CBM SERVICE

PET ROM LISTING

VERSION
BASIC 3.00

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INTRODUCTION.

This book contains a disassembly of the Basic 3.00 ROMs in the PET computer. It must be emphasised that the official listings of this software has never been published and is strictly the copyright of MICROSOFT. What is printed in this book is the result of one mans interpretation of the functioning and operation of the Basic interpreter and operating system in the PET. Since it is only a disassembly with annotated notes on its supposed function its accuracy can not be guarenteed in any way, it is purely a guide for those wishing to understand in greater depth the workings of their PET computer. This document is not intended to infringe in any way aggreements between Commodore and Microsoft.

```
C000  40 C7 57 C6 1F CC FF C7     END     FOR     NEXT    DATA
C008  A6 CA C0 CA 62 CF 06 CB     INPT#   INPUT   DIM     READ
C010  AC C8 AC C7 84 C7 2F C8     LET     GOTO    RUN     IF
C018  2F C7 8F C7 D9 C7 42 C8     RESTOR  GOSUB   RETURN  REM
C020  3E C7 52 C8 0F D7 D4 FF     STOP    ON      WAIT    LOAD
C028  D7 FF DA FF 8C D2 06 D7     SAVE    VERIFY  DEF     POKE
C030  8A C9 AA C9 6A C7 B4 C5     PRINT#  PRINT   CONT    LIST
C038  76 C5 90 C9 DD FF BF FF     CLR     CMD     SYS     OPEN
C040  C2 FF 7C CA 5A C5 45 DB     CLOSE   GET     NEW      sgn
C048  D8 DB 64 DB 00 00 59 D2     int     abs      usr     fre
C050  7A D2 5E DE 7F DF F6 D8     pos     sqr      rnd     log
C058  DA DE D8 DF DF DF 28 E0     exp     cos      sin     tan
C060  8C E0 E8 D6 56 D6 3F D3     atn     peek     len     str$
C068  87 D6 65 D6 C6 D5 DA D5     val     asc      chr$    left$
C070  06 D6 11 D6 79.75 D7.79.    right$  mid$        +
C078  35 D7.7B.36 D9.7B.1D DA.      -           *       /
C080  7F.67 DE.50.CA CE.46.C7          ↑         AND
C088  CE.7D.A0 DE.5A.CE CD.64.    OR      NEGATE      NOT
C090  F7 CE.45 4E 64 46 4F D2     Compare
```

KEYWORDS

```
C090 WNENDFORNEXTDATA
C0A0 INPUT#INPUTDIMRE
C0B0 ADLETGOTORUNIFRE
C0C0 STOREGOSUBRETURN
C0D0 REMSTOPONWAITLOA
C0E0 DSAVEVERIFYDEFPO
C0F0 KEPRINT#PRINTCON
C100 TLISTCLRCMDSYSOP
C110 ENCLOSEGETNEWTAB
C120 (TOFNSPC(THENNOT
C130 STEP+-*/^ANDOR>=
C140 <SGNINTABSUSRFRE
C150 POSSQRRNDLOGEXPC
C160 OSSINTANATNPEEKL
C170 ENSTR$VALASCCHR$
C180 LEFT$RIGHT$MID$G
C190 O NEXT WITHOUT F
C1A0 ORSYNTAXRETURN W
C1B0 ITHOUT GOSUBOUT
C1C0 OF DATAILLEGAL Q
C1D0 UANTITYOVERFLOWO
C1E0 UT OF MEMORYUNDE
C1F0 F'D STATEMENTBAD
C200  SUBSCRIPTREDIM'
C210 D ARRAYDIVISION
C220 BY ZEROILLEGAL D
C230 IRECTTYPE MISMAT
C240 CHSTRING TOO LON
C250 GFILE DATAFORMUL
C260 A TOO COMPLEXCAN
C270 'T CONTINUEUNDEF
C280 'D FUNCTION ERRO
C290 R  IN    READY.
C2A0     BREAK :HHHH=
```

ERROR NOTICES

```
C2AA  BA        TSX
C2AB  E8        INX
C2AC  E8        INX
C2AD  E8        INX
```

PEEK STACK FOR 'FOR' OR 'GOSUB'

```
C2AF  BD 01 01    LDA $0101,X
C2B2  C9 81       CMP #$81
C2B4  D0 21       BNE $C2D7
C2B6  A5 47       LDA V-PNTR+1
C2B8  D0 0A       BNE $C2C4
C2BA  BD 02 01    LDA $0102,X
C2BD  85 46       STA V-PNTR
C2BF  BD 03 01    LDA $0103,X
C2C2  85 47       STA V-PNTR+1
C2C4  DD 03 01    CMP $0103,X
C2C7  D0 07       BNE $C2D0
C2C9  A5 46       LDA V-PNTR
C2CB  DD 02 01    CMP $0102,X
C2CE  F0 07       BEQ $C2D7
C2D0  8A          TXA
C2D1  18          CLC
C2D2  69 12       ADC #$12
C2D4  AA          TAX
C2D5  D0 D8       BNE $C2AF
C2D7  60          RTS
```

OPEN UP SPACE IN MEMORY

```
C2D8  20 28 C3    JSR $C328
C2DB  85 2E       STA END-ARRAYS
C2DD  84 2F       STY END-ARRAYS+1
C2DF  38          SEC
C2E0  A5 57       LDA $57
C2E2  E5 5C       SBC WK-POINTR
C2E4  85 1F       STA POINTER
C2E6  A8          TAY
C2E7  A5 58       LDA $58
C2E9  E5 5D       SBC WK-POINTR+1
C2EB  AA          TAX
C2EC  E8          INX
C2ED  98          TYA
C2EE  F0 23       BEQ $C313
C2F0  A5 57       LDA $57
C2F2  38          SEC
C2F3  E5 1F       SBC POINTER
C2F5  85 57       STA $57
C2F7  B0 03       BCS $C2FC
C2F9  C6 58       DEC $58
C2FB  38          SEC
C2FC  A5 55       LDA $55
C2FE  E5 1F       SBC POINTER
C300  85 55       STA $55
C302  B0 08       BCS $C30C
C304  C6 56       DEC $56
C306  90 04       BCC $C30C
C308  B1 57       LDA ($57),Y
C30A  91 55       STA ($55),Y
C30C  88          DEY
C30D  D0 F9       BNE $C308
C30F  B1 57       LDA ($57),Y
C311  91 55       STA ($55),Y
C313  C6 58       DEC $58
C315  C6 56       DEC $56
C317  CA          DEX
C318  D0 F2       BNE $C30C
C31A  60          RTS
```

```
C31E  B0 35        BCS $C355
C320  85 1F        STA POINTER
C322  BA           TSX
C323  E4 1F        CPX POINTER
C325  90 2E        BCC $C355
C327  60           RTS
```

CHECK AVAILABLE MEMORY

```
C328  C4 31        CPY STRING-LO+1
C32A  90 28        BCC $C354
C32C  D0 04        BNE $C332
C32E  C5 30        CMP STRING-LO
C330  90 22        BCC $C354
C332  48           PHA
C333  A2 09        LDX #$09
C335  98           TYA
C336  48           PHA
C337  B5 54        LDA $54,X
C339  CA           DEX
C33A  10 FA        BPL $C336
C33C  20 00 D4     JSR $D400
C33F  A2 F7        LDX #$F7
C341  68           PLA
C342  95 5E        STA ACC#1/E,X
C344  E8           INX
C345  30 FA        BMI $C341
C347  68           PLA
C348  A8           TAY
C349  68           PLA
C34A  C4 31        CPY STRING-LO+1
C34C  90 06        BCC $C354
C34E  D0 05        BNE $C355
C350  C5 30        CMP STRING-LO
C352  B0 01        BCS $C355
C354  60           RTS
```

SEND CANNED ERROR MESSAGE

```
C355  A2 4D        LDX #$4D  "OUT OF MEMORY"
C357  46 0D        LSR $0D
C359  A5 0E        LDA $0E
C35B  F0 07        BEQ $C364
C35D  20 CC FF     JSR $FFCC
C360  A9 00        LDA #$00
C362  85 0E        STA $0E
C364  20 E2 C9     JSR $C9E2
C367  20 43 CA     JSR $CA43
C36A  BD 92 C1     LDA $C192,X
C36D  48           PHA
C36E  29 7F        AND #$7F
C370  20 45 CA     JSR $CA45     P. OUTPUT
C373  E8           INX
C374  68           PLA
C375  10 F3        BPL $C36A
C377  20 93 C5     JSR $C593
C37A  A9 8B        LDA #$8B      "ERROR"
C37C  A0 C2        LDY #$C2
C37E  20 1C CA     JSR $CA1C
C381  A4 37        LDY BASIC-LINE#+1
C383  C8           INY
C384  F0 03        BEQ $C389
C386  20 CE DC     JSR $DCCE
C389  46 0D        LSR $0D
C38B  A9 97        LDA #$97      "READY."
C38D  A0 C2        LDY #$C2
```

```
C38F  20 1C CA    JSR $CA1C
C392  20 6F C4    JSR $C46F
C395  86 77       STX BASIC-ADDS
C397  84 78       STY BASIC-ADDS/HI
C399  20 70 00    JSR $0070
C39C  AA          TAX
C39D  F0 F3       BEQ $C392
C39F  A2 FF       LDX #$FF
C3A1  86 37       STX BASIC-LINE#+1
C3A3  90 06       BCC $C3AB
C3A5  20 95 C4    JSR $C495
C3A8  4C F7 C6    JMP $C6F7
```

```
C3AB  20 73 C8    JSR $C873
C3AE  20 95 C4    JSR $C495
C3B1  84 05       STY N-SUBSCR
C3B3  20 2C C5    JSR $C52C
C3B6  90 44       BCC $C3FC
C3B8  A0 01       LDY #$01
C3BA  B1 5C       LDA (WK-POINTR),Y
C3BC  85 20       STA POINTER-HI
C3BE  A5 2A       LDA END-BASIC
C3C0  85 1F       STA POINTER
C3C2  A5 5D       LDA WK-POINTR+1
C3C4  85 22       STA $22
C3C6  A5 5C       LDA WK-POINTR
C3C8  88          DEY
C3C9  F1 5C       SBC (WK-POINTR),Y
C3CB  18          CLC
C3CC  65 2A       ADC END-BASIC
C3CE  85 2A       STA END-BASIC
C3D0  85 21       STA $21
C3D2  A5 2B       LDA END-BASIC+1
C3D4  69 FF       ADC #$FF
C3D6  85 2B       STA END-BASIC+1
C3D8  E5 5D       SBC WK-POINTR+1
C3DA  AA          TAX
C3DB  38          SEC
C3DC  A5 5C       LDA WK-POINTR
C3DE  E5 2A       SBC END-BASIC
C3E0  A8          TAY
C3E1  B0 03       BCS $C3E6
C3E3  E8          INX
C3E4  C6 22       DEC $22
C3E6  18          CLC
C3E7  65 1F       ADC POINTER
C3E9  90 03       BCC $C3EE
C3EB  C6 20       DEC POINTER-HI
C3ED  18          CLC
C3EE  B1 1F       LDA (POINTER),Y
C3F0  91 21       STA ($21),Y
C3F2  C8          INY
C3F3  D0 F9       BNE $C3EE
C3F5  E6 20       INC POINTER-HI
C3F7  E6 22       INC $22
C3F9  CA          DEX
C3FA  D0 F2       BNE $C3EE
C3FC  20 72 C5    JSR $C572
C3FF  20 42 C4    JSR $C442
C402  AD 00 02    LDA $0200
C405  F0 8B       BEQ $C392
```

HANDLE NEW BASIC LINE FROM KEYBOARD

```
C407  18        CLC
C408  A5 2A     LDA END-BASIC
C40A  85 57     STA $57
C40C  65 05     ADC N-SUBSCR
C40E  85 55     STA $55
C410  A4 2B     LDY END-BASIC+1
C412  84 58     STY $58
C414  90 01     BCC $C417
C416  C8        INY
C417  84 56     STY $56
C419  20 D8 C2  JSR $C2D8  OPEN UP SPACE
C41C  A5 11     LDA FIXED-LO
C41E  A4 12     LDY FIXED-HI
C420  8D FE 01  STA $01FE
C423  8C FF 01  STY $01FF
C426  A5 2E     LDA END-ARRAYS
C428  A4 2F     LDY END-ARRAYS+1
C42A  85 2A     STA END-BASIC
C42C  84 2B     STY END-BASIC+1
C42E  A4 05     LDY N-SUBSCR
C430  88        DEY
C431  B9 FC 01  LDA $01FC,Y
C434  91 5C     STA (WK-POINTR),Y
C436  88        DEY
C437  10 F8     BPL $C431
C439  20 72 C5  JSR $C572
C43C  20 42 C4  JSR $C442
C43F  4C 92 C3  JMP $C392
```

CORRECT BASIC CHAINING

```
C442  A5 28     LDA START-BASIC
C444  A4 29     LDY START-BASIC+1
C446  85 1F     STA POINTER
C448  84 20     STY POINTER-HI
C44A  18        CLC
C44B  A0 01     LDY #$01
C44D  B1 1F     LDA (POINTER),Y
C44F  F0 1D     BEQ $C46E
C451  A0 04     LDY #$04
C453  C8        INY
C454  B1 1F     LDA (POINTER),Y
C456  D0 FB     BNE $C453
C458  C8        INY
C459  98        TYA
C45A  65 1F     ADC POINTER
C45C  AA        TAX
C45D  A0 00     LDY #$00
C45F  91 1F     STA (POINTER),Y
C461  A5 20     LDA POINTER-HI
C463  69 00     ADC #$00
C465  C8        INY
C466  91 1F     STA (POINTER),Y
C468  86 1F     STX POINTER
C46A  85 20     STA POINTER-HI
C46C  90 DD     BCC $C44B
C46E  60        RTS
```

RECEIVE FROM KEYBOARD

```
C46F  A2 00     LDX #$00
C471  20 81 C4  JSR $C481
C474  C9 0D     CMP #$0D
C476  F0 06     BEQ $C47E
```

```
C47C  D0 F3       BNE $C471
C47E  4C D5 C9    JMP $C9D5
-------------------------------------------
C481  20 CF FF    JSR $FFCF "INPUT"      GET A
C484  A4 0E       LDY $0E                CHARACTER
C486  D0 0C       BNE $C494              FROM
C488  C9 0F       CMP #$0F               KEYBOARD
C48A  D0 08       BNE $C494
C48C  48          PHA
C48D  A5 0D       LDA $0D
C48F  49 FF       EOR #$FF
C491  85 0D       STA $0D
C493  68          PLA
C494  60          RTS
-------------------------------------------
C495  A6 77       LDX BASIC-ADDS         CHANGE
C497  A0 04       LDY #$04               KEYWORDS
C499  84 09       STY $09                TO TOKENS
C49B  BD 00 02    LDA $0200,X
C49E  10 07       BPL $C4A7
C4A0  C9 FF       CMP #$FF
C4A2  F0 3E       BEQ $C4E2
C4A4  E8          INX
C4A5  D0 F4       BNE $C49B
C4A7  C9 20       CMP #$20
C4A9  F0 37       BEQ $C4E2
C4AB  85 04       STA $04
C4AD  C9 22       CMP #$22
C4AF  F0 56       BEQ $C507
C4B1  24 09       BIT $09
C4B3  70 2D       BVS $C4E2
C4B5  C9 3F       CMP #$3F
C4B7  D0 04       BNE $C4BD
C4B9  A9 99       LDA #$99
C4BB  D0 25       BNE $C4E2
C4BD  C9 30       CMP #$30
C4BF  90 04       BCC $C4C5
C4C1  C9 3C       CMP #$3C
C4C3  90 1D       BCC $C4E2
C4C5  84 6E       STY $6E
C4C7  A0 00       LDY #$00
C4C9  84 05       STY N-SUBSCR
C4CB  88          DEY
C4CC  86 77       STX BASIC-ADDS
C4CE  CA          DEX
C4CF  C8          INY
C4D0  E8          INX
C4D1  BD 00 02    LDA $0200,X
C4D4  38          SEC
C4D5  F9 92 C0    SBC $C092,Y
C4D8  F0 F5       BEQ $C4CF
C4DA  C9 80       CMP #$80
C4DC  D0 30       BNE $C50E
C4DE  05 05       ORA N-SUBSCR
C4E0  A4 6E       LDY $6E
C4E2  E8          INX
C4E3  C8          INY
C4E4  99 FB 01    STA $01FB,Y
C4E7  B9 FB 01    LDA $01FB,Y
C4EA  F0 36       BEQ $C522
```

```
C4EF  F0 04      BEQ $C4F5
C4F1  C9 49      CMP #$49
C4F3  D0 02      BNE $C4F7
C4F5  85 09      STA $09
C4F7  38         SEC
C4F8  E9 55      SBC #$55
C4FA  D0 9F      BNE $C49B
C4FC  85 04      STA $04
C4FE  BD 00 02   LDA $0200,X
C501  F0 DF      BEQ $C4E2
C503  C5 04      CMP $04
C505  F0 DB      BEQ $C4E2
C507  C8         INY
C508  99 FB 01   STA $01FB,Y
C50B  E8         INX
C50C  D0 F0      BNE $C4FE
C50E  A6 77      LDX BASIC-ADDS
C510  E6 05      INC N-SUBSCR
C512  C8         INY
C513  B9 91 C0   LDA $C091,Y
C516  10 FA      BPL $C512
C518  B9 92 C0   LDA $C092,Y
C51B  D0 B4      BNE $C4D1
C51D  BD 00 02   LDA $0200,X
C520  10 BE      BPL $C4E0
C522  99 FD 01   STA $01FD,Y
C525  C6 78      DEC BASIC-ADDS/HI
C527  A9 FF      LDA #$FF
C529  85 77      STA BASIC-ADDS
C52B  60         RTS
```

