403          JMP     F1ADJ       ; NOT LAST STEP, GO TO UPDATE FUNC
                                              VALUE

02165 102440 F1CLR:   SUBO    0,0         ; LAST STEP, CLEAR F1FLG
02166 040305          STA     0,F1FLG

02167 024260 F1ADJ:   LDA     1,F1BSE     ; ADD CURRENT FUNC VALUE (F1BSE)
02170 020264          LDA     0,F1DSP     ; AND DISPLACEMENT
A 02171 030602 ϕ32424 LDA     2,~~FMAX~~ @FMAX.
02172 147400          AND     2,1         ; MASK BASE VALUE TO MAX LIMIT
02173 107122          ADDZL   0,1,SZC     ; ADD AND TEST SIGN
02174 000412          JMP     F1ZER       ; NEGATIVE, UNDERFLOW OCCURRED
                                              GO TO SET ZERO VALUE
02175 125200          MOVR    1,1
02176 034576          LDA     3,FM2       ; MASK SUM TO LOOK FOR OVERFLOW
02177 137404          AND     1,3,SZR
02200 000411          JMP     F1MAX       ; OVERFLOW, GO TO SET MAX

02201 034246 F1OUT:   LDA     3,EAD1      ; GET ADDRESS OF ENVELOPE 1 VCA
02202 167000          ADD     3,1         ; COMBINE WITH NEW BASE VALUE
02203 044260          STA     1,F1BSE     ; SAVE
02204 066376          DOBP    1,76        ; OUTPUT
02205 000413          JMP     FUNC2       ; GO TO FUNC 2

02206 126440 F1ZER:   SUBO    1,1         ; BASE VALUE < ϕ, SET ZERO
02207 044305          STA     1,F1FLG     ; CLEAR FLAG
02210 000771          JMP     F1OUT       ; GO TO OUTPUT

02211 126440 F1MAX:   SUBO    1,1         ; BASE VALUE > MAX, SET MAX
02212 044305          STA     1,F1FLG
02213 024560          LDA     1,FMAX  ;FMAX=1777    MAX = 1777
02214 000765          JMP     F1OUT       ; GO TO OUTPUT
ϕ2215 ϕϕ2373 FMAX.:   FMAX
      002220 .LOC     2220

02220 020306 FUNC2:   LDA     0,F2FLG     ; FUNC 2 SAME AS FUNC 1
02221 101005          MOV     0,0,SNR         WITH APPROPRIATE CHANGES
02222 000436          JMP     FUNC3           IN ARGUMENTS
02223 014271          DSZ     F2TOT
02224 000403          JMP     F2ADJ

02225 102440 F2CLR:   SUBO    0,0
02226 040306          STA     0,F2FLG

02227 024261 F2ADJ:   LDA     1,F2BSE
02230 020265          LDA     0,F2DSP
02231 030542          LDA     2,FMAX
02232 147400          AND     2,1
02233 107122          ADDZL   0,1,SZC
02234 000412          JMP     F2ZER
02235 125200          MOVR    1,1
02236 034536          LDA     3,FM2
02237 137404          AND     1,3,SZR
02240 000411          JMP     F2MAX

02241 034247 F2OUT:   LDA     3,EAD2
02242 167000          ADD     3,1
02243 044261          STA     1,F2BSE
02244 066376          DOBP    1,76
```

```
02245 000413           JMP     FUNC3

02246 126440 F2ZER:    SUBO    1,1
02247 044306           STA     1,F2FLG
02250 000771           JMP     F2OUT

02251 126440 F2MAX:    SUBO    1,1
02252 044306           STA     1,F2FLG
02253 024520           LDA     1,FMAX
02254 000765           JMP     F2OUT

      002260 .LOC      2260

02260 020307 FUNC3:    LDA     0,F3FLG      ; FUNC3 ETC.
02261 101005           MOV     0,0,SNR
02262 000436           JMP     FUNC4
02263 014272           DSZ     F3TOT
02264 000403           JMP     F3ADJ

02265 102440 F3CLR:    SUBO    0,0
02266 040307           STA     0,F3FLG

02267 024262 F3ADJ:    LDA     1,F3BSE
02270 020266           LDA     0,F3DSP
02271 030502           LDA     2,FMAX
02272 147400           AND     2,1
02273 107122           ADDZL   0,1,SZC
02274 000412           JMP     F3ZER
02275 125200           MOVR    1,1
02276 034476           LDA     3,FM2
02277 137404           AND     1,3,SZR
02300 000411           JMP     F3MAX

02301 034250 F3OUT:    LDA     3,EAD3
02302 167000           ADD     3,1
02303 044262           STA     1,F3BSE
02304 066376           DOBP    1,76
02305 000413           JMP     FUNC4

02306 126440 F3ZER:    SUBO    1,1
02307 044307           STA     1,F3FLG
02310 000771           JMP     F3OUT

02311 126440 F3MAX:    SUBO    1,1
02312 044307           STA     1,F3FLG
02313 024460           LDA     1,FMAX
02314 000765           JMP     F3OUT

      002320 .LOC      2320

02320 020310 FUNC4:    LDA     0,F4FLG      ; FUNC 4 ETC, ACTUALLY NEVER
02321 101005           MOV     0,0,SNR        USED
02322 000436           JMP     FUNCN
02323 014273           DSZ     F4TOT
02324 000403           JMP     F4ADJ

02325 102440 F4CLR:    SUBO    0,0
02326 040310           STA     0,F4FLG

02327 024263 F4ADJ:    LDA     1,F4BSE
```

```
02330 020267           LDA     0,F4DSP
02331 030442           LDA     2,FMAX
02332 147400           AND     2,1
02333 107122           ADDZL   0,1,SZC
02334 000412           JMP     F4ZER
02335 125200           MOVR    1,1
02336 034436           LDA     3,FM2
02337 137404           AND     1,3,SZR
02340 000411           JMP     F4MAX
                       ↙ NO ACTUAL ADDRESS
02341 034400 F4OUT:    LDA     3,EAD4   ← NOT ON PG 0, PUT THERE IF FUNC4 TO BE USED
02342 167000           ADD     3,1
02343 044263           STA     1,F4BSE
02344 066376           DOBP    1,76
02345 000413           JMP     FUNCN

02346 126440 F4ZER:    SUBO    1,1
02347 044310           STA     1,F4FLG
02350 000771           JMP     F4OUT

02351 126440 F4MAX:    SUBO    1,1
02352 044310           STA     1,F4FLG
02353 024420           LDA     1,FMAX
02354 000765           JMP     F4OUT

      002360 .LOC      2360

02360 000401 FUNCN:    JMP     RESTR

02361 102440 RESTR:    SUBO    0,0      ; RESTORE AC 0-3 AND CARRY
02362 020304           LDA     0,SAVC
02363 101200           MOVR    0,0
02364 020300           LDA     0,SAV0
02365 024301           LDA     1,SAV1
02366 030302           LDA     2,SAV2
02367 034303           LDA     3,SAV3

02370 060114 RET:      NIOS    RTC      ; CLEAR CLOCK FLAG
02371 060177           INTEN            ; INTERRUPT ON
02372 002000           JMP     @0       ; RETURN TO BACKGROUND PROGRAM

02373 001777 FMAX:     1777
02374 176000 FM2:      176000

               .EOT
```

```
                ;LIFE SUBROUTINE

---     002400 .LOC    2400

02400 054564 LIFE:   STA    3,LSAV    ; SAVE RETURN

02401 102440 GINIT:  SUBO   0,0       ;
02402 040112         STA    0,NTBB    } CLEAR BIRTH, ABORT & KILL LISTS
02403 040113         STA    0,NTBA
02404 040114         STA    0,NTBK    }
02405 020160         LDA    0,LLPT    ;
02406 040020         STA    0,20
02407 020161         LDA    0,KLPT      AUTOINDEX
02410 040022         STA    0,22      } SET POINTERS TO LISTS
02411 020162         LDA    0,BLPT
02412 040023         STA    0,23
02413 020163         LDA    0,ALPT
02414 040024         STA    0,24      }
02415 020115         LDA    0,NLIVE   ; NLIVE = 0 ?
02416 101005         MOV    0,0,SNR
02417 002545         JMP    @LSAV     ; YES, EXIT
02420 040545         STA    0,LCNT    ; NO, INITIALIZE COUNTER = NLIVE

02421 022020 LEXAM:  LDA    0,@20     ; GET FIRST LIVE LOCATION
02422 040544         STA    0,LHLD1   ; SAVE IN BUFFER
02423 102440         SUBO   0,0
02424 040543         STA    0,NTOT1   ; CLEAR NTOT1
02425 020071         LDA    0,TPTPT   ; INITIALIZE TESTPOINTER POINTER
02426 040542         STA    0,TPT1    ; PUT IN FIRST TESTPOINTER
02427 020542         LDA    0,K8    ;K8=10
02430 040542         STA    0,CT8A    ; SET COUNTER FOR EIGHT TIMES

