```
A

  10 0000           ;560Z  Z80 IN/OUT HANDLER
  20 0000           ;  DEMO HANDLES PORTS 0,1,10
  30 0000           ;
  40 0000           PORT=$21
  50 0000           DATA=$22
  60 0000           TEMP=$23
  70 0000           JMPL=$24
  80 0000           JMPH=$25
  90 0000           WR=$26
 100 0000           ;
 110 0000           BASE=$F000
 120 0000           ;
 130 0000           ;REFERENCES TO UTILITIES PACKAGE
 140 0000           ;
 150 0000           READD=$3CD4
 160 0000           INPUT=$3CE8
 170 0000           OUTPUT=$3D01
 180 0000           OUTBL=$3D14
 190 0000           OUTBH=$3D1D
 200 0000           RUNSTP=$3F2F
 210 0000           CKLN=$3F31
 220 0000           D7=$3F5F
 230 0000           A7=$3F6F
 240 0000           Z80WR=$3FA3
 250 0000           IORQ=$3FAB
 260 0000           ;
 270 3200                    *=$3200
 280 3200 AEAB3F    Z80IO    LDX IORQ  WAIT FOR I/O COMMAND
 290 3203 20D43C             JSR READD
 300 3206 2CAC3F             BIT IORQ+1
 310 3209 D0F5               BNE Z80IO
 320 320B           ;
 330 320B AE6F3F             LDX A7  READ PORT #
 340 320E 20D43C             JSR READD
 350 3211 8521               STA PORT
 360 3213 AE2F3F             LDX RUNSTP  SET SINGLE STEP
 370 3216 AD303F             LDA RUNSTP+1
 380 3219 48                 PHA
 390 321A 20013D             JSR OUTPUT
 400 321D 68                 PLA
 410 321E 20143D             JSR OUTBL
 420 3221 AE313F             LDX CKLN  SET UP CLOCK
 430 3224 AD323F             LDA CKLN+1
 440 3227 48                 PHA
 450 3228 20013D             JSR OUTPUT
 460 322B 68                 PLA
 470 322C 201D3D             JSR OUTBH
 480 322F AEA33F             LDX Z80WR  SEE IF READ OR WRITE
 490 3232 20D43C             JSR READD
 500 3235 2DA43F             AND Z80WR+1
 510 3238 8526               STA WR
 520 323A F003               BEQ LOW
 530 323C           ;
 540 323C 4CAD32    HIGH     JMP SELECT
 550 323F           ;
 560 323F AE5F3F    LOW      LDX D7
 570 3242 20D43C             JSR READD
 580 3245 8522               STA DATA
```

```
 590 3247 4CAD32          JMP SELECT
 600 324A                 ;
 610 324A                 ;CLOCK CKLN (FLIP FLOP IT)
 620 324A                 ;
 630 324A AE313F  CLOCK   LDX CKLN
 640 324D BD00F0          LDA BASE,X
 650 3250 4D323F          EOR CKLN+1
 660 3253 9D00F0          STA BASE,X
 670 3256 60              RTS
 680 3257                 ;
 690 3257                 ;CLOCK Z80 OUT OF IORQ AND LET IT LOOSE
 700 3257                 ;
 710 3257 AEAB3F  NOTHIN  LDX IORQ
 720 325A 20D43C          JSR READD
 730 325D 2CAC3F          BIT IORQ+1
 740 3260 D006            BNE NEXT
 750 3262 204A32          JSR CLOCK
 760 3265 4C5732          JMP NOTHIN
 770 3268 204A32  NEXT    JSR CLOCK
 780 326B AE5F3F          LDX D7
 790 326E A9FF            LDA ##$FF
 800 3270 20E83C          JSR INPUT
 810 3273 AE2F3F          LDX RUNSTP
 820 3276 AD303F          LDA RUNSTP+1
 830 3279 201D3D          JSR OUTBH
 840 327C 4C0032          JMP Z80IO
 850 327F                 ;
 860 327F                 ;TTY INPUT (PORT 0)
 870 327F                 ;
 880 327F AD03FB  TTYIN   LDA $FB03  UART INPUT
 890 3282 8D07FB          STA $FB07          - Reset ODA
 900 3285 4C9332          JMP GIVE
 910 3288                 ;
 920 3288                 ;TTY FLAGS (PORT 1)
 930 3288                 ;
 940 3288 AD05FB  TTYFLG  LDA $FB05
 950 328B 2981            AND ##$81
 960 328D 1004            BPL GIVE
 970 328F 2901            AND #1
 980 3291 0902            ORA #2
 990 3293                 ;
1000 3293                 ;GIVE AC TO Z80
1010 3293                 ;
1020 3293 AE5F3F  GIVE    LDX D7
1030 3296 48              PHA
1040 3297 A9FF            LDA ##$FF
1050 3299 20013D          JSR OUTPUT
1060 329C 68              PLA
1070 329D 9D00F0          STA BASE,X
1080 32A0 4C5732          JMP NOTHIN
1090 32A3                 ;
1100 32A3                 ;TTY OUTPUT (PORT 10)
1110 32A3                 ;
1120 32A3 A522    TTYOUT  LDA DATA
1130 32A5 8D04FB          STA $FB04  UART OUTPUT
1140 32A8 4C5732          JMP NOTHIN
1150 32AB                 ;
1160 32AB C833    VECL    .WORD VECTOR
1170 32AD                 ;
1180 32AD                 ;SELECT A PORT HANDLING SUBROUTINE
```

```
1190 32AD           ;
1200 32AD A621      SELECT LDX PORT
1210 32AF BDC832           LDA INDX,X
1220 32B2 8523             STA TEMP  TIMES 3
1230 32B4 0A               ASL A
1240 32B5 18               CLC
1250 32B6 6523             ADC TEMP
1260 32B8 18               CLC
1270 32B9 6DAB32           ADC VECL
1280 32BC 8524             STA JMPL
1290 32BE A900             LDA #0
1300 32C0 6DAC32           ADC VECL+1
1310 32C3 8525             STA JMPH
1320 32C5 6C2400           JMP (JMPL)
1330 32C8           ;
1340 32C8           ;TABLE OF INDEXES TO VECTORS
1350 32C8           ;
1360 32C8 01        INDX    .BYTE 1
1370 32C9 02                .BYTE 2
1380 32CA 00                .BYTE 0
1390 32CB 00                .BYTE 0
1400 32CC 00                .BYTE 0
1410 32CD 00                .BYTE 0
1420 32CE 00                .BYTE 0
1430 32CF 00                .BYTE 0
1440 32D0 00                .BYTE 0
1450 32D1 00                .BYTE 0
1460 32D2 00                .BYTE 0
1470 32D3 00                .BYTE 0
1480 32D4 00                .BYTE 0
1490 32D5 00                .BYTE 0
1500 32D6 00                .BYTE 0
1510 32D7 00                .BYTE 0
1520 32D8 03                .BYTE 3
1530 32D9 00                .BYTE 0
1540 32DA 0000              .WORD 0,0,0
1540 32DC 0000
1540 32DE 0000
1550 32E0 0000              .WORD 0,0,0,0
1550 32E2 0000
1550 32E4 0000
1550 32E6 0000
1560 32E8 0000              .WORD 0,0,0,0
1560 32EA 0000
1560 32EC 0000
1560 32EE 0000
1570 32F0 0000              .WORD 0,0,0,0
1570 32F2 0000
1570 32F4 0000
1570 32F6 0000
1580 32F8 0000              .WORD 0,0,0,0
1580 32FA 0000
1580 32FC 0000
1580 32FE 0000
1590 3300 0000              .WORD 0,0,0,0
1590 3302 0000
1590 3304 0000
1590 3306 0000
1600 3308 0000              .WORD 0,0,0,0
1600 330A 0000
```

```
1600 330C 0000
1600 330E 0000
1610 3310 0000          .WORD 0,0,0,0
1610 3312 0000
1610 3314 0000
1610 3316 0000
1620 3318 0000          .WORD 0,0,0,0
1620 331A 0000
1620 331C 0000
1620 331E 0000
1630 3320 0000          .WORD 0,0,0,0
1630 3322 0000
1630 3324 0000
1630 3326 0000
1640 3328 0000          .WORD 0,0,0,0
1640 332A 0000
1640 332C 0000
1640 332E 0000
1650 3330 0000          .WORD 0,0,0,0
1650 3332 0000
1650 3334 0000
1650 3336 0000
1660 3338 0000          .WORD 0,0,0,0
1660 333A 0000
1660 333C 0000
1660 333E 0000
1670 3340 0000          .WORD 0,0,0,0
1670 3342 0000
1670 3344 0000
1670 3346 0000
1680 3348 0000          .WORD 0,0,0,0
1680 334A 0000
1680 334C 0000
1680 334E 0000
1690 3350 0000          .WORD 0,0,0,0
1690 3352 0000
1690 3354 0000
1690 3356 0000
1700 3358 0000          .WORD 0,0,0,0
1700 335A 0000
1700 335C 0000
1700 335E 0000
1710 3360 0000          .WORD 0,0,0,0
1710 3362 0000
1710 3364 0000
1710 3366 0000
1720 3368 0000          .WORD 0,0,0,0
1720 336A 0000
1720 336C 0000
1720 336E 0000
1730 3370 0000          .WORD 0,0,0,0
1730 3372 0000
1730 3374 0000
1730 3376 0000
1740 3378 0000          .WORD 0,0,0,0
1740 337A 0000
1740 337C 0000
1740 337E 0000
1750 3380 0000          .WORD 0,0,0,0
1750 3382 0000
```

```
1750 3384 0000
1750 3386 0000
1760 3388 0000              .WORD 0,0,0,0
1760 338A 0000
1760 338C 0000
1760 338E 0000
1770 3390 0000              .WORD 0,0,0,0
1770 3392 0000
1770 3394 0000
1770 3396 0000
1780 3398 0000              .WORD 0,0,0,0
1780 339A 0000
1780 339C 0000
1780 339E 0000
1790 33A0 0000              .WORD 0,0,0,0
1790 33A2 0000
1790 33A4 0000
1790 33A6 0000
1800 33A8 0000              .WORD 0,0,0,0
1800 33AA 0000
1800 33AC 0000
1800 33AE 0000
1810 33B0 0000              .WORD 0,0,0,0
1810 33B2 0000
1810 33B4 0000
1810 33B6 0000
1820 33B8 0000              .WORD 0,0,0,0
1820 33BA 0000
1820 33BC 0000
1820 33BE 0000
1830 33C0 0000              .WORD 0,0,0,0
1830 33C2 0000
1830 33C4 0000
1830 33C6 0000
1840 33C8                   ;
1850 33C8                   ;VECTORS
1860 33C8                   ;
1870 33C8 4C5732  VECTOR    JMP NOTHIN
1880 33CB 4C7F32            JMP TTYIN
1890 33CE 4C8832            JMP TTYFLG
1900 33D1 4CA332            JMP TTYOUT
1910 33D4                   .END
```

ACIA IN BF07

ACIA OUT BF15

A

```
  10 0000           ;5602 IOT, INTERUPT, AND SWITCH REGISTER
  20 0000           ; HANDLER FOR THE 6100.