FIND BASIC LINE FROM LINE #

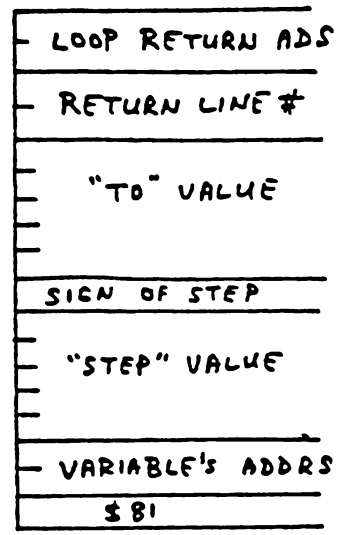
```
C52C  A5 28      LDA START-BASIC
C52E  A6 29      LDX START-BASIC+1
C530  A0 01      LDY #$01
C532  85 5C      STA WK-POINTR
C534  86 5D      STX WK-POINTR+1
C536  B1 5C      LDA (WK-POINTR),Y
C538  F0 1F      BEQ $C559
C53A  C8         INY
C53B  C8         INY
C53C  A5 12      LDA FIXED-HI
C53E  D1 5C      CMP (WK-POINTR),Y
C540  90 18      BCC $C55A
C542  F0 03      BEQ $C547
C544  88         DEY
C545  D0 09      BNE $C550
C547  A5 11      LDA FIXED-LO
C549  88         DEY
C54A  D1 5C      CMP (WK-POINTR),Y
C54C  90 0C      BCC $C55A
C54E  F0 0A      BEQ $C55A
C550  88         DEY
C551  B1 5C      LDA (WK-POINTR),Y
C553  AA         TAX
C554  88         DEY
C555  B1 5C      LDA (WK-POINTR),Y
C557  B0 D7      BCS $C530
C559  18         CLC
C55A  60         RTS
```

```
C55F  A8        TAY
C560  91 28     STA (START-BASIC),Y
C562  C8        INY
C563  91 28     STA (START-BASIC),Y
C565  A5 28     LDA START-BASIC
C567  18        CLC
C568  69 02     ADC #$02
C56A  85 2A     STA END-BASIC
C56C  A5 29     LDA START-BASIC+1
C56E  69 00     ADC #$00
C570  85 2B     STA END-BASIC+1
C572  20 A7 C5  JSR $C5A7
C575  A9 00     LDA #$00
C577  D0 2D     BNE $C5A6                    'CLR'
C579  A5 34     LDA MEM-LIMIT
C57B  A4 35     LDY MEM-LIMIT+1
C57D  85 30     STA STRING-LO
C57F  84 31     STY STRING-LO+1
C581  20 E7 FF  JSR $FFE7
C584  A5 2A     LDA END-BASIC
C586  A4 2B     LDY END-BASIC+1
C588  85 2C     STA END-VARIBLES
C58A  84 2D     STY END-VARIBLES+1
C58C  85 2E     STA END-ARRAYS
C58E  84 2F     STY END-ARRAYS+1
C590  20 30 C7  JSR $C730
C593  A2 16     LDX #$16
C595  86 13     STX $13
C597  68        PLA
C598  A8        TAY
C599  68        PLA
C59A  A2 FA     LDX #$FA
C59C  9A        TXS
C59D  48        PHA
C59E  98        TYA
C59F  48        PHA
C5A0  A9 00     LDA #$00
C5A2  85 3B     STA PCOMD+1
C5A4  85 0A     STA $0A
C5A6  60        RTS
-------------------------------------------------------------------
C5A7  18        CLC                          RESET
C5A8  A5 28     LDA START-BASIC               BASIC
C5AA  69 FF     ADC #$FF                       TO
C5AC  85 77     STA BASIC-ADDS                START
C5AE  A5 29     LDA START-BASIC+1
C5B0  69 FF     ADC #$FF
C5B2  85 78     STA BASIC-ADDS/HI
C5B4  60        RTS
-------------------------------------------------------------------
C5B5  90 06     BCC $C5BD                    'LIST'
C5B7  F0 04     BEQ $C5BD
C5B9  C9 AB     CMP #$AB   "-"
C5BB  D0 E9     BNE $C5A6
C5BD  20 73 C8  JSR $C873  GET FX.PT. NUMBER
C5C0  20 2C C5  JSR $C52C  FIND BASIC LINE
C5C3  20 76 00  JSR $0076
C5C6  F0 0C     BEQ $C5D4
C5C8  C9 AB     CMP #$AB   "-"
C5CA  D0 8E     BNE $C55A  RTS
C5CC  20 70 00  JSR $0070
C5CF  20 73 C8  JSR $C873  GET FX.PT. NUMBER
```

```
C5D2  D0 86      BNE $C55A
C5D4  68         PLA              KILL SUBRTN
C5D5  68         PLA                STATUS
C5D6  A5 11      LDA FIXED-LO
C5D8  05 12      ORA FIXED-HI
C5DA  D0 06      BNE $C5E2
C5DC  A9 FF      LDA #$FF
C5DE  85 11      STA FIXED-LO
C5E0  85 12      STA FIXED-HI
C5E2  A0 01      LDY #$01        NEW LINE
C5E4  84 09      STY $09
C5E6  B1 5C      LDA (WK-POINTR),Y
C5E8  F0 43      BEQ $C62D       EXIT
C5EA  20 E1 FF   JSR $FFE1       TEST-STOP
C5ED  20 E2 C9   JSR $C9E2       (CR,LF)
C5F0  C8         INY             =2
C5F1  B1 5C      LDA (WK-POINTR),Y
C5F3  AA         TAX
C5F4  C8         INY
C5F5  B1 5C      LDA (WK-POINTR),Y
C5F7  C5 12      CMP FIXED-HI
C5F9  D0 04      BNE $C5FF
C5FB  E4 11      CPX FIXED-LO
C5FD  F0 02      BEQ $C601
C5FF  B0 2C      BCS $C62D
C601  84 46      STY Y-PNTR
C603  20 D9 DC   JSR $DCD9       PRINT LINE#
C606  A9 20      LDA #$20
C608  A4 46      LDY Y-PNTR
C60A  29 7F      AND #$7F
C60C  20 45 CA   JSR $CA45       P. OUTPUT
C60F  C9 22      CMP #$22        QUOTE?
C611  D0 06      BNE $C619
C613  A5 09      LDA $09
C615  49 FF      EOR #$FF
C617  85 09      STA $09
C619  C8         INY
C61A  F0 11      BEQ $C62D       "READY"
C61C  B1 5C      LDA (WK-POINTR),Y
C61E  D0 10      BNE $C630
C620  A8         TAY             =0
C621  B1 5C      LDA (WK-POINTR),Y
C623  AA         TAX                          GO TO
C624  C8         INY                          NEXT LINE
C625  B1 5C      LDA (WK-POINTR),Y
C627  86 5C      STX WK-POINTR
C629  85 5D      STA WK-POINTR+1
C62B  D0 B5      BNE $C5E2
C62D  4C 89 C3   JMP $C389       "READY"
C630  10 DA      BPL $C60C
C632  C9 FF      CMP #$FF
C634  F0 D6      BEQ $C60C
C636  24 09      BIT $09
C638  30 D2      BMI $C60C
C63A  38         SEC
C63B  E9 7F      SBC #$7F
C63D  AA         TAX
C63E  84 46      STY Y-PNTR
C640  A0 FF      LDY #$FF
```

```
C643  F0 08      BEQ $C64D
C645  C8         INY
C646  B9 92 C0   LDA $C092,Y
C649  10 FA      BPL $C645
C64B  30 F5      BMI $C642
C64D  C8         INY
C64E  B9 92 C0   LDA $C092,Y   PRINT
C651  30 B5      BMI $C608     KEYWORD
C653  20 45 CA   JSR $CA45     P.OUTPUT
C656  D0 F5      BNE $C64D
C658  A9 80      LDA #$80                    'FOR'
C65A  85 0A      STA $0A
C65C  20 AD C8   JSR $C8AD SEARCH STACK
C65F  20 AA C2   JSR $C2AA
C662  D0 05      BNE $C669
C664  8A         TXA
C665  69 0F      ADC #$0F
C667  AA         TAX
C668  9A         TXS
C669  68         PLA
C66A  68         PLA
C66B  A9 09      LDA #$09
C66D  20 1B C3   JSR $C31B STACK TOO DEEP?
C670  20 0E C8   JSR $C80E
C673  18         CLC
C674  98         TYA
C675  65 77      ADC BASIC-ADDS
C677  48         PHA
C678  A5 78      LDA BASIC-ADDS/HI
C67A  69 00      ADC #$00
C67C  48         PHA
C67D  A5 37      LDA BASIC-LINE#+1
C67F  48         PHA
C680  A5 36      LDA BASIC-LINE#
C682  48         PHA
C683  A9 A4      LDA #$A4 "TO"
C685  20 FA CD   JSR $CDFA
C688  20 8E CC   JSR $CC8E
C68B  20 8B CC   JSR $CC8B
C68E  A5 63      LDA ACC#1/S
C690  09 7F      ORA #$7F
C692  25 5F      AND ACC#1/M1
C694  85 5F      STA ACC#1/M1
C696  A9 A1      LDA #$A1
C698  A0 C6      LDY #$C6                    VECTOR
C69A  85 1F      STA POINTER
C69C  84 20      STY POINTER-HI
C69E  4C 44 CD   JMP $CD44
C6A1  A9 C8      LDA #$C8      +1
C6A3  A0 D8      LDY #$D8
C6A5  20 AE DA   JSR $DAAE
C6A8  20 76 00   JSR $0076
C6AB  C9 A9      CMP #$A9  "STEP"
C6AD  D0 06      BNE $C6B5
C6AF  20 70 00   JSR $0070
C6B2  20 8B CC   JSR $CC8B
C6B5  20 37 DB   JSR $DB37
C6B8  20 39 CD   JSR $CD39
C6BB  A5 47      LDA V-PNTR+1
```

STACK ENTRY FOR ACTIVE 'FOR':



```
C6BE  A5 46     LDA V-PNTR
C6C0  48        PHA
C6C1  A9 81     LDA #$81
C6C3  48        PHA
C6C4  20 E1 FF  JSR $FFE1                    NEXT
C6C7  A5 77     LDA BASIC-ADDS               STATEMENT
C6C9  A4 78     LDY BASIC-ADDS/HI
C6CB  C0 02     CPY #$02
C6CD  EA        NOP
C6CE  F0 04     BEQ $C6D4
C6D0  85 3A     STA PCOMD
C6D2  84 3B     STY PCOMD+1
C6D4  A0 00     LDY #$00
C6D6  B1 77     LDA (BASIC-ADDS),Y
C6D8  D0 40     BNE $C71A
C6DA  A0 02     LDY #$02
C6DC  B1 77     LDA (BASIC-ADDS),Y
C6DE  18        CLC
C6DF  D0 03     BNE $C6E4
C6E1  4C 5B C7  JMP $C75B
C6E4  C8        INY
C6E5  B1 77     LDA (BASIC-ADDS),Y
C6E7  85 36     STA BASIC-LINE#
C6E9  C8        INY
C6EA  B1 77     LDA (BASIC-ADDS),Y
C6EC  85 37     STA BASIC-LINE#+1
C6EE  98        TYA
C6EF  65 77     ADC BASIC-ADDS
C6F1  85 77     STA BASIC-ADDS
C6F3  90 02     BCC $C6F7
C6F5  E6 78     INC BASIC-ADDS/HI
C6F7  20 70 00  JSR $0070
C6FA  20 00 C7  JSR $C700
C6FD  4C C4 C6  JMP $C6C4
C700  F0 3C     BEQ $C73E                    EXECUTE
C702  E9 80     SBC #$80                       STATEMENT
C704  90 11     BCC $C717
C706  C9 23     CMP #$23
C708  B0 17     BCS $C721
C70A  0A        ASL A
C70B  A8        TAY
C70C  B9 01 C0  LDA $C001,Y
C70F  48        PHA
C710  B9 00 C0  LDA $C000,Y
C713  48        PHA
C714  4C 70 00  JMP $0070
C717  4C AD C8  JMP $C8AD    DEFAULT TO 'LET'
C71A  C9 3A     CMP #$3A
C71C  F0 D9     BEQ $C6F7
C71E  4C 03 CE  JMP $CE03    "SYNTAX ERROR"
C721  C9 4B     CMP #$4B     "GO"..
C723  D0 F9     BNE $C71E
C725  20 70 00  JSR $0070
C728  A9 A4     LDA #$A4        .."TO"
C72A  20 FA CD  JSR $CDFA
C72D  4C AD C7  JMP $C7AD
C730  38        SEC                          'RESTORE'
C731  A5 28     LDA START-BASIC
C733  E9 01     SBC #$01
C735  A4 29     LDY START-BASIC+1
```

```
C737  B0 01     BCS $C73A
C739  88        DEY
C73A  85 3E     STA DATA-ADDS
C73C  84 3F     STY DATA-ADDS+1
C73E  60        RTS
-------------------------------------------------
C73F  B0 01     BCS $C742                 'STOP'
C741  18        CLC                       'END'
C742  D0 40     BNE $C784
C744  A5 77     LDA BASIC-ADDS
C746  A4 78     LDY BASIC-ADDS/HI
C748  A6 37     LDX BASIC-LINE#+1
C74A  E8        INX
C74B  F0 0C     BEQ $C759
C74D  85 3A     STA PCOMD
C74F  84 3B     STY PCOMD+1
C751  A5 36     LDA BASIC-LINE#
C753  A4 37     LDY BASIC-LINE#+1
C755  85 38     STA PLINE#
C757  84 39     STY PLINE#+1
C759  68        PLA
C75A  68        PLA
C75B  A9 A2     LDA #$A2    "BREAK"
C75D  A0 C2     LDY #$C2
C75F  A2 00     LDX #$00
C761  86 0D     STX $0D
C763  90 03     BCC $C768
C765  4C 7E C3  JMP $C37E
-------------------------------------------------
C768  4C 89 C3  JMP $C389
-------------------------------------------------
C76B  D0 17     BNE $C784
C76D  A2 DB     LDX #$DB  "CAN'T CONT.."  'CONT'
C76F  A4 3B     LDY PCOMD+1
C771  D0 03     BNE $C776
C773  4C 57 C3  JMP $C357
C776  A5 3A     LDA PCOMD
C778  85 77     STA BASIC-ADDS
C77A  84 78     STY BASIC-ADDS/HI
C77C  A5 38     LDA PLINE#
C77E  A4 39     LDY PLINE#+1
C780  85 36     STA BASIC-LINE#
C782  84 37     STY BASIC-LINE#+1
C784  60        RTS
-------------------------------------------------
C785  D0 03     BNE $C78A                 'RUN'
C787  4C 72 C5  JMP $C572
-------------------------------------------------
C78A  20 79 C5  JSR $C579
C78D  4C A4 C7  JMP $C7A4
-------------------------------------------------
C790  A9 03     LDA #$03                  'GOSUB'
C792  20 1B C3  JSR $C31B  STACK TOO DEEP?
C795  A5 78     LDA BASIC-ADDS/HI
C797  48        PHA
C798  A5 77     LDA BASIC-ADDS
C79A  48        PHA
C79B  A5 37     LDA BASIC-LINE#+1
C79D  48        PHA
C79E  A5 36     LDA BASIC-LINE#
C7A0  48        PHA
C7A1  A9 8D     LDA #$8D
C7A3  48        PHA
C7A4  20 76 00  JSR $0076
C7A7  20 AD C7  JSR $C7AD
```

STACK:

$C6FD
RETURN ADDS
LINE #
$8D

```
C7AD  20 73 C8    JSR $C873          'GOTO'
C7B0  20 11 C8    JSR $C811
C7B3  A5 37       LDA BASIC-LINE#+1
C7B5  C5 12       CMP FIXED-HI
C7B7  B0 0B       BCS $C7C4
C7B9  98          TYA
C7BA  38          SEC
C7BB  65 77       ADC BASIC-ADDS
C7BD  A6 78       LDX BASIC-ADDS/HI
C7BF  90 07       BCC $C7C8
C7C1  E8          INX
C7C2  B0 04       BCS $C7C8
C7C4  A5 28       LDA START-BASIC
C7C6  A6 29       LDX START-BASIC+1
C7C8  20 30 C5    JSR $C530
C7CB  90 1E       BCC $C7EB  "UNDEF'D STATEMENT"
C7CD  A5 5C       LDA WK-POINTR
C7CF  E9 01       SBC #$01
C7D1  85 77       STA BASIC-ADDS
C7D3  A5 5D       LDA WK-POINTR+1
C7D5  E9 00       SBC #$00
C7D7  85 78       STA BASIC-ADDS/HI
C7D9  60          RTS
C7DA  D0 FD       BNE $C7D9          'RETURN'
C7DC  A9 FF       LDA #$FF
C7DE  85 47       STA Y-PNTR+1
C7E0  20 AA C2    JSR $C2AA  SEARCH STACK
C7E3  9A          TXS
C7E4  C9 8D       CMP #$8D
C7E6  F0 0B       BEQ $C7F3
C7E8  A2 16       LDX #$16   "RETURN WITHOUT GOSUB"
C7EA  2C A2 5A    BIT $5AA2
C7EB  A2 5A       LDX #$5A   "UNDEF'D STATEMENT"
C7ED  4C 57 C3    JMP $C357
C7F0  4C 03 CE    JMP $CE03  "SYNTAX ERR"
C7F3  68          PLA
C7F4  68          PLA
C7F5  85 36       STA BASIC-LINE#
C7F7  68          PLA
C7F8  85 37       STA BASIC-LINE#+1
C7FA  68          PLA
C7FB  85 77       STA BASIC-ADDS
C7FD  68          PLA
C7FE  85 78       STA BASIC-ADDS/HI
C800  20 0E C8    JSR $C80E          'DATA'
C803  98          TYA
C804  18          CLC
C805  65 77       ADC BASIC-ADDS
C807  85 77       STA BASIC-ADDS
C809  90 02       BCC $C80D
C80B  E6 78       INC BASIC-ADDS/HI
C80D  60          RTS
C80E  A2 3A       LDX #$3A           SCAN FOR:
C810  2C A2 00    BIT $00A2          NEXT STATEMENT..
C811  A2 00       LDX #$00           NEXT LINE
C813  86 03       STX $03
C815  A0 00       LDY #$00
C817  84 04       STY $04
```

```
C819  A5 04      LDA $04
C81B  A6 03      LDX $03
C81D  85 03      STA $03
C81F  86 04      STX $04
C821  B1 77      LDA (BASIC-ADDS),Y
C823  F0 E8      BEQ $C80D
C825  C5 04      CMP $04
C827  F0 E4      BEQ $C80D
C829  C8         INY
C82A  C9 22      CMP #$22
C82C  D0 F3      BNE $C821
C82E  F0 E9      BEQ $C819
C830  20 9F CC   JSR $CC9F        'IF'
C833  20 76 00   JSR $0076
C836  C9 89      CMP #$89 "GOTO"
C838  F0 05      BEQ $C83F
C83A  A9 A7      LDA #$A7 "THEN"
C83C  20 FA CD   JSR $CDFA
C83F  A5 5E      LDA ACC#1/E
C841  D0 05      BNE $C848
C843  20 11 C8   JSR $C811        'REM'
C846  F0 BB      BEQ $C803
C848  20 76 00   JSR $0076
C84B  B0 03      BCS $C850
C84D  4C AD C7   JMP $C7AD
C850  4C 00 C7   JMP $C700
C853  20 78 D6   JSR $D678        'ON'
C856  48         PHA
C857  C9 8D      CMP #$8D
C859  F0 04      BEQ $C85F
C85B  C9 89      CMP #$89
C85D  D0 91      BNE $C7F0
C85F  C6 62      DEC ACC#1/M4
C861  D0 04      BNE $C867
C863  68         PLA
C864  4C 02 C7   JMP $C702
C867  20 70 00   JSR $0070
C86A  20 73 C8   JSR $C873
C86D  C9 2C      CMP #$2C
C86F  F0 EE      BEQ $C85F
C871  68         PLA
C872  60         RTS
C873  A2 00      LDX #$00        GET FIXED-POINT NUMBER FROM BASIC
C875  86 11      STX FIXED-LO
C877  86 12      STX FIXED-HI
C879  B0 F7      BCS $C872
C87B  E9 2F      SBC #$2F
C87D  85 03      STA $03
C87F  A5 12      LDA FIXED-HI
C881  85 1F      STA POINTER
C883  C9 19      CMP #$19
C885  B0 D4      BCS $C85B
C887  A5 11      LDA FIXED-LO
C889  0A         ASL A
C88A  26 1F      ROL POINTER
C88C  0A         ASL A
C88D  26 1F      ROL POINTER
C88F  65 11      ADC FIXED-LO
```