02431 022537 LEACH:  LDA    0,@TPT1   ; GET FIRST TEST (OFFSET)
02432 030541         LDA    2,MSKL
02433 024533         LDA    1,LHLD1
02434 123000         ADD    1,0       ; OFFSET LOCATION
02435 143400         AND    2,0       ; MASK CARRY OUTS
02436 100400         NEG    0,0       ; NEGATE
02437 004421         JSR    LTEST     ; DO LTEST SUBROUTINE
02440 010530         ISZ    TPT1      ; INCREMENT TESTPOINTER
02441 014531         DSZ    CT8A      ; LAST ?
02442 000767         JMP    LEACH     ; NO DO AGAIN

02443 020524 NCNT:   LDA    0,NTOT1     ; HOW MANY LIVE NEIGHBORS?
02444 024116         LDA    1,KLIV1 ;KLIV1=-2
02445 107005         ADD    0,1,SNR     ; N = 2?
02446 000407         JMP    CONT0       ; YES, LOC MAY STAY ALIVE
02447 024117         LDA    1,KLIV2 ;KLIV2=-3
02450 107005         ADD    0,1,SNR     ; N = 3?
02451 000404         JMP    CONT0       ; YES, LOC MAY STAY ALIVE

02452 020020 DSGK:   LDA    0,20      ; NO, GET ADDRESS OF LOC.
02453 042022         STA    0,@22   ;ADDRESS OF LOC TO BE KILLED
02454 010114         ISZ    NTBK        ; TALLY  STORED IN KILL LIST
                                        NTBK = "NUMBER TO BE KILLED"
02455 014510 CONT0:  DSZ    LCNT      ; LAST LIVE LOC TO TEST ?
02456 000743         JMP    LEXAM     ; NO, GO BACK
02457 000526         JMP    CINIT     ; YES, DONE WITH 1ST PART of LIFE

02460 054514 LTEST:  STA    3,LTSAV ;AC0 CONTAINS -(1ST OFFSET)
```

```
02461 030160          LDA     2,LLPT      ; INITIALIZE A SECOND LIVE LIST
                                              INDEX
02462 050021          STA     2,21
02463 030115          LDA     2,NLIVE     ; AND A COUNTER
02464 050511          STA     2,SCNT

02465 026021 DOTST:   LDA     1,@21       ; LOOK AT EACH IN LIVELIST
02466 107005          ADD     0,1,SNR
02467 000404          JMP     YES         ; FOUND; NEIGHBOR IS ALIVE
02470 014505          DSE     SCNT        ; DONE?
02471 000774          JMP     DOTST       ; DO AGAIN
02472 000403          JMP     BATST       ; NOT FOUND, TO BIRTH/ABORT TEST

02473 010474 YES:     ISE     NTOT1       ; INCREMENT NTOT1 TO INDICATE
                                              A LIVE NEIGHBOR, AND RETURN
02474 002500          JMP     @LTSAV

02475 030113 BATST:   LDA     2,NTBA      ; COMPARE WITH ABORT LIST TO
                                              SEE IF ALREADY LISTED
02476 151005          MOV     2,2,SNR
02477 000411          JMP     BINIT
02500 050476          STA     2,ATALY
02501 030163          LDA     2,ALPT
02502 050025          STA     2,25

02503 026025 TRY:     LDA     1,@25       ;
02504 107005          ADD     0,1,SNR     ;  } COMPARE LOOP
02505 002467          JMP     @LTSAV      ;
02506 014470          DSE     ATALY
02507 000774          JMP     TRY

02510 100400 BINIT:   NEG     0,0         ; NOT FOUND, DO BIRTH TEST
02511 152440          SUBO    2,2           RENEGATE 1ST OFFSET
02512 050465          STA     2,NTOT2       AND ZERO NTOT2 TO COUNT
                                              BIRTH NEIGHBORS
02513 030071 BEXAM:   LDA     2,TPTPT     ; SET UP 2ND TESTPOINTER
02514 050464          STA     2,TPT2
02515 030454          LDA     2,K8        ; AND A COUNTER FOR 8 TIMES
02516 050463          STA     2,CT8B

02517 026461 BEACH:   LDA     1,@TPT2     ; OFFSET THE OFFSET
02520 107000          ADD     0,1
02521 034452          LDA     3,MSKL      ; MASK CARRY OUT!
02522 167400          AND     3,1
02523 124400          NEG     1,1
02524 004416          JSR     BTEST     ;WITH AC1-(2ND OFFSET)
02525 010453          ISE     TPT2        ; INCREMENT TESTPOINTER #2
02526 014453          DSE     CT8B        ; LAST TIME
02527 000770          JMP     BEACH       ; NO, DO AGAIN

02530 030447 NOT3:    LDA     2,NTOT2     ; YES, HOW MANY LIVE NEIGHBORS?
02531 034120          LDA     3,BORN1     ; BORN1 = -3
02532 157005          ADD     2,3,SNR
02533 000404          JMP     DSGB        ; 3 LIVE NEIGHBORS, LIST AS A
                                              BIRTH LOCATION
02534 042024 DSGA:    STA     0,@24       ; TOO FEW (OR TOO MANY) TO BE BORN
02535 010113          ISZ     NTBA        ; TALLY ABORT
02536 002436          JMP     @LTSAV      ; RETURN TO LEACH

02537 042023 DSGB:    STA     0,@23       ; BIRTH LISTING
02540 010112          ISZ     NTBB        ; TALLY
02541 000773          JMP     DSGA        ; LIST ALSO IN ABORT LIST TO
                                              AVOID CHECKING AGAIN.
```

```
02542 054440 BTEST:  STA    3,BSAV    ; COMPARE 2ND OFFSET AGAINST
02543 030160         LDA    2,LLPT      LIVE LIST
02544 050026         STA    2,26
02545 030115         LDA    2,NLIVE
02546 050436         STA    2,BCNT
02547 030121         LDA    2,BORN2
02550 050433         STA    2,IS4     ; COUNTER TO INDICATE REACHING
                                         NEIGHBOR COUNT OF 4

02551 032026 DTST2:  LDA    2,@26     }
02552 133005         ADD    1,2,SNR   }
02553 000404         JMP    YES2      } COMPARE LOOP
02554 014430         DSZ    BCNT      }
02555 000774         JMP    DTST2     }
02556 002424         JMP    @BSAV     ; NOT FOUND, RETURN

02557 010420 YES2:   ISZ    NTOT2     ; FOUND, INCREMENT NTOT2
02560 010423         ISZ    IS4       ; FOURTH LIVE NEIGHBOR?
02561 002421         JMP    @BSAV     ; NO, DO AGAIN
02562 000752         JMP    DSGA      ; YES, EXIT DIRECTLY TO DESIGNATE
                                         AND LIST AS ABORT LOCATION
02563 002401 WAY:    JMP    @LSAV

02564 000000 LSAV:   0         ;
02565 000000 LCNT:   0         }
02566 000000 LHLD1:  0         }
02567 000000 NTOT1:  0         }
02570 000000 TPT1:   0         }
02571 000010 K8:     10        }
02572 000000 CT8A:   0         }
02573 007477 MSKL:   7477      } VARIOUS CONSTANTS & BUFFERS USED
02574 000000 LTSAV:  0         }   IN LIFE SUBR ONLY.
02575 000000 SCNT:   0         }
02576 000000 ATALY:  0         }
02577 000000 NTOT2:  0         }
02600 000000 TPT2:   0         }
02601 000000 CT8B:   0         }
02602 000000 BSAV:   0         }
02603 000000 IS4:    0         }
02604 000000 BCNT:   0         }

02605 102440 CINIT:  SUBO   0,0       ; INITIALIZE KILL & BIRTH LIST
02606 126400         SUB    1,1         POINTERS & TALLYS
02607 020161         LDA    0,KLPT    }
02610 040020         STA    0,20      }
02611 020162         LDA    0,BLPT    }
02612 040021         STA    0,21      }
02613 020114         LDA    0,NTBK    }
02614 101005         MOV    0,0,SNR   ; ANY TO BE KILLED?
02615 000420         JMP    NOKIL     ; NO, GO TO ADD BIRTH LIST TO
                                         LIVE LIST
02616 040517         STA    0,KTALY
02617 020112         LDA    0,NTBB    ; ANY TO BE BORN?
02620 101005         MOV    0,0,SNR
02621 000436         JMP    GARB      ; SOME TO BE KILLED BUT NONE TO BE
                                         BORN, GO TO GARBAGE ROUTINE
02622 040514         STA    0,BTALY

02623 022020 OVWRT:  LDA    0,@20     ; SOME TO BE KILLED AND BORN
02624 040513         STA    0,KPT     ; GET A KILL ADDRESS
02625 022021         LDA    0,@21     ; GET A BIRTH LOCATION
02626 042511         STA    0,@KPT    ; STORE AT KILL ADDRESS, THUS
                                         OVERWRITING AT THAT LOCATION
                                         WITH A BIRTH LOC. IN LIVE
                                         LIST
02627 014506         DSZ    KTALY     ; LAST KILL LIST ENTRY?
```

```
02630 101001          MOV     0,0,SKP ;ALWAYS SKIP; NO
02631 000411          JMP     KDONE           ; YES, TEST FOR LAST BIRTH ENTRY
02632 014504          DSE     BTALY   ; LAST BIRTH ?
02633 000770          JMP     OVWRT   ; NO GO BACK
02634 000423          JMP     GARB    ; YES, GO TO GARBAGE

02635 020112 NOKIL:   LDA     0,NTBB  ; NONE TO KILL BUT SOME TO BE BORN?
02636 101005          MOV     0,0,SNR
02637 000450          JMP     UPDT2   ; NO, GO TO UPDATE 2
02640 040476          STA     0,BTALY ; YES, INITIALIZE BTALLY AGAIN.
02641 000404          JMP     EXTEN   ; GO TO EXTEND LIVE LIST WITH BIRTH LIST.