  30 0000           ;
  40 0000           PNTL=3
  50 0000           PNTH=4
  60 0000           TEMP=$C
  70 0000           ;
  80 0000           DCODE=$1A
  90 0000           OCODE=$1B
 100 0000           DCODEH=$1C
 110 0000           DEVL=$1D
 120 0000           DEVH=$1E
 130 0000           COUNT=$1F
 140 0000           COUNT2=$20
 150 0000           ;
 160 0000           BASE=$F000
 170 0000           ;
 180 0000           DELAYC=200
 190 0000           DELAYD=3
 200 0000           ;
 210 0000           ;REFERENCES TO UTILITIES PACKAGE
 220 0000           ;
 230 0000           READD=$3CD4
 240 0000           INPUT=$3CE8
 250 0000           OUTPUT=$3D01
 260 0000           OUTBL=$3D14
 270 0000           OUTBH=$3D1D
 280 0000           CRLF=$3D72
 290 0000           PROC12=$3DA6
 300 0000           RUNSTP=$3F2F
 310 0000           CKLN=$3F31
 320 0000           INTREQ=$3F33
 330 0000           SWSEL=$3F3F
 340 0000           A8=$3F5D
 350 0000           D7=$3F5F
 360 0000           A7=$3F6F
 370 0000           DEVSEL=$3F81
 380 0000           C0=$3F83
 390 0000           C1=$3F85
 400 0000           C2=$3F87
 410 0000           SKP=$3F89
 420 0000           XTC=$3F8B
 430 0000           D11=$3F97
 440 0000           ;
 450 3400                     *=$3400
 460 3400 A903      START     LDA #DELAYD
 470 3402 8520                STA COUNT2
 480 3404 A9C8                LDA #DELAYC
 490 3406 851F                STA COUNT
 500 3408 ADA434    HANIOT    LDA INTFLG
 510 340B F041                BEQ HANA
 520 340D ADA734              LDA PFLAG
 530 3410 D00F                BNE NOUTA
 540 3412 AD05FB    CHEK      LDA $FB05
 550 3415 101D                BPL NOUT
 560 3417 A901                LDA #1
 570 3419 8DBF37              STA FLAGS+4
 580 341C 8DA734              STA PFLAG
```

```
 590 341F D01E            BNE GENINT
 600 3421 C61F    NOUTA   DEC COUNT
 610 3423 D00F            BNE NOUT
 620 3425 C620            DEC COUNT2
 630 3427 D00B            BNE NOUT
 640 3429 A903            LDA #DELAYD
 650 342B 9520            STA COUNT2
 660 342D A9C8            LDA #DELAYC
 670 342F 851F            STA COUNT
 680 3431 4C1234          JMP CHEK
 690 3434 AD05FB  NOUT    LDA $FB05
 700 3437 4A              LSR A
 710 3438 9011            BCC NOINP
 720 343A A901            LDA #1
 730 343C 8DBE37          STA FLAGS+3
 740 343F         ;
 750 343F AE333F  GENINT  LDX INTREQ
 760 3442 AD343F          LDA INTREQ+1
 770 3445 20143D          JSR OUTBL
 780 3448 4C4E34          JMP HANA
 790 344B         ;
 800 344B 20D835  NOINP   JSR CLRINT
 810 344E AE813F  HANA    LDX DEVSEL  WAIT FOR DEVSEL LOW
 820 3451 20D43C          JSR READD
 830 3454 2C823F          BIT DEVSEL+1
 840 3457 F00E            BEQ ANIOT
 850 3459 AE3F3F          LDX SWSEL
 860 345C 20D43C          JSR READD
 870 345F 2C403F          BIT SWSEL+1
 880 3462 D0A4            BNE HANIOT
 890 3464 4CA834          JMP SWITCH
 900 3467         ;
 910 3467 AE2F3F  ANIOT   LDX RUNSTP
 920 346A AD303F          LDA RUNSTP+1
 930 346D 48              PHA
 940 346E 20013D          JSR OUTPUT
 950 3471 68              PLA
 960 3472 20143D          JSR OUTBL
 970 3475 AE313F          LDX CKLN
 980 3478 AD323F          LDA CKLN+1
 990 347B 20013D          JSR OUTPUT
1000 347E 205035          JSR READOP
1010 3481 201F35          JSR HANREQ
1020 3484 A51C            LDA DCODEH
1030 3486 0A              ASL A
1040 3487 AA              TAX
1050 3488 BDC337          LDA POSTH,X
1060 348B 851D            STA DEVL
1070 348D BDC437          LDA POSTH+1,X
1080 3490 851E            STA DEVH
1090 3492 A51A            LDA DCODE
1100 3494 0A              ASL A
1110 3495 A8              TAY
1120 3496 B11D            LDA (DEVL),Y
1130 3498 8503            STA PNTL
1140 349A C8              INY
1150 349B B11D            LDA (DEVL),Y
1160 349D 8504            STA PNTH
1170 349F 6C0300          JMP (PNTL)
1180 34A2         ;
```

```
1190 34A2          ;SWITCH REGISTER VALUE
1200 34A2          ;
1210 34A2 0000     SWREG .WORD 0
1220 34A4          ;
1230 34A4          ;INTERUPT ENABLE FLAG
1240 34A4          ;
1250 34A4 00       INTFLG .BYTE 0
1260 34A5          ;
1270 34A5          ;IOT TRACE FLAG
1280 34A5          ;
1290 34A5 00       TRACE  .BYTE 0
1300 34A6          ;
1310 34A6          ;WHETHER IN THE 1ST DEVSEL OR 2ND
1320 34A6          ;
1330 34A6 00       STATE  .BYTE 0
1340 34A7          ;
1350 34A7          ;PRINTER INTERUPT ENABLE FLAG
1360 34A7          ;
1370 34A7 01       PFLAG  .BYTE 1
1380 34A8          ;
1390 34A8          ;HANDLE A REQUEST FOR A SWITCH REGISTER VALUE
1400 34A8          ;
1410 34A8 AE2F3F   SWITCH LDX RUNSTP
1420 34AB AD303F          LDA RUNSTP+1
1430 34AE 48              PHA
1440 34AF 20013D          JSR OUTPUT
1450 34B2 68              PLA
1460 34B3 20143D          JSR OUTBL
1470 34B6 AE313F          LDX CKLN
1480 34B9 AD323F          LDA CKLN+1
1490 34BC 20013D          JSR OUTPUT
1500 34BF AE5F3F          LDX D7
1510 34C2 A9FF            LDA #$FF
1520 34C4 20013D          JSR OUTPUT
1530 34C7 ADA234          LDA SWREG
1540 34CA 9D00F0          STA BASE,X
1550 34CD AE973F          LDX D11
1560 34D0 AD983F          LDA D11+1
1570 34D3 0D9A3F          ORA D11+3
1580 34D6 0D9C3F          ORA D11+5
1590 34D9 0D9E3F          ORA D11+7
1600 34DC 48              PHA
1610 34DD 20013D          JSR OUTPUT
1620 34E0 68              PLA
1630 34E1 48              PHA
1640 34E2 49FF            EOR #$FF
1650 34E4 850C            STA TEMP
1660 34E6 BD00F0          LDA BASE,X
1670 34E9 250C            AND TEMP
1680 34EB 0DA334          ORA SWREG+1
1690 34EE 9D00F0          STA BASE,X
1700 34F1 20CB35   WACXTC JSR CLOCK
1710 34F4 AE8B3F          LDX XTC
1720 34F7 20D43C          JSR READD
1730 34FA 2C8C3F          BIT XTC+1
1740 34FD D0F2            BNE WACXTC
1750 34FF 68              PLA
1760 3500 AE973F          LDX D11
1770 3503 20E83C          JSR INPUT
1780 3506 AE5F3F          LDX D7
```

```
1790 3509 A9FF           LDA #$FF
1800 350B 20E83C         JSR INPUT
1810 350E 20CB35  WACSWT JSR CLOCK
1820 3511 AE3F3F         LDX SWSEL
1830 3514 20D43C         JSR READD
1840 3517 2C403F         BIT SWSEL+1
1850 351A F0F2           BEQ WACSWT
1860 351C 4C3936         JMP FULLSP
1870 351F          ;
1880 351F          ;SUBROUTINE TO HANDLE ACTUAL IOT REQUEST
1890 351F          ;
1900 351F A51C    HANREQ LDA DCODEH
1910 3521 0A             ASL A
1920 3522 AA             TAX
1930 3523 BD4B37         LDA HDEVIC,X
1940 3526 851D           STA DEVL
1950 3528 BD4C37         LDA HDEVIC+1,X
1960 352B 851E           STA DEVH
1970 352D A51A           LDA DCODE
1980 352F 0A             ASL A
1990 3530 A8             TAY
2000 3531 A51B           LDA OCODE
2010 3533 0A             ASL A
2020 3534 18             CLC
2030 3535 711D           ADC (DEVL),Y
2040 3537 8503           STA PNTL
2050 3539 C8             INY
2060 353A B11D           LDA (DEVL),Y
2070 353C 6900           ADC #0
2080 353E 8504           STA PNTH
2090 3540 A000           LDY #0
2100 3542 B103           LDA (PNTL),Y
2110 3544 48             PHA
2120 3545 C8             INY
2130 3546 B103           LDA (PNTL),Y
2140 3548 8504           STA PNTH
2150 354A 68             PLA
2160 354B 8503           STA PNTL
2170 354D 6C0300         JMP (PNTL)
2180 3550          ;
2190 3550          ;READ IOT OPCODE (LOW 8 BITS) OFF LATCH
2200 3550          ;
2210 3550 AE6F3F  READOP LDX A7
2220 3553 20D43C         JSR READD
2230 3556 8503           STA PNTL
2240 3558 48             PHA
2250 3559 2907           AND #%111
2260 355B 851B           STA OCODE
2270 355D 68             PLA
2280 355E 4A             LSR A
2290 355F 4A             LSR A
2300 3560 4A             LSR A
2310 3561 2907           AND #%111
2320 3563 851A           STA DCODE
2330 3565 AE5D3F         LDX A8
2340 3568 20D43C         JSR READD
2350 356B 290F           AND #$F
2360 356D 8504           STA PNTH
2370 356F 48             PHA
2380 3570 ADA534         LDA TRACE
```

```
2390 3573 F008           BEQ NOTR
2400 3575 20723D         JSR CRLF
2410 3578 A203           LDX #PNTL
2420 357A 20A63D         JSR PROC12
2430 357D A503    NOTR   LDA PNTL
2440 357F 4604           LSR PNTH
2450 3581 2A             ROL A
2460 3582 2A             ROL A
2470 3583 2A             ROL A
2480 3584 2907           AND #7
2490 3586 851C           STA DCODEH
2500 3588 68             PLA
2510 3589 8504           STA PNTH
2520 358B 60             RTS
2530 358C                ;
2540 358C                ;WAIT FOR XTC TO GO LOW THEN SET 6100 RUNNING
2550 358C                ;AT FULL SPEED.