CONV ASCII TO INT.

```
C895  65 12       ADC FIXED-HI
C897  85 12       STA FIXED-HI
C899  06 11       ASL FIXED-LO
C89B  26 12       ROL FIXED-HI
C89D  A5 11       LDA FIXED-LO
C89F  65 03       ADC $03
C8A1  85 11       STA FIXED-LO
C8A3  90 02       BCC $C8A7
C8A5  E6 12       INC FIXED-HI
C8A7  20 70 00    JSR $0070
C8AA  4C 79 C8    JMP $C879
C8AD  20 6D CF    JSR $CF6D          'LET'
C8B0  85 46       STA V-PNTR
C8B2  84 47       STY V-PNTR+1
C8B4  A9 B2       LDA #$B2
C8B6  20 FA CD    JSR $CDFA
C8B9  A5 08       LDA INT-FLAG
C8BB  48          PHA
C8BC  A5 07       LDA STR-FLAG
C8BE  48          PHA
C8BF  20 9F CC    JSR $CC9F
C8C2  68          PLA
C8C3  2A          ROL A
C8C4  20 91 CC    JSR $CC91
C8C7  D0 18       BNE $C8E1
C8C9  68          PLA
C8CA  10 12       BPL $C8DE
C8CC  20 27 DB    JSR $DB27
C8CF  20 9A D0    JSR $D09A
C8D2  A0 00       LDY #$00
C8D4  A5 61       LDA ACC#1/M3
C8D6  91 46       STA (V-PNTR),Y
C8D8  C8          INY
C8D9  A5 62       LDA ACC#1/M4
C8DB  91 46       STA (V-PNTR),Y
C8DD  60          RTS
C8DE  4C DC DA    JMP $DADC
C8E1  68          PLA                STRING.
C8E2  A4 47       LDY V-PNTR+1
C8E4  C0 DE       CPY #$DE
C8E6  D0 4F       BNE $C937
C8E8  20 80 D5    JSR $D580          DISCARD STRING IF TEMP
C8EB  C9 06       CMP #$06
C8ED  D0 40       BNE $C92F
C8EF  A0 00       LDY #$00
C8F1  84 5E       STY ACC#1/E
C8F3  84 63       STY ACC#1/S
C8F5  84 6E       STY $6E
C8F7  20 28 C9    JSR $C928
C8FA  20 EE D9    JSR $D9EE
C8FD  E6 6E       INC $6E
C8FF  A4 6E       LDY $6E
C901  20 28 C9    JSR $C928
C904  20 18 DB    JSR $DB18
C907  AA          TAX
C908  F0 05       BEQ $C90F
C90A  E8          INX
C90B  8A          TXA
```

```
C911  C8          INY
C912  C0 06       CPY #$06
C914  D0 DF       BNE $C8F5
C916  20 EE D9    JSR $D9EE
C919  20 A7 DB    JSR $DBA7
C91C  A2 02       LDX #$02
C91E  78          SEI
C91F  B5 60       LDA ACC#1/M2,X
C921  95 8D       STA CLOCK,X
C923  CA          DEX
C924  10 F9       BPL $C91F
C926  58          CLI
C927  60          RTS
C928  B1 1F       LDA (POINTER),Y    ADD A
C92A  20 7D 00    JSR $007D          (ASCII)
C92D  90 03       BCC $C932
C92F  4C 23 D1    JMP $D123 "ILLEGAL QTY"   DIGIT
C932  E9 2F       SBC #$2F             TO ACC#1
C934  4C 8A DC    JMP $DC8A
C937  A0 02       LDY #$02           LET,
C939  B1 61       LDA (ACC#1/M3),Y   CONTINUED
C93B  C5 31       CMP STRING-LO+1
C93D  90 17       BCC $C956
C93F  D0 07       BNE $C948
C941  88          DEY
C942  B1 61       LDA (ACC#1/M3),Y
C944  C5 30       CMP STRING-LO
C946  90 0E       BCC $C956
C948  A4 62       LDY ACC#1/M4
C94A  C4 2B       CPY END-BASIC+1
C94C  90 08       BCC $C956
C94E  D0 0D       BNE $C95D
C950  A5 61       LDA ACC#1/M3
C952  C5 2A       CMP END-BASIC
C954  B0 07       BCS $C95D
C956  A5 61       LDA ACC#1/M3
C958  A4 62       LDY ACC#1/M4
C95A  4C 73 C9    JMP $C973
C95D  A0 00       LDY #$00
C95F  B1 61       LDA (ACC#1/M3),Y
C961  20 4F D3    JSR $D34F
C964  A5 4D       LDA $4D
C966  A4 4E       LDY $4E
C968  85 6C       STA SGN-COMPR
C96A  84 6D       STY ROUND
C96C  20 54 D5    JSR $D554
C96F  A9 5E       LDA #$5E
C971  A0 00       LDY #$00
C973  85 4D       STA $4D
C975  84 4E       STY $4E
C977  20 B5 D5    JSR $D5B5
C97A  A0 00       LDY #$00
C97C  B1 4D       LDA ($4D),Y
C97E  91 46       STA (V-PNTR),Y
C980  C8          INY
C981  B1 4D       LDA ($4D),Y
C983  91 46       STA (V-PNTR),Y
C985  C8          INY
```

```
C98A  60           RTS
C98B  20 91 C9     JSR $C991      'PRINT#'
C98E  4C B7 CA     JMP $CAB7
C991  20 78 D6     JSR $D678      'CMD'
C994  F0 05        BEQ $C99B
C996  A9 2C        LDA #$2C
C998  20 FA CD     JSR $CDFA
C99B  08           PHP
C99C  20 C9 FF     JSR $FFC9
C99F  86 0E        STX $0E
C9A1  28           PLP
C9A2  4C AB C9     JMP $C9AB
C9A5  20 1F CA     JSR $CA1F      'PRINT'
C9A8  20 76 00     JSR $0076
C9AB  F0 35        BEQ $C9E2
C9AD  F0 3F        BEQ $C9EE
C9AF  C9 A3        CMP #$A3  "TAB("
C9B1  F0 49        BEQ $C9FC
C9B3  C9 A6        CMP #$A6  "SPC("
C9B5  18           CLC
C9B6  F0 44        BEQ $C9FC
C9B8  C9 2C        CMP #$2C  ","
C9BA  F0 33        BEQ $C9EF
C9BC  C9 3B        CMP #$3B  ";"
C9BE  F0 51        BEQ $CA11
C9C0  20 9F CC     JSR $CC9F
C9C3  24 07        BIT STR-FLAG
C9C5  30 DE        BMI $C9A5
C9C7  20 E9 DC     JSR $DCE9
C9CA  20 61 D3     JSR $D361
C9CD  20 1F CA     JSR $CA1F
C9D0  20 39 CA     JSR $CA39
C9D3  D0 D3        BNE $C9A8
C9D5  A9 00        LDA #$00
C9D7  9D 00 02     STA $0200,X
C9DA  A2 FF        LDX #$FF
C9DC  A0 01        LDY #$01
C9DE  A5 0E        LDA $0E
C9E0  D0 0C        BNE $C9EE
C9E2  A9 0D        LDA #$0D  <CR>
C9E4  20 45 CA     JSR $CA45
C9E7  A9 0A        LDA #$0A  <LF>
C9E9  20 45 CA     JSR $CA45
C9EC  49 FF        EOR #$FF
C9EE  60           RTS
C9EF  A5 C6        LDA CURSOR-COL
C9F1  38           SEC
C9F2  E9 0A        SBC #$0A
C9F4  B0 FC        BCS $C9F2
C9F6  49 FF        EOR #$FF
C9F8  69 01        ADC #$01
C9FA  D0 10        BNE $CA0C
C9FC  08           PHP
C9FD  20 75 D6     JSR $D675
CA00  C9 29        CMP #$29
CA02  D0 5D        BNE $CA61
CA04  28           PLP
CA05  90 06        BCC $CA0D
CA07  8A           TXA
```

```
CA0A  90 05      BCC $CA11
CA0C  AA         TAX
CA0D  E8         INX
CA0E  CA         DEX
CA0F  D0 06      BNE $CA17
CA11  20 70 00   JSR $0070
CA14  4C AD C9   JMP $C9AD
CA17  20 39 CA   JSR $CA39
CA1A  D0 F2      BNE $CA0E
-------------------------------------------------------------
CA1C  20 61 D3   JSR $D361      PRINT CHARACTER-
CA1F  20 80 D5   JSR $D580      STRING TO SCREEN.
CA22  AA         TAX            FROM
CA23  A0 00      LDY #$00       (Y,A)
CA25  E8         INX
CA26  CA         DEX
CA27  F0 C5      BEQ $C9EE
CA29  B1 1F      LDA (POINTER),Y
CA2B  20 45 CA   JSR $CA45
CA2E  C8         INY
CA2F  C9 0D      CMP #$0D
CA31  D0 F3      BNE $CA26
CA33  20 EC C9   JSR $C9EC
CA36  4C 26 CA   JMP $CA26
-------------------------------------------------------------
CA39  A5 0E      LDA $0E
CA3B  F0 03      BEQ $CA40
CA3D  A9 20      LDA #$20      "SPACE"
CA3F  2C A9 1D   BIT $1DA9
CA40  A9 1D      LDA #$1D      "CURSOR-RIGHT"
CA42  2C A9 3F   BIT $3FA9
CA43  A9 3F      LDA #$3F      "?"
CA45  24 0D      BIT $0D
CA47  30 03      BMI $CA4C
CA49  20 D2 FF   JSR $FFD2     OUTPUT
CA4C  29 FF      AND #$FF
CA4E  60         RTS
-------------------------------------------------------------
CA4F  A5 0B      LDA $0B                       HANDLE
CA51  F0 11      BEQ $CA64     INPUT?          BAD
CA53  30 04      BMI $CA59     READ?           INPUT
CA55  A0 FF      LDY #$FF      NO, 'GET'         DATA
CA57  D0 04      BNE $CA5D
CA59  A5 3C      LDA DATA-LINE#
CA5B  A4 3D      LDY DATA-LINE#+1
CA5D  85 36      STA BASIC-LINE#
CA5F  84 37      STY BASIC-LINE#+1
CA61  4C 03 CE   JMP $CE03     "SYNTAX ERROR"
CA64  A5 0E      LDA $0E
CA66  F0 05      BEQ $CA6D
CA68  A2 BF      LDX #$BF      "FILE DATA ERROR"
CA6A  4C 57 C3   JMP $C357
CA6D  A9 0D      LDA #$0D      "REDO FROM START"
CA6F  A0 CC      LDY #$CC
CA71  20 1C CA   JSR $CA1C
CA74  A5 3A      LDA PCOMD
CA76  A4 3B      LDY PCOMD+1
CA78  85 77      STA BASIC-ADDS
CA7A  84 78      STY BASIC-ADDS/HI
CA7C  60         RTS
-------------------------------------------------------------
```

```
CA80  C9 23        CMP #$23   "#"
CA82  D0 10        BNE $CA94
CA84  20 70 00     JSR $0070
CA87  20 78 D6     JSR $D678
CA8A  A9 2C        LDA #$2C   ","
CA8C  20 FA CD     JSR $CDFA
CA8F  20 C6 FF     JSR $FFC6
CA92  86 0E        STX $0E
CA94  A2 01        LDX #$01
CA96  A0 02        LDY #$02
CA98  A9 00        LDA #$00
CA9A  8D 01 02     STA $0201
CA9D  A9 40        LDA #$40
CA9F  20 10 CB     JSR $CB10
CAA2  A6 0E        LDX $0E
CAA4  D0 13        BNE $CAB9
CAA6  60           RTS
-------------------------------------------------------
CAA7  20 78 D6     JSR $D678        'INPUT#'
CAAA  A9 2C        LDA #$2C
CAAC  20 FA CD     JSR $CDFA
CAAF  20 C6 FF     JSR $FFC6
CAB2  86 0E        STX $0E
CAB4  20 D2 CA     JSR $CAD2
CAB7  A5 0E        LDA $0E
CAB9  20 CC FF     JSR $FFCC
CABC  A2 00        LDX #$00
CABE  86 0E        STX $0E
CAC0  60           RTS
-------------------------------------------------------
CAC1  46 0D        LSR $0D          'INPUT'
CAC3  C9 22        CMP #$22
CAC5  D0 0B        BNE $CAD2
CAC7  20 B8 CD     JSR $CDB8
CACA  A9 3B        LDA #$3B   ";"
CACC  20 FA CD     JSR $CDFA
CACF  20 1F CA     JSR $CA1F
CAD2  20 80 D2     JSR $D280
CAD5  A9 2C        LDA #$2C
CAD7  8D FF 01     STA $01FF
CADA  20 FA CA     JSR $CAFA
CADD  A5 0E        LDA $0E
CADF  F0 0C        BEQ $CAED
CAE1  A5 96        LDA ST
CAE3  29 02        AND #$02
CAE5  F0 06        BEQ $CAED
CAE7  20 B7 CA     JSR $CAB7
CAEA  4C 00 C8     JMP $C800
CAED  AD 00 02     LDA $0200
CAF0  D0 1C        BNE $CB0E
CAF2  A5 0E        LDA $0E
CAF4  D0 E4        BNE $CADA
CAF6  18           CLC
CAF7  4C 51 C7     JMP $C751
-------------------------------------------------------
CAFA  A5 0E        LDA $0E          PROMPT
CAFC  D0 06        BNE $CB04          AND
CAFE  20 43 CA     JSR $CA43        RECEIVE
CB01  20 39 CA     JSR $CA39          INPUT
CB04  4C 6F C4     JMP $C46F
-------------------------------------------------------
CB07  A6 3E        LDX DATA-ADDS    'READ'
CB09  A4 3F        LDY DATA-ADDS+1
CB0B  A9 98        LDA #$98
```

```
CB0D  2C A9 00    BIT $00A9

CB0E  A9 00       LDA #$00
CB10  85 0B       STA $0B
CB12  86 40       STX INPUT-VEC
CB14  84 41       STY INPUT-VEC+1
CB16  20 6D CF    JSR $CF6D
CB19  85 46       STA V-PNTR
CB1B  84 47       STY V-PNTR+1
CB1D  A5 77       LDA BASIC-ADDS
CB1F  A4 78       LDY BASIC-ADDS/HI
CB21  85 48       STA OP-PTR
CB23  84 49       STY OP-PTR+1
CB25  A6 40       LDX INPUT-VEC
CB27  A4 41       LDY INPUT-VEC+1
CB29  86 77       STX BASIC-ADDS
CB2B  84 78       STY BASIC-ADDS/HI
CB2D  20 76 00    JSR $0076
CB30  D0 20       BNE $CB52
CB32  24 0B       BIT $0B
CB34  50 0C       BVC $CB42
CB36  20 E4 FF    JSR $FFE4
CB39  8D 00 02    STA $0200
CB3C  A2 FF       LDX #$FF
CB3E  A0 01       LDY #$01
CB40  D0 0C       BNE $CB4E
CB42  30 75       BMI $CBB9
CB44  A5 0E       LDA $0E
CB46  D0 03       BNE $CB4B
CB48  20 43 CA    JSR $CA43
CB4B  20 FA CA    JSR $CAFA
CB4E  86 77       STX BASIC-ADDS
CB50  84 78       STY BASIC-ADDS/HI
CB52  20 70 00    JSR $0070
CB55  24 07       BIT STR-FLAG
CB57  10 31       BPL $CB8A
CB59  24 0B       BIT $0B
CB5B  50 09       BVC $CB66
CB5D  E8          INX
CB5E  86 77       STX BASIC-ADDS
CB60  A9 00       LDA #$00
CB62  85 03       STA $03
CB64  F0 0C       BEQ $CB72
CB66  85 03       STA $03
CB68  C9 22       CMP #$22
CB6A  F0 07       BEQ $CB73
CB6C  A9 3A       LDA #$3A
CB6E  85 03       STA $03
CB70  A9 2C       LDA #$2C
CB72  18          CLC
CB73  85 04       STA $04
CB75  A5 77       LDA BASIC-ADDS
CB77  A4 78       LDY BASIC-ADDS/HI
CB79  69 00       ADC #$00
CB7B  90 01       BCC $CB7E
CB7D  C8          INY
CB7E  20 67 D3    JSR $D367
CB81  20 BD D6    JSR $D6BD
CB84  20 E2 C8    JSR $C8E2
CB87  4C 92 CB    JMP $CB92
```

```
CB8A  20 FF DB    JSR $DBFF
CB8D  A5 08       LDA INT-FLAG
CB8F  20 CA C8    JSR $C8CA
CB92  20 76 00    JSR $0076
CB95  F0 07       BEQ $CB9E
CB97  C9 2C       CMP #$2C   ","
CB99  F0 03       BEQ $CB9E
CB9B  4C 4F CA    JMP $CA4F
CB9E  A5 77       LDA BASIC-ADDS
CBA0  A4 78       LDY BASIC-ADDS/HI
CBA2  85 40       STA INPUT-VEC
CBA4  84 41       STY INPUT-VEC+1
CBA6  A5 48       LDA OP-PTR
CBA8  A4 49       LDY OP-PTR+1
CBAA  85 77       STA BASIC-ADDS
CBAC  84 78       STY BASIC-ADDS/HI
CBAE  20 76 00    JSR $0076
CBB1  F0 2C       BEQ $CBDF
CBB3  20 F8 CD    JSR $CDF8
CBB6  4C 16 CB    JMP $CB16
CBB9  20 0E C8    JSR $C80E
CBBC  C8          INY
CBBD  AA          TAX
CBBE  D0 12       BNE $CBD2
CBC0  A2 2A       LDX #$2A
CBC2  C8          INY
CBC3  B1 77       LDA (BASIC-ADDS),Y
CBC5  F0 6D       BEQ $CC34
CBC7  C8          INY
CBC8  B1 77       LDA (BASIC-ADDS),Y
CBCA  85 3C       STA DATA-LINE#
CBCC  C8          INY
CBCD  B1 77       LDA (BASIC-ADDS),Y
CBCF  C8          INY
CBD0  85 3D       STA DATA-LINE#+1
CBD2  B1 77       LDA (BASIC-ADDS),Y
CBD4  AA          TAX
CBD5  20 03 C8    JSR $C803
CBD8  E0 83       CPX #$83
CBDA  D0 DD       BNE $CBB9
CBDC  4C 52 CB    JMP $CB52
CBDF  A5 40       LDA INPUT-VEC
CBE1  A4 41       LDY INPUT-VEC+1
CBE3  A6 0B       LDX $0B
CBE5  10 03       BPL $CBEA
CBE7  4C 3A C7    JMP $C73A
CBEA  A0 00       LDY #$00
CBEC  B1 40       LDA (INPUT-VEC),Y
CBEE  F0 0B       BEQ $CBFB
CBF0  A5 0E       LDA $0E
CBF2  D0 07       BNE $CBFB
CBF4  A9 FC       LDA #$FC   "EXTRA IGNORED"
CBF6  A0 CB       LDY #$CB
CBF8  4C 1C CA    JMP $CA1C
CBFB  60          RTS

CBFC ?EXTRA IGNORED
CC0C  ?REDO FROM STAR
CC1C T ---F---F--HE-F---
```

```
CC20  D0 04        BNE $CC26          'NEXT'
CC22  A0 00        LDY #$00
CC24  F0 03        BEQ $CC29          GET VARIABLE NAME
CC26  20 6D CF     JSR $CF6D
CC29  85 46        STA V-PNTR
CC2B  84 47        STY V-PNTR+1
CC2D  20 AA C2     JSR $C2AA          SEARCH STACK
CC30  F0 04        BEQ $CC36
CC32  A2 00        LDX #$00
CC34  F0 66        BEQ $CC9C          "NEXT WITHOUT FOR"
CC36  9A           TXS                ABORT INNER LOOPS
CC37  8A           TXA
CC38  18           CLC
CC39  69 04        ADC #$04
CC3B  48           PHA
CC3C  69 06        ADC #$06
CC3E  85 21        STA $21
CC40  68           PLA
CC41  A0 01        LDY #$01
CC43  20 AE DA     JSR $DAAE          STACK -> ACC#1
CC46  BA           TSX
CC47  BD 09 01     LDA $0109,X
CC4A  85 63        STA ACC#1/S
CC4C  A5 46        LDA V-PNTR
CC4E  A4 47        LDY V-PNTR+1
CC50  20 73 D7     JSR $D773          ADD
CC53  20 DC DA     JSR $DADC
CC56  A0 01        LDY #$01
CC58  20 69 DB     JSR $DB69          COMPARE
CC5B  BA           TSX
CC5C  38           SEC
CC5D  FD 09 01     SBC $0109,X
CC60  F0 17        BEQ $CC79
CC62  BD 0F 01     LDA $010F,X
CC65  85 36        STA BASIC-LINE#
CC67  BD 10 01     LDA $0110,X
CC6A  85 37        STA BASIC-LINE#+1
CC6C  BD 12 01     LDA $0112,X
CC6F  85 77        STA BASIC-ADDS
CC71  BD 11 01     LDA $0111,X
CC74  85 78        STA BASIC-ADDS/HI
CC76  4C C4 C6     JMP $C6C4
CC79  8A           TXA                TYPE MISMATCH?
CC7A  69 11        ADC #$11
CC7C  AA           TAX
CC7D  9A           TXS
CC7E  20 76 00     JSR $0076
CC81  C9 2C        CMP #$2C           ","
CC83  D0 F1        BNE $CC76
CC85  20 70 00     JSR $0070
CC88  20 26 CC     JSR $CC26
CC8B  20 9F CC     JSR $CC9F
CC8E  18           CLC
CC8F  24 38        BIT PLINE#

CC90  38           SEC
CC91  24 07        BIT STR-FLAG
CC93  30 03        BMI $CC98
CC95  B0 03        BCS $CC9A
CC97  50           BVC
```

```
CC98  B0 FD     BCS $CC97
CC9A  A2 A3     LDX #$A3   "TYPE MISMATCH"
CC9C  4C 57 C3  JMP $C357
-------------------------------------------
CC9F  A6 77     LDX BASIC-ADDS          EVALUATE
CCA1  D0 02     BNE $CCA5                EXPRESSION
CCA3  C6 78     DEC BASIC-ADDS/HI
CCA5  C6 77     DEC BASIC-ADDS
CCA7  A2 00     LDX #$00
CCA9  24 48     BIT OP-PTR

CCAA  48        PHA
CCAB  8A        TXA
CCAC  48        PHA
CCAD  A9 01     LDA #$01
CCAF  20 1B C3  JSR $C31B STACK TOO DEEP?
CCB2  20 84 CD  JSR $CD84
CCB5  A9 00     LDA #$00
CCB7  85 4A     STA $4A
CCB9  20 76 00  JSR $0076
CCBC  38        SEC
CCBD  E9 B1     SBC #$B1
CCBF  90 17     BCC $CCD8
CCC1  C9 03     CMP #$03
CCC3  B0 13     BCS $CCD8          1  2  3  4  5  6
CCC5  C9 01     CMP #$01           >  =  >=  <  <>  <=
CCC7  2A        ROL A
CCC8  49 01     EOR #$01
CCCA  45 4A     EOR $4A
CCCC  C5 4A     CMP $4A
CCCE  90 61     BCC $CD31
CCD0  85 4A     STA $4A
CCD2  20 70 00  JSR $0070
CCD5  4C BC CC  JMP $CCBC
-------------------------------------------
CCD8  A6 4A     LDX $4A
CCDA  D0 2C     BNE $CD08
CCDC  B0 7B     BCS $CD59
CCDE  69 07     ADC #$07
CCE0  90 77     BCC $CD59
CCE2  65 07     ADC STR-FLAG
CCE4  D0 03     BNE $CCE9
CCE6  4C 17 D5  JMP $D517
-------------------------------------------
CCE9  69 FF     ADC #$FF
CCEB  85 1F     STA POINTER
CCED  0A        ASL A
CCEE  65 1F     ADC POINTER
CCF0  A8        TAY
CCF1  68        PLA
CCF2  D9 74 C0  CMP $C074,Y
CCF5  B0 67     BCS $CD5E
CCF7  20 8E CC  JSR $CC8E
CCFA  48        PHA
CCFB  20 21 CD  JSR $CD21
CCFE  68        PLA
CCFF  A4 48     LDY OP-PTR
CD01  10 17     BPL $CD1A
CD03  AA        TAX
CD04  F0 56     BEQ $CD5C
CD06  D0 5F     BNE $CD67
CD08  46 07     LSR STR-FLAG
```

```
CD0B  2A        ROL A
CD0C  A6 77     LDX BASIC-ADDS
CD0E  D0 02     BNE $CD12
CD10  C6 78     DEC BASIC-ADDS/HI
CD12  C6 77     DEC BASIC-ADDS
CD14  A0 1B     LDY #$1B
CD16  85 4A     STA $4A
CD18  D0 D7     BNE $CCF1
CD1A  D9 74 C0  CMP $C074,Y
CD1D  B0 48     BCS $CD67
CD1F  90 D9     BCC $CCFA
CD21  B9 76 C0  LDA $C076,Y
CD24  48        PHA
CD25  B9 75 C0  LDA $C075,Y
CD28  48        PHA
CD29  20 34 CD  JSR $CD34
CD2C  A5 4A     LDA $4A
CD2E  4C AA CC  JMP $CCAA
CD31  4C 03 CE  JMP $CE03 "SYNTAX ERR"
CD34  A5 63     LDA ACC#1/S
CD36  BE 74 C0  LDX $C074,Y
CD39  A8        TAY
CD3A  68        PLA
CD3B  85 1F     STA POINTER
CD3D  E6 1F     INC POINTER
CD3F  68        PLA
CD40  85 20     STA POINTER-HI
CD42  98        TYA
CD43  48        PHA
CD44  20 27 DB  JSR $DB27
CD47  A5 62     LDA ACC#1/M4
CD49  48        PHA
CD4A  A5 61     LDA ACC#1/M3
CD4C  48        PHA
CD4D  A5 60     LDA ACC#1/M2
CD4F  48        PHA
CD50  A5 5F     LDA ACC#1/M1
CD52  48        PHA
CD53  A5 5E     LDA ACC#1/E
CD55  48        PHA
CD56  6C 1F 00  JMP ($001F)
CD59  A0 FF     LDY #$FF
CD5B  68        PLA
CD5C  F0 23     BEQ $CD81
CD5E  C9 64     CMP #$64
CD60  F0 03     BEQ $CD65
CD62  20 8E CC  JSR $CC8E
CD65  84 48     STY OP-PTR
CD67  68        PLA
CD68  4A        LSR A
CD69  85 0C     STA $0C
CD6B  68        PLA
CD6C  85 66     STA ACC#2/E
CD6E  68        PLA
CD6F  85 67     STA ACC#2/M1
CD71  68        PLA
CD72  85 68     STA ACC#2/M2
CD74  68        PLA
CD75  85 69     STA ACC#2/M3
```