02642 014474 KDONE:   DSE     BTALY   ; FINISHED WITH BIRTH LIST ?
02643 000402          JMP     EXTEN   ; NO, GO TO EXTEND
02644 000443          JMP     UPDT2   ; YES, GO TO UPDATE 2

02645 020160 EXTEN:   LDA     0,LLPT  ; THIS ROUTINE COPIES BIRTH LIST
02646 024115          LDA     1,NLIVE   INTO HEAD OF LIVE LIST.
02647 101000          MOV     0,0     ;CHANGE TO 123000 FOR STRICT ~~LIFE~~
02650 040022          STA     0,22    ; STRICT LIFE GROWS TOO
                                        FAST AND CHOKES PROGRAM,
                                        SO THIS VARIANT IS
                                        USED TO INSURE
                                        RAPID DECAY OF
                                        PATTERNS
02651 022021 AGN2:    LDA     0,@21   }
02652 042022          STA     0,@22   }
02653 010115          ISE     NLIVE   };COPY
02654 014462          DSE     BTALY   }  LOOP
02655 000774          JMP     AGN2    }
02656 000431          JMP     UPDT2   }

02657 020115 GARB:    LDA     0,NLIVE ; SET PT = END OF LIVE LIST
02660 024160          LDA     1,LLPT
02661 107000          ADD     0,1
02662 044456          STA     1,EVAL  ; SAVE PT TO END IN EVAL
02663 124400          NEG     1,1
02664 020020          LDA     0,20    ; SET ANOTHER POINTER EQUAL TO
02665 040023          STA     0,23    ; CURRENT VALUE OF KILL LIST PT,
02666 020447          LDA     0,KTALY
02667 040452          STA     0,K2TLY ; ALSO ANOTHER KILL LIST TALLY

02670 022023 LOOK:    LDA     0,@23   ; COMPARE REST OF KILL LIST TO
02671 123005          ADD     1,0,SNR ; ADDRESS OF LAST LOC IN LIVE
02672 000407          JMP     DELET   ; LIST TO SEE IF THAT LOCATION
02673 014446          DSE     K2TLY   ;IS DESIGNATED TO BE KILLED
02674 000774          JMP     LOOK      IF FOUND, SIMPLY TRIM LIST (DELET)

02675 022020 OVWR2:   LDA     0,@20   ; NOT FOUND, LOAD LIVE LOC AT BOTTOM
02676 040444          STA     0,KPT2  ; OF LIST OVERWRITING LOCATION
02677 022441          LDA     0,@EVAL ; AT CURRENT KILL ADDRESS
02700 042442          STA     0,@KPT2

02701 102000 DELET:   ADC     0,0     ;AC0←-1 ; TRIM LIST BY DECREMENTING
02702 024115          LDA     1,NLIVE           NLIVE
02703 123000          ADD     1,0
02704 040115          STA     0,NLIVE
02705 014430          DSE     KTALY           ; LAST TO BE KILLED?
02706 000751          JMP     GARB            ; NO, GO BACK

02707 020042 UPDT2:   LDA     0,DISPT ; COPY LIVE LIST INTO
02710 040020          STA     0,20    ; DISPLAY LIST
02711 020160          LDA     0,LLPT
02712 040021          STA     0,21
```

```
02713 024115          LDA     1,NLIVE
02714 125005 ϕ44346   MOV     1,1,SNR
02715 000000 125ϕϕ5   JMP     OVER
02716 102520 ϕϕϕ427   SUBZL   0,0
02717 056000 124ϕϕ    STA     KBF
02720 124400 ϕ22ϕ21   NEG     1,1
02721 065277 ϕ42ϕ2ϕ   INTDS
              1254ϕ4
02722 022021 LLP:     LDA     0,021
02723 042020 ϕϕϕ775   STA     0,020
02724 125404 ϕ2ϕ115   INC     1,1,SZR
02725 000775 ϕ24417   JMP     LLP
02726 022115 1234ϕϕ   LDA     0,NLIVE
02727 024415 ϕ4ϕ115   LDA     1,MAXLV
02730 123400 ϕϕϕ42ϕ   AND     1,0
02731 042115          STA     0,NLIVE
02732 040106          STA     0,NDISP
02733 060177          INTEN
02734 000027 6131     JMP     WAY

02735 000000 KTALY:   0
02736 000000 BTALY:   0
02737 000000 KPT:     0
02740 000000 EVAL:    0
02741 000000 K2TLY:   0
02742 000000 KPT2:    0
02743 000000 UTALY:   0
02744 000077 MAXLV:   77
 2745 1ϕ1ϕϕϕ
 2746 002750
 2747 ϕ44344
02750 044046 OVER:    STA     1,KBF
02751 044045 1ϕ1ϕϕ5   STA     1,MBF
02752 044106 ϕϕϕ414   STA     1,NDISP
02753 125400 1ϕϕ4ϕϕ   INC     1,1
02754 044044 ϕ24760   STA     1,BBF
02755 000000 ϕ44ϕ21   JMP     WAY

          .EOT
```

```
LLP:  LDA  ϕ,@21
      STA  ϕ,@2ϕ
      INC  1,1,SZR
      JMP  .-3
      LDA  ϕ,NLIVE
      LDA  1,MAXLV
      AND  1,ϕ
      STA  ϕ,NLIVE
      JMP  OV2
```

```
      STA  1,KBF    ; SET BLOB FLAG
      MOV  1,1,SNR  ; NLIVE=ϕ
      JMP  OVER     ; YES COPY BLOB LIST ONLY
      NEG  1,1
```

; COPY LOOP

; TRIM NLIVE TO < 778

BLP.: 6131

```
OVER: MOV  ϕ,ϕ
      INC  1,1
      STA  1,BBF
OV2:  LDA  ϕ,NBDIS
      MOV  ϕ,ϕ,SNR
      JMP  .+14
      NEG  ϕ,ϕ
      LDA  1,BLP.
      STA  1,21
```

```
2756  ϕ3ϕ361
2757  ϕ34347
2760  ϕ26ϕ21
2761  167ϕϕϕ
2762  147400
2763  ϕ46ϕ2ϕ
2764  1ϕ14ϕ4
2765  ϕϕϕ773
2766  ϕ2ϕ115
2767  ϕ24342
2770  1ϕ7ϕϕϕ
2771  ϕ441ϕ6
2772  ϕϕ24ϕ1
2773  ϕϕ2563
```

```
LLP2: LDA  2,T2     ; T2 = 7477
      LDA  3,ORG
      LDA  1,@21
      ADD  3,1
      AND  2,1
      STA  1,@2ϕ
      INC  ϕ,ϕ,SZR
      JMP  .-5
      LDA  ϕ,NLIVE
      LDA  1,NBDIS
      ADD  ϕ,1
      STA  1,NDISP
      JMP  @.+1
      WAY
```

; THIS ROUTINE COPIES LIVE LIST PLUS BLOB LIST IN CASES WHERE BLOB IS STILL ALIVE.

```
                ;INSTRUMENT 1 SUBROUTINE
                ;MODIFICATION SUBROUTINES        ; INST 1 ALWAYS RUN EACH
                                                   TIME AROUND MAIN LOOP
        003000  .LOC    3000

03000 054474 INST1:  STA     3,I1SAV
03001 020203         LDA     0,I1FLG        ; I1 FLAG ALWAYS SET
03002 101005         MOV     0,0,SNR
03003 002471         JMP     @I1SAV

03004 020124 I1EV1:  LDA     0,TIM1         ; TIM1 NEG?
03005 101123         MOVEL   0,0,SNC        ;
03006 002466         JMP     @I1SAV         ; NO, RETURN

03007 020207 QMOD1:  LDA     0,MFLG1        ; YES, WHAT IS STATE OF
03010 024146         LDA     1,MSK3  ;MSK3=3    MODIFY FLAG?
03011 123405         AND     1,0,SNR
03012 040207         STA     0,MFLG1        ; =0, NO MODIFY
03013 000432         JMP     COMP1
03014 101222         MOVER   0,0,SEC
03015 000406         JMP     XMOD1          ; = 2, XOR MODIFY
03016 101222         MOVER   0,0,SEC
03017 000407         JMP     RMOD1          ; = 3, RANDOM MODIFY

03020 020061 AMOD1:  LDA     0,APT   ;APT=1050  ; = 1, ADD MODIFY, SET
03021 040171         STA     0,MSRPT              MSRPT TO ADDRESS OF
03022 000406         JMP     MARG1                ADD SUBR.