2560 358C                ;
2570 358C AE8B3F  WATXTC LDX XTC
2580 358F 20D43C         JSR READD
2590 3592 2C8C3F         BIT XTC+1
2600 3595 F006           BEQ JGO
2610 3597 20CB35         JSR CLOCK
2620 359A 4C8C35         JMP WATXTC
2630 359D 4CE135  JGO    JMP GORUN
2640 35A0                ;
2650 35A0                ;WAIT FOR XTC AND DEVSEL TO GO LOW
2660 35A0                ;
2670 35A0 AE8B3F  WXTDVS LDX XTC
2680 35A3 20D43C         JSR READD
2690 35A6 2C8C3F         BIT XTC+1
2700 35A9 D00C           BNE WXT2
2710 35AB AE813F         LDX DEVSEL
2720 35AE 20D43C         JSR READD
2730 35B1 2C823F         BIT DEVSEL+1
2740 35B4 D001           BNE WXT2
2750 35B6 60             RTS
2760 35B7 20CB35  WXT2   JSR CLOCK
2770 35BA 4CA035         JMP WXTDVS
2780 35BD                ;
2790 35BD                ;SET SKP LINE HIGH
2800 35BD                ;
2810 35BD AE893F  SKPHI  LDX SKP
2820 35C0 AD8A3F         LDA SKP+1
2830 35C3 48             PHA
2840 35C4 20013D         JSR OUTPUT
2850 35C7 68             PLA
2860 35C8 4C1D3D         JMP OUTBH
2870 35CB                ;
2880 35CB                ;FLIP FLOP CLOCK
2890 35CB                ;
2900 35CB AE313F  CLOCK  LDX CKLN
2910 35CE BD00F0         LDA BASE,X
2920 35D1 4D323F         EOR CKLN+1
2930 35D4 9D00F0         STA BASE,X
2940 35D7 60             RTS
2950 35D8                ;
2960 35D8                ;CLEAR INTREQ (SET HIGH)
2970 35D8                ;
2980 35D8 AE333F  CLRINT LDX INTREQ
```

```
2990 35DB AD343F          LDA INTREQ+1
3000 35DE 4C1D3D          JMP OUTBH
3010 35E1           ;
3020 35E1           ;CLEAN THINGS UP AND SET 6100 LOOSE
3030 35E1           ;
3040 35E1 AE5F3F  GORUN   LDX D7
3050 35E4 A9FF            LDA #$FF
3060 35E6 20E83C          JSR INPUT
3070 35E9 AE973F          LDX D11
3080 35EC AD983F          LDA D11+1
3090 35EF 0D9A3F          ORA D11+3
3100 35F2 0D9C3F          ORA D11+5
3110 35F5 0D9E3F          ORA D11+7
3120 35F8 20E83C          JSR INPUT
3130 35FB AE893F          LDX SKP
3140 35FE AD8A3F          LDA SKP+1
3150 3601 20E83C          JSR INPUT
3160 3604 AE833F          LDX C0
3170 3607 AD843F          LDA C0+1
3180 360A 0D863F          ORA C1+1
3190 360D 0D883F          ORA C2+1
3200 3610 20E83C          JSR INPUT
3210 3613 ADA634          LDA STATE
3220 3616 D00E            BNE WDEV0
3230 3618 20CB35  LABL    JSR CLOCK
3240 361B AE813F          LDX DEVSEL
3250 361E 20D43C          JSR READD
3260 3621 2C823F          BIT DEVSEL+1
3270 3624 D0F2            BNE LABL
3280 3626 A900    WDEV0   LDA #0
3290 3628 8DA634          STA STATE
3300 362B 20CB35  WDEV    JSR CLOCK
3310 362E AE813F          LDX DEVSEL
3320 3631 20D43C          JSR READD
3330 3634 2C823F          BIT DEVSEL+1
3340 3637 F0F2            BEQ WDEV
3350 3639 AE2F3F  FULLSP  LDX RUNSTP
3360 363C AD303F          LDA RUNSTP+1
3370 363F 201D3D          JSR OUTBH
3380 3642 4C0834          JMP HANIOT
3390 3645           ;
3400 3645           ;READ DATA FOR AN OUTPUT IOT
3410 3645           ;
3420 3645 A51B    READPD  LDA OCODE
3430 3647 2904            AND #%100
3440 3649 F01E            BEQ WATJMP
3450 364B A901            LDA #1
3460 364D 8DA634          STA STATE
3470 3650 20A035          JSR WXTDVS
3480 3653 AE5F3F          LDX D7
3490 3656 20D43C          JSR READD
3500 3659 48              PHA
3510 365A AD05FB  U1      LDA $FB05  STUFF OUT UART
3520 365D 10FB            BPL U1
3530 365F 68              PLA
3540 3660 8D04FB          STA $FB04
3550 3663 20D835          JSR CLRINT
3560 3666 4CE135          JMP GORUN
3570 3669           ;
3580 3669 4C8C35  WATJMP  JMP WATXTC
```

```
3590 366C          ;
3600 366C          ;CLEAR A DEVICE FLAG
3610 366C          ;
3620 366C A61A     CLEARF LDX DCODE
3630 366E A900            LDA #0
3640 3670 9DBB37          STA FLAGS,X
3650 3673 60              RTS
3660 3674          ;
3670 3674          ;KSF IOT  (KEYBOARD SKIP FLAG)
3680 3674          ;
3690 3674 A61A     KSF    LDX DCODE
3700 3676 AD05FB          LDA $FB05  UART INPUT
3710 3679 4A              LSR A
3720 367A 9004            BCC KSF0
3730 367C A901     KSF1   LDA #1
3740 367E D002            BNE SKIPEX
3750 3680 A900     KSF0   LDA #0
3760 3682          ;
3770 3682 9DBB37   SKIPEX STA FLAGS,X
3780 3685 F024            BEQ NOSKIP
3790 3687          ;
3800 3687 AE893F   STSKIP LDX SKP
3810 368A AD8A3F          LDA SKP+1
3820 368D 48              PHA
3830 368E 20013D          JSR OUTPUT
3840 3691 68              PLA
3850 3692 20143D          JSR OUTBL
3860 3695          ;
3870 3695 AE833F   SC0C2H LDX C0  SET C0-C2 HIGH
3880 3698 A004            LDY #4
3890 369A A900            LDA #0
3900 369C 19843F   HIGHST ORA C0+1,Y
3910 369F 88              DEY
3920 36A0 88              DEY
3930 36A1 10F9            BPL HIGHST
3940 36A3 48              PHA
3950 36A4 20013D          JSR OUTPUT
3960 36A7 68              PLA
3970 36A8 4C1D3D          JMP OUTBH
3980 36AB          ;
3990 36AB 20BD35   NOSKIP JSR SKPHI
4000 36AE 4C9536          JMP SC0C2H
4010 36B1          ;
4020 36B1          ;TSF IOT  (TELEPRINTER SKIP FLAG)
4030 36B1          ;
4040 36B1 A61A     TSF    LDX DCODE
4050 36B3 AD05FB          LDA $FB05
4060 36B6 10C8            BPL KSF0
4070 36B8 30C2            BMI KSF1
4080 36BA          ;
4090 36BA          ;KRB IOT  (KEYBOARD READ BUFFER)
4100 36BA          ;
4110 36BA 201A37   KRB    JSR KCC
4120 36BD          ;
4130 36BD          ;KRS IOT  (KEYBOARD READ STATIC)
4140 36BD          ;
4150 36BD 20BD35   KRS    JSR SKPHI
4160 36C0 AE833F          LDX C0
4170 36C3 AD843F          LDA C0+1
4180 36C6 0D863F          ORA C1+1
```

```
4190 36C9 48            PHA
4200 36CA 20013D        JSR OUTPUT
4210 36CD 68            PLA
4220 36CE 20143D        JSR OUTBL
4230 36D1 AE873F        LDX C2
4240 36D4 AD883F        LDA C2+1
4250 36D7 48            PHA
4260 36D8 20013D        JSR OUTPUT
4270 36DB 68            PLA
4280 36DC 201D3D        JSR OUTBH
4290 36DF AD03FB        LDA $FB03
4300 36E2 8D07FB        STA $FB07
4310 36E5 0980          ORA #$80
4320 36E7 48            PHA
4330 36E8 AE5F3F        LDX D7
4340 36EB A9FF          LDA #$FF
4350 36ED 20013D        JSR OUTPUT
4360 36F0 68            PLA
4370 36F1 9D00F0        STA BASE,X
4380 36F4 AE973F        LDX D11
4390 36F7 AD983F        LDA D11+1
4400 36FA 0D9A3F        ORA D11+3
4410 36FD 0D9C3F        ORA D11+5
4420 3700 0D9E3F        ORA D11+7
4430 3703 48            PHA
4440 3704 20013D        JSR OUTPUT
4450 3707 68            PLA
4460 3708 20143D        JSR OUTBL
4470 370B 20D835        JSR CLRINT
4480 370E 60            RTS
4490 370F               ;
4500 370F               ;TLS IOT  (TELEPRINTER LOAD SELECT)
4510 370F               ;
4520 370F 202C37  TLS     JSR TCF
4530 3712               ;
4540 3712               ;TPC IOT  (TELEPRINTER PRINT CHARACTER)
4550 3712               ;
4560 3712 A900    TPC     LDA #0
4570 3714 8DA734          STA PFLAG
4580 3717 4C9536          JMP SC0C2H
4590 371A               ;
4600 371A               ;KCC IOT  (KEYBOARD CLEAR CHARACTER)
4610 371A               ;
4620 371A 209536  KCC     JSR SC0C2H
4630 371D AE833F          LDX C0
4640 3720 AD843F          LDA C0+1
4650 3723 20143D          JSR OUTBL
4660 3726 20BD35          JSR SKPHI
4670 3729 4C6C36          JMP CLEARF
4680 372C               ;
4690 372C               ;TCF IOT  (TELEPRINTER CLEAR FLAG)
4700 372C               ;
4710 372C 209536  TCF     JSR SC0C2H
4720 372F 20BD35          JSR SKPHI
4730 3732 4C6C36          JMP CLEARF
4740 3735               ;
4750 3735               ;ION IOT  (INTERUPTS ON)
4760 3735               ;
4770 3735 A901    ION     LDA #1
4780 3737 8DA434          STA INTFLG
```

```
4790 373A 20D835          JSR CLRINT
4800 373D 4CAB36          JMP NOSKIP
4810 3740                 ;
4820 3740                 ;IOF IOT  (INTERUPTS OFF)
4830 3740                 ;
4840 3740 A900     IOF    LDA #0
4850 3742 8DA434          STA INTFLG
4860 3745 20D835          JSR CLRINT
4870 3748 4CAB36          JMP NOSKIP
4880 374B                 ;
4890 374B                 ;IOT TABLES:
4900 374B                 ;-----------
4910 374B                 ;
4920 374B                 NOPX=NOSKIP
4930 374B                 ;
4940 374B                 ;TABLE OF DEVICE TABLES
4950 374B                 ;
4960 374B 5B37     HDEVIC .WORD DEVICE
4970 374D 6B37            .WORD NULL
4980 374F 6B37            .WORD NULL
4990 3751 6B37            .WORD NULL
5000 3753 6B37            .WORD NULL
5010 3755 6B37            .WORD NULL
5020 3757 6B37            .WORD NULL
5030 3759 6B37            .WORD NULL
5040 375B                 ;
5050 375B                 ;DEVICE TABLE 0
5060 375B                 ;
5070 375B AB37     DEVICE .WORD INTERU
5080 375D 7B37            .WORD NONE
5090 375F 7B37            .WORD NONE
5100 3761 8B37            .WORD KEYB
5110 3763 9B37            .WORD PRIN
5120 3765 7B37            .WORD NONE
5130 3767 7B37            .WORD NONE
5140 3769 7B37            .WORD NONE
5150 376B                 ;
5160 376B                 ;NULL DEVICE TABLE
5170 376B                 ;
5180 376B 7B37     NULL   .WORD NONE
5190 376D 7B37            .WORD NONE
5200 376F 7B37            .WORD NONE
5210 3771 7B37            .WORD NONE
5220 3773 7B37            .WORD NONE
5230 3775 7B37            .WORD NONE
5240 3777 7B37            .WORD NONE
5250 3779 7B37            .WORD NONE
5260 377B                 ;