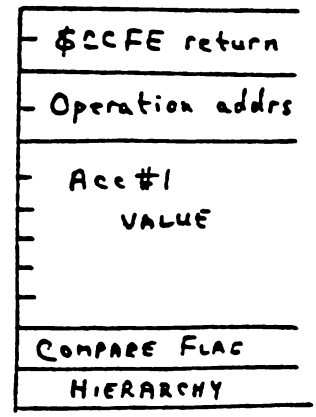
PUSH ARGUMENT TO STACK

PUSH PRIMARY TO STACK

PERFORM STACKED OPERATION

SAVE NEW OPERATOR

COMPARISON FLAG



```
CD78  85 6A       STA ACC#2/M4
CD7A  68          PLA
CD7B  85 6B       STA ACC#2/S
CD7D  45 63       EOR ACC#1/S
CD7F  85 6C       STA SGN-COMPR
CD81  A5 5E       LDA ACC#1/E
CD83  60          RTS              --> GO DIRECTLY TO OPERATOR ROUTINE!
CD84  A9 00       LDA #$00
CD86  85 07       STA STR-FLAG     GET VALUE OR OPERATOR
CD88  20 70 00    JSR $0070
CD8B  B0 03       BCS $CD90
CD8D  4C FF DB    JMP $DBFF
CD90  20 F7 CF    JSR $CFF7
CD93  B0 7A       BCS $CE0F
CD95  C9 FF       CMP #$FF         π ?
CD97  D0 0F       BNE $CDA8
CD99  A9 A3       LDA #$A3
CD9B  A0 CD       LDY #$CD
CD9D  20 AE DA    JSR $DAAE
CDA0  4C 70 00    JMP $0070

CDA3  82 49 0F DA A1 ~~C9 2E F0~~   π

CDA8  C9 2E       CMP #$2E         .
CDAA  F0 E1       BEQ $CD8D
CDAC  C9 AB       CMP #$AB         -
CDAE  F0 58       BEQ $CE08
CDB0  C9 AA       CMP #$AA         +
CDB2  F0 D4       BEQ $CD88
CDB4  C9 22       CMP #$22         "
CDB6  D0 0F       BNE $CDC7
CDB8  A5 77       LDA BASIC-ADDS   GET STRING FROM BASIC
CDBA  A4 78       LDY BASIC-ADDS/HI
CDBC  69 00       ADC #$00
CDBE  90 01       BCC $CDC1
CDC0  C8          INY
CDC1  20 61 D3    JSR $D361
CDC4  4C BD D6    JMP $D6BD
CDC7  C9 A8       CMP #$A8
CDC9  D0 13       BNE $CDDE
CDCB  A0 18       LDY #$18
CDCD  D0 3B       BNE $CE0A
CDCF  20 9A D0    JSR $D09A        "NOT"
CDD2  A5 62       LDA ACC#1/M4
CDD4  49 FF       EOR #$FF
CDD6  A8          TAY
CDD7  A5 61       LDA ACC#1/M3
CDD9  49 FF       EOR #$FF
CDDB  4C 6D D2    JMP $D26D
CDDE  C9 A5       CMP #$A5         'FNx' ?
CDE0  D0 03       BNE $CDE5
CDE2  4C CE D2    JMP $D2CE
CDE5  C9 B4       CMP #$B4         FUNCTION? (SGN, INT, etc.)
CDE7  90 03       BCC $CDEC
CDE9  4C 89 CE    JMP $CE89
CDEC  20 F5 CD    JSR $CDF5        EVALUATE "(EXPRESSION)"
CDEF  20 9F CC    JSR $CC9F
CDF2  A9 29       LDA #$29         ")"
CDF4  2C A9 28    BIT $28A9
```

```
CDF5  A9 28     LDA #$28    "("
CDF7  2C A9 2C  BIT $2CA9
CDF8  A9 2C     LDA #$2C    ","
CDFA  A0 00     LDY #$00
CDFC  D1 77     CMP (BASIC-ADDS),Y
CDFE  D0 03     BNE $CE03
CE00  4C 70 00  JMP $0070
CE03  A2 10     LDX #$10    "SYNTAX ERROR"
CE05  4C 57 C3  JMP $C357
CE08  A0 15     LDY #$15
CE0A  68        PLA
CE0B  68        PLA
CE0C  4C FB CC  JMP $CCFB
CE0F  20 6D CF  JSR $CF6D       SEARCH
CE12  85 61     STA ACC#1/M3      FOR
CE14  84 62     STY ACC#1/M4    VARIABLE
CE16  A5 42     LDA V-NAME
CE18  A4 43     LDY V-NAME+1
CE1A  A6 07     LDX STR-FLAG
CE1C  F0 25     BEQ $CE43
CE1E  A2 00     LDX #$00
CE20  86 6D     STX ROUND
CE22  24 62     BIT ACC#1/M4
CE24  10 1C     BPL $CE42
CE26  C9 54     CMP #$54    "T"
CE28  D0 18     BNE $CE42
CE2A  C0 C9     CPY #$C9    "I$
CE2C  D0 14     BNE $CE42
CE2E  20 69 CE  JSR $CE69
CE31  84 5B     STY $5B
CE33  88        DEY
CE34  84 6E     STY $6E
CE36  A0 06     LDY #$06
CE38  84 5A     STY $5A
CE3A  A0 24     LDY #$24
CE3C  20 74 DD  JSR $DD74
CE3F  4C 49 D3  JMP $D349
CE42  60        RTS
CE43  A6 08     LDX INT-FLAG
CE45  10 0D     BPL $CE54
CE47  A0 00     LDY #$00
CE49  B1 61     LDA (ACC#1/M3),Y
CE4B  AA        TAX
CE4C  C8        INY
CE4D  B1 61     LDA (ACC#1/M3),Y
CE4F  A8        TAY
CE50  8A        TXA
CE51  4C 8D D2  JMP $D28D
CE54  24 62     BIT ACC#1/M4
CE56  10 2A     BPL $CE82
CE58  C9 54     CMP #$54    "T"
CE5A  D0 19     BNE $CE75
CE5C  C0 49     CPY #$49    "I"
CE5E  D0 22     BNE $CE82
CE60  20 69 CE  JSR $CE69
CE63  98        TYA
CE64  A2 A0     LDX #$A0
CE67  4C 5B DE  JMP $DE5B
```

```
CE6B  A0 00     LDY #$00
CE6D  78        SEI
CE6E  20 AE DA  JSR $DAAE
CE71  58        CLI
CE72  84 5F     STY ACC#1/M1
CE74  60        RTS
CE75  C9 53     CMP #$53    "S"
CE77  D0 09     BNE $CE82
CE79  C0 54     CPY #$54    "T"
CE7B  D0 05     BNE $CE82
CE7D  A5 96     LDA ST
CE7F  4C 48 DB  JMP $DB48
CE82  A5 61     LDA ACC#1/M3
CE84  A4 62     LDY ACC#1/M4
CE86  4C AE DA  JMP $DAAE
CE89  0A        ASL A                  SET UP
CE8A  48        PHA                    FUNCTION
CE8B  AA        TAX                    REFERENCES
CE8C  20 70 00  JSR $0070
CE8F  E0 8F     CPX #$8F    LEFT$,RIGHT$,MID$ ?
CE91  90 20     BCC $CEB3
CE93  20 F5 CD  JSR $CDF5   "("
CE96  20 9F CC  JSR $CC9F
CE99  20 F8 CD  JSR $CDF8   ","
CE9C  20 90 CC  JSR $CC90
CE9F  68        PLA
CEA0  AA        TAX
CEA1  A5 62     LDA ACC#1/M4
CEA3  48        PHA
CEA4  A5 61     LDA ACC#1/M3
CEA6  48        PHA
CEA7  8A        TXA
CEA8  48        PHA
CEA9  20 78 D6  JSR $D678
CEAC  68        PLA
CEAD  A8        TAY
CEAE  8A        TXA
CEAF  48        PHA
CEB0  4C B8 CE  JMP $CEB8
CEB3  20 EC CD  JSR $CDEC   EVALUATE FUNCTION
CEB6  68        PLA                    ARGUMENT
CEB7  A8        TAY
CEB8  B9 DE BF  LDA $BFDE,Y
CEBB  85 52     STA $52
CEBD  B9 DF BF  LDA $BFDF,Y
CEC0  85 53     STA $53
CEC2  20 51 00  JSR $0051
CEC5  4C 8E CC  JMP $CC8E
CEC8  A0 FF     LDY #$FF               'OR'
CECA  2C A0 00  BIT $00A0
CECB  A0 00     LDY #$00               'AND'
CECD  84 05     STY N-SUBSCR
CECF  20 9A D0  JSR $D09A
CED2  A5 61     LDA ACC#1/M3
CED4  45 05     EOR N-SUBSCR
CED6  85 03     STA $03
CED8  A5 62     LDA ACC#1/M4
CEDA  45 05     EOR N-SUBSCR
```

```
CEDE  20 08 DB    JSR $DB08
CEE1  20 9A D0    JSR $D09A
CEE4  A5 62       LDA ACC#1/M4
CEE6  45 05       EOR N-SUBSCR
CEE8  25 04       AND $04.
CEEA  45 05       EOR N-SUBSCR
CEEC  A8          TAY
CEED  A5 61       LDA ACC#1/M3
CEEF  45 05       EOR N-SUBSCR
CEF1  25 03       AND $03
CEF3  45 05       EOR N-SUBSCR
CEF5  4C 6D D2    JMP $D26D
CEF8  20 91 CC    JSR $CC91          COMPARE
CEFB  B0 13       BCS $CF10
CEFD  A5 6B       LDA ACC#2/S
CEFF  09 7F       ORA #$7F
CF01  25 67       AND ACC#2/M1
CF07  85 67       STA ACC#2/M1
CF05  A9 66       LDA #$66
CF07  A0 00       LDY #$00
CF09  20 67 DB    JSR $DB67
CF0C  AA          TAX
CF0D  4C 43 CF    JMP $CF43
CF10  A9 00       LDA #$00           STRING
CF12  85 07       STA STR-FLAG         COMPARE
CF14  C6 4A       DEC $4A
CF16  20 80 D5    JSR $D580
CF19  85 5E       STA ACC#1/E
CF1B  86 5F       STX ACC#1/M1
CF1D  84 60       STY ACC#1/M2
CF1F  A5 69       LDA ACC#2/M3
CF21  A4 6A       LDY ACC#2/M4
CF23  20 84 D5    JSR $D584
CF26  86 69       STX ACC#2/M3
CF28  84 6A       STY ACC#2/M4
CF2A  AA          TAX
CF2B  38          SEC
CF2C  E5 5E       SBC ACC#1/E
CF2E  F0 08       BEQ $CF38
CF30  A9 01       LDA #$01
CF32  90 04       BCC $CF38
CF34  A6 5E       LDX ACC#1/E
CF36  A9 FF       LDA #$FF
CF38  85 63       STA ACC#1/S
CF3A  A0 FF       LDY #$FF
CF3C  E8          INX
CF3D  C8          INY
CF3E  CA          DEX
CF3F  D0 07       BNE $CF48
CF41  A6 63       LDX ACC#1/S
CF43  30 0F       BMI $CF54
CF45  18          CLC
CF46  90 0C       BCC $CF54
CF48  B1 69       LDA (ACC#2/M3),Y
CF4A  D1 5F       CMP (ACC#1/M1),Y
CF4C  F0 EF       BEQ $CF3D
CF4E  A2 FF       LDX #$FF
CF50  B0 02       BCS $CF54
CF52  A2 01       LDX #$01
```

```
CF55  8A        TXA
CF56  2A        ROL A
CF57  25 0C     AND $0C     COMPARISON FLAG
CF59  F0 02     BEQ $CF5D   ...TRUE
CF5B  A9 FF     LDA #$FF    ...FALSE
CF5D  4C 48 DB  JMP $DB48
-------------------------------------------
CF60  20 F8 CD  JSR $CDF8
CF63  AA        TAX                 'DIM'
CF64  20 72 CF  JSR $CF72
CF67  20 76 00  JSR $0076
CF6A  D0 F4     BNE $CF60
CF6C  60        RTS
-------------------------------------------
CF6D  A2 00     LDX #$00            GET
CF6F  20 76 00  JSR $0076           VARIABLE
CF72  86 06     STX DIM-FL          LOCATION
CF74  85 42     STA V-NAME
CF76  20 76 00  JSR $0076
CF79  20 F7 CF  JSR $CFF7   ALPHA?
CF7C  B0 03     BCS $CF81
CF7E  4C 03 CE  JMP $CE03   "SYNTAX ERROR"
-------------------------------------------
CF81  A2 00     LDX #$00
CF83  86 07     STX STR-FLAG
CF85  86 08     STX INT-FLAG
CF87  20 70 00  JSR $0070
CF8A  90 05     BCC $CF91
CF8C  20 F7 CF  JSR $CFF7
CF8F  90 0B     BCC $CF9C
CF91  AA        TAX
CF92  20 70 00  JSR $0070
CF95  90 FB     BCC $CF92
CF97  20 F7 CF  JSR $CFF7
CF9A  B0 F6     BCS $CF92
CF9C  C9 24     CMP #$24    "$"
CF9E  D0 06     BNE $CFA6
CFA0  A9 FF     LDA #$FF
CFA2  85 07     STA STR-FLAG
CFA4  D0 10     BNE $CFB6
CFA6  C9 25     CMP #$25    "%"
CFA8  D0 13     BNE $CFBD
CFAA  A5 0A     LDA $0A
CFAC  D0 D0     BNE $CF7E
CFAE  A9 80     LDA #$80
CFB0  85 08     STA INT-FLAG
CFB2  05 42     ORA V-NAME
CFB4  85 42     STA V-NAME
CFB6  8A        TXA
CFB7  09 80     ORA #$80
CFB9  AA        TAX
CFBA  20 70 00  JSR $0070
CFBD  86 43     STX V-NAME+1
CFBF  38        SEC
CFC0  05 0A     ORA $0A
CFC2  E9 28     SBC #$28    "("
CFC4  D0 03     BNE $CFC9
CFC6  4C AC D0  JMP $D0AC   ARRAY
-------------------------------------------
CFC9  A9 00     LDA #$00
CFCB  85 0A     STA $0A
CFCD  A5 2A     LDA END-BASIC
CFCF  A6 2B     LDX END-BASIC+1
```

```
CFD3  86 5D     STX WK-POINTR+1
CFD5  85 5C     STA WK-POINTR
CFD7  E4 2D     CPX END-VARIBLES+1
CFD9  D0 04     BNE $CFDF
CFDB  C5 2C     CMP END-VARIBLES
CFDD  F0 22     BEQ $D001
CFDF  A5 42     LDA V-NAME
CFE1  D1 5C     CMP (WK-POINTR),Y
CFE3  D0 08     BNE $CFED
CFE5  A5 43     LDA V-NAME+1
CFE7  C8        INY
CFE8  D1 5C     CMP (WK-POINTR),Y
CFEA  F0 7D     BEQ $D069    FOUND!
CFEC  88        DEY
CFED  18        CLC
CFEE  A5 5C     LDA WK-POINTR
CFF0  69 07     ADC #$07
CFF2  90 E1     BCC $CFD5
CFF4  E8        INX
CFF5  D0 DC     BNE $CFD3
-------------------------------------------
CFF7  C9 41     CMP #$41        CHECK IF
CFF9  90 05     BCC $D000       ALPHABETIC
CFFB  E9 5B     SBC #$5B
CFFD  38        SEC
CFFE  E9 A5     SBC #$A5
D000  60        RTS
-------------------------------------------
D001  68        PLA             CREATE
D002  48        PHA               NEW
D003  C9 11     CMP #$11        VARIABLE
D005  D0 05     BNE $D00C
D007  A9 1F     LDA #$1F
D009  A0 DE     LDY #$DE
D00B  60        RTS
              -------------------
D00C  A5 42     LDA V-NAME
D00E  A4 43     LDY V-NAME+1
D010  C9 54     CMP #$54
D012  D0 0B     BNE $D01F
D014  C0 C9     CPY #$C9
D016  F0 EF     BEQ $D007
D018  C0 49     CPY #$49
D01A  D0 03     BNE $D01F
D01C  4C 03 CE  JMP $CE03 "SYNTAX ERR"
              -------------------
D01F  C9 53     CMP #$53
D021  D0 04     BNE $D027
D023  C0 54     CPY #$54
D025  F0 F5     BEQ $D01C
D027  A5 2C     LDA END-VARIBLES
D029  A4 2D     LDY END-VARIBLES+1
D02B  85 5C     STA WK-POINTR
D02D  84 5D     STY WK-POINTR+1
D02F  A5 2E     LDA END-ARRAYS
D031  A4 2F     LDY END-ARRAYS+1
D033  85 57     STA $57
D035  84 58     STY $58
D037  18        CLC
D038  69 07     ADC #$07
D03A  90 01     BCC $D03D
D03C  C8        INY
D03D  85 55     STA $55
```

```
D041  20 D8 C2    JSR $C2D8  OPEN UP SPACE
D044  A5 55       LDA $55
D046  A4 56       LDY $56
D048  C8          INY
D049  85 2C       STA END-VARIBLES
D04B  84 2D       STY END-VARIBLES+1
D04D  A0 00       LDY #$00
D04F  A5 42       LDA V-NAME
D051  91 5C       STA (WK-POINTR),Y
D053  C8          INY
D054  A5 43       LDA V-NAME+1
D056  91 5C       STA (WK-POINTR),Y
D058  A9 00       LDA #$00
D05A  C8          INY
D05B  91 5C       STA (WK-POINTR),Y
D05D  C8          INY
D05E  91 5C       STA (WK-POINTR),Y
D060  C8          INY
D061  91 5C       STA (WK-POINTR),Y
D063  C8          INY
D064  91 5C       STA (WK-POINTR),Y
D066  C8          INY
D067  91 5C       STA (WK-POINTR),Y
D069  A5 5C       LDA WK-POINTR
D06B  18          CLC
D06C  69 02       ADC #$02
D06E  A4 5D       LDY WK-POINTR+1
D070  90 01       BCC $D073
D072  C8          INY
D073  85 44       STA V-ADDS
D075  84 45       STY V-ADDS+1
D077  60          RTS
```

```
D078  A5 05       LDA N-SUBSCR        ARRAY
D07A  0A          ASL A               POINTER
D07B  69 05       ADC #$05            SUBRTN
D07D  65 5C       ADC WK-POINTR
D07F  A4 5D       LDY WK-POINTR+1
D081  90 01       BCC $D084
D083  C8          INY
D084  85 55       STA $55
D086  84 56       STY $56
D088  60          RTS
```

```
D089  90 80 00 00 20 70 00 20   =32768
```

```
D08D  20 70 00    JSR $0070           FLOAT
D090  20 9F CC    JSR $CC9F             →
D093  20 8E CC    JSR $CC8E           FIXED
D096  A5 63       LDA ACC#1/S
D098  30 0D       BMI $D0A7
D09A  A5 5E       LDA ACC#1/E         POINT TO INTEGER
D09C  C9 90       CMP #$90
D09E  90 09       BCC $D0A9
D0A0  A9 89       LDA #$89
D0A2  A0 D0       LDY #$D0
D0A4  20 67 DB    JSR $DB67
D0A7  D0 7A       BNE $D123
D0A9  4C A7 DB    JMP $DBA7
```

```
D0AC  A5 06       LDA DIM-FL          FIND ARRAY
```

```
D0B0  48           PHA
D0B1  A5 07        LDA STR-FLAG
D0B3  48           PHA
D0B4  A0 00        LDY #$00
D0B6  98           TYA
D0B7  48           PHA
D0B8  A5 43        LDA V-NAME+1
D0BA  48           PHA
D0BB  A5 42        LDA V-NAME
D0BD  48           PHA
D0BE  20 8D D0     JSR $D08D    GET SUBSCRIPT(S)
D0C1  68           PLA
D0C2  85 42        STA V-NAME
D0C4  68           PLA
D0C5  85 43        STA V-NAME+1
D0C7  68           PLA
D0C8  A8           TAY
D0C9  BA           TSX
D0CA  BD 02 01     LDA $0102,X
D0CD  48           PHA
D0CE  BD 01 01     LDA $0101,X
D0D1  48           PHA
D0D2  A5 61        LDA ACC#1/M3
D0D4  9D 02 01     STA $0102,X
D0D7  A5 62        LDA ACC#1/M4
D0D9  9D 01 01     STA $0101,X
D0DC  C8           INY
D0DD  20 76 00     JSR $0076
D0E0  C9 2C        CMP #$2C   ","
D0E2  F0 D2        BEQ $D0B6
D0E4  84 05        STY N-SUBSCR
D0E6  20 F2 CD     JSR $CDF2
D0E9  68           PLA
D0EA  85 07        STA STR-FLAG
D0EC  68           PLA
D0ED  85 08        STA INT-FLAG
D0EF  29 7F        AND #$7F
D0F1  85 06        STA DIM-FL
D0F3  A6 2C        LDX END-VARIBLES
D0F5  A5 2D        LDA END-VARIBLES+1
D0F7  86 5C        STX WK-POINTR
D0F9  85 5D        STA WK-POINTR+1
D0FB  C5 2F        CMP END-ARRAYS+1
D0FD  D0 04        BNE $D103
D0FF  E4 2E        CPX END-ARRAYS
D101  F0 39        BEQ $D13C
D103  A0 00        LDY #$00
D105  B1 5C        LDA (WK-POINTR),Y
D107  C8           INY
D108  C5 42        CMP V-NAME
D10A  D0 06        BNE $D112
D10C  A5 43        LDA V-NAME+1
D10E  D1 5C        CMP (WK-POINTR),Y
D110  F0 16        BEQ $D128
D112  C8           INY
D113  B1 5C        LDA (WK-POINTR),Y   GOTO
D115  18           CLC
D116  65 5C        ADC WK-POINTR       NEXT ARRAY
```