03023 020064 XMOD1:  LDA     0,XPT   ;XPT=1164  ; SET MSRPT TO ADD. OF
03024 040171         STA     0,MSRPT              XOR SUBR.
03025 000403         JMP     MARG1

03026 020062 RMOD1:  LDA     0,RPT   ;RPT=1060  ; SET MSRPT TO ADD. of
03027 040171         STA     0,MSRPT              RAND MOD. SUBR.

03030 020044 MARG1:  LDA     0,MPT1A            ; POINTER SETUP SIMILAR
03031 024152         LDA     1,MMSK1 ;MMSK1=377   TO TECHNIQUE IN
03032 101400         INC     0,0                  REASON PART of INTERRUPT
03033 123400         AND     1,0
03034 034053         LDA     3,MOVFL ;MOVFL=# IN MLIST
03035 104400         NEG     0,1
03036 ~~167400~~ 167000  ~~AND  3,1~~  ADD 3,1
03037 125122         MOVEL   1,1,SEC
03040 102440         SUBO    0,0
03041 024003         LDA     1,MPT1B
03042 123000         ADD     1,0
03043 040044         STA     0,MPT1A
03044 032044         LDA     2,@MPT1A           ; FETCH MODIFY ARGUMENT,
                                                  KEEP IN AC2

03045 102440 COMP1:  SUBO    0,0

03046 020045 OSC1:   LDA     0,PPT1A   AT ADDR 045   ; GET A PITCH
03047 024153         LDA     1,PMSK1 ;PMSK1=377      ; INSTRUCTION
03050 101400         INC     0,0                       FROM LIST
03051 123400         AND     1,0
03052 034054         LDA     3,POVFL ;POVFL=# IN PLIST = 77
03053 104400         NEG     0,1
03054 167000         ADD     3,1
03055 125122         MOVEL   1,1,SEC
03056 102440         SUBO    0,0                SET AC0 TO 0 IF OVERFLOW
```

```
03057 024004          LDA     1,PPT1B  AT ADR LOC ϕϕ4 = BASE ADDR
03060 123000          ADD     1,0              FOR PITCH
03061 040045          STA     0,PPT1A          LIST
03062 022045          LDA     0,@PPT1A
03063 024207          LDA     1,MFLG1
03064 125004          MOV     1,1,SZR  ; IF MODIFY FLAG IS SET
03065 006171          JSR     @MSRPT   (LOC 1050) NEXTPAGE ; CALL MODIFY SUBR
03066 024313          LDA     1,PMSK2 ;PMSK2=1777 ; MASK 10 BITS
03067 123400          AND     1,0
03070 024240          LDA     1,PAD1
03071 123000          ADD     1,0
03072 040225          STA     0,PNEW1          ; PUT IN BUFFER
03073 000402          JMP     FILF1            ; FOR OUTPUTTING
                                               ;   TO DAC
03074 000000 I1SAV:   0                        ;

03075 020046 FILF1:   LDA     0,FPT1A          ; GET A FILTER
03076 024154          LDA     1,FMSK1 ;FMSK1=377   FREQ INSTRUCTION
03077 101400          INC     0,0
03100 123400          AND     1,0
03101 034055          LDA     3,FOVFL ;FOVFL=# IN FLIST
03102 104400          NEG     0,1
03103 167000          ADD     3,1
03104 125122          MOVZL   1,1,SZC
03105 102440          SUBO    0,0
03106 024005          LDA     1,FPT1B
03107 123000          ADD     1,0
03110 040046          STA     0,FPT1A
03111 022046          LDA     0,@FPT1A
03112 024207          LDA     1,MFLG1
03113 125004          MOV     1,1,SZR
03114 006171          JSR     @MSRPT           ; CALL MODIFY SUBR
03115 024312          LDA     1,FMSK2 ;FMSK2=1760   IF MODFLAG SET
03116 123400          AND     1,0
03117 024244          LDA     1,FFAD1
03120 123000          ADD     1,0
03121 040231          STA     0,FNEW1          ; PUT IN BUFFER

03122 020047 ENV1:    LDA     0,EPT1A          ; SETUP ENVELOPE
03123 024311          LDA     1,EMSK1 ;EMSK1=777   POINTERS
03124 101400          INC     0,0
03125 123400          AND     1,0
03126 034056          LDA     3,EOVFL ;EOVFL=# IN ELIST
03127 104400          NEG     0,1
03130 167000          ADD     3,1
03131 125122          MOVZL   1,1,SZC
03132 102440          SUBO    0,0
03133 024006          LDA     1,EPT1B
03134 123000          ADD     1,0
03135 040047          STA     0,EPT1A
03136 022047          LDA     0,@EPT1A
03137 024207          LDA     1,MFLG1
03140 125004          MOV     1,1,SZR
03141 006171          JSR     @MSRPT           ; MODIFY IF CALLED

03142 040450 ESET1:   STA     0,EBUF1          ; SEPARATE DISPL AND
03143 024155          LDA     1,MSK10 ;MSK10=1777   DATA PARTS OF
03144 123400          AND     1,0                   WORD
03145 024246          LDA     1,EAD1  ;EAD1=30000  ; ADD ADDRESS
03146 123000          ADD     1,0
```

```
03147 040233           STA     0,ENEW1                  ; NEW ENV. VALUE
03150 020442           LDA     0,EBUF1
03151 024150           LDA     1,MSK6  ;MSK6=176000     ; GET DISPLACEMENT
03152 123400           AND     1,0
03153 101320           MOVZS   0,0                      ; SHIFT RIGHT 10 STEPS
03154 101220           MOVZR   0,0
03155 101220           MOVZR   0,0
03156 100400           NEG     0,0
03157 040211           STA     0,ESTP1                  ; NEGATE, DISPL ALWAYS
                                                          NEGATIVE FOR INST 1
03160 020151           LDA     0,KRAMP ;KRAMP=2000      ; STEP COUNT MAX.
03161 040215           STA     0,ETOT1

03162 010047 EVNT1:    ISZ     EPT1A                    ; GET NEXT WORD
03163 060076           NIO     76                       ; IGNORE SKIP
03164 022047           LDA     0,@EPT1A
03165 024221           LDA     1,ESPD1 ;MASK TO LIMIT EVENTSPEED (=17)
03166 123400           AND     1,0
03167 040124           STA     0,TIM1                   ; USE AS EVENT
                                                          DURATION BY LOADING
                                                          EVENT SPEED

03170 102620 FSET1:    SUBZR   0,0
03171 024225           LDA     1,PNEW1
03172 030231           LDA     2,FNEW1                  ; OUTPUT ALL NEW
03173 034233           LDA     3,ENEW1                    VALUES
03174 060277           INTDS                            ; INT OFF TO PREVENT
03175 063076           DOC     0,76  ENABLE DACS        ; ENABLE   INTERFERENCE
03176 066376           DOBP    1,76  PITCH              ; OUTPUT
03177 072376           DOBP    2,76  FILTER
03200 076376           DOBP    3,76  ENVELOPE
03201 054260           STA     3,F1BSE                  ; UPDATE FUNC 1
03202 020211           LDA     0,ESTP1                    ARGUMENTS
03203 040264           STA     0,F1DSP
03204 020215           LDA     0,ETOT1
03205 040270           STA     0,F1TOT
03206 102520           SUBZL   0,0
03207 040305           STA     0,F1FLG                  ; SET FUNC 1 FLAG.
03210 060177           INTEN
03211 002563           JMP     @I1SAV

03212 000000 EBUF1:    0

      001050 .LOC      1050

01050 054403 AMOD:     STA     3,AMSAV                  ; ADD MODIFY ARGUMENT
01051 143000           ADD     2,0                      ; TO NEW DATA
01052 002401           JMP     @AMSAV

01053 000000 AMSAV:    0


      001164 .LOC      1164

01164 054406 XMOD:     STA     3,XMSAV                  ; XOR MODIFY ARGUMENT
01165 155000           MOV     2,3                        TO NEW DATA
01166 117520           ANDZL   0,3
01167 143000           ADD     2,0
01170 162400           SUB     3,0
01171 002401           JMP     @XMSAV