5270 377B                 ;DUMMY DEVICE OP TABLE
5280 377B                 ;
5290 377B AB36     NONE   .WORD NOPX
5300 377D AB36            .WORD NOPX
5310 377F AB36            .WORD NOPX
5320 3781 AB36            .WORD NOPX
5330 3783 AB36            .WORD NOPX
5340 3785 AB36            .WORD NOPX
5350 3787 AB36            .WORD NOPX
5360 3789 AB36            .WORD NOPX
5370 378B                 ;
5380 378B                 ;KEYBOARD OP TABLE
```

```
5390 378B                ;
5400 378B AB36     KEYB  .WORD NOPX
5410 378D 7436           .WORD KSF
5420 378F 1A37           .WORD KCC
5430 3791 AB36           .WORD NOPX
5440 3793 BD36           .WORD KRS
5450 3795 AB36           .WORD NOPX
5460 3797 BA36           .WORD KRB
5470 3799 AB36           .WOR NOPX
5480 379B                ;
5490 379B                ;PRINTER OP TABLE
5500 379B                ;
5510 379B AB36     PRIN  .WORD NOPX
5520 379D B136           .WORD TSF
5530 379F 2C37           .WORD TCF
5540 37A1 AB36           .WORD NOPX
5550 37A3 1237           .WORD TPC
5560 37A5 AB36           .WORD NOPX
5570 37A7 0F37           .WORD TLS
5580 37A9 AB36           .WORD NOPX
5590 37AB                ;
5600 37AB                ;INTERUPT OP TABLE
5610 37AB                ;
5620 37AB AB36     INTERU.WORD NOPX
5630 37AD 3537           .WORD ION
5640 37AF 4037           .WORD IOF
5650 37B1 AB36           .WORD NOPX
5660 37B3 AB36           .WORD NOPX
5670 37B5 AB36           .WORD NOPX
5680 37B7 AB36           .WORD NOPX
5690 37B9 AB36           .WORD NOPX
5700 37BB                ;
5710 37BB                ;DEVICE FLAGS
5720 37BB                ;
5730 37BB 00       FLAGS .BYTE 0
5740 37BC 00             .BYTE 0
5750 37BD 00             .BYTE 0
5760 37BE 00             .BYTE 0
5770 37BF 00             .BYTE 0
5780 37C0 00             .BYTE 0
5790 37C1 00             .BYTE 0
5800 37C2 00             .BYTE 0
5810 37C3                ;
5820 37C3                ;TABLE OF WHAT TO DO AFTER HANREQ TABLES
5830 37C3                ;
5840 37C3 E337     POSTH .WORD POSTMS
5850 37C5 D337           .WORD NULLM
5860 37C7 D337           .WORD NULLM
5870 37C9 D337           .WORD NULLM
5880 37CB D337           .WORD NULLM
5890 37CD D337           .WORD NULLM
5900 37CF D337           .WORD NULLM
5910 37D1 D337           .WORD NULLM
5920 37D3                ;
5930 37D3                ;NULL WHAT TO DO AFTER HANREQ TABLE
5940 37D3                ;
5950 37D3 8C35     NULLM .WORD WATXTC
5960 37D5 8C35           .WORD WATXTC
5970 37D7 8C35           .WORD WATXTC
5980 37D9 8C35           .WORD WATXTC
```

```
5990 37DB 8C35            .WORD WATXTC
6000 37DD 8C35            .WORD WATXTC
6010 37DF 8C35            .WORD WATXTC
6020 37E1 8C35            .WORD WATXTC
6030 37E3                 ;
6040 37E3                 ;WHAT TO DO AFTER HANREQ TABLE 0
6050 37E3                 ;
6060 37E3 8C35    POSTMS  .WORD WATXTC
6070 37E5 8C35            .WORD WATXTC
6080 37E7 8C35            .WORD WATXTC
6090 37E9 8C35            .WORD WATXTC
6100 37EB 4536            .WORD READPD
6110 37ED 8C35            .WORD WATXTC
6120 37EF 8C35            .WORD WATXTC
6130 37F1 8C35            .WORD WATXTC
6140 37F3                 END
```

```
 10 0000           ;UTILITIES FOR THE 560Z BOARD
 20 0000           ;
 30 0000           TMP=0
 40 0000           FLP=1
 50 0000           FLAG=2
 60 0000           PNTL=3
 70 0000           PNTH=4
 80 0000           YSAVE=5
 90 0000           DSTL=6
100 0000           DSTH=7
110 0000           SRCSL=8
120 0000           SRCSH=9
130 0000           SRCEL=$A
140 0000           SRCEH=$B
150 0000           TEMP=$C
160 0000           OCTAL=$D
170 0000           OCTAH=$E
180 0000           OCTDL=$F
190 0000           OCTDH=$10
200 0000           HIGH=$11
210 0000           HIGHER=$12
220 0000           TMPA=$13
230 0000           TIMEL=$14
240 0000           TIMEH=$15
250 0000           DELAYL=$16
260 0000           DELAYH=$17
270 0000           BITPAT=$18
280 0000           NOTBPT=$19
290 0000           ;
300 0000           FIELD=$27
310 0000           ;
320 0000           SWREG=$34A2
330 0000           TRACE=$34A5
340 0000           ;
350 0000           Z80IO=$3200  I/O HANDLERS
360 0000           I61IO=$3400
370 0000           ;
380 0000           BASE=$F000  /LOCATION OF PIAS/
390 0000           BLOC=$E0  /BASE ADDRESS OF BOARD/
400 0000           ;
410 3800                    *=$3800
420 3800 A900      START    LDA #0
430 3802 8DA534             STA TRACE
440 3805 8502               STA FLAG
450 3807 8527               STA FIELD
460 3809 A200      CLEAR    LDX #0
470 380B 20BF3C             JSR INIT
480 380E E010               CPX #$10
490 3810 D0F9               BNE CLEAR+2
500 3812 20BE3F             JSR PRESET
510 3815 AD323F             LDA CKLN+1
520 3818 20013D             JSR OUTPUT
530 381B A064               LDY #100
540 381D BD00F0             LDA BASE,X
550 3820 4D323F    CKCLR    EOR CKLN+1
560 3823 9D00F0             STA BASE,X
570 3826 88                 DEY
580 3827 D0F7               BNE CKCLR
```

```
 590 3829 AD323F          LDA CKLN+1
 600 382C 20E83C          JSR INPUT
 610 382F           ;
 620 382F 20723D  PROMPT  JSR CRLF
 630 3832 A95A            LDA #'Z
 640 3834 20C93B          JSR OUTCH
 650 3837 A93A            LDA #':
 660 3839 20C93B          JSR OUTCH
 670 383C 20AB3B          JSR INCH  INPUT A COMMAND
 680 383F C943            CMP #'C  C-CLEAR
 690 3841 F0C6            BEQ CLEAR
 700 3843 C950            CMP #'P  P-PRINT
 710 3845 D04F            BNE NXT1
 720 3847 A200    PRINT   LDX #0
 730 3849 8601            STX FLP
 740 384B 20723D          JSR CRLF
 750 384E 8A              TXA
 760 384F 48              PHA
 770 3850 4A              LSR A
 780 3851 4A              LSR A
 790 3852 20D23B          JSR DIGIT
 800 3855 A501            LDA FLP
 810 3857 D009            BNE B
 820 3859 A941            LDA #'A
 830 385B 20C93B          JSR OUTCH
 840 385E E601            INC FLP
 850 3860 D007            BNE PR1
 860 3862 A942    B       LDA #'B
 870 3864 20C93B          JSR OUTCH
 880 3867 C601            DEC FLP
 890 3869 A920    PR1     LDA #'
 900 386B 20C93B          JSR OUTCH
 910 386E 20D83C          JSR RDDR
 920 3871 207C3D          JSR BINARY
 930 3874 20723D          JSR CRLF
 940 3877 A920            LDA #'
 950 3879 20C93B          JSR OUTCH
 960 387C 20C93B          JSR OUTCH
 970 387F 20C93B          JSR OUTCH
 980 3882 68              PLA
 990 3883 AA              TAX
1000 3884 48              PHA
1010 3885 20D43C          JSR READD
1020 3888 207C3D          JSR BINARY
1030 388B 68              PLA
1040 388C 18              CLC
1050 388D 6902            ADC #2
1060 388F AA              TAX
1070 3890 E010            CPX #$10
1080 3892 D0B7            BNE PRINT+4
1090 3894 F099            BEQ PROMPT
1100 3896 C953    NXT1    CMP #'S  S-SET
1110 3898 D03D            BNE NXT2
1120 389A 20323D          JSR NAMEX
1130 389D 8600            STX TMP
1140 389F 20503D          JSR BITS
1150 38A2 48              PHA
1160 38A3 20AB3B          JSR INCH
1170 38A6 A600            LDX TMP
1180 38A8 C949            CMP #'I
```

```
1190 38AA D007           BNE N1
1200 38AC 68             PLA
1210 38AD 20E83C         JSR INPUT
1220 38B0 4C2F38         JMP PROMPT
1230 38B3 C948    N1     CMP #'H
1240 38B5 D00C           BNE N2
1250 38B7 68             PLA
1260 38B8 48             PHA
1270 38B9 20013D         JSR OUTPUT
1280 38BC 68             PLA
1290 38BD 201D3D         JSR OUTBH
1300 38C0 4C2F38         JMP PROMPT
1310 38C3 C94C    N2     CMP #'L
1320 38C5 D00C           BNE N3
1330 38C7 68             PLA
1340 38C8 48             PHA
1350 38C9 20013D         JSR OUTPUT
1360 38CC 68             PLA
1370 38CD 20143D         JSR OUTBL
1380 38D0 4C2F38         JMP PROMPT
1390 38D3 68      N3     PLA
1400 38D4 4C673D  ERR    JMP ERROR
1410 38D7 C945    NXT2   CMP #'E  E-EXIT
1420 38D9 D003           BNE NXT3
1430 38DB 4CCC3B         JMP EXIT
1440 38DE C946    NXT3   CMP #'F  F-FETCH
1450 38E0 D00C           BNE NXT4
1460 38E2 A203           LDX #PNTL
1470 38E4 20033E         JSR BUILD
1480 38E7 A901           LDA #1
1490 38E9 8502           STA FLAG
1500 38EB 4C2F38         JMP PROMPT
1510 38EE C94C    NXT4   CMP #'L  L-LEARN
1520 38F0 D039           BNE NXT5
1530 38F2 A203           LDX #PNTL
1540 38F4 20033E         JSR BUILD
1550 38F7 A000           LDY #0
1560 38F9 20AB3B  NEXT   JSR INCH
1570 38FC C90D           CMP #$D
1580 38FE D006           BNE CHAR
1590 3900 20723D         JSR CRLF
1600 3903 4CF938         JMP NEXT
1610 3906 C924    CHAR   CMP #'$
1620 3908 D017           BNE GOAHEA
1630 390A 98             TYA
1640 390B 18             CLC
1650 390C 6503           ADC PNTL
1660 390E 8503           STA PNTL
1670 3910 9002           BCC NOC
1680 3912 E604           INC PNTH
1690 3914 A504    NOC    LDA PNTH
1700 3916 20CF3B         JSR BYTE
1710 3919 A503           LDA PNTL
1720 391B 20CF3B         JSR BYTE
1730 391E 4C2F38         JMP PROMPT
1740 3921 9103    GOAHEA STA (PNTL),Y
1750 3923 C8             INY
1760 3924 D0D3           BNE NEXT
1770 3926 E604           INC PNTH
1780 3928 4CF938         JMP NEXT
```

```
1790 392B C958    NXT5   CMP #'X  X-EXIT FETCH MODE
1800 392D D007           BNE NXT6
1810 392F A900           LDA #0
1820 3931 8502           STA FLAG
1830 3933 4C2F38         JMP PROMPT
1840 3936 C94D    NXT6   CMP #'M  M-MOVE
1850 3938 D031           BNE NXT7