STACK EACH SUBSCRIPT BEHIND FLAGS

```
D11A  B1 5C      LDA (WK-POINTR),Y
D11C  65 5D      ADC WK-POINTR+1
D11E  90 D7      BCC $D0F7
D120  A2 6B      LDX #$6B    "BAD SUBSCRIPT"
D122  2C A2 35   BIT $35A2
D123  A2 35      LDX #$35    "ILLEGAL QTY"
D125  4C 57 C3   JMP $C357
D128  A2 78      LDX #$78
D12A  A5 06      LDA DIM-FL
D12C  D0 F7      BNE $D125
D12E  20 78 D0   JSR $D078
D131  A5 05      LDA N-SUBSCR
D133  A0 04      LDY #$04
D135  D1 5C      CMP (WK-POINTR),Y
D137  D0 E7      BNE $D120
D139  4C C6 D1   JMP $D1C6
D13C  20 78 D0   JSR $D078   ARRAY NOT
D13F  20 28 C3   JSR $C328     FOUND
D142  A9 00      LDA #$00
D144  A8         TAY
D145  85 6F      STA $6F
D147  A2 05      LDX #$05
D149  A5 42      LDA V-NAME
D14B  91 5C      STA (WK-POINTR),Y
D14D  10 01      BPL $D150
D14F  CA         DEX
D150  C8         INY
D151  A5 43      LDA V-NAME+1
D153  91 5C      STA (WK-POINTR),Y
D155  10 02      BPL $D159
D157  CA         DEX
D158  CA         DEX
D159  86 6E      STX $6E
D15B  A5 05      LDA N-SUBSCR
D15D  C8         INY
D15E  C8         INY
D15F  C8         INY
D160  91 5C      STA (WK-POINTR),Y
D162  A2 0B      LDX #$0B    (DEFAULT
D164  A9 00      LDA #$00      ARRAY DIM)
D166  24 06      BIT DIM-FL
D168  50 08      BVC $D172
D16A  68         PLA
D16B  18         CLC
D16C  69 01      ADC #$01
D16E  AA         TAX
D16F  68         PLA
D170  69 00      ADC #$00
D172  C8         INY
D173  91 5C      STA (WK-POINTR),Y
D175  C8         INY
D176  8A         TXA
D177  91 5C      STA (WK-POINTR),Y
D179  20 28 D2   JSR $D228
D17C  86 6E      STX $6E
D17E  85 6F      STA $6F
D180  A4 1F      LDY POINTER
D182  C6 05      DEC N-SUBSCR
```

WRITE NEW ARRAY DIMENSIONS

```
D186  65 56       ADC $56
D188  B0 5D       BCS $D1E7
D18A  85 56       STA $56
D18C  A8          TAY
D18D  8A          TXA
D18E  65 55       ADC $55
D190  90 03       BCC $D195
D192  C8          INY
D193  F0 52       BEQ $D1E7
D195  20 28 C3    JSR $C328
D198  85 2E       STA END-ARRAYS
D19A  84 2F       STY END-ARRAYS+1
D19C  A9 00       LDA #$00
D19E  E6 6F       INC $6F
D1A0  A4 6E       LDY $6E
D1A2  F0 05       BEQ $D1A9
D1A4  88          DEY
D1A5  91 55       STA ($55),Y
D1A7  D0 FB       BNE $D1A4
D1A9  C6 56       DEC $56
D1AB  C6 6F       DEC $6F
D1AD  D0 F5       BNE $D1A4
D1AF  E6 56       INC $56
D1B1  38          SEC
D1B2  A5 2E       LDA END-ARRAYS
D1B4  E5 5C       SBC WK-POINTR
D1B6  A0 02       LDY #$02
D1B8  91 5C       STA (WK-POINTR),Y
D1BA  A5 2F       LDA END-ARRAYS+1
D1BC  C8          INY
D1BD  E5 5D       SBC WK-POINTR+1
D1BF  91 5C       STA (WK-POINTR),Y
D1C1  A5 06       LDA DIM-FL
D1C3  D0 62       BNE $D227
D1C5  C8          INY
D1C6  B1 5C       LDA (WK-POINTR),Y   CALCULATE
D1C8  85 05       STA N-SUBSCR        ARRAY
D1CA  A9 00       LDA #$00            ELEMENT
D1CC  85 6E       STA $6E              ADDRESS
D1CE  85 6F       STA $6F
D1D0  C8          INY
D1D1  68          PLA
D1D2  AA          TAX
D1D3  85 61       STA ACC#1/M3
D1D5  68          PLA
D1D6  85 62       STA ACC#1/M4
D1D8  D1 5C       CMP (WK-POINTR),Y
D1DA  90 0E       BCC $D1EA
D1DC  D0 06       BNE $D1E4
D1DE  C8          INY
D1DF  8A          TXA
D1E0  D1 5C       CMP (WK-POINTR),Y
D1E2  90 07       BCC $D1EB
D1E4  4C 20 D1    JMP $D120     "BAD SUBSCRIPT".
D1E7  4C 55 C3    JMP $C355     "OUT OF MEMORY"
D1EA  C8          INY
D1EB  A5 6F       LDA $6F
D1ED  05 6E       ORA $6E
D1EF  18          CLC
D1F0  F0 0A       BEQ $D1FC
```

```
D1F2  20 28 D2    JSR $D228
D1F5  8A          TXA
D1F6  65 61       ADC ACC#1/M3
D1F8  AA          TAX
D1F9  98          TYA
D1FA  A4 1F       LDY POINTER
D1FC  65 62       ADC ACC#1/M4
D1FE  86 6E       STX $6E
D200  C6 05       DEC N-SUBSCR
D202  D0 CA       BNE $D1CE
D204  85 6F       STA $6F
D206  A2 05       LDX #$05
D208  A5 42       LDA V-NAME
D20A  10 01       BPL $D20D
D20C  CA          DEX
D20D  A5 43       LDA V-NAME+1
D20F  10 02       BPL $D213
D211  CA          DEX
D212  CA          DEX
D213  86 25       STX $25
D215  A9 00       LDA #$00
D217  20 31 D2    JSR $D231
D21A  8A          TXA
D21B  65 55       ADC $55
D21D  85 44       STA V-ADDS
D21F  98          TYA
D220  65 56       ADC $56
D222  85 45       STA V-ADDS+1
D224  A8          TAY
D225  A5 44       LDA V-ADDS
D227  60          RTS
```

```
D228  84 1F       STY POINTER
D22A  B1 5C       LDA (WK-POINTR),Y
D22C  85 25       STA $25
D22E  88          DEY
D22F  B1 5C       LDA (WK-POINTR),Y
D231  85 26       STA $26
D233  A9 10       LDA #$10
D235  85 5A       STA $5A
D237  A2 00       LDX #$00
D239  A0 00       LDY #$00
D23B  8A          TXA
D23C  0A          ASL A
D23D  AA          TAX
D23E  98          TYA
D23F  2A          ROL A
D240  A8          TAY
D241  B0 A4       BCS $D1E7
D243  06 6E       ASL $6E
D245  26 6F       ROL $6F
D247  90 0B       BCC $D254
D249  18          CLC
D24A  8A          TXA
D24B  65 25       ADC $25
D24D  AA          TAX
D24E  98          TYA
D24F  65 26       ADC $26
D251  A8          TAY
D252  B0 93       BCS $D1E7
```