01172 000000 XMSAV:    0
```

```
        001060 .LOC    1060

01060 054412 RMOD:   STA     3,RMSAV
01061 024074 ⌀24253  LDA     1,RANDP ;RANDP ON PG 0 @ 253
01062 152440         SUBO    2,2
01063 150220         COMER   2,2
01064 125400         INC     1,1
01065 147400         AND     2,1
01066 044074 ⌀44253  STA     1,RANDP JRAND
01067 026074 ⌀26253  LDA     1,@RANDP JRAND
01070 123000         ADD     1,0
01071 002401         JMP     @RMSAV

01072 000000 RMSAV:  0


              .EOT
```

JRAND

JRAND

; RANDOM # SUBSTITUTE FOR NEW VALUE

```
                ;INSTRUMENT 2 SUBROUTINE - PITCH 2,UP-DOWN ENVELOPE

        003220  .LOC    3220

03220 054537 INST2:  STA     3,I2SAV        ; INST 2 SAME GENERAL
03221 020204         LDA     0,I2FLG          STRUCTURE AS INST 1
03222 101005         MOV     0,0,SNR
03223 002534         JMP     @I2SAV

03224 020125 I2EV2:  LDA     0,TIM2         ; TIME TO DO?
03225 101123         MOVEL   0,0,SNC
03226 002531         JMP     @I2SAV

03227 102440 COMP2:  SUBO    0,0

03230 020045 OSC2:   LDA     0,PPT1A        ; GET OSC DATA
03231 024153         LDA     1,PMSK1
03232 101400         INC     0,0
03233 123400         AND     1,0
03234 034054         LDA     3,POVFL
03235 104400         NEG     0,1
03236 167000         ADD     3,1
03237 125122         MOVEL   1,1,SEC
03240 102440         SUBO    0,0
03241 024004         LDA     1,PPT1B
03242 123000         ADD     1,0
03243 040045         STA     0,PPT1A
03244 022045         LDA     0,@PPT1A
03245 024207         LDA     1,MFLG1
03246 125004         MOV     1,1,SZR
03247 006171         JSR     @MSRPT
03250 024313         LDA     1,PMSK2
03251 123400         AND     1,0
03252 024241         LDA     1,PAD2
03253 123000         ADD     1,0
03254 040226         STA     0,PNEW2
03255 000403         JMP     ENV2

        003260  .LOC    3260

03260 020050 ENV2:   LDA     0,EPT2A        ; GET ENV DATA
03261 024311         LDA     1,EMSK1
03262 101400         INC     0,0
03263 123400         AND     1,0
03264 034056         LDA     3,EOVFL
03265 104400         NEG     0,1
03266 167000         ADD     3,1
03267 125122         MOVEL   1,1,SEC
03270 102440         SUBO    0,0
03271 024007         LDA     1,EPT2B
03272 123000         ADD     1,0
03273 040050         STA     0,EPT2A
03274 022050         LDA     0,@EPT2A
03275 024207         LDA     1,MFLG1
03276 125004         MOV     1,1,SZR
03277 006171         JSR     @MSRPT

                ;RULE;RULE FOR ENVELOPE 2:
                ;IF DSP(-) AND DIFF(+) SET MAX AND RAMP DOWN
                ;IF DSP(+) AND DIFF(-) SET 0 AND RAMP UP
```

```
                ;IF DSP AND DIFF SAME SIGN COMPUTE DIFF/DSP AND EXECUTE
                ;AT CURRENT BASE VALUE

03300 040533 ESET2:  STA     0,EBUF2
03301 030155         LDA     2,MSK10
03302 113400         AND     0,2
03303 044236 ~~040236~~ STA   2,~~E2BSE~~
03304 024150         LDA     1,MSK6
03305 123400         AND     1,0        ; 0 ← RAW DISP

03306 024530 QSIGN:  LDA     1,KNEG     ; → KNEG = 40
03307 ~~161130~~ 101320 ~~MOVZL#~~ 0,0
03310 ~~161360~~ 101240 ~~MOVS~~ 0,0
03311 101200         MOVR    0,0
03312 ~~101200~~ 107464 ~~MOVR~~ 0,0,~~SZC~~
03313 ~~107000~~ 100466 ~~ADD~~ 0,1
03314 ~~044212~~ 040212 ~~STA~~ 1,ESTP2
                     101132
03315 ~~125132~~ DABS:  ~~MOVZL#~~ 1,1,~~SZC~~
03316 ~~124400~~ 100400 ~~NEG~~ 1,1
03317 ~~044515~~ 040515 ~~STA~~ 1,DISPL
03320 ~~126560~~ 101000 ~~SUBCL~~ 1,1
03321 ~~044514~~ 101000 ~~STA~~ 1,NFLAG

03322 034261 WVG:    LDA     3,F2BSE    ; DETERMINE SIGN OF
03323 024155          LDA     1,MSK10      DIFFERENCE BETWEEN
03324 137400          AND     1,3          CURRENT VALUE AND
03325 ~~156415~~ 156435 SUB~~Z~~#  2,3,SNR  NEW VALUE
03326 000452          JMP     NOENV      ; NO DIFFERENCE
03327 ~~175003~~ 175042 MOV   3,3,~~SNC~~ SZC ; TEST WHICH GREATER
03330 000414          JMP     CVG        ; CURRENT GREATER
03331 172400          SUB     3,2        ; NEW GREATER
03332 ~~024503~~ 024502 ~~LDA~~ 1,~~NFLAG~~
03333 ~~125004~~ 125132 ~~MOV~~ 1,1,~~SZR~~
03334 000435          JMP     NVMAX      ;
03335 145000          MOV     2,1        ; → SIGN DIFF, GO TO MAX = RAMP DOWN
03336 030476          LDA     2,DISPL
03337 004511          JSR     IDIV       ; CALL DIVIDE TO COMPUTE STEP COUNT
03340 125002          MOV     1,1,SEC
03341 000437          JMP     NOENV
03342 044216          STA     1,ETOT2
03343 000441          JMP     EVNT2

03344 156400 CVG:     SUB     2,3        ; CURRENT GREATER
03345 ~~024470~~ 024467 LDA   1,NFLAG
03346 ~~125005~~ 125133 MOV   1,1,SNR
03347 000421          JMP     NV0        ;
03350 165000          MOV     3,1        ; → SIGN DIFF, GO TO 0 = RAMP UP
03351 030463          LDA     2,DISPL
03352 004476          JSR     IDIV       ; → CALL DIVIDE TO COMPUTE STEP COUNT
03353 125002          MOV     1,1,SEC
03354 000424          JMP     NOENV
03355 044216          STA     1,ETOT2
03356 000426          JMP     EVNT2

03357 000000 I2SAV:   0

      003370 .LOC     3370

03370 102441 NV0:     SUBO    0,0,SKP    ; 0 VALUE + SKIP
```

```
MOVZS 0,0      ; DETERMINE
MOVR  0,0      ; SIGN OF
MOVR  0,0      ; DISPL
AND   0,1,SZR
NEG   0,0
STA   0 ESTP2  ; ESTP2 = SIGNED VALUE

MOVZL# 0,0,SZC
NEG    0,0
STA    0,DISPL ; DISPL = ABS VALUE
MOV    0,0
MOV    0,0
```

```
LDA 1,DISPL
MOVZL# 1,1,SZC
```

```
LDA 1,DISPL
MOVZL# 1,1,SNC
```

```
03371 020155 NVMAX:  LDA     0,MSK10    ; GET 1777
03372 024247         LDA     1,EAD2     ; ADD ADDRESS
03373 123000         ADD     1,0
03374 040236         STA     0,E2BSE    ; LOAD IN BUFF
03375 020151         LDA     0,KRAMP    ; SET STEP COUNT = 2000
03376 040216         STA     0,ETOT2
03377 000405         JMP     EVNT2

03400 102520 NOENV:  SUBEL   0,0        ; SET STEP COUNT = 1
03401 040216         STA     0,ETOT2    ; SET UP ARGUMENTS
03402 020261         LDA     0,F2BSE
03403 040236         STA     0,E2BSE

03404 010050 EVNT2:  ISZ     EPT2A      ; GET NEXT WORD for
03405 060076         NIO     76
03406 022050         LDA     0,@EPT2A   ; DURATION TIME &
03407 024222         LDA     1,ESPD2    ; LOAD TIM2
03410 123400         AND     1,0
03411 040125         STA     0,TIM2

03412 102620 FSET2:  SUBZR   0,0
03413 024226         LDA     1,PNEW2    ;
03414 030236         LDA     2,E2BSE
03415 060277         INTDS
03416 063076         DOC     0,76
03417 066376         DOBP    1,76
03420 ~~072376~~ 100000 ~~DOBP 2,76~~ MOV 0,0
03421 050261         STA     2,F2BSE
03422 020212         LDA     0,ESTP2
03423 040265         STA     0,F2DSP
03424 020216         LDA     0,ETOT2
03425 101005         MOV     0,0,SNR
03426 102520         SUBEL   0,0
03427 040271         STA     0,F2TOT
03430 040306         STA     0,F2FLG
03431 060177         INTEN
03432 002725         JMP     @I2SAV