1860 393A 20AB3B         JSR INCH
1870 393D C946           CMP #'F
1880 393F D00B           BNE T
1890 3941 20313E         JSR PARM3
1900 3944 A202           LDX #2
1910 3946 20493E         JSR MOVE
1920 3949 4C2F38         JMP PROMPT
1930 394C C954    T      CMP #'T
1940 394E D00B           BNE I
1950 3950 20313E         JSR PARM3
1960 3953 A200           LDX #0
1970 3955 20493E         JSR MOVE
1980 3958 4C2F38         JMP PROMPT
1990 395B C949    I      CMP #'I
2000 395D D009           BNE JMPERR
2010 395F 20313E         JSR PARM3
2020 3962 20923E         JSR MOVE12
2030 3965 4C2F38         JMP PROMPT
2040 3968 4C673D  JMPERR JMP ERROR
2050 396B C923    NXT7   CMP #'#  #-OPEN
2060 396D D05F           BNE NXT8
2070 396F A006           LDY #6
2080 3971 A20D           LDX #OCTAL
2090 3973 20D33D         JSR INOCTA
2100 3976 A92F    SHOWER LDA #'/
2110 3978 20C93B         JSR OUTCH
2120 397B 200D3C  SHOW   JSR READO
2130 397E A20F           LDX #OCTDL
2140 3980 20A63D         JSR PROC12
2150 3983 A920           LDA #'
2160 3985 20C93B         JSR OUTCH
2170 3988 20AB3B  SCMD   JSR INCH
2180 398B C90D           CMP #$D
2190 398D F03C           BEQ GOPROM
2200 398F C92F           CMP #'/
2210 3991 F0E8           BEQ SHOW
2220 3993 C90A           CMP #$A
2230 3995 D013           BNE MUSTBE
2240 3997 E60D           INC OCTAL
2250 3999 D002           BNE NCR1
2260 399B E60E           INC OCTAH
2270 399D A90D    NCR1   LDA #$D
2280 399F 20C93B         JSR OUTCH
2290 39A2 A20D           LDX #OCTAL
2300 39A4 20943D         JSR PROC16
2310 39A7 4C7639         JMP SHOWER
2320 39AA 48      MUSTBE PHA
2330 39AB A20F           LDX #OCTDL
2340 39AD A004           LDY #4
2350 39AF A900           LDA #0
2360 39B1 9500           STA 0,X
2370 39B3 9501           STA 1,X
2380 39B5 A903           LDA #3
```

```
2390 39B7 850C            STA TEMP
2400 39B9 68              PLA
2410 39BA 20F53D          JSR DIGOCT+3
2420 39BD 20E03D          JSR NXR+7
2430 39C0 A920            LDA #'
2440 39C2 20C93B          JSR OUTCH
2450 39C5 20D83B          JSR WRITEO
2460 39C8 4C8839          JMP SCMD
2470 39CB 4C2F38  GOPROM  JMP PROMPT
2480 39CE C94B    NXT8    CMP #'K  K-CLOCK
2490 39D0 D036            BNE NXT9
2500 39D2 20AB3B          JSR INCH
2510 39D5 C948            CMP #'H
2520 39D7 D014            BNE LOWQ
2530 39D9 20243D          JSR SINGCY
2540 39DC AE313F          LDX CKLN
2550 39DF AD323F          LDA CKLN+1
2560 39E2 48              PHA
2570 39E3 20013D          JSR OUTPUT
2580 39E6 68              PLA
2590 39E7 201D3D          JSR OUTBH
2600 39EA 4C2F38          JMP PROMPT
2610 39ED C94C    LOWQ    CMP #'L
2620 39EF D014            BNE ERRJ
2630 39F1 20243D          JSR SINGCY
2640 39F4 AE313F          LDX CKLN
2650 39F7 AD323F          LDA CKLN+1
2660 39FA 48              PHA
2670 39FB 20013D          JSR OUTPUT
2680 39FE 68              PLA
2690 39FF 20143D          JSR OUTBL
2700 3A02 4C2F38          JMP PROMPT
2710 3A05                 ;
2720 3A05 4C673D  ERRJ    JMP ERROR
2730 3A08 C952    NXT9    CMP #'R  R-RUN
2740 3A0A D066            BNE NXT10
2750 3A0C A214            LDX #TIMEL
2760 3A0E 20033E          JSR BUILD
2770 3A11 20243D          JSR SINGCY
2780 3A14 AE313F          LDX CKLN
2790 3A17 AD323F          LDA CKLN+1
2800 3A1A 8518            STA BITPAT
2810 3A1C 20013D          JSR OUTPUT
2820 3A1F A518            LDA BITPAT
2830 3A21 49FF            EOR #$FF
2840 3A23 8519            STA NOTBPT
2850 3A25 A515            LDA TIMEH
2860 3A27 D017            BNE RUNLP
2870 3A29 A514            LDA TIMEL
2880 3A2B D013            BNE RUNLP
2890 3A2D A519    FAST    LDA NOTBPT
2900 3A2F 3D00F0          AND BASE,X
2910 3A32 9D00F0          STA BASE,X
2920 3A35 A518            LDA BITPAT
2930 3A37 1D00F0          ORA BASE,X
2940 3A3A 9D00F0          STA BASE,X
2950 3A3D 4C2D3A          JMP FAST
2960 3A40 A519    RUNLP   LDA NOTBPT
2970 3A42 3D00F0          AND BASE,X
2980 3A45 9D00F0          STA BASE,X
```

```
2990 3A48 A515           LDA TIMEH
3000 3A4A 8517           STA DELAYH
3010 3A4C A514    DEL1A  LDA TIMEL
3020 3A4E 8516           STA DELAYL
3030 3A50 C616    DEL2A  DEC DELAYL
3040 3A52 D0FC           BNE DEL2A
3050 3A54 C617           DEC DELAYH
3060 3A56 D0F4           BNE DEL1A
3070 3A58 A518           LDA BITPAT
3080 3A5A 1D00F0         ORA BASE,X
3090 3A5D 9D00F0         STA BASE,X
3100 3A60 A515           LDA TIMEH
3110 3A62 8517           STA DELAYH
3120 3A64 A514    DEL1B  LDA TIMEL
3130 3A66 8516           STA DELAYL
3140 3A68 C616    DEL2B  DEC DELAYL
3150 3A6A D0FC           BNE DEL2B
3160 3A6C C617           DEC DELAYH
3170 3A6E D0F4           BNE DEL1B
3180 3A70 F0CE           BEQ RUNLP
3190 3A72 C942    NXT10  CMP #'B  B-BIN LOADER
3200 3A74 D00B           BNE NXT11
3210 3A76 A206           LDX #DSTL
3220 3A78 20033E         JSR BUILD
3230 3A7B 20383C         JSR BINLDR
3240 3A7E 4C2F38         JMP PROMPT
3250 3A81 C957    NXT11  CMP #'W  W-SWITCH SET
3260 3A83 D014           BNE NXT12
3270 3A85 A004           LDY #4
3280 3A87 A203           LDX #PNTL
3290 3A89 20D33D         JSR INOCTA
3300 3A8C A503           LDA PNTL
3310 3A8E 8DA234         STA SWREG
3320 3A91 A504           LDA PNTH
3330 3A93 8DA334         STA SWREG+1
3340 3A96 4C2F38         JMP PROMPT
3350 3A99 C95A    NXT12  CMP #'Z  Z-Z80 IN/OUT
3360 3A9B D003           BNE NXT13
3370 3A9D 4C0032         JMP Z80IO
3380 3AA0 C949    NXT13  CMP #'I  I-I6100 IOT
3390 3AA2 D003           BNE NXT14
3400 3AA4 4C0034         JMP I61IO
3410 3AA7 C954    NXT14  CMP #'T  T-TRACE IOTS
3420 3AA9 D008           BNE NXT15
3430 3AAB A901           LDA #1
3440 3AAD 8DA534         STA TRACE
3450 3AB0 4C2F38         JMP PROMPT
3460 3AB3 C947    NXT15  CMP #'G  G-GO
3470 3AB5 F003           BEQ GYES
3480 3AB7 4C983B         JMP NXT16
3490 3ABA 20AB3B  GYES   JSR INCH
3500 3ABD C95A           CMP #'Z
3510 3ABF D064           BNE IQUEST
3520 3AC1 A203           LDX #PNTL
3530 3AC3 20033E         JSR BUILD
3540 3AC6 AE4D3F         LDX MMENAB
3550 3AC9 AD4E3F         LDA MMENAB+1
3560 3ACC 48             PHA
3570 3ACD 20013D         JSR OUTPUT
3580 3AD0 68             PLA
```

```
3590 3AD1 20143D          JSR OUTBL
3600 3AD4 AE4B3F          LDX MM12
3610 3AD7 AD4C3F          LDA MM12+1
3620 3ADA 0D4E3F          ORA MM12+3
3630 3ADD 0D503F          ORA MM12+5
3640 3AE0 0D523F          ORA MM12+7
3650 3AE3 48              PHA
3660 3AE4 20013D          JSR OUTPUT
3670 3AE7 68              PLA
3680 3AE8 20143D          JSR OUTBL
3690 3AEB A9C3            LDA #$C3  JP INSTRUCTIO (Z80)
3700 3AED 8D00E0          STA BLOC*$100
3710 3AF0 A503            LDA PNTL
3720 3AF2 8D01E0          STA BLOC*$100+1
3730 3AF5 A504            LDA PNTH
3740 3AF7 8D02E0          STA BLOC*$100+2
3750 3AFA AE4D3F          LDX MMENAB
3760 3AFD AD4E3F          LDA MMENAB+1
3770 3B00 201D3D          JSR OUTBH
3780 3B03 EA              NOP
3790 3B04 EA              NOP
3800 3B05 EA              NOP
3810 3B06 AE3D3F          LDX CNPIA1
3820 3B09 AD3E3F          LDA CNPIA1+1
3830 3B0C 48              PHA
3840 3B0D 20013D          JSR OUTPUT
3850 3B10 68              PLA
3860 3B11 20143D          JSR OUTBL
3870 3B14 AE393F          LDX Z80RST
3880 3B17 AD3A3F          LDA Z80RST+1
3890 3B1A 48              PHA
3900 3B1B 20013D          JSR OUTPUT
3910 3B1E 68              PLA
3920 3B1F 20143D          JSR OUTBL
3930 3B22 4C2F38          JMP PROMPT
3940 3B25 C949    IQUEST  CMP #'I
3950 3B27 F003            BEQ IYES
3960 3B29 4C673D          JMP ERROR
3970 3B2C A20F    IYES    LDX #OCTDL
3980 3B2E A004            LDY #4
3990 3B30 20D33D          JSR INOCTA
4000 3B33 A527            LDA FIELD
4010 3B35 090F            ORA #%1111
4020 3B37 850E            STA OCTAH
4030 3B39 A9FE            LDA #$FE
4040 3B3B 850D            STA OCTAL
4050 3B3D 20D83B          JSR WRITEO
4060 3B40 A90B            LDA #%1011  5776 (BASE 8)
4070 3B42 8510            STA OCTDH  JMP I (6100)
4080 3B44 A9FE            LDA #%11111110
4090 3B46 850F            STA OCTDL
4100 3B48 E60D            INC OCTAL
4110 3B4A 20D83B          JSR WRITEO
4120 3B4D A527            LDA FIELD
4130 3B4F 20DC3E          JSR SETHI
4140 3B52 AE973F          LDX D11
4150 3B55 20BF3C          JSR INIT
4160 3B58 AE3B3F          LDX CNPIA2
4170 3B5B AD3C3F          LDA CNPIA2+1
4180 3B5E 48              PHA
```

```
4190 3B5F 20013D          JSR OUTPUT
4200 3B62 68              PLA
4210 3B63 20143D          JSR OUTBL
4220 3B66 AE373F          LDX I61RST
4230 3B69 AD383F          LDA I61RST+1
4240 3B6C 48              PHA
4250 3B6D 20013D          JSR OUTPUT
4260 3B70 68              PLA
4270 3B71 20143D          JSR OUTBL
4280 3B74 AE333F          LDX INTREQ
4290 3B77 AD343F          LDA INTREQ+1
4300 3B7A 48              PHA
4310 3B7B 20013D          JSR OUTPUT
4320 3B7E 68              PLA
4330 3B7F 201D3D          JSR OUTBH
4340 3B82 AE353F          LDX I61RHT
4350 3B85 AD363F          LDA I61RHT+1
4360 3B88 48              PHA
4370 3B89 20013D          JSR OUTPUT
4380 3B8C 68              PLA
4390 3B8D 48              PHA
4400 3B8E 20143D          JSR OUTBL
4410 3B91 68              PLA
4420 3B92 201D3D          JSR OUTBH
4430 3B95 4C2F38          JMP PROMPT
4440 3B98 C948    NXT16   CMP #'H  H-HIGH 4 BITS
4450 3B9A F003            BEQ HYES
4460 3B9C 4C673D          JMP ERROR
4470 3B9F 20193E  HYES    JSR ONED