COMPUTE ARRAY SUBSCRIPT SIZE

↖ MULTIPLY ↓

```
D256  D0 E3        BNE $D23B
D258  60           RTS
-------------------------------------------------
D259  A5 07        LDA STR-FLAG      'FRE'
D25B  F0 03        BEQ $D260
D25D  20 80 D5     JSR $D580
D260  20 00 D4     JSR $D400
D263  38           SEC
D264  A5 30        LDA STRING-LO
D266  E5 2E        SBC END-ARRAYS
D268  A8           TAY
D269  A5 31        LDA STRING-LO+1
D26B  E5 2F        SBC END-ARRAYS+1
D26D  A2 00        LDX #$00          FIXED (INTEGER)
D26F  86 07        STX STR-FLAG        →
D271  85 5F        STA ACC#1/M1      FLOAT
D273  84 60        STY ACC#1/M2
D275  A2 90        LDX #$90
D277  4C 50 DB     JMP $DB50
-------------------------------------------------
D27A  A4 C6        LDY CURSOR-COL    'POS'
D27C  A9 00        LDA #$00
D27E  F0 ED        BEQ $D26D
-------------------------------------------------
D280  A6 37        LDX BASIC-LINE#+1
D282  E8           INX               CHECK DIRECT
D283  D0 A2        BNE $D227
D285  A2 95        LDX #$95    "ILLEGAL DIRECT"
D287  2C A2 E9     BIT $E9A2
                   /  /  /
                                 "UNDEF'D FUNCTION"
D288  A2 E9        LDX #$E9
D28A  4C 57 C3     JMP $C357
-------------------------------------------------
D28D  20 8B D2     JSR $D28B         'DEF'
D290  20 80 D2     JSR $D280
D293  20 F5 CD     JSR $CDF5
D296  A9 80        LDA #$80
D298  85 0A        STA $0A
D29A  20 6D CF     JSR $CF6D
D29D  20 8E CC     JSR $CC8E
D2A0  20 F2 CD     JSR $CDF2
D2A3  A9 B2        LDA #$B2
D2A5  20 FA CD     JSR $CDFA
D2A8  48           PHA
D2A9  A5 45        LDA V-ADDS+1
D2AB  48           PHA
D2AC  A5 44        LDA V-ADDS
D2AE  48           PHA
D2AF  A5 78        LDA BASIC-ADDS/HI
D2B1  48           PHA
D2B2  A5 77        LDA BASIC-ADDS
D2B4  48           PHA
D2B5  20 00 C8     JSR $C800
D2B8  4C 29 D3     JMP $D329
-------------------------------------------------
D2BB  A9 A5        LDA #$A5     "FN" CHECK
D2BD  20 FA CD     JSR $CDFA
D2C0  09 80        ORA #$80       FNx
D2C2  85 0A        STA $0A        SYNTAX
D2C4  20 74 CF     JSR $CF74
D2C7  85 4B        STA $4B
D2C9  84 4C        STY $4C
D2CB  4C 8E CC     JMP $CC8E
-------------------------------------------------
                                  'FN'
```

```
D2D3  48          PHA
D2D4  A5 4B       LDA $4B
D2D6  48          PHA
D2D7  20 EC CD    JSR $CDEC
D2DA  20 8E CC    JSR $CC8E
D2DD  68          PLA
D2DE  85 4B       STA $4B
D2E0  68          PLA
D2E1  85 4C       STA $4C
D2E3  A0 02       LDY #$02
D2E5  B1 4B       LDA ($4B),Y
D2E7  85 44       STA V-ADDS
D2E9  AA          TAX
D2EA  C8          INY
D2EB  B1 4B       LDA ($4B),Y
D2ED  F0 99       BEQ $D288
D2EF  85 45       STA V-ADDS+1
D2F1  C8          INY
D2F2  B1 44       LDA (V-ADDS),Y
D2F4  48          PHA
D2F5  88          DEY
D2F6  10 FA       BPL $D2F2
D2F8  A4 45       LDY V-ADDS+1
D2FA  20 E0 DA    JSR $DAE0
D2FD  A5 78       LDA BASIC-ADDS/HI
D2FF  48          PHA
D300  A5 77       LDA BASIC-ADDS
D302  48          PHA
D303  B1 4B       LDA ($4B),Y
D305  85 77       STA BASIC-ADDS
D307  C8          INY
D308  B1 4B       LDA ($4B),Y
D30A  85 78       STA BASIC-ADDS/HI
D30C  A5 45       LDA V-ADDS+1
D30E  48          PHA
D30F  A5 44       LDA V-ADDS
D311  48          PHA
D312  20 8B CC    JSR $CC8B
D315  68          PLA
D316  85 4B       STA $4B
D318  68          PLA
D319  85 4C       STA $4C
D31B  20 76 00    JSR $0076
D31E  F0 03       BEQ $D323
D320  4C 03 CE    JMP $CE03 "SYNTAX ERROR"
D323  68          PLA
D324  85 77       STA BASIC-ADDS
D326  68          PLA
D327  85 78       STA BASIC-ADDS/HI
D329  A0 00       LDY #$00
D32B  68          PLA
D32C  91 4B       STA ($4B),Y
D32E  68          PLA
D32F  C8          INY
D330  91 4B       STA ($4B),Y
D332  68          PLA
D333  C8          INY
D334  91 4B       STA ($4B),Y
D336  68          PLA
```

```
D338  91 4B       STA (*4B),Y
D33A  68          PLA
D33B  C8          INY
D33C  91 4B       STA (*4B),Y
D33E  60          RTS
-------------------------------------------
D33F  20 8E CC    JSR *CC8E        STR$
D342  A0 00       LDY #*00
D344  20 EB DC    JSR *DCEB
D347  68          PLA
D348  68          PLA
D349  A9 FF       LDA #*FF
D34B  A0 00       LDY #*00
D34D  F0 12       BEQ *D361
-------------------------------------------
D34F  A6 61       LDX ACC#1/M3     CALCULATE
D351  A4 62       LDY ACC#1/M4       STRING
D353  86 4D       STX *4D            VECTOR
D355  84 4E       STY *4E
D357  20 CE D3    JSR *D3CE
D35A  86 5F       STX ACC#1/M1
D35C  84 60       STY ACC#1/M2
D35E  85 5E       STA ACC#1/E
D360  60          RTS
-------------------------------------------
D361  A2 22       LDX #*22         SCAN +
D363  86 03       STX *03            SET UP
D365  86 04       STX *04              STRING
D367  85 6C       STA SGN-COMPR
D369  84 6D       STY ROUND
D36B  85 5F       STA ACC#1/M1
D36D  84 60       STY ACC#1/M2
D36F  A0 FF       LDY #*FF
D371  C8          INY
D372  B1 6C       LDA (SGN-COMPR),Y
D374  F0 0C       BEQ *D382
D376  C5 03       CMP *03
D378  F0 04       BEQ *D37E
D37A  C5 04       CMP *04
D37C  D0 F3       BNE *D371
D37E  C9 22       CMP #*22
D380  F0 01       BEQ *D383
D382  18          CLC
D383  84 5E       STY ACC#1/E
D385  98          TYA
D386  65 6C       ADC SGN-COMPR
D388  85 6E       STA *6E
D38A  A6 6D       LDX ROUND
D38C  90 01       BCC *D38F
D38E  E8          INX
D38F  86 6F       STX *6F
D391  A5 6D       LDA ROUND
D393  F0 04       BEQ *D399
D395  C9 02       CMP #*02
D397  D0 0B       BNE *D3A4
D399  98          TYA
D39A  20 4F D3    JSR *D34F
D39D  A6 6C       LDX SGN-COMPR
D39F  A4 6D       LDY ROUND
D3A1  20 62 D5    JSR *D562
D3A4  A6 13       LDX *13
```

```
D3AA  A2 C8        LDX #$C8  "FORMULA TOO COMPLEX"
D3AC  4C 57 C3     JMP $C357
-------------------------------------------------
D3AF  A5 5E        LDA ACC#1/E
D3B1  95 00        STA $00,X
D3B3  A5 5F        LDA ACC#1/M1
D3B5  95 01        STA $01,X
D3B7  A5 60        LDA ACC#1/M2
D3B9  95 02        STA $02,X
D3BB  A0 00        LDY #$00
D3BD  86 61        STX ACC#1/M3
D3BF  84 62        STY ACC#1/M4
D3C1  84 6D        STY ROUND
D3C3  88           DEY
D3C4  84 07        STY STR-FLAG
D3C6  86 14        STX $14
D3C8  E8           INX
D3C9  E8           INX
D3CA  E8           INX
D3CB  86 13        STX $13
D3CD  60           RTS
-------------------------------------------------
D3CE  46 09        LSR $09          BUILD
D3D0  48           PHA                STRING
D3D1  49 FF        EOR #$FF             VECTOR
D3D3  38           SEC
D3D4  65 30        ADC STRING-LO
D3D6  A4 31        LDY STRING-LO+1
D3D8  B0 01        BCS $D3DB
D3DA  88           DEY
D3DB  C4 2F        CPY END-ARRAYS+1
D3DD  90 11        BCC $D3F0
D3DF  D0 04        BNE $D3E5
D3E1  C5 2E        CMP END-ARRAYS
D3E3  90 0B        BCC $D3F0
D3E5  85 30        STA STRING-LO
D3E7  84 31        STY STRING-LO+1
D3E9  85 32        STA STRING-HI
D3EB  84 33        STY STRING-HI+1
D3ED  AA           TAX
D3EE  68           PLA
D3EF  60           RTS
-------------------------------------------------
D3F0  A2 4D        LDX #$4D
D3F2  A5 09        LDA $09
D3F4  30 B6        BMI $D3AC
D3F6  20 00 D4     JSR $D400
D3F9  A9 80        LDA #$80
D3FB  85 09        STA $09
D3FD  68           PLA
D3FE  D0 D0        BNE $D3D0
-------------------------------------------------
D400  A6 34        LDX MEM-LIMIT    GARBAGE
D402  A5 35        LDA MEM-LIMIT+1    COLLECTION
D404  86 30        STX STRING-LO
D406  85 31        STA STRING-LO+1
D408  A0 00        LDY #$00
D40A  84 4C        STY $4C
D40C  84 4B        STY $4B
D40E  A5 2E        LDA END-ARRAYS
D410  A6 2F        LDX END-ARRAYS+1
D412  85 5C        STA WK-POINTR
D414  86 5D        STX WK-POINTR+1
D416  A9 15        LDA #$15
```

```
D418  A2 00       LDX #$00
D41A  85 1F       STA POINTER
D41C  86 20       STX POINTER-HI
D41E  C5 13       CMP $13
D420  F0 05       BEQ $D427
D422  20 A1 D4    JSR $D4A1
D425  F0 F7       BEQ $D41E
D427  A9 07       LDA #$07
D429  85 50       STA $50
D42B  A5 2A       LDA END-BASIC
D42D  A6 2B       LDX END-BASIC+1
D42F  85 1F       STA POINTER
D431  86 20       STX POINTER-HI
D433  E4 2D       CPX END-VARIBLES+1
D435  D0 04       BNE $D43B
D437  C5 2C       CMP END-VARIBLES
D439  F0 05       BEQ $D440
D43B  20 97 D4    JSR $D497
D43E  F0 F3       BEQ $D433
D440  85 55       STA $55
D442  86 56       STX $56
D444  A9 03       LDA #$03
D446  85 50       STA $50
D448  A5 55       LDA $55
D44A  A6 56       LDX $56
D44C  E4 2F       CPX END-ARRAYS+1
D44E  D0 07       BNE $D457
D450  C5 2E       CMP END-ARRAYS
D452  D0 03       BNE $D457
D454  4C E0 D4    JMP $D4E0
D457  85 1F       STA POINTER
D459  86 20       STX POINTER-HI
D45B  A0 00       LDY #$00
D45D  B1 1F       LDA (POINTER),Y
D45F  AA          TAX
D460  C8          INY
D461  B1 1F       LDA (POINTER),Y
D463  08          PHP
D464  C8          INY
D465  B1 1F       LDA (POINTER),Y
D467  65 55       ADC $55
D469  85 55       STA $55
D46B  C8          INY
D46C  B1 1F       LDA (POINTER),Y
D46E  65 56       ADC $56
D470  85 56       STA $56
D472  28          PLP
D473  10 D3       BPL $D448
D475  8A          TXA
D476  30 D0       BMI $D448
D478  C8          INY
D479  B1 1F       LDA (POINTER),Y
D47B  A0 00       LDY #$00
D47D  0A          ASL A
D47E  69 05       ADC #$05
D480  65 1F       ADC POINTER
D482  85 1F       STA POINTER
D484  90 02       BCC $D488
D486  E6 20       INC POINTER-HI
D488  A6 20       LDX POINTER-HI
```

```
D48A  E4 56        CPX $56
D48C  D0 04        BNE $D492
D48E  C5 55        CMP $55
D490  F0 BA        BEQ $D44C
D492  20 A1 D4     JSR $D4A1
D495  F0 F3        BEQ $D48A
-------------------------------------------------
D497  B1 1F        LDA (POINTER),Y      CHECK
D499  30 35        BMI $D4D0            STRING
D49B  C8           INY       NAME='$'   FOR
D49C  B1 1F        LDA (POINTER),Y      COLLECTION
D49E  10 30        BPL $D4D0
D4A0  C8           INY
D4A1  B1 1F        LDA (POINTER),Y
D4A3  F0 2B        BEQ $D4D0
D4A5  C8           INY
D4A6  B1 1F        LDA (POINTER),Y
D4A8  AA           TAX
D4A9  C8           INY
D4AA  B1 1F        LDA (POINTER),Y      }
D4AC  C5 31        CMP STRING-LO+1      }  ALREADY
D4AE  90 06        BCC $D4B6            }  COLLECTED?
D4B0  D0 1E        BNE $D4D0            }
D4B2  E4 30        CPX STRING-LO        }
D4B4  B0 1A        BCS $D4D0            }
D4B6  C5 5D        CMP WK-POINTR+1      }
D4B8  90 16        BCC $D4D0            }  HIGHEST
D4BA  D0 04        BNE $D4C0            }  SO FAR?
D4BC  E4 5C        CPX WK-POINTR        }
D4BE  90 10        BCC $D4D0            }
D4C0  86 5C        STX WK-POINTR        }
D4C2  85 5D        STA WK-POINTR+1      }
D4C4  A5 1F        LDA POINTER          }  LOG
D4C6  A6 20        LDX POINTER-HI       }  STRING
D4C8  85 4B        STA $4B              }  FOR NEXT
D4CA  86 4C        STX $4C              }  COLLECTION
D4CC  A5 50        LDA $50              }
D4CE  85 52        STA $52              }
D4D0  A5 50        LDA $50              PROCEED
D4D2  18           CLC                  TO NEXT
D4D3  65 1F        ADC POINTER          VARIABLE
D4D5  85 1F        STA POINTER
D4D7  90 02        BCC $D4DB
D4D9  E6 20        INC POINTER-HI
D4DB  A6 20        LDX POINTER-HI
D4DD  A0 00        LDY #$00
D4DF  60           RTS
-------------------------------------------------
D4E0  A5 4C        LDA $4C              COLLECT
D4E2  05 4B        ORA $4B              STRING
D4E4  F0 F5        BEQ $D4DB
D4E6  A5 52        LDA $52
D4E8  29 04        AND #$04
D4EA  4A           LSR A
D4EB  A8           TAY
D4EC  85 52        STA $52
D4EE  B1 4B        LDA ($4B),Y
D4F0  65 5C        ADC WK-POINTR
D4F2  85 57        STA $57
D4F4  A5 5D        LDA WK-POINTR+1
D4F6  69 00        ADC #$00
```

```
D4FA  A5 30      LDA STRING-LO
D4FC  A6 31      LDX STRING-LO+1
D4FE  85 55      STA $55
D500  86 56      STX $56
D502  20 DF C2   JSR $C2DF  OPEN UP SPACE (CLOSE UP)
D505  A4 52      LDY $52
D507  C8         INY
D508  A5 55      LDA $55
D50A  91 4B      STA ($4B),Y
D50C  AA         TAX
D50D  E6 56      INC $56
D50F  A5 56      LDA $56
D511  C8         INY
D512  91 4B      STA ($4B),Y
D514  4C 04 D4   JMP $D404
```

CONCATENATE

```
D517  A5 62      LDA ACC#1/M4
D519  48         PHA
D51A  A5 61      LDA ACC#1/M3
D51C  48         PHA
D51D  20 84 CD   JSR $CD84
D520  20 90 CC   JSR $CC90
D523  68         PLA
D524  85 6C      STA SGN-COMPR
D526  68         PLA
D527  85 6D      STA ROUND
D529  A0 00      LDY #$00
D52B  B1 6C      LDA (SGN-COMPR),Y
D52D  18         CLC
D52E  71 61      ADC (ACC#1/M3),Y
D530  90 05      BCC $D537
D532  A2 B0      LDX #$B0   "STRING TOO LONG"
D534  4C 57 C3   JMP $C357
D537  20 4F D3   JSR $D34F
D53A  20 54 D5   JSR $D554
D53D  A5 4D      LDA $4D
D53F  A4 4E      LDY $4E
D541  20 84 D5   JSR $D584
D544  20 66 D5   JSR $D566
D547  A5 6C      LDA SGN-COMPR
D549  A4 6D      LDY ROUND
D54B  20 84 D5   JSR $D584
D54E  20 A4 D3   JSR $D3A4
D551  4C B9 CC   JMP $CCB9
```

BUILD STRING INTO MEMORY

```
D554  A0 00      LDY #$00
D556  B1 6C      LDA (SGN-COMPR),Y
D558  48         PHA
D559  C8         INY
D55A  B1 6C      LDA (SGN-COMPR),Y
D55C  AA         TAX
D55D  C8         INY
D55E  B1 6C      LDA (SGN-COMPR),Y
D560  A8         TAY
D561  68         PLA
D562  86 1F      STX POINTER
D564  84 20      STY POINTER-HI
D566  A8         TAY
D567  F0 0A      BEQ $D573
D569  48         PHA
D56A  88         DEY
```

```
D56D  91 32     STA (STRING-HI),Y
D56F  98        TYA
D570  D0 F8     BNE $D56A
D572  68        PLA
D573  18        CLC
D574  65 32     ADC STRING-HI
D576  85 32     STA STRING-HI
D578  90 02     BCC $D57C
D57A  E6 33     INC STRING-HI+1
D57C  60        RTS
```

DISCARD UNWANTED STRING

```
D57D  20 90 CC  JSR $CC90
D580  A5 61     LDA ACC#1/M3
D582  A4 62     LDY ACC#1/M4
D584  85 1F     STA POINTER
D586  84 20     STY POINTER-HI
D588  20 B5 D5  JSR $D5B5
D58B  08        PHP
D58C  A0 00     LDY #$00
D58E  B1 1F     LDA (POINTER),Y
D590  48        PHA
D591  C8        INY
D592  B1 1F     LDA (POINTER),Y
D594  AA        TAX
D595  C8        INY
D596  B1 1F     LDA (POINTER),Y
D598  A8        TAY
D599  68        PLA
D59A  28        PLP
D59B  D0 13     BNE $D5B0
D59D  C4 31     CPY STRING-LO+1
D59F  D0 0F     BNE $D5B0
D5A1  E4 30     CPX STRING-LO
D5A3  D0 0B     BNE $D5B0
D5A5  48        PHA
D5A6  18        CLC
D5A7  65 30     ADC STRING-LO
D5A9  85 30     STA STRING-LO
D5AB  90 02     BCC $D5AF
D5AD  E6 31     INC STRING-LO+1
D5AF  68        PLA
D5B0  86 1F     STX POINTER
D5B2  84 20     STY POINTER-HI
D5B4  60        RTS
```

CLEAN DESCRIPTOR STACK

```
D5B5  C4 15     CPY $15
D5B7  D0 0C     BNE $D5C5
D5B9  C5 14     CMP $14
D5BB  D0 08     BNE $D5C5
D5BD  85 13     STA $13
D5BF  E9 03     SBC #$03
D5C1  85 14     STA $14
D5C3  A0 00     LDY #$00
D5C5  60        RTS
```