03433 000000 EBUF2:  0
03434 000000 DISPL:  0          dddd4d
03435 000000 NFLAG:  0
03436 ~~177740~~ KNEG:  ~~177740~~   4ϕ
03437 ~~000020~~ CC20:  -20
03440 000000 CC03:   0          177763

      003450 .LOC    3450

03450 102400 IDIV:   SUB     0,0        ; STANDARD DATA GENERAL
03451 054767         STA     3,CC03     INTEGER DIVIDE
03452 142432         SUBZ#   2,0,SZC    SUBROUTINE
03453 000412         JMP     CC99
03454 034763         LDA     3,CC20
03455 125120         MOVZL   1,1

03456 101100 CC98:   MOVL    0,0
03457 142412         SUB#    2,0,SZC
03460 142400         SUB     2,0
03461 125100         MOVL    1,1
03462 175404         INC     3,3,SZR
```

OUTPUT AS IN INST 1

```
03463 000773           JMP     CC98
03464 176441           SUBO    3,3,SKP

03465 176420 CC99:     SUBZ    3,3
03466 002752           JMP     @CC03

                .EOT
```

```
                ;INSTRUMENT 3 SUBROUTINE - PITCH 3 & 4, FILT B AND
                ;ENV3, SAME AS ENV1

        003500  .LOC    3500

03500 054466 INST3:  STA     3,I3SAV        ; ONLY DIFFERENCE BETWEEN
03501 020205         LDA     0,I3FLG          INST 1 + 3 IS THAT
03502 101005         MOV     0,0,SNR          INST 3 CONTROLS TWO
03503 002463         JMP     @I3SAV           OSCILLATORS (PITCH 3 + 4)

03504 020126 I3EV3:  LDA     0,TIM3
03505 101123         MOVZL   0,0,SNC
03506 002460         JMP     @I3SAV

03507 102440 COMP3:  SUBO    0,0

03510 020045 OSC3:   LDA     0,PPT1A
03511 024153         LDA     1,PMSK1
03512 101400         INC     0,0
03513 123400         AND     1,0
03514 034054         LDA     3,POVFL
03515 104400         NEG     0,1
03516 167000         ADD     3,1
03517 125122         MOVZL   1,1,SZC
03520 102440         SUBO    0,0
03521 024004         LDA     1,PPT1B
03522 123000         ADD     1,0
03523 040045         STA     0,PPT1A
03524 022045         LDA     0,@PPT1A
03525 024207         LDA     1,MFLG1
03526 125004         MOV     1,1,SZR
03527 006171         JSR     @MSRPT
03530 024313         LDA     1,PMSK2
03531 123400         AND     1,0
03532 024242         LDA     1,PAD3
03533 123000         ADD     1,0
03534 040227         STA     0,PNEW3
03535 000403         JMP     OSC4

        003540  .LOC    3540

03540 020045 OSC4:   LDA     0,PPT1A
03541 024153         LDA     1,PMSK1
03542 101400         INC     0,0
03543 123400         AND     1,0
03544 034054         LDA     3,POVFL
03545 104400         NEG     0,1
03546 167000         ADD     3,1
03547 125122         MOVZL   1,1,SZC
03550 102440         SUBO    0,0
03551 024004         LDA     1,PPT1B
03552 123000         ADD     1,0
03553 040045         STA     0,PPT1A
03554 022045         LDA     0,@PPT1A
03555 024207         LDA     1,MFLG1
03556 125004         MOV     1,1,SZR
03557 006171         JSR     @MSRPT
03560 024313         LDA     1,PMSK2
03561 123400         AND     1,0
03562 024243         LDA     1,PAD4
```

```
03563 123000          ADD     1,0
03564 040230          STA     0,PNEW4
03565 000403          JMP     FILF2

03566 000000 I3SAV:   0

      003570 .LOC     3570

03570 020046 FILF2:   LDA     0,FPT1A
03571 024154          LDA     1,FMSK1
03572 101400          INC     0,0
03573 123400          AND     1,0
03574 034055          LDA     3,FOVFL
03575 104400          NEG     0,1
03576 167000          ADD     3,1
03577 125122          MOVZL   1,1,SZC
03600 102440          SUBO    0,0
03601 024005          LDA     1,FPT1B
03602 123000          ADD     1,0
03603 040046          STA     0,FPT1A
03604 022046          LDA     0,@FPT1A
03605 024207          LDA     1,MFLG1
03606 125004          MOV     1,1,SZR
03607 006171          JSR     @MSRPT
03610 024312          LDA     1,FMSK2
03611 123400          AND     1,0
03612 024245          LDA     1,FFAD2
03613 123000          ADD     1,0
03614 040232          STA     0,FNEW2

03615 020051 ENV3:    LDA     0,EPT3A
03616 024311          LDA     1,EMSK1
03617 101400          INC     0,0
03620 123400          AND     1,0
03621 034056          LDA     3,EOVFL
03622 104400          NEG     0,1
03623 167000          ADD     3,1
03624 125122          MOVZL   1,1,SZC
03625 102440          SUBO    0,0
03626 024010          LDA     1,EPT3B
03627 123000          ADD     1,0
03630 040051          STA     0,EPT3A
03631 022051          LDA     0,@EPT3A
03632 024207          LDA     1,MFLG1
03633 125004          MOV     1,1,SZR
03634 006171          JSR     @MSRPT

03635 040452 ESET3:   STA     0,EBUF3
03636 024155          LDA     1,MSK10
03637 123400          AND     1,0
03640 024250          LDA     1,EAD3   ;EAD3=50000
03641 123000          ADD     1,0
03642 040235          STA     0,ENEW3
03643 020444          LDA     0,EBUF3
03644 024150          LDA     1,MSK6
03645 123400          AND     1,0
03646 101320          MOVZS   0,0
03647 101220          MOVZR   0,0
03650 101220          MOVZR   0,0
03651 100400          NEG     0,0
```

```
03652 040213           STA     0,ESTP3
03653 020151           LDA     0,KRAMP
03654 040217           STA     0,ETOT3

03655 010051 EVNT3:    ISZ     EPT3A
03656 060076           NIO     76
03657 022051           LDA     0,@EPT3A
03660 024223           LDA     1,ESPD3
03661 123400           AND     1,0
03662 040126           STA     0,TIM3

03663 102620 FSET3:    SUBZR   0,0
03664 024227           LDA     1,PNEW3
03665 030230           LDA     2,PNEW4
03666 034232           LDA     3,FNEW2
03667 060277           INTDS
03670 063076           DOC     0,76
03671 066376           DOBP    1,76
03672 072376           DOBP    2,76
03673 076376           DOBP    3,76
03674 020235           LDA     0,ENEW3
03675 ~~062376~~ 161666  ~~DOBP    0,76~~     MOV 0,0
03676 040262           STA     0,F3BSE
03677 020213           LDA     0,ESTP3
03700 040266           STA     0,F3DSP
03701 020217           LDA     0,ETOT3
03702 040272           STA     0,F3TOT
03703 102520           SUBZL   0,0
03704 040307           STA     0,F3FLG
03705 060177           INTEN
03706 002660           JMP     @I3SAV

03707 000000 EBUF3:    0

               .EOT
```

SEATTLE 5 - PART 2 25 JULY 73

```
                ;GENERATE, MAINTAIN, AND KILL A BLOB OUTLINE + SYMBOLS
                ;EXECUTIVE

        006000  .LOC    6000

06000 054414 BLOB:  STA     3,BRTN1     ; SAVE RETURN
06001 102400        SUB     0,0
06002 040350        STA     0,EDGEF     ; CLEAR EDGEFLAG
06003 006575        JSR     @RRET.
06004 000344        BBF
06005 151004        MOV     2,2,SZR
06006 000471        JMP     BKILL
06007 125004        MOV     1,1,SZR
06010 002516        JMP     @BMAI.
06011 101004        MOV     0,0,SZR
06012 000403        JMP     BBIRT

06013 002401 BRET:  JMP     @BRTN1

06014 000000 BRTN1: 0

                ;START BLOB BIRTH

06015 024342 BBIRT: LDA     1,NBDIS
06016 125004        MOV     1,1,SZR
06017 000440        JMP     BBCON
06020 024511        LDA     1,BLIS.
06021 044021        STA     1,21
06022 020506        LDA     0,NBP
06023 040341        STA     0,NBLIV
06024 040550        STA     0,R1
06025 006556        JSR     @BGR0.
06026 030340        LDA     2,BPAT.
06027 143000        ADD     2,0
06030 040020        STA     0,20
06031 022020        LDA     0,@20
06032 101113        MOVL#   0,0,SNC
06033 000404        JMP     .+4
06034 020340        LDA     0,BPAT.
06035 040020        STA     0,20
06036 022020        LDA     0,@20
06037 042021        STA     0,@21
06040 014534        DSZ     R1
06041 000770        JMP     .-10
06042 020531        LDA     0,MARK
06043 042021        STA     0,@21
06044 004351        JSR     BRMOD
06045 004351        JSR     BRMOD
06046 004351        JSR     BRMOD
06047 004351        JSR     BRMOD
06050 020525        LDA     0,SETCM
06051 040347        STA     0,ORG
06052 102400        SUB     0,0
06053 040342        STA     0,NBDIS
06054 006526        JSR     @BMS1.
06055 006524        JSR     @BMDI.
06056 000405        JMP     BBCO1