4480 3BA2 0A              ASL A
4490 3BA3 0A              ASL A
4500 3BA4 0A              ASL A
4510 3BA5 0A              ASL A
4520 3BA6 8527            STA FIELD
4530 3BA8 4C2F38          JMP PROMPT
4540 3BAB                 ;
4550 3BAB                 ;SPECIAL INPUT A CHARACTER SUBROUTINE
4560 3BAB                 ;
4570 3BAB A502    INCH    LDA FLAG
4580 3BAD D003            BNE FILE
4590 3BAF 4CC63B          JMP INCHER
4600 3BB2 8405    FILE    STY YSAVE
4610 3BB4 A000            LDY #0
4620 3BB6 B103            LDA (PNTL),Y
4630 3BB8 E603            INC PNTL
4640 3BBA D002            BNE NOCARY
4650 3BBC E604            INC PNTH
4660 3BBE A405    NOCARY  LDY YSAVE
4670 3BC0 4CC93B          JMP OUTCH
4680 3BC3                 ;
4690 3BC3 4C673D  EJMPER  JMP ERROR
4700 3BC6                 ;
4710 3BC6                 ;I/O JUMP TABLE
4720 3BC6                 ;
4730 3BC6 4CF921  INCHER  JMP $21F9
4740 3BC9 4C6D22  OUTCH   JMP $226D
4750 3BCC 4C0025  EXIT    JMP $2500
4760 3BCF 4C2C27  BYTE    JMP $272C
4770 3BD2 4C3527  DIGIT   JMP $2735
4780 3BD5 4CFC22  REDCHR  JMP $22FC  UART- BIN LOADER INPUT
```

FF2A FF69 - FF6C

```
4790 3BD8           ;
4800 3BD8           ;GENERAL PURPOSE SUBROUTINES
4810 3BD8           ;---------------------------
4820 3BD8           ;
4830 3BD8           ;WRITE (OCTDL,OCTDH) INTO (OCTAL,OCTAH)
4840 3BD8           ;
4850 3BD8 A50E      WRITEO LDA OCTAH
4860 3BDA 20DC3E           JSR SETHI
4870 3BDD A510             LDA OCTDH
4880 3BDF 8500             STA TMP
4890 3BE1 A904             LDA #4
4900 3BE3 8513             STA TMPA
4910 3BE5 A058             LDY #D11-MM15+6
4920 3BE7 20F93E           JSR COPY
4930 3BEA A50E             LDA OCTAH
4940 3BEC 48               PHA
4950 3BED 290F             AND #$F
4960 3BEF 09E0             ORA #BLOC
4970 3BF1 850E             STA OCTAH
4980 3BF3 A50F             LDA OCTDL
4990 3BF5 A000             LDY #0
5000 3BF7 910D             STA (OCTAL),Y
5010 3BF9 68               PLA
5020 3BFA 850E             STA OCTAH
5030 3BFC A900      CLRINP LDA #0
5040 3BFE A006             LDY #6
5050 3C00 19973F    SETR   ORA D11,Y
5060 3C03 88               DEY
5070 3C04 88               DEY
5080 3C05 10F9             BPL SETR
5090 3C07 AE983F           LDX D11+1
5100 3C0A 4CE83C           JMP INPUT
5110 3C0D           ;
5120 3C0D           ;READ (OCTAL,OCTAH) CONTENTS INTO (OCTDL,OCTD
5130 3C0D           ;
5140 3C0D A50E      READO  LDA OCTAH
5150 3C0F 20DC3E           JSR SETHI
5160 3C12 A50E             LDA OCTAH
5170 3C14 48               PHA
5180 3C15 290F             AND #$F
5190 3C17 09E0             ORA #BLOC
5200 3C19 850E             STA OCTAH
5210 3C1B A000             LDY #0
5220 3C1D B10D             LDA (OCTAL),Y
5230 3C1F 850F             STA OCTDL
5240 3C21 68               PLA
5250 3C22 850E             STA OCTAH
5260 3C24 AE953F           LDX D12
5270 3C27 20D43C           JSR READD
5280 3C2A 8510             STA OCTDH
5290 3C2C AD963F           LDA D12+1
5300 3C2F 4A        RL     LSR A
5310 3C30 B005             BCS OUTR
5320 3C32 4610             LSR OCTDH
5330 3C34 4C2F3C           JMP RL
5340 3C37 60        OUTR   RTS
5350 3C38           ;
5360 3C38           ;BIN LOADER FOR 6100
5370 3C38           ;
5380 3C38           ;(DSTL,DSTH)  IS BASE ADDRESS TO 8K BLOCK
```

```
5390 3C38           ;SUPPORTS NO FIELD CHANGES (4K MEMORY ONLY)
5400 3C38           ; PRINTS "FLD" ON ANY FIELD CHANGE + EXITS
5410 3C38           ;
5420 3C38 A900      BINLDR LDA #0
5430 3C3A 8504             STA PNTH
5440 3C3C A9FF             LDA #$FF  SET INPUT MASK TO 8 BITS
5450 3C3E 8D0C23           STA $230C
5460 3C41 20D53B    BINL0  JSR REDCHR
5470 3C44 C980             CMP #$80
5480 3C46 F0F9             BEQ BINL0
5490 3C48 D007             BNE BINL1A
5500 3C4A A900      BINL1  LDA #0
5510 3C4C 8504             STA PNTH
5520 3C4E 20D53B           JSR REDCHR
5530 3C51 2CBE3C    BINL1A BIT SC0
5540 3C54 F039             BEQ DATAFD
5550 3C56 2CBD3C           BIT S80
5560 3C59 D01A             BNE FIELDQ
5570 3C5B 20A83C           JSR TWELV
5580 3C5E 0A               ASL A  ADDRESS*2
5590 3C5F 850D             STA OCTAL
5600 3C61 860E             STX OCTAH
5610 3C63 260E             ROL OCTAH
5620 3C65 A506             LDA DSTL  ADD OFFSET
5630 3C67 18               CLC
5640 3C68 650D             ADC OCTAL
5650 3C6A 850D             STA OCTAL
5660 3C6C A507             LDA DSTH
5670 3C6E 650E             ADC OCTAH
5680 3C70 850E             STA OCTAH
5690 3C72 4C4A3C           JMP BINL1
5700 3C75 2CBC3C    FIELDQ BIT S40
5710 3C78 F00F             BEQ END
5720 3C7A A946             LDA #'F
5730 3C7C 20C93B           JSR OUTCH  PRINT FLD
5740 3C7F A94C             LDA #'L
5750 3C81 20C93B           JSR OUTCH
5760 3C84 A944             LDA #'D
5770 3C86 20C93B           JSR OUTCH
5780 3C89 A97F      END    LDA #$7F
5790 3C8B 8D0C23           STA $230C  SET IT BACK TO 7 BITS
5800 3C8E 60               RTS
5810 3C8F 20A83C    DATAFD JSR TWELV
5820 3C92 A000             LDY #0
5830 3C94 910D             STA (OCTAL),Y
5840 3C96 C8               INY
5850 3C97 8A               TXA
5860 3C98 910D             STA (OCTAL),Y
5870 3C9A A902             LDA #2
5880 3C9C 18               CLC
5890 3C9D 650D             ADC OCTAL
5900 3C9F 850D             STA OCTAL
5910 3CA1 90A7             BCC BINL1
5920 3CA3 E60E             INC OCTAH
5930 3CA5 4C4A3C           JMP BINL1
5940 3CA8           ;
5950 3CA8 0A        TWELV  ASL A
5960 3CA9 0A               ASL A
5970 3CAA A204             LDX #4
5980 3CAC 0A        TW1    ASL A
```

```
5990 3CAD 2604          ROL PNTH
6000 3CAF CA            DEX
6010 3CB0 D0FA          BNE TW1
6020 3CB2 8503          STA PNTL
6030 3CB4 20D53B        JSR REDCHR
6040 3CB7 0503          ORA PNTL
6050 3CB9 A604          LDX PNTH
6060 3CBB 60            RTS
6070 3CBC           ;
6080 3CBC 40        S40     .BYTE $40
6090 3CBD 80        S80     .BYTE $80
6100 3CBE C0        SC0     .BYTE $C0
6110 3CBF           ;
6120 3CBF           ;INITIALIZE A GIVEN PIA (INDEXED BY X)
6130 3CBF           ;SET A AND B AS INPUTS.
6140 3CBF           ;
6150 3CBF A002      INIT    LDY #2
6160 3CC1 A900      IN1     LDA #0
6170 3CC3 9D01F0            STA BASE+1,X
6180 3CC6 9D00F0            STA BASE,X
6190 3CC9 A904              LDA #4
6200 3CCB 9D01F0            STA BASE+1,X
6210 3CCE E8                INX
6220 3CCF E8                INX
6230 3CD0 88                DEY  DO SIDES A AND B
6240 3CD1 D0EE              BNE IN1
6250 3CD3 60                RTS
6260 3CD4           ;
6270 3CD4           ;READ DATA REGISTER INTO AC (INDEXED BY X)
6280 3CD4           ;
6290 3CD4 BD00F0    READD   LDA BASE,X
6300 3CD7 60                RTS
6310 3CD8           ;
6320 3CD8           ;READ THE DATA DIRECTION REGISTOR
6330 3CD8           ;INTO AC (PIA INDEXED BY X)
6340 3CD8           ;
6350 3CD8 A900      RDDR    LDA #0
6360 3CDA 9D01F0            STA BASE+1,X
6370 3CDD BD00F0            LDA BASE,X
6380 3CE0 48                PHA
6390 3CE1 A904              LDA #4
6400 3CE3 9D01F0            STA BASE+1,X
6410 3CE6 68                PLA
6420 3CE7 60                RTS
6430 3CE8           ;
6440 3CE8           ;SET A PARTICULAR BIT AS AN INPUT
6450 3CE8           ;BASED ON BITS SET IN AC (PIA INDEXED BY X)
6460 3CE8           ;
6470 3CE8 48        INPUT   PHA
6480 3CE9 A900              LDA #0
6490 3CEB 9D01F0            STA BASE+1,X
6500 3CEE 68                PLA
6510 3CEF 49FF              EOR #$FF
6520 3CF1 3D00F0            AND BASE,X
6530 3CF4 9D00F0            STA BASE,X
6540 3CF7 A904              LDA #4
6550 3CF9 9D01F0            STA BASE+1,X
6560 3CFC 60                RTS
6570 3CFD           ;
6580 3CFD           ;CHECK IF A BIT IS SET IN PIA INDEXED BY X
```

```
6590 3CFD          ;Z=1 IF NOT SET // Z=0 IF SET
6600 3CFD          ;AC HAS BIT OF INTEREST SET
6610 3CFD          ;
6620 3CFD 3D00F0   ISSET  AND BASE,X
6630 3D00 60              RTS
6640 3D01          ;
6650 3D01          ;SET A PARTICULAR BIT AS AN OUTPUT BASED
6660 3D01          ;ON BITS SET IN AC (PIA INDEXED BY X)
6670 3D01          ;
6680 3D01 48       OUTPUT PHA
6690 3D02 A900            LDA #0
6700 3D04 9D01F0          STA BASE+1,X
6710 3D07 68              PLA
6720 3D08 1D00F0          ORA BASE,X
6730 3D0B 9D00F0          STA BASE,X
6740 3D0E A904            LDA #4
6750 3D10 9D01F0          STA BASE+1,X
6760 3D13 60              RTS
6770 3D14          ;
6780 3D14          ;OUTPUT A LOW BIT PATTERN TO PIA
6790 3D14          ;FROM AC (PIA INDEXED BY X)
6800 3D14          ;
6810 3D14 49FF     OUTBL  EOR #$FF
6820 3D16 3D00F0          AND BASE,X
6830 3D19 9D00F0          STA BASE,X
6840 3D1C 60              RTS
6850 3D1D          ;
6860 3D1D          ;OUTPUT A HIGH BIT PATTERN TO PIA BASED
6870 3D1D          ;ON BITS SET IN AC (PIA INDEXED BY X)
6880 3D1D          ;
6890 3D1D 1D00F0   OUTBH  ORA BASE,X
6900 3D20 9D00F0          STA BASE,X
6910 3D23 60              RTS
6920 3D24          ;
6930 3D24          ;SET SINGLE CYCLE MODE
6940 3D24          ;
6950 3D24 AE3F3F   SINGCY LDX RUNSTP
6960 3D27 AD303F          LDA RUNSTP+1
6970 3D2A 48              PHA
6980 3D2B 20013D          JSR OUTPUT
6990 3D2E 68              PLA
7000 3D2F 4C143D          JMP OUTBL
7010 3D32          ;
7020 3D32          ;INPUT A NAME SPECIFYING A 8 BIT PIA
7030 3D32          ;PORT (1 OF 8 POSSIBLE) AND CALCULATE
7040 3D32          ;X INDEX FOR IT.