'CHR$'

```
D5C6  20 7B D6  JSR $D67B
D5C9  8A        TXA
D5CA  48        PHA
D5CB  A9 01     LDA #$01
D5CD  20 57 D3  JSR $D357
D5D0  68        PLA
D5D1  A0 00     LDY #$00
```

```
D5D5  68        PLA
D5D6  68        PLA
D5D7  4C A4 D3  JMP $D3A4
-------------------------------------------
D5DA  20 3B D6  JSR $D63B       'LEFT$'
D5DD  D1 4D     CMP ($4D),Y
D5DF  98        TYA
D5E0  90 04     BCC $D5E6
D5E2  B1 4D     LDA ($4D),Y
D5E4  AA        TAX
D5E5  98        TYA
D5E6  48        PHA
D5E7  8A        TXA
D5E8  48        PHA
D5E9  20 57 D3  JSR $D357
D5EC  A5 4D     LDA $4D
D5EE  A4 4E     LDY $4E
D5F0  20 84 D5  JSR $D584
D5F3  68        PLA
D5F4  A8        TAY
D5F5  68        PLA
D5F6  18        CLC
D5F7  65 1F     ADC POINTER
D5F9  85 1F     STA POINTER
D5FB  90 02     BCC $D5FF
D5FD  E6 20     INC POINTER-HI
D5FF  98        TYA
D600  20 66 D5  JSR $D566
D603  4C A4 D3  JMP $D3A4
-------------------------------------------
D606  20 3B D6  JSR $D63B       'RIGHT$'
D609  18        CLC
D60A  F1 4D     SBC ($4D),Y
D60C  49 FF     EOR #$FF
D60E  4C E0 D5  JMP $D5E0
-------------------------------------------
D611  A9 FF     LDA #$FF        'MID$'
D613  85 62     STA ACC#1/M4
D615  20 76 00  JSR $0076
D618  C9 29     CMP #$29
D61A  F0 06     BEQ $D622
D61C  20 F8 CD  JSR $CDF8
D61F  20 78 D6  JSR $D678
D622  20 3B D6  JSR $D63B
D625  F0 4B     BEQ $D672
D627  CA        DEX
D628  8A        TXA
D629  48        PHA
D62A  18        CLC
D62B  A2 00     LDX #$00
D62D  F1 4D     SBC ($4D),Y
D62F  B0 B6     BCS $D5E7
D631  49 FF     EOR #$FF
D633  C5 62     CMP ACC#1/M4
D635  90 B1     BCC $D5E8
D637  A5 62     LDA ACC#1/M4
D639  B0 AD     BCS $D5E8
-------------------------------------------
D63B  20 F2 CD  JSR $CDF2
D63E  68        PLA
D63F  A8        TAY
D640  68        PLA
D641  85 52     STA $52
D643  68        PLA
```

```
D644  68        PLA
D645  68        PLA
D646  AA        TAX
D647  68        PLA
D648  85 4D     STA $4D
D64A  68        PLA
D64B  85 4E     STA $4E
D64D  A5 52     LDA $52
D64F  48        PHA
D650  98        TYA
D651  48        PHA
D652  A0 00     LDY #$00
D654  8A        TXA
D655  60        RTS
-------------------------------------------
D656  20 5C D6  JSR $D65C       'LEN'
D659  4C 7C D2  JMP $D27C
-------------------------------------------
D65C  20 7D D5  JSR $D57D
D65F  A2 00     LDX #$00
D661  86 07     STX STR-FLAG
D663  A8        TAY
D664  60        RTS
-------------------------------------------
D665  20 5C D6  JSR $D65C       'ASC'
D668  F0 08     BEQ $D672
D66A  A0 00     LDY #$00
D66C  B1 1F     LDA (POINTER),Y
D66E  A8        TAY
D66F  4C 7C D2  JMP $D27C
-------------------------------------------
D672  4C 23 D1  JMP $D123  "ILLEGAL QTY"
-------------------------------------------
D675  20 70 00  JSR $0070
D678  20 8B CC  JSR $CC8B       INPUT
D67B  20 93 D0  JSR $D093         BYTE
D67E  A6 61     LDX ACC#1/M3    PARAMETER
D680  D0 F0     BNE $D672
D682  A6 62     LDX ACC#1/M4
D684  4C 76 00  JMP $0076
-------------------------------------------
D687  20 5C D6  JSR $D65C       'VAL'
D68A  D0 03     BNE $D68F
D68C  4C 03 D8  JMP $D803
D68F  A6 77     LDX BASIC-ADDS
D691  A4 78     LDY BASIC-ADDS/HI
D693  86 6E     STX $6E
D695  84 6F     STY $6F
D697  A6 1F     LDX POINTER
D699  86 77     STX BASIC-ADDS
D69B  18        CLC
D69C  65 1F     ADC POINTER
D69E  85 21     STA $21
D6A0  A6 20     LDX POINTER-HI
D6A2  86 78     STX BASIC-ADDS/HI
D6A4  90 01     BCC $D6A7
D6A6  E8        INX
D6A7  86 22     STX $22
D6A9  A0 00     LDY #$00
D6AB  B1 21     LDA ($21),Y
D6AD  48        PHA
D6AE  A9 00     LDA #$00
D6B0  91 21     STA ($21),Y
D6B2  20 76 00  JSR $0076
D6B5  20 FF DB  JSR $DBFF
```

```
D6B9  A0 00     LDY #$00
D6BB  91 21     STA (*21),Y
D6BD  A6 6E     LDX $6E
D6BF  A4 6F     LDY $6F
D6C1  86 77     STX BASIC-ADDS
D6C3  84 78     STY BASIC-ADDS/HI
D6C5  60        RTS
-------------------------------------------------
D6C6  20 8B CC  JSR $CC8B       GET PARAM'S
D6C9  20 D2 D6  JSR $D6D2       FOR POKE, WAIT
D6CC  20 F8 CD  JSR $CDF8
D6CF  4C 78 D6  JMP $D678
-------------------------------------------------
D6D2  A5 63     LDA ACC#1/S     CONVERT
D6D4  30 9C     BMI $D672  "ILLEGAL QTY"   TO
D6D6  A5 5E     LDA ACC#1/E     FIXED-PT
D6D8  C9 91     CMP #$91        INTEGER
D6DA  B0 96     BCS $D672  "ILLEGAL QTY"
D6DC  20 A7 DB  JSR $DBA7  →FIXED
D6DF  A5 61     LDA ACC#1/M3
D6E1  A4 62     LDY ACC#1/M4
D6E3  84 11     STY FIXED-LO
D6E5  85 12     STA FIXED-HI
D6E7  60        RTS
-------------------------------------------------
D6E8  A5 12     LDA FIXED-HI    'PEEK'
D6EA  48        PHA
D6EB  A5 11     LDA FIXED-LO
D6ED  48        PHA
D6EE  20 D2 D6  JSR $D6D2
D6F1  A0 00     LDY #$00
D6F3  EA        NOP
D6F4  EA        NOP
D6F5  EA        NOP
D6F6  EA        NOP
D6F7  EA        NOP
D6F8  EA        NOP
D6F9  EA        NOP
D6FA  EA        NOP
D6FB  B1 11     LDA (FIXED-LO),Y
D6FD  A8        TAY
D6FE  68        PLA
D6FF  85 11     STA FIXED-LO
D701  68        PLA
D702  85 12     STA FIXED-HI
D704  4C 7C D2  JMP $D27C
-------------------------------------------------
D707  20 C6 D6  JSR $D6C6       'POKE'
D70A  8A        TXA
D70B  A0 00     LDY #$00
D70D  91 11     STA (FIXED-LO),Y
D70F  60        RTS
-------------------------------------------------
D710  20 C6 D6  JSR $D6C6       'WAIT'
D713  86 46     STX V-PNTR
D715  A2 00     LDX #$00
D717  20 76 00  JSR $0076
D71A  F0 29     BEQ $D745
D71C  20 CC D6  JSR $D6CC
D71F  86 47     STX V-PNTR+1
D721  A0 00     LDY #$00
D723  B1 11     LDA (FIXED-LO),Y
D725  45 47     EOR V-PNTR+1
D727  25 46     AND V-PNTR
D729  F0 F9     BEQ $D724
```

```
D72B  60        RTS
D72C  A9 1D     LDA #$1D
D72E  A0 DE     LDY #$DE
D730  4C 73 D7  JMP $D773
D733  20 98 D9  JSR $D998
D736  A5 63     LDA ACC#1/S
D738  49 FF     EOR #$FF
D73A  85 63     STA ACC#1/S
D73C  45 6B     EOR ACC#2/S
D73E  85 6C     STA SGN-COMPR
D740  A5 5E     LDA ACC#1/E
D742  4C 76 D7  JMP $D776
D745  A5 11     LDA FIXED-LO
D747  C9 66     CMP #$66
D749  D0 D4     BNE $D71F
D74B  A5 12     LDA FIXED-HI
D74D  E9 19     SBC #$19
D74F  D0 CE     BNE $D71F
D751  85 11     STA FIXED-LO
D753  A8        TAY
D754  A9 80     LDA #$80
D756  85 12     STA FIXED-HI
D758  A2 0A     LDX #$0A
D75A  BD 81 E0  LDA $E081,X
D75D  29 3F     AND #$3F
D75F  91 11     STA (FIXED-LO),Y
D761  C8        INY
D762  D0 02     BNE $D766
D764  E6 12     INC FIXED-HI
D766  CA        DEX
D767  D0 F1     BNE $D75A
D769  C6 46     DEC V-PNTR
D76B  D0 EB     BNE $D758
D76D  60        RTS
D76E  20 A5 D8  JSR $D8A5
D771  90 3C     BCC $D7AF
D773  20 98 D9  JSR $D998
D776  D0 03     BNE $D77B
D778  4C 08 DB  JMP $DB08
D77B  A6 6D     LDX ROUND
D77D  86 53     STX $53
D77F  A2 66     LDX #$66
D781  A5 66     LDA ACC#2/E
D783  A8        TAY
D784  F0 A5     BEQ $D72B
D786  38        SEC
D787  E5 5E     SBC ACC#1/E
D789  F0 24     BEQ $D7AF
D78B  90 12     BCC $D79F
D78D  84 5E     STY ACC#1/E
D78F  A4 6B     LDY ACC#2/S
D791  84 63     STY ACC#1/S
D793  49 FF     EOR #$FF
D795  69 00     ADC #$00
D797  A0 00     LDY #$00
D799  84 53     STY $53
D79B  A2 5E     LDX #$5E
D79D  D0 04     BNE $D7A3
D79F  A0 00     LDY #$00
```

'-' FLP − FLP.

TEST PARAMETER1 = "6502"

PRINT "MICROSOFT!"

'+' ADD'S 2 FLP. NUMBERS

```
D7A3  C9 F9        CMP #$F9
D7A5  30 C7        BMI $D76E
D7A7  A8           TAY
D7A8  A5 6D        LDA ROUND
D7AA  56 01        LSR $01,X
D7AC  20 BC D8     JSR $D8BC
D7AF  24 6C        BIT SGN-COMPR
D7B1  10 57        BPL $D80A
D7B3  A0 5E        LDY #$5E
D7B5  E0 66        CPX #$66
D7B7  F0 02        BEQ $D7BB
D7B9  A0 66        LDY #$66
D7BB  38           SEC
D7BC  49 FF        EOR #$FF
D7BE  65 53        ADC $53
D7C0  85 6D        STA ROUND
D7C2  B9 04 00     LDA $0004,Y
D7C5  F5 04        SBC $04,X
D7C7  85 62        STA ACC#1/M4
D7C9  B9 03 00     LDA $0003,Y
D7CC  F5 03        SBC $03,X
D7CE  85 61        STA ACC#1/M3
D7D0  B9 02 00     LDA $0002,Y
D7D3  F5 02        SBC $02,X
D7D5  85 60        STA ACC#1/M2
D7D7  B9 01 00     LDA $0001,Y
D7DA  F5 01        SBC $01,X
D7DC  85 5F        STA ACC#1/M1
D7DE  B0 03        BCS $D7E3
D7E0  20 53 D8     JSR $D853
D7E3  A0 00        LDY #$00
D7E5  98           TYA
D7E6  18           CLC
D7E7  A6 5F        LDX ACC#1/M1
D7E9  D0 4A        BNE $D835
D7EB  A6 60        LDX ACC#1/M2
D7ED  86 5F        STX ACC#1/M1
D7EF  A6 61        LDX ACC#1/M3
D7F1  86 60        STX ACC#1/M2
D7F3  A6 62        LDX ACC#1/M4
D7F5  86 61        STX ACC#1/M3
D7F7  A6 6D        LDX ROUND
D7F9  86 62        STX ACC#1/M4
D7FB  84 6D        STY ROUND
D7FD  69 08        ADC #$08
D7FF  C9 20        CMP #$20
D801  D0 E4        BNE $D7E7
D803  A9 00        LDA #$00
D805  85 5E        STA ACC#1/E
D807  85 63        STA ACC#1/S
D809  60           RTS
D80A  65 53        ADC $53
D80C  85 6D        STA ROUND
D80E  A5 62        LDA ACC#1/M4
D810  65 6A        ADC ACC#2/M4
D812  85 62        STA ACC#1/M4
D814  A5 61        LDA ACC#1/M3
D816  65 69        ADC ACC#2/M3
D818  85 61        STA ACC#1/M3
```

```
D81C  65 68     ADC ACC#2/M2
D81E  85 60     STA ACC#1/M2
D820  A5 5F     LDA ACC#1/M1
D822  65 67     ADC ACC#2/M1
D824  85 5F     STA ACC#1/M1
D826  4C 42 D8  JMP $D842
D829  69 01     ADC #$01
D82B  06 6D     ASL ROUND
D82D  26 62     ROL ACC#1/M4
D82F  26 61     ROL ACC#1/M3
D831  26 60     ROL ACC#1/M2
D833  26 5F     ROL ACC#1/M1
D835  10 F2     BPL $D829
D837  38        SEC
D838  E5 5E     SBC ACC#1/E
D83A  B0 C7     BCS $D803
D83C  49 FF     EOR #$FF
D83E  69 01     ADC #$01
D840  85 5E     STA ACC#1/E
D842  90 0E     BCC $D852
D844  E6 5E     INC ACC#1/E
D846  F0 42     BEQ $D88A
D848  66 5F     ROR ACC#1/M1
D84A  66 60     ROR ACC#1/M2
D84C  66 61     ROR ACC#1/M3
D84E  66 62     ROR ACC#1/M4
D850  66 6D     ROR ROUND
D852  60        RTS
D853  A5 63     LDA ACC#1/S
D855  49 FF     EOR #$FF
D857  85 63     STA ACC#1/S
D859  A5 5F     LDA ACC#1/M1
D85B  49 FF     EOR #$FF
D85D  85 5F     STA ACC#1/M1
D85F  A5 60     LDA ACC#1/M2
D861  49 FF     EOR #$FF
D863  85 60     STA ACC#1/M2
D865  A5 61     LDA ACC#1/M3
D867  49 FF     EOR #$FF
D869  85 61     STA ACC#1/M3
D86B  A5 62     LDA ACC#1/M4
D86D  49 FF     EOR #$FF
D86F  85 62     STA ACC#1/M4
D871  A5 6D     LDA ROUND
D873  49 FF     EOR #$FF
D875  85 6D     STA ROUND
D877  E6 6D     INC ROUND
D879  D0 0E     BNE $D889
D87B  E6 62     INC ACC#1/M4
D87D  D0 0A     BNE $D889
D87F  E6 61     INC ACC#1/M3
D881  D0 06     BNE $D889
D883  E6 60     INC ACC#1/M2
D885  D0 02     BNE $D889
D887  E6 5F     INC ACC#1/M1
D889  60        RTS
D88A  A2 45     LDX #$45      "OVERFLOW"
D88C  4C 57 C3  JMP $C357
D88F  A2 22     LDX #$22
D891  B4 04     LDY $04,X
```

```
D893  84 6D     STY ROUND
D895  B4 03     LDY $03,X
D897  94 04     STY $04,X
D899  B4 02     LDY $02,X
D89B  94 03     STY $03,X
D89D  B4 01     LDY $01,X
D89F  94 02     STY $02,X
D8A1  A4 65     LDY HI-ACC-OFLO
D8A3  94 01     STY $01,X
D8A5  69 08     ADC #$08
D8A7  30 E8     BMI $D891
D8A9  F0 E6     BEQ $D891
D8AB  E9 08     SBC #$08
D8AD  A8        TAY
D8AE  A5 6D     LDA ROUND
D8B0  B0 14     BCS $D8C6
D8B2  16 01     ASL $01,X
D8B4  90 02     BCC $D8B8
D8B6  F6 01     INC $01,X
D8B8  76 01     ROR $01,X
D8BA  76 01     ROR $01,X
D8BC  76 02     ROR $02,X
D8BE  76 03     ROR $03,X
D8C0  76 04     ROR $04,X
D8C2  6A        ROR A
D8C3  C8        INY
D8C4  D0 EC     BNE $D8B2
D8C6  18        CLC
D8C7  60        RTS
```

```
D8C8  81 00 00 00 00 03 7F 5E
D8D0  56 CB 79 80 13 9B 0B 64
D8D8  80 76 38 93 16 82 38 AA
D8E0  3B 20 80 35 04 F3 34 81
D8E8  35 04 F3 34 80 80 00 00
D8F0  00 80 31 72 17 F8 20 37
```

```
D8F6  20 37 DB  JSR $DB37          'LOG'
D8F9  F0 02     BEQ $D8FD
D8FB  10 03     BPL $D900
D8FD  4C 23 D1  JMP $D123          "ILLEGAL QTY"
D900  A5 5E     LDA ACC#1/E
D902  E9 7F     SBC #$7F
D904  48        PHA
D905  A9 80     LDA #$80
D907  85 5E     STA ACC#1/E
D909  A9 E2     LDA #$E2           √.5
D90B  A0 D8     LDY #$D8
D90D  20 73 D7  JSR $D773
D910  A9 E7     LDA #$E7           √2
D912  A0 D8     LDY #$D8
D914  20 1B DA  JSR $DA1B
D917  A9 C8     LDA #$C8           1.0
D919  A0 D8     LDY #$D8
D91B  20 33 D7  JSR $D733
D91E  A9 CD     LDA #$CD
D920  A0 D8     LDY #$D8
D922  20 2D DF  JSR $DF2D
D925  A9 EC     LDA #$EC           -0.5
D927  A0 D8     LDY #$D8
```

```
D929  20 73 D7    JSR $D773
D92C  68          PLA
D92D  20 8A DC    JSR $DC8A
D930  A9 F1       LDA #$F1
D932  A0 D8       LDY #$D8
D934  20 98 D9    JSR $D998
D937  D0 03       BNE $D93C
D939  4C 97 D9    JMP $D997
D93C  20 C3 D9    JSR $D9C3
D93F  A9 00       LDA #$00
D941  85 23       STA $23
D943  85 24       STA $24
D945  85 25       STA $25
D947  85 26       STA $26
D949  A5 6D       LDA ROUND
D94B  20 65 D9    JSR $D965
D94E  A5 62       LDA ACC#1/M4
D950  20 65 D9    JSR $D965
D953  A5 61       LDA ACC#1/M3
D955  20 65 D9    JSR $D965
D958  A5 60       LDA ACC#1/M2
D95A  20 65 D9    JSR $D965
D95D  A5 5F       LDA ACC#1/M1
D95F  20 6A D9    JSR $D96A
D962  4C 9B DA    JMP $DA9B
D965  D0 03       BNE $D96A
D967  4C 8F D8    JMP $D88F
D96A  4A          LSR A
D96B  09 80       ORA #$80
D96D  A8          TAY
D96E  90 19       BCC $D989
D970  18          CLC
D971  A5 26       LDA $26
D973  65 6A       ADC ACC#2/M4
D975  85 26       STA $26
D977  A5 25       LDA $25
D979  65 69       ADC ACC#2/M3
D97B  85 25       STA $25
D97D  A5 24       LDA $24
D97F  65 68       ADC ACC#2/M2
D981  85 24       STA $24
D983  A5 23       LDA $23
D985  65 67       ADC ACC#2/M1
D987  85 23       STA $23
D989  66 23       ROR $23
D98B  66 24       ROR $24
D98D  66 25       ROR $25
D98F  66 26       ROR $26
D991  66 6D       ROR ROUND
D993  98          TYA
D994  4A          LSR A
D995  D0 D6       BNE $D96D
D997  60          RTS
D998  85 1F       STA POINTER
D99A  84 20       STY POINTER-HI
D99C  A0 04       LDY #$04
D99E  B1 1F       LDA (POINTER),Y
D9A0  85 6A       STA ACC#2/M4
D9A2  88          DEY
D9A3  B1 1F       LDA (POINTER),Y
```