                ;BIRTH CONTINUATION
```

SEE ATTACHED DESCRIPTION FOR COMMENTS.

= AUTO INCREMENTING LOCATIONS

```
06057 004546 BBCON:   JSR     BBMOD
06060 020133          LDA     0,XTIME
06061 101102          MOVL    0,0,SZC
06062 000731          JMP     BRET
```

should read

```
BBCO1: LDA   0, NBDIS
       LDA   1, NBLIV
       SUB   0, 1, SZR
       JMP   .+4
       ISZ   MBF
       JSR   @BMSE.
       JMP   BRET
       ISZ   NBDIS
       ISZ   NDISP
       JSR   @BDIS.
       JSR   @BBSE.
       JMP   BRET
```

```
      Ø2Ø342
06063 Ø1Ø342 BBCO1:  ISZ     NBDIS
06064 Ø1Ø1Ø6 Ø24341  ISZ     NDISP
06065 Ø06511 1Ø64Ø4  JSR     @BDIS.
06066 Ø2Ø342 ØØØ4Ø4  LDA     0,NBDIS
06067 Ø24341 Ø1Ø345  LDA     1,NBLIV
06070 106405 ØØ6561  SUB     0,1,SNR
06071 000403 ØØ0722  JMP     .+3
06072 006505 Ø1Ø342  JSR     @BBSE.
06073 000725 Ø1Ø1Ø6  JMP     BRET
06074 Ø10345 ØØ65Ø2  ISZ     MBF
06075 006554 ØØ65Ø2  JSR     @BMSE.
06076 000715          JMP     BRET

                ;KILL BLOB SLOWLY

      Ø24342
06077 Ø24341 BKILL:  LDA     1,NBLIV  NBDIS
06100 125005          MOV     1,1,SNR
06101 000712          JMP     BRET
06102 004523          JSR     BBMOD
06103 020342          LDA     0,NBDIS
06104 024341          LDA     1,NBLIV
06105 106415          SUB#    0,1,SNR
06106 000404          JMP     .+4
06107 020133          LDA     0,XTIME
06110 101102          MOVL    0,0,SZC
06111 000702          JMP     BRET
06112 014106          DSZ     NDISP
06113 101000          MOV     0,0
06114 014342          DSZ     NBDIS
06115 000402          JMP     .+2
06116 000404          JMP     .+4
06117 006457          JSR     @BDIS.
06120 006457          JSR     @BBSE.
06121 000672          JMP     BRET
06122 102400          SUB     0,0
06123 040345          STA     0,MBF
06124 040344          STA     0,BBF
06125 000666          JMP     BRET

06126 006220 BMAI.:   BMAIN
06127 006603 RSAV.:   RSAVE
06130 000030 NBP:     30
06131 006131 BLIS.:   BLIS-1
      000040 BLIS:    .BLK    40
06172 000040 NBMX:    40
06173 100000 MARK:    100000
06174 000000 R1:      0
06175 002040 SETCM:   2040
06176 006440 BDIS.:   BDISP
06177 006555 BBSE.:   BBSET
06200 006613 RRET.:   RRET
06201 006335 BMDI.:   BMDIR
06202 006566 BMS1.:   BMS1
06203 006536 BGR0.:   BGR0
```

```
006220 .LOC    6220

               ;MAINTAIN PATTERN

06220 020133 BMAIN:  LDA     0,XTIME
06221 101103         MOVL    0,0,SNC
06222 004351         JSR     BRMOD
06223 004402         JSR     BBMOD
06224 002426         JMP     @BRET.

06225 054426 BBMOD:  STA     3,BS6
06226 020134         LDA     0,YTIME
06227 101103         MOVL    0,0,SNC
06230 004577         JSR     BMSCI
06231 020135         LDA     0,ZTIME
06232 101102         MOVL    0,0,SZC
06233 002420         JMP     @BS6
06234 020420         LDA     0,NMOV
06235 024343         LDA     1,M4
06236 107004         ADD     0,1,SZR
06237 ~~000404~~ 006405 ~~JMP~~     ~~.+4~~
06240 004475         JSR     BMDIR
06241 004577         JSR     BDISP
06242 006740         JSR     @BMS1.
06243 002410         JMP     @BS6
06244 004536         JSR     BMMOV
06245 004573         JSR     BDISP
06246 006734         JSR     @BMS1.
06247 002404         JMP     @BS6

06250 006603 RSVE.:  RSAVE
06251 006562 BMSE.:  BMSET
06252 006013 BRET.:  BRET
06253 000000 BS6:    0

06254 000000 NMOV:   0
06255 000036 K36:    36
      000003 B5:     .BLK    3
06261 006262 MOV.:   MOVV
06262 000001 MOVV:   1
06263 000001         1
06264 000401         401
06265 000001         1
06266 000401         401
06267 000401         401
06270 000401         401
06271 000400         400
06272 000400         400
06273 000400         400
06274 000477         477
06275 000400         400
06276 000477         477
06277 000477         477
06300 000477         477
06301 000077         77
06302 000077         77
06303 000077         77
06304 017477         17477
06305 000077         77
06306 017477         17477
```

P-3
JMP .+5

```
06307 017477            17477
06310 017477            17477
06311 017400            17400
06312 017400            17400
06313 017400            17400
06314 017400            17400
06315 017401            17401
06316 017401            17401
06317 017401            17401
06320 017401            17401
06321 000001            1
06322 000000 MOV1:      0
06323 000000 MOV2:      0
06324 000000 M1OR2:     0
06325 000020 K20:       20
06326 000016 K16:       16
      000003 B6:        .BLK    3
06332 000000 BS3:       0
06333 000000 BS4:       0
06334 017477 LMSK2:     17477

              ;CHOOSE DIRECTION (1 OF 16 OR 1 OF 8)

06335 054775 BMDIR:     STA     3,BS3
06336 006712            JSR     @RSVE.
06337 006256            B5
06340 020350            LDA     0,EDGEF
06341 101004            MOV     0,0,SZR
06342 000421            JMP     BMDR2
06343 004565            JSR     BGR16
06344 024711            LDA     1,K36
06345 107400            AND     0,1

06346 030713 BMDR1:     LDA     2,MOV.
06347 133000            ADD     1,2
06350 021000            LDA     0,0,2
06351 040751            STA     0,MOV1
06352 021001            LDA     0,1,2
06353 040750            STA     0,MOV2
06354 102400            SUB     0,0
06355 040677            STA     0,NMOV
06356 040746            STA     0,M1OR2
06357 004423            JSR     BMMOV
06360 006620            JSR     @RRET.
06361 006256            B5
06362 002750            JMP     @BS3

06363 126400 BMDR2:     SUB     1,1
06364 124000            COM     1,1
06365 ~~107004~~ 107000 ADD     0,1,~~SZR~~
06366 125004            MOV     1,1,SZR
06367 024736            LDA     1,K20
06370 030736            LDA     2,K16
06371 004537            JSR     BGR16
06372 143400            AND     2,0
06373 101005            MOV     0,0,SNR
06374 ~~000776~~ 000775 JMP     ~~.-2~~ .-3
06375 000401            JMP     .+1
06376 107000            ADD     0,1
06377 102400            SUB     0,0
```

```
06400 040350          STA     0,EDGEF
06401 000745          JMP     BMDR1

                ;MAKE A TRANSLATION MOVE ON ORIGIN

06402 054731 BMMOV:   STA     3,BS4
06403 006645          JSR     @RSVE.
06404 006327          B6
06405 020717          LDA     0,M1OR2
06406 024714          LDA     1,MOV1
06407 030347          LDA     2,ORG
06410 101004          MOV     0,0,SZR
06411 000411          JMP     .+11
06412 010712          ISZ     M1OR2
06413 133000          ADD     1,2
06414 034720          LDA     3,LMSK2
06415 173400          AND     3,2
06416 050347          STA     2,ORG
06417 004574          JSR     RRET
06420 006327          B6
06421 002712          JMP     @BS4
06422 102400          SUB     0,0
06423 040701          STA     0,M1OR2
06424 010630          ISZ     NMOV
06425 024676          LDA     1,MOV2
06426 000765          JMP     .-13