7050 3D32          ;
7060 3D32 20AB3B   NAMEX  JSR INCH
7070 3D35 C930            CMP #'0
7080 3D37 302E            BMI ERROR
7090 3D39 C934            CMP #'4
7100 3D3B 102A            BPL ERROR
7110 3D3D 2903            AND #%11
7120 3D3F 0A              ASL A
7130 3D40 0A              ASL A
7140 3D41 AA              TAX
7150 3D42 20AB3B          JSR INCH
7160 3D45 C941            CMP #'A
7170 3D47 F006            BEQ DONE
7180 3D49 C942            CMP #'B
```

```
7190 3D4B D01A           BNE ERROR
7200 3D4D E8             INX
7210 3D4E E8             INX
7220 3D4F 60      DONE   RTS
7230 3D50                ;
7240 3D50                ;INPUT A BIT NUMBER AND SET IT IN AC
7250 3D50                ;
7260 3D50 20AB3B  BITS   JSR INCH
7270 3D53 C930           CMP #'0
7280 3D55 3010           BMI ERROR
7290 3D57 C938           CMP #'8
7300 3D59 100C           BPL ERROR
7310 3D5B 2907           AND #%111
7320 3D5D AA             TAX
7330 3D5E E8             INX
7340 3D5F A900           LDA #0
7350 3D61 38             SEC
7360 3D62 2A      LOOP   ROL A
7370 3D63 CA             DEX
7380 3D64 D0FC           BNE LOOP
7390 3D66 60             RTS
7400 3D67                ;
7410 3D67                ;ERROR TRAP
7420 3D67                ;
7430 3D67 A93F    ERROR  LDA #'?
7440 3D69 20C93B         JSR OUTCH
7450 3D6C 20C93B         JSR OUTCH
7460 3D6F 4C2F38         JMP PROMPT
7470 3D72                ;
7480 3D72                ;OUTPUT A RETURN/LINEFEED
7490 3D72                ;
7500 3D72 A90D    CRLF   LDA #$D
7510 3D74 20C93B         JSR OUTCH
7520 3D77 A90A           LDA #$A
7530 3D79 4CC93B         JMP OUTCH
7540 3D7C                ;
7550 3D7C                ;PRINT THE BINARY NUMBER IN AC
7560 3D7C                ;
7570 3D7C A008    BINARY LDY #8
7580 3D7E 0A      BIN1   ASL A
7590 3D7F AA             TAX
7600 3D80 9008           BCC ZERO
7610 3D82 A931           LDA #'1
7620 3D84 20C93B         JSR OUTCH
7630 3D87 4C8F3D         JMP BIN2
7640 3D8A A930    ZERO   LDA #'0
7650 3D8C 20C93B         JSR OUTCH
7660 3D8F 8A      BIN2   TXA
7670 3D90 88             DEY
7680 3D91 D0EB           BNE BIN1
7690 3D93 60             RTS
7700 3D94                ;
7710 3D94                ;PRINT PAGE 0 INDEXED BY X AS 16 BIT OCTAL
7720 3D94                ;
7730 3D94 B501    PROC16 LDA 1,X
7740 3D96 2A             ROL A
7750 3D97 2A             ROL A
7760 3D98 2901           AND #%1
7770 3D9A 20CC3D         JSR OCTDIG
7780 3D9D B501           LDA 1,X
```

```
7790 3D9F 4A            LSR A
7800 3DA0 4A            LSR A
7810 3DA1 4A            LSR A
7820 3DA2 4A            LSR A
7830 3DA3 20CC3D        JSR OCTDIG
7840 3DA6          ;
7850 3DA6          ;PRINT PAGE 0 INDEXED BY X AS 12 BIT OCTAL
7860 3DA6          ;
7870 3DA6 B501     PROC12 LDA 1,X
7880 3DA8 4A            LSR A
7890 3DA9 20CC3D        JSR OCTDIG
7900 3DAC B500          LDA 0,X
7910 3DAE 4A            LSR A
7920 3DAF 850C          STA TEMP
7930 3DB1 B501          LDA 1,X
7940 3DB3 4A            LSR A
7950 3DB4 A50C          LDA TEMP
7960 3DB6 9002          BCC PR1X
7970 3DB8 0980          ORA #$80
7980 3DBA 4A       PR1X LSR A
7990 3DBB 4A            LSR A
8000 3DBC 4A            LSR A
8010 3DBD 4A            LSR A
8020 3DBE 4A            LSR A
8030 3DBF 20CC3D        JSR OCTDIG
8040 3DC2 B500          LDA 0,X
8050 3DC4 4A            LSR A
8060 3DC5 4A            LSR A
8070 3DC6 4A            LSR A
8080 3DC7 20CC3D        JSR OCTDIG
8090 3DCA B500          LDA 0,X
8100 3DCC          ;
8110 3DCC          ;PRINT LOW 3 BIT FROM AC AS AN OCTAL DIGIT
8120 3DCC          ;
8130 3DCC 2907     OCTDIG AND #%111
8140 3DCE 0930          ORA #'0
8150 3DD0 4CC93B        JMP OUTCH
8160 3DD3          ;
8170 3DD3          ;INPUT AN N DIGIT OCTAL NUMBER (Y=N<=6)
8180 3DD3          ;X INDEXES TO STORAGE LOCATION LOW
8190 3DD3          ;
8200 3DD3 A900     INOCTA LDA #0
8210 3DD5 9500          STA 0,X
8220 3DD7 9501          STA 1,X
8230 3DD9 A903     NXR  LDA #3
8240 3DDB 850C          STA TEMP
8250 3DDD 20F23D        JSR DIGOCT
8260 3DE0 0A            ASL A
8270 3DE1 0A            ASL A
8280 3DE2 0A            ASL A
8290 3DE3 0A            ASL A
8300 3DE4 0A            ASL A
8310 3DE5 0A       NXRA ASL A
8320 3DE6 3600          ROL 0,X
8330 3DE8 3601          ROL 1,X
8340 3DEA C60C          DEC TEMP
8350 3DEC D0F7          BNE NXRA
8360 3DEE 88            DEY
8370 3DEF D0E8          BNE NXR
8380 3DF1 60            RTS
```

```
8390 3DF2           ;
8400 3DF2           ;INPUT 1 OCTAL DIGIT TO LOW 3 BITS OF AC
8410 3DF2           ;
8420 3DF2 20AB3B    DIGOCT JSR INCH
8430 3DF5 C930             CMP #'0
8440 3DF7 3007             BMI ERRJMP
8450 3DF9 C938             CMP #'8
8460 3DFB 1003             BPL ERRJMP
8470 3DFD 2907             AND #%111
8480 3DFF 60               RTS
8490 3E00           ;
8500 3E00 4C673D    ERRJMP JMP ERROR
8510 3E03           ;
8520 3E03           ;INPUT A 16 BIT (2 BYTE) NUMBER TO PAGE 0
8530 3E03           ;INDEXED BY X
8540 3E03           ;
8550 3E03 E8        BUILD  INX
8560 3E04 20083E           JSR ONEB
8570 3E07 CA               DEX
8580 3E08           ;
8590 3E08 20193E    ONEB   JSR ONED
8600 3E0B 0A               ASL A
8610 3E0C 0A               ASL A
8620 3E0D 0A               ASL A
8630 3E0E 0A               ASL A
8640 3E0F 9500             STA 0,X
8650 3E11 20193E           JSR ONED
8660 3E14 1500             ORA 0,X
8670 3E16 9500             STA 0,X
8680 3E18 60               RTS
8690 3E19           ;
8700 3E19 20AB3B    ONED   JSR INCH
8710 3E1C C930             CMP #'0
8720 3E1E 30E0             BMI ERRJMP
8730 3E20 C93A             CMP #':
8740 3E22 300A             BMI DIG1
8750 3E24 C941             CMP #'A
8760 3E26 30D8             BMI ERRJMP
8770 3E28 C947             CMP #'G
8780 3E2A 10D4             BPL ERRJMP
8790 3E2C E906             SBC #6
8800 3E2E 290F     DIG1    AND #$F
8810 3E30 60               RTS
8820 3E31           ;
8830 3E31           ;BUILD 3 ADDRESSES
8840 3E31           ;
8850 3E31 A206     PARM3   LDX #DSTL
8860 3E33 A000             LDY #0
8870 3E35 20033E   PA1     JSR BUILD
8880 3E38 B9463E           LDA SYNTA,Y
8890 3E3B 20C93B           JSR OUTCH
8900 3E3E C8               INY
8910 3E3F E8               INX
8920 3E40 E8               INX
8930 3E41 E00C             CPX #SRCEH+1
8940 3E43 D0F0             BNE PA1
8950 3E45 60               RTS
8960 3E46           ;
8970 3E46 3D       SYNTA   .BYTE '=, '
8970 3E47 2C
```

```
8970 3E48 20
8980 3E49          ;
8990 3E49          ;MOVE A BLOCK OF MEMORY THROUGH 4K WINDOW
9000 3E49          ; X=0 MEANS MOVE FROM HERE TO 460Z BUS
9010 3E49          ; X=2 MEANS MOVE FROM 460Z BUS TO HERE
9020 3E49          ;
9030 3E49 860C     MOVE   STX TEMP
9040 3E4B 20DF3E          JSR ENABM
9050 3E4E A509            LDA SRCSH
9060 3E50 8511            STA HIGH
9070 3E52 A60C            LDX TEMP
9080 3E54 B507            LDA DSTH,X
9090 3E56 8512            STA HIGHER
9100 3E58 201F3F          JSR SETUP
9110 3E5B 38       DONEK  SEC
9120 3E5C A50A            LDA SRCEL
9130 3E5E E508            SBC SRCSL
9140 3E60 A50B            LDA SRCEH
9150 3E62 E511            SBC HIGH
9160 3E64 902B            BCC ENDER
9170 3E66 A000            LDY #0
9180 3E68 B108            LDA (SRCSL),Y
9190 3E6A 9106            STA (DSTL),Y
9200 3E6C E608            INC SRCSL
9210 3E6E D00F            BNE NC1
9220 3E70 E611            INC HIGH
9230 3E72 E609            INC SRCSH
9240 3E74 A60C            LDX TEMP
9250 3E76 C902            CMP #2
9260 3E78 D005            BNE NC1
9270 3E7A E612            INC HIGHER
9280 3E7C 201F3F          JSR SETUP
9290 3E7F E606     NC1    INC DSTL
9300 3E81 D0D8            BNE DONEK
9310 3E83 E607            INC DSTH
9320 3E85 A60C            LDX TEMP
9330 3E87 D0D2            BNE DONEK
9340 3E89 E612            INC HIGHER
9350 3E8B 201F3F          JSR SETUP
9360 3E8E 4C5B3E          JMP DONEK
9370 3E91 60       ENDER  RTS