                ;SCINTILLATE

06427 001400 BMSCI:   JMP     0,3

                .EOT
```

```
                006440 .LOC    6440

                       ;OUTPUT NBDIS LAMP COORDINATES TO LAMP DISPLAY LIST

06440 054452 BDISP:    STA     3,BRTN2
06441 004542           JSR     RSAVE
06442 006513           B2
06443 020445           LDA     0,BLIZ.
06444 040020           STA     0,20
06445 040021           STA     0,21
06446 020341           LDA     0,NBLIV
06447 040452           STA     0,R10
06450 034347           LDA     3,ORG
06451 030446           LDA     2,KYER
06452 022020           LDA     0,@20
06453 163000           ADD     3,0
06454 143404           AND     2,0,SZR
06455 000446           JMP     BDEDG

06456 014443 BDIS1:    DSZ     R10
06457 000773           JMP     .-5
06460 004427           JSR     BMCON
06461 022425           LDA     0,@NBDI.
06462 040437           STA     0,R10
06463 024042           LDA     1,DISPT
06464 030106           LDA     2,NDISP
06465 112400           SUB     0,2
06466 050432           STA     2,R2
06467 147000           ADD     2,1
06470 044022           STA     1,22
06471 034347           LDA     3,ORG
06472 022021           LDA     0,@21
06473 163000           ADD     3,0
06474 042022           STA     0,@22
06475 014424           DSZ     R10
06476 000774           JMP     .-4
06477 024421           LDA     1,R2
06500 020342           LDA     0,NBDIS
06501 107000           ADD     0,1
06502 044106           STA     1,NDISP
06503 004510           JSR     RRET
06504 006513           B2
06505 002405           JMP     @BRTN2

06506 000342 NBDI.:    NBDIS
06507 001400 BMCON:    JMP     0,3
06510 006131 BLIZ.:    BLIS-1
06511 006335 BMDJ.:    BMDIR
06512 000000 BRTN2:    0
      000003 B2:       .BLK    3
06516 007477 LMASK:    7477
06517 010000 KYER:     10000
06520 000000 R2:       0
06521 000000 R10:      0
06522 000350 EDGE.:    EDGEF

                       ;CHECK EDGES: OK IF HIT SIDE, NOT OK IF TOP OR BOTTOM

06523 012777 BDEDG:    ISZ     @EDGE.
06524 173405           AND     3,2,SNR
```

```
06525 012775          ISZ     @EDGE.
06526 006763          JSR     @BMDJ.
06527 000714          JMP     BDISP+3

                ;GET RANDOM 16-BIT NUMBER INTO AC0

06530 044452 BGR16:   STA     1,R7
06531 020000          LDA     0,0
06532 105300          MOVS    0,1
06533 123000          ADD     1,0
06534 024446          LDA     1,R7
06535 001400          JMP     0,3

                ;GET RANDOM NUMBER MODULO NUMBER IN AC0

06536 054536 BGR0:    STA     3,BS5
06537 004444          JSR     RSAVE
06540 006551          B4
06541 004767          JSR     BGR16
06542 024407          LDA     1,B4
06543 004460          JSR     MULT
06544 040410          STA     0,R0
06545 004446          JSR     RRET
06546 006551          B4
06547 020405          LDA     0,R0
06550 002524          JMP     @BS5

      000003 B4:      .BLK    3
06554 000000 R0:      0

                ;SETUP ROUTINES

06555 040424 BBSET:   STA     0,BS1
06556 020420          LDA     0,MRT
06557 040133          STA     0,XTIME
06560 020421          LDA     0,BS1
06561 001400          JMP     0,3


06562 040417 BMSET:   STA     0,BS1
06563 020413          LDA     0,MRT
06564 040133          STA     0,XTIME
06565 000402          JMP     .+2

06566 040413 BMS1:    STA     0,BS1
06567 020410          LDA     0,MST
06570 ~~040134~~ 104000   ~~STA     0,YTIME~~   MOV 0,0
06571 020407          LDA     0,MMT
06572 040135          STA     0,ΞTIME
06573 020406          LDA     0,BS1
06574 001400          JMP     0,3

06575 000000 R:       0
06576 177716 MRT:     -62
06577 177766 MST:     -12
06600 177752 MMT:     -26
06601 000000 BS1:     0
06602 000000 R7:      0

                ;SAVE REGISTERS
```

```
06603 043400 RSAVE:   STA     0,@0,3
06604 021400          LDA     0,0,3
06605 040770          STA     0,R
06606 010767          ISZ     R
06607 046766          STA     1,@R
06610 010765          ISZ     R
06611 052764          STA     2,@R
06612 001401          JMP     1,3

06613 021400 RRET:    LDA     0,0,3
06614 040761          STA     0,R
06615 022760          LDA     0,@R
06616 010757          ISZ     R
06617 026756          LDA     1,@R
06620 010755          ISZ     R
06621 032754          LDA     2,@R
06622 001401          JMP     1,3

                ;MULTIPLY AC0 BY AC1, HIGH ORDER PROD IN AC0

06623 050416 MULT:    STA     2,R8
06624 054416          STA     3,R9
06625 034413          LDA     3,M20
06626 152400          SUB     2,2
06627 125203          MOVR    1,1,SNC
06630 151201          MOVR    2,2,SKP
06631 113220          ADDZR   0,2
06632 175404          INC     3,3,SZR
06633 000774          JMP     .-4
06634 125260          MOVCR   1,1
06635 141000          MOV     2,0
06636 030403          LDA     2,R8
06637 002403          JMP     @R9

06640 177760 M20:     -20
06641 000000 R8:      0
06642 000000 R9:      0

06643 000002 BPAT:    2       3
06644 000003          3       4
06645 000004          4       405
06646 000005          5       406
06647 000006          6       7
06650 000407          407     10
06651 001010          1010    411
06652 001410          1410    1012
06653 002010          2010    1413
06654 002410          2410    2012
06655 003010          3010    2411
06656 003407          3407    3010
06657 004006          4006    3007
06660 004005          4005    2406
06661 004004          4004    2405
06662 004003          4003    3004
06663 004002          4002    3003
06664 003401          3401    2402
06665 003000          3000    2001
06666 002400          2400    1400
```

COORDINATES FOR BLOB PATTERN

```
06667 002000            2000  1001
06670 001400            1400  402
06671 001000            1000  1405
06672 000401            401   1406
06673 100000            100000

06674 000000 BS5:       0

                ;ADDITIONAL PG0 CONSTANTS

      000340 .LOC       340

00340 006642 BPAT.:     BPAT-1
00341 000000 NBLIV:     0
00342 000000 NBDIS:     0
00343 177774 M4:        -4
00344 000000 BBF:       0
00345 000000 MBF:       0
00346 000000 KBF:       0
00347 000000 ORG:       0
00350 000000 EDGEF:     0
00351 001400 BRMOD:     JMP       0,3

      000042 .LOC       42

00042 010200 DISPT:     10200

      000106 .LOC       106

00106 000000 NDISP:     0

      000133 .LOC       133

00133 000000 XTIME:     0
00134 000000 YTIME:     0
00135 000000 ETIME:     0

      000115 .LOC       115

00115 000000 NLIVE:     0

                .EOT
```

177775

-3

```
---
B2          006513
B4          006551
B5          006256
B6          006327
BBCO1       006063
BBCON       006057
BBF         000344
BBIRT       006015
BBMOD       006225
BBSET       006555
BBSE.       006177
BDEDG       006523
BDIS1       006456
BDISP       006440
BDIS.       006176
BGR0        006536
BGR0.       006203
BGR16       006530
BKILL       006077
BLIS        006132
BLIS.       006131
BLIZ.       006510
BLOB        006000
BMAIN       006220
BMAI.       006126
BMCON       006507
BMDIR       006335
BMDI.       006201
BMDJ.       006511
BMDR1       006346
BMDR2       006363
BMMOV       006402
BMS1        006566
BMS1.       006202
BMSCI       006427
BMSET       006562
BMSE.       006251
BPAT        006643
BPAT.       000340
BRET        006013
BRET.       006252
BRMOD       000351
BRTN1       006014
BRTN2       006512
BS1         006601
BS3         006332
BS4         006333
BS5         006674
BS6         006253
DISPT       000042
EDGEF       000350
EDGE.       006522
K16         006326
K20         006325
K36         006255
KBF         000346
KYER        006517
LMASK       006516
LMSK2       006334
M1OR2       006324
```

```
---
M20       006640
M4        000343
MARK      006173
MBF       000345
MMT       006600
MOV1      006322
MOV2      006323
MOVV      006262
MOV.      006261
MRT       006576
MST       006577
MULT      006623
NBDIS     000342
NBDI.     006506
NBLIV     000341
NBMX      006172
NBP       006130
NDISP     000106
NLIVE     000115
NMOV      006254
ORG       000347
R         006575
RØ        006554
R1        006174
R10       006521
R2        006520
R7        006602
R8        006641
R9        006642
RRET      006613
RRET.     006200
RSAVE     006603
RSAV.     006127
RSVE.     006250
SETCM     006175
XTIME     000133
YTIME     000134
ZTIME     000135
```