9380 3E92          ;
9390 3E92          ;MOVE BLOCK OF UNCOMPRESSED 12 BIT NUMBERS
9400 3E92          ;
9410 3E92 A506     MOVE12 LDA DSTL
9420 3E94 850D            STA OCTAL
9430 3E96 A507     MOVEA  LDA DSTH
9440 3E98 290F            AND #$F
9450 3E9A 09E0            ORA #BLOC
9460 3E9C 850E            STA OCTAH
9470 3E9E A507            LDA DSTH
9480 3EA0 20DC3E          JSR SETHI
9490 3EA3 38       MOV1   SEC
9500 3EA4 A50A            LDA SRCEL
9510 3EA6 E508            SBC SRCSL
9520 3EA8 A50B            LDA SRCEH
9530 3EAA E509            SBC SRCSH
9540 3EAC 902B            BCC ENDER2
9550 3EAE A001            LDY #1
9560 3EB0 B108            LDA (SRCSL),Y
```

```
 9570 3EB2 8500           STA TMP
 9580 3EB4 A904           LDA #4
 9590 3EB6 8513           STA TMPA
 9600 3EB8 A058           LDY #D11-MM15+6
 9610 3EBA 20F93E         JSR COPY
 9620 3EBD A000           LDY #0
 9630 3EBF B108           LDA (SRCSL),Y
 9640 3EC1 910D           STA (OCTAL),Y
 9650 3EC3 A902           LDA #2
 9660 3EC5 18             CLC
 9670 3EC6 6508           ADC SRCSL
 9680 3EC8 8508           STA SRCSL
 9690 3ECA 9002           BCC CRYC1
 9700 3ECC E609           INC SRCSH
 9710 3ECE E60D    CRYC1  INC OCTAL
 9720 3ED0 D0D1           BNE MOV1
 9730 3ED2 E607           INC DSTH
 9740 3ED4 E60E           INC OCTAH
 9750 3ED6 4C963E         JMP MOVEA
 9760 3ED9 4CFC3B  ENDER2 JMP CLRINP
 9770 3EDC                ;
 9780 3EDC                ;SET HIGH 4 BITS OF ADDRESS=AC USING MMUX
 9790 3EDC                ;
 9800 3EDC 20ED3E  SETHI  JSR HIGH4
 9810 3EDF AE4D3F  ENABM  LDX MMENAB
 9820 3EE2 AD4E3F         LDA MMENAB+1
 9830 3EE5 48             PHA
 9840 3EE6 20013D         JSR OUTPUT
 9850 3EE9 68             PLA
 9860 3EEA 4C143D         JMP OUTBL
 9870 3EED                ;
 9880 3EED                ;SET UP HIGH 4 BITS OF ADDRESS
 9890 3EED                ;
 9900 3EED 4A      HIGH4  LSR A
 9910 3EEE 4A             LSR A
 9920 3EEF 4A             LSR A
 9930 3EF0 4A             LSR A
 9940 3EF1 A004           LDY #4
 9950 3EF3 8413           STY TMPA
 9960 3EF5 8500           STA TMP
 9970 3EF7 A006           LDY #6
 9980 3EF9 BE453F  COPY   LDX MM15,Y
 9990 3EFC C8             INY
10000 3EFD B9453F         LDA MM15,Y
10010 3F00 4600           LSR TMP
10020 3F02 900B           BCC CLR
10030 3F04 48             PHA
10040 3F05 20013D         JSR OUTPUT
10050 3F08 68             PLA
10060 3F09 201D3D         JSR OUTBH
10070 3F0C 4C173F         JMP INLP
10080 3F0F 48      CLR    PHA
10090 3F10 20013D         JSR OUTPUT
10100 3F13 68             PLA
10110 3F14 20143D         JSR OUTBL
10120 3F17 88      INLP   DEY
10130 3F18 88             DEY
10140 3F19 88             DEY
10150 3F1A C613           DEC TMPA
10160 3F1C D0DB           BNE COPY
```

```
10170 3F1E 60              RTS
10180 3F1F                 ;
10190 3F1F A512     SETUP  LDA HIGHER
10200 3F21 20ED3E          JSR HIGH4
10210 3F24 A60C            LDX TEMP
10220 3F26 A512            LDA HIGHER
10230 3F28 290F            AND #$F
10240 3F2A 09E0            ORA #BLOC
10250 3F2C 9507            STA DSTH,X
10260 3F2E 60              RTS
10270 3F2F                 ;
10280 3F2F                 ;PIA BIT ASSIGNMENT TABLE
10290 3F2F                 ;
10300 3F2F 0E       RUNSTP .BYTE $E,$10
10300 3F30 10
10310 3F31 0E       CKLN   .BYTE $E,4
10310 3F32 04
10320 3F33 0A       INTREQ .BYTE $A,1
10320 3F34 01
10330 3F35 08       I61RHT .BYTE 8,$40
10330 3F36 40
10340 3F37 0E       I61RST .BYTE $E,8
10340 3F38 08
10350 3F39 0E       Z80RST .BYTE $E,$40
10350 3F3A 40
10360 3F3B 0E       CNPIA2 .BYTE $E,2
10360 3F3C 02
10370 3F3D 0E       CNPIA1  BYTE $E,1
10370 3F3E 01
10380 3F3F 0A       SWSEL  .BYTE $A,$20
10380 3F40 20
10390 3F41 08       DATAF  .BYTE 8,4
10390 3F42 04
10400 3F43 08       MEMSEL .BYTE 8,$10
10400 3F44 10
10410 3F45 02       MM15   .BYTE 2,$80
10410 3F46 80
10420 3F47 02       MM14   .BYTE 2,$40
10420 3F48 40
10430 3F49 02       MM13   .BYTE 2,$20
10430 3F4A 20
10440 3F4B 02       MM12   .BYTE 2,$10
10440 3F4C 10
10450 3F4D 02       MMENAB .BYTE 2,8
10450 3F4E 08
10460 3F4F 04       A15    .BYTE 4,$80
10460 3F50 80
10470 3F51 04       A14    .BYTE 4,$40
10470 3F52 40
10480 3F53 04       A13    .BYTE 4,$20
10480 3F54 20
10490 3F55 04       A12    .BYTE 4,$10
10490 3F56 10
10500 3F57 04       A11    .BYTE 4,8
10500 3F58 08
10510 3F59 04       A10    .BYTE 4,4
10510 3F5A 04
10520 3F5B 04       A9     .BYTE 4,2
10520 3F5C 02
10530 3F5D 04       A8     .BYTE 4,1
```

```
10530 3F5E 01
10540 3F5F 06       D7      .BYTE 6,$80
10540 3F60 80
10550 3F61 06       D6      .BYTE 6,$40
10550 3F62 40
10560 3F63 06       D5      .BYTE 6,$20
10560 3F64 20
10570 3F65 06       D4      .BYTE 6,$10
10570 3F66 10
10580 3F67 06       D3      .BYTE 6,8
10580 3F68 08
10590 3F69 06       D2      .BYTE 6,4
10590 3F6A 04
10600 3F6B 06       D1      .BYTE 6,2
10600 3F6C 02
10610 3F6D 06       D0      .BYTE 6,1
10610 3F6E 01
10620 3F6F 00       A7      .BYTE 0,$80
10620 3F70 80
10630 3F71 00       A6      .BYTE 0,$40
10630 3F72 40
10640 3F73 00       A5      .BYTE 0,$20
10640 3F74 20
10650 3F75 00       A4      .BYTE 0,$10
10650 3F76 10
10660 3F77 00       A3      .BYTE 0,8
10660 3F78 08
10670 3F79 00       A2      .BYTE 0,4
10670 3F7A 04
10680 3F7B 00       A1      .BYTE 0,2
10680 3F7C 02
10690 3F7D 00       A0      .BYTE 0,1
10690 3F7E 01
10700 3F7F 0A       LXMAR   .BYTE $A,$10
10700 3F80 10
10710 3F81 0A       DEVSEL  .BYTE $A,$80
10710 3F82 80
10720 3F83 0A       C0      .BYTE $A,8
10720 3F84 08
10730 3F85 0A       C1      .BYTE $A,4
10730 3F86 04
10740 3F87 0A       C2      .BYTE $A,2
10740 3F88 02
10750 3F89 08       SKP     .BYTE 8,$80
10750 3F8A 80
10760 3F8B 0A       XTC     .BYTE $A,$40
10760 3F8C 40
10770 3F8D 08       IFETCH  .BYTE 8,$20
10770 3F8E 20
10780 3F8F 0C       D15     .BYTE $C,$80
10780 3F90 80
10790 3F91 0C       D14     .BYTE $C,$40
10790 3F92 40
10800 3F93 0C       D13     .BYTE $C,$20
10800 3F94 20
10810 3F95 0C       D12     .BYTE $C,$10
10810 3F96 10
10820 3F97 0C       D11     .BYTE $C,8
10820 3F98 08
10830 3F99 0C       D10     .BYTE $C,4
```

```
10830 3F9A 04
10840 3F9B 0C       D9      .BYTE $C,2
10840 3F9C 02
10850 3F9D 0C       D8      .BYTE $C,1
10850 3F9E 01
10860 3F9F 02       Z80RFS  .BYTE 2,1
10860 3FA0 01
10870 3FA1 08       Z80MRQ  .BYTE 8,2
10870 3FA2 02
10880 3FA3 08       Z80WR   .BYTE 8,1
10880 3FA4 01
10890 3FA5 0E       Z80BAK  .BYTE $E,$80
10890 3FA6 80
10900 3FA7 0E       M1      .BYTE $E,$20
10900 3FA8 20
10910 3FA9 02       INT     .BYTE 2,2
10910 3FAA 02
10920 3FAB 02       IORQ    .BYTE 2,4
10920 3FAC 04
10930 3FAD 08       CPSEL   .BYTE 8,8
10930 3FAE 08
10940 3FAF          ;
10950 3FAF          ;SET A LINE AS AN OUTPUT HIGH
10960 3FAF          ;
10970 3FAF BE2F3F   OBH     LDX RUNSTP,Y
10980 3FB2 C8               INY
10990 3FB3 B92F3F           LDA RUNSTP,Y
11000 3FB6 48               PHA
11010 3FB7 20013D           JSR OUTPUT
11020 3FBA 68               PLA
11030 3FBB 4C1D3D           JMP OUTBH
11040 3FBE          ;
11050 3FBE          ;SET UP THE PREDEFINED STATES OF THE PIAS
11060 3FBE          ;
11070 3FBE          RN=RUNSTP
11080 3FBE          ;
11090 3FBE A00E     PRESET  LDY #CNPIA1-RN
11100 3FC0 20AF3F           JSR OBH
11110 3FC3 A00C             LDY #CNPIA2-RN
11120 3FC5 20AF3F           JSR OBH
11130 3FC8 A000             LDY #RUNSTP-RN
11140 3FCA 20AF3F           JSR OBH
11150 3FCD A07A             LDY #INT-RN
11160 3FCF 20AF3F           JSR OBH
11170 3FD2 A01E             LDY #MMENAB-RN
11180 3FD4 20AF3F           JSR OBH
11190 3FD7 A006             LDY #I61RHT-RN
11200 3FD9 20AF3F           JSR OBH
11210 3FDC A008             LDY #I61RST-RN
11220 3FDE 20AF3F           JSR OBH
11230 3FE1 A004             LDY #INTREQ-RN
11240 3FE3 20AF3F           JSR OBH
11250 3FE6 AE313F           LDX CKLN
11260 3FE9 60               RTS
11270 3FEA                  .END
```