'*' ↓ FLP * FLP

MULTIPLY-A-BIT

MOVE MEMORY POINTED TO BY A,Y → ACC#2

```
D9A5  85 69        STA ACC#2/M3
D9A7  88           DEY
D9A8  B1 1F        LDA (POINTER),Y
D9AA  85 68        STA ACC#2/M2
D9AC  88           DEY
D9AD  B1 1F        LDA (POINTER),Y
D9AF  85 6B        STA ACC#2/S
D9B1  45 63        EOR ACC#1/S
D9B3  85 6C        STA SGN-COMPR
D9B5  A5 6B        LDA ACC#2/S
D9B7  09 80        ORA #$80
D9B9  85 67        STA ACC#2/M1
D9BB  88           DEY
D9BC  B1 1F        LDA (POINTER),Y
D9BE  85 66        STA ACC#2/E
D9C0  A5 5E        LDA ACC#1/E
D9C2  60           RTS
-------------------------------------------------
D9C3  A5 66        LDA ACC#2/E      TEST
D9C5  F0 1F        BEQ $D9E6        + ADJUST
D9C7  18           CLC              ACC#1,
D9C8  65 5E        ADC ACC#1/E        ACC#2
D9CA  90 04        BCC $D9D0
D9CC  30 1D        BMI $D9EB
D9CE  18           CLC
D9CF  2C 10 14     BIT $1410
                   /  /  /
D9D0  10 14        BPL $D9E6
D9D2  69 80        ADC #$80
D9D4  85 5E        STA ACC#1/E
D9D6  D0 03        BNE $D9DB
D9D8  4C 07 D8     JMP $D807
D9DB  A5 6C        LDA SGN-COMPR
D9DD  85 63        STA ACC#1/S
D9DF  60           RTS
-------------------------------------------------
D9E0  A5 63        LDA ACC#1/S      UNDERFLOW/
D9E2  49 FF        EOR #$FF           OVERFLOW
D9E4  30 05        BMI $D9EB
D9E6  68           PLA
D9E7  68           PLA
D9E8  4C 03 D8     JMP $D803
D9EB  4C 8A D8     JMP $D88A        "OVERFLOW"
-------------------------------------------------
D9EE  20 18 DB     JSR $DB18        MULTIPLY
D9F1  AA           TAX                BY
D9F2  F0 10        BEQ $DA04          10
D9F4  18           CLC
D9F5  69 02        ADC #$02
D9F7  B0 F2        BCS $D9EB
D9F9  A2 00        LDX #$00
D9FB  86 6C        STX SGN-COMPR
D9FD  20 83 D7     JSR $D783
DA00  E6 5E        INC ACC#1/E
DA02  F0 E7        BEQ $D9EB
DA04  60           RTS
-------------------------------------------------
DA05  84 20 00 00 00 ~~20 18 DB~~     +10
-------------------------------------------------
DA0A  20 18 DB     JSR $DB18        DIVIDE BY
DA0D  A9 05        LDA #$05           10
DA0F  A0 DA        LDY #$DA   +10
```

```
DA13  86 6C      STX SGN-COMPR
DA15  20 AE DA   JSR $DAAE
DA18  4C 1E DA   JMP $DA1E
DA1B  20 98 D9   JSR $D998
DA1E  F0 76      BEQ $DA96
DA20  20 27 DB   JSR $DB27
DA23  A9 00      LDA #$00
DA25  38         SEC
DA26  E5 5E      SBC ACC#1/E
DA28  85 5E      STA ACC#1/E
DA2A  20 C3 D9   JSR $D9C3
DA2D  E6 5E      INC ACC#1/E
DA2F  F0 BA      BEQ $D9EB
DA31  A2 FC      LDX #$FC
DA33  A9 01      LDA #$01
DA35  A4 67      LDY ACC#2/M1
DA37  C4 5F      CPY ACC#1/M1
DA39  D0 10      BNE $DA4B
DA3B  A4 68      LDY ACC#2/M2
DA3D  C4 60      CPY ACC#1/M2
DA3F  D0 0A      BNE $DA4B
DA41  A4 69      LDY ACC#2/M3
DA43  C4 61      CPY ACC#1/M3
DA45  D0 04      BNE $DA4B
DA47  A4 6A      LDY ACC#2/M4
DA49  C4 62      CPY ACC#1/M4
DA4B  08         PHP
DA4C  2A         ROL A
DA4D  90 09      BCC $DA58
DA4F  E8         INX
DA50  95 26      STA $26,X
DA52  F0 32      BEQ $DA86
DA54  10 34      BPL $DA8A
DA56  A9 01      LDA #$01
DA58  28         PLP
DA59  B0 0E      BCS $DA69
DA5B  06 6A      ASL ACC#2/M4
DA5D  26 69      ROL ACC#2/M3
DA5F  26 68      ROL ACC#2/M2
DA61  26 67      ROL ACC#2/M1
DA63  B0 E6      BCS $DA4B
DA65  30 CE      BMI $DA35
DA67  10 E2      BPL $DA4B
DA69  A8         TAY
DA6A  A5 6A      LDA ACC#2/M4
DA6C  E5 62      SBC ACC#1/M4
DA6E  85 6A      STA ACC#2/M4
DA70  A5 69      LDA ACC#2/M3
DA72  E5 61      SBC ACC#1/M3
DA74  85 69      STA ACC#2/M3
DA76  A5 68      LDA ACC#2/M2
DA78  E5 60      SBC ACC#1/M2
DA7A  85 68      STA ACC#2/M2
DA7C  A5 67      LDA ACC#2/M1
DA7E  E5 5F      SBC ACC#1/M1
DA80  85 67      STA ACC#2/M1
DA82  98         TYA
DA83  4C 5B DA   JMP $DA5B
DA86  A9 40      LDA #$40
```

'÷' DIVIDE FLP. NUMBERS

```
DA89  0A        ASL A
DA8B  0A        ASL A
DA8C  0A        ASL A
DA8D  0A        ASL A
DA8E  0A        ASL A
DA8F  0A        ASL A
DA90  85 6D     STA ROUND
DA92  28        PLP
DA93  4C 9B DA  JMP $DA9B
-------------------------------------------
DA96  A2 85     LDX #$85    "DIVISION BY ZERO"
DA98  4C 57 C3  JMP $C357
-------------------------------------------
DA9B  A5 23     LDA $23
DA9D  85 5F     STA ACC#1/M1
DA9F  A5 24     LDA $24
DAA1  85 60     STA ACC#1/M2
DAA3  A5 25     LDA $25
DAA5  85 61     STA ACC#1/M3
DAA7  A5 26     LDA $26
DAA9  85 62     STA ACC#1/M4
DAAB  4C E3 D7  JMP $D7E3
-------------------------------------------
DAAE  85 1F     STA POINTER
DAB0  84 20     STY POINTER-HI   MOVE MEMORY POINTED TO BY A,Y
DAB2  A0 04     LDY #$04              → ACC#1
DAB4  B1 1F     LDA (POINTER),Y
DAB6  85 62     STA ACC#1/M4
DAB8  88        DEY
DAB9  B1 1F     LDA (POINTER),Y
DABB  85 61     STA ACC#1/M3
DABD  88        DEY
DABE  B1 1F     LDA (POINTER),Y
DAC0  85 60     STA ACC#1/M2
DAC2  88        DEY
DAC3  B1 1F     LDA (POINTER),Y
DAC5  85 63     STA ACC#1/S
DAC7  09 80     ORA #$80
DAC9  85 5F     STA ACC#1/M1
DACB  88        DEY
DACC  B1 1F     LDA (POINTER),Y
DACE  85 5E     STA ACC#1/E
DAD0  84 6D     STY ROUND
DAD2  60        RTS
-------------------------------------------
DAD3  A2 59     LDX #$59
DAD5  2C A2 54  BIT $54A2       ACC#1
                                  → MEMORY
DAD6  A2 54     LDX #$54
DAD8  A0 00     LDY #$00
DADA  F0 04     BEQ $DAE0
DADC  A6 46     LDX V-PNTR
DADE  A4 47     LDY V-PNTR+1
DAE0  20 27 DB  JSR $DB27
DAE3  86 1F     STX POINTER
DAE5  84 20     STY POINTER-HI
DAE7  A0 04     LDY #$04
DAE9  A5 62     LDA ACC#1/M4
DAEB  91 1F     STA (POINTER),Y
DAED  88        DEY
DAEE  A5 61     LDA ACC#1/M3
DAF0  91 1F     STA (POINTER),Y
DAF2  88        DEY
DAF3  A5 60     LDA ACC#1/M2
```

```
DAF5  91 1F     STA (POINTER),Y
DAF7  88        DEY
DAF8  A5 63     LDA ACC#1/S
DAFA  09 7F     ORA #$7F
DAFC  25 5F     AND ACC#1/M1
DAFE  91 1F     STA (POINTER),Y
DB00  88        DEY
DB01  A5 5E     LDA ACC#1/E
DB03  91 1F     STA (POINTER),Y
DB05  84 6D     STY ROUND
DB07  60        RTS
-------------------------------------
DB08  A5 6B     LDA ACC#2/S        ACC#2
DB0A  85 63     STA ACC#1/S          →ACC#1
DB0C  A2 05     LDX #$05
DB0E  B5 65     LDA HI-ACC-OFLO,X
DB10  95 5D     STA WK-POINTR+1,X
DB12  CA        DEX
DB13  D0 F9     BNE $DB0E
DB15  86 6D     STX ROUND
DB17  60        RTS
-------------------------------------
DB18  20 27 DB  JSR $DB27          ACCUM#1
DB1B  A2 06     LDX #$06             →AC#2
DB1D  B5 5D     LDA WK-POINTR+1,X
DB1F  95 65     STA HI-ACC-OFLO,X
DB21  CA        DEX
DB22  D0 F9     BNE $DB1D
DB24  86 6D     STX ROUND
DB26  60        RTS
-------------------------------------
DB27  A5 5E     LDA ACC#1/E        ROUND
DB29  F0 FB     BEQ $DB26            ACCUM#1
DB2B  06 6D     ASL ROUND
DB2D  90 F7     BCC $DB26
DB2F  20 7B D8  JSR $D87B
DB32  D0 F2     BNE $DB26
DB34  4C 44 D8  JMP $D844
-------------------------------------
DB37  A5 5E     LDA ACC#1/E
DB39  F0 09     BEQ $DB44
DB3B  A5 63     LDA ACC#1/S
DB3D  2A        ROL A
DB3E  A9 FF     LDA #$FF
DB40  B0 02     BCS $DB44
DB42  A9 01     LDA #$01
DB44  60        RTS
-------------------------------------
DB45  20 37 DB  JSR $DB37          'SGN'
DB48  85 5F     STA ACC#1/M1
DB4A  A9 00     LDA #$00
DB4C  85 60     STA ACC#1/M2
DB4E  A2 88     LDX #$88
DB50  A5 5F     LDA ACC#1/M1
DB52  49 FF     EOR #$FF
DB54  2A        ROL A
DB55  A9 00     LDA #$00
DB57  85 62     STA ACC#1/M4
DB59  85 61     STA ACC#1/M3
DB5B  86 5E     STX ACC#1/E
DB5D  85 6D     STA ROUND
DB5F  85 63     STA ACC#1/S
DB61  4C DE D7  JMP $D7DE
-------------------------------------
DB64  46 63     LSR ACC#1/S        'ABS'
```

```
DB67  85 21        STA $21
DB69  84 22        STY $22
DB6B  A0 00        LDY #$00
DB6D  B1 21        LDA ($21),Y
DB6F  C8           INY
DB70  AA           TAX
DB71  F0 C4        BEQ $DB37
DB73  B1 21        LDA ($21),Y
DB75  45 63        EOR ACC#1/S
DB77  30 C2        BMI $DB3B
DB79  E4 5E        CPX ACC#1/E
DB7B  D0 21        BNE $DB9E
DB7D  B1 21        LDA ($21),Y
DB7F  09 80        ORA #$80
DB81  C5 5F        CMP ACC#1/M1
DB83  D0 19        BNE $DB9E
DB85  C8           INY
DB86  B1 21        LDA ($21),Y
DB88  C5 60        CMP ACC#1/M2
DB8A  D0 12        BNE $DB9E
DB8C  C8           INY
DB8D  B1 21        LDA ($21),Y
DB8F  C5 61        CMP ACC#1/M3
DB91  D0 0B        BNE $DB9E
DB93  C8           INY
DB94  A9 7F        LDA #$7F
DB96  C5 6D        CMP ROUND
DB98  B1 21        LDA ($21),Y
DB9A  E5 62        SBC ACC#1/M4
DB9C  F0 28        BEQ $DBC6
DB9E  A5 63        LDA ACC#1/S
DBA0  90 02        BCC $DBA4
DBA2  49 FF        EOR #$FF
DBA4  4C 3D DB     JMP $DB3D
```

COMPARE ACCUM#1 TO MEMORY

```
DBA7  A5 5E        LDA ACC#1/E
DBA9  F0 4A        BEQ $DBF5
DBAB  38           SEC
DBAC  E9 A0        SBC #$A0
DBAE  24 63        BIT ACC#1/S
DBB0  10 09        BPL $DBBB
DBB2  AA           TAX
DBB3  A9 FF        LDA #$FF
DBB5  85 65        STA HI-ACC-OFLO
DBB7  20 59 D8     JSR $D859
DBBA  8A           TXA
DBBB  A2 5E        LDX #$5E
DBBD  C9 F9        CMP #$F9
DBBF  10 06        BPL $DBC7
DBC1  20 A5 D8     JSR $D8A5
DBC4  84 65        STY HI-ACC-OFLO
DBC6  60           RTS
DBC7  A8           TAY
DBC8  A5 63        LDA ACC#1/S
DBCA  29 80        AND #$80
DBCC  46 5F        LSR ACC#1/M1
DBCE  05 5F        ORA ACC#1/M1
DBD0  85 5F        STA ACC#1/M1
DBD2  20 BC D8     JSR $D8BC
DBD5  84 65        STY HI-ACC-OFLO
```

FLOAT → FIXED

```
DBD8  A5 5E        LDA ACC#1/E      'INT'
DBDA  C9 A0        CMP #$A0
DBDC  B0 20        BCS $DBFE
DBDE  20 A7 DB     JSR $DBA7
DBE1  84 6D        STY ROUND
DBE3  A5 63        LDA ACC#1/S
DBE5  84 63        STY ACC#1/S
DBE7  49 80        EOR #$80
DBE9  2A           ROL A
DBEA  A9 A0        LDA #$A0
DBEC  85 5E        STA ACC#1/E
DBEE  A5 62        LDA ACC#1/M4
DBF0  85 03        STA $03
DBF2  4C DE D7     JMP $D7DE
DBF5  85 5F        STA ACC#1/M1
DBF7  85 60        STA ACC#1/M2
DBF9  85 61        STA ACC#1/M3
DBFB  85 62        STA ACC#1/M4
DBFD  A8           TAY
DBFE  60           RTS
```

```
DBFF  A0 00        LDY #$00         CONVERT
DC01  A2 0A        LDX #$0A           STRING
DC03  94 5A        STY $5A,X            TO
DC05  CA           DEX                FLOATING
DC06  10 FB        BPL $DC03            POINT
DC08  90 0F        BCC $DC19
DC0A  C9 2D        CMP #$2D
DC0C  D0 04        BNE $DC12
DC0E  86 64        STX CON-CNTHI
DC10  F0 04        BEQ $DC16
DC12  C9 2B        CMP #$2B
DC14  D0 05        BNE $DC1B
DC16  20 70 00     JSR $0070
DC19  90 5B        BCC $DC76
DC1B  C9 2E        CMP #$2E
DC1D  F0 2E        BEQ $DC4D
DC1F  C9 45        CMP #$45
DC21  D0 30        BNE $DC53
DC23  20 70 00     JSR $0070
DC26  90 17        BCC $DC3F
DC28  C9 AB        CMP #$AB
DC2A  F0 0E        BEQ $DC3A
DC2C  C9 2D        CMP #$2D
DC2E  F0 0A        BEQ $DC3A
DC30  C9 AA        CMP #$AA
DC32  F0 08        BEQ $DC3C
DC34  C9 2B        CMP #$2B
DC36  F0 04        BEQ $DC3C
DC38  D0 07        BNE $DC41
DC3A  66 5D        ROR WK-POINTR+1
DC3C  20 70 00     JSR $0070
DC3F  90 5C        BCC $DC9D
DC41  24 5D        BIT WK-POINTR+1
DC43  10 0E        BPL $DC53
DC45  A9 00        LDA #$00
DC47  38           SEC
DC48  E5 5B        SBC $5B
DC4A  4C 55 DC     JMP $DC55
DC4D  66 5C        ROR WK-POINTR
      24 5D        BIT WK-POINTR
```

```
DC51  50 C3       BVC $DC16
DC53  A5 5B       LDA $5B
DC55  38          SEC
DC56  E5 5A       SBC $5A
DC58  85 5B       STA $5B
DC5A  F0 12       BEQ $DC6E
DC5C  10 09       BPL $DC67
DC5E  20 0A DA    JSR $DA0A
DC61  E6 5B       INC $5B
DC63  D0 F9       BNE $DC5E
DC65  F0 07       BEQ $DC6E
DC67  20 EE D9    JSR $D9EE
DC6A  C6 5B       DEC $5B
DC6C  D0 F9       BNE $DC67
DC6E  A5 64       LDA CON-CNTHI
DC70  30 01       BMI $DC73
DC72  60          RTS
DC73  4C A1 DE    JMP $DEA1
DC76  48          PHA
DC77  24 5C       BIT WK-POINTR
DC79  10 02       BPL $DC7D
DC7B  E6 5A       INC $5A
DC7D  20 EE D9    JSR $D9EE
DC80  68          PLA
DC81  38          SEC
DC82  E9 30       SBC #$30
DC84  20 8A DC    JSR $DC8A
DC87  4C 16 DC    JMP $DC16
DC8A  48          PHA                    GET NEW
DC8B  20 18 DB    JSR $DB18                ASCII
DC8E  68          PLA                      DIGIT
DC8F  20 48 DB    JSR $DB48
DC92  A5 6B       LDA ACC#2/S
DC94  45 63       EOR ACC#1/S
DC96  85 6C       STA SGN-COMPR
DC98  A6 5E       LDX ACC#1/E
DC9A  4C 76 D7    JMP $D776
DC9D  A5 5B       LDA $5B
DC9F  C9 0A       CMP #$0A
DCA1  90 09       BCC $DCAC
DCA3  A9 64       LDA #$64
DCA5  24 5D       BIT WK-POINTR+1
DCA7  30 11       BMI $DCBA
DCA9  4C 8A D8    JMP $D88A "OVERFLOW"
DCAC  0A          ASL A
DCAD  0A          ASL A
DCAE  18          CLC
DCAF  65 5B       ADC $5B
DCB1  0A          ASL A
DCB2  18          CLC
DCB3  A0 00       LDY #$00
DCB5  71 77       ADC (BASIC-ADDS),Y
DCB7  38          SEC
DCB8  E9 30       SBC #$30
DCBA  85 5B       STA $5B
DCBC  4C 3C DC    JMP $DC3C

DCBF  9B 3E BC 1F FD 9E 6E 6B
```

```
DCD0  A0 C2     LDY #$C2
DCD2  20 E6 DC  JSR $DCE6
DCD5  A5 37     LDA BASIC-LINE#+1
DCD7  A6 36     LDX BASIC-LINE#
DCD9  85 5F     STA ACC#1/M1
DCDB  86 60     STX ACC#1/M2
DCDD  A2 90     LDX #$90          FLOAT
DCDF  38        SEC                 ACC#1
DCE0  20 55 DB  JSR $DB55
DCE3  20 E9 DC  JSR $DCE9  CONVERT TO ASCII
DCE6  4C 1C CA  JMP $CA1C  PRINT IT!
```

CONVERT FLPOINT TO ASCII

```
DCE9  A0 01     LDY #$01
DCEB  A9 20     LDA #$20
DCED  24 63     BIT ACC#1/S
DCEF  10 02     BPL $DCF3
DCF1  A9 2D     LDA #$2D
DCF3  99 FF 00  STA $00FF,Y
DCF6  85 63     STA ACC#1/S
DCF8  84 6E     STY $6E
DCFA  C8        INY
DCFB  A9 30     LDA #$30
DCFD  A6 5E     LDX ACC#1/E
DCFF  D0 03     BNE $DD04
DD01  4C 10 DE  JMP $DE10
DD04  A9 00     LDA #$00
DD06  E0 80     CPX #$80
DD08  F0 02     BEQ $DD0C
DD0A  B0 09     BCS $DD15
DD0C  A9 C9     LDA #$C9
DD0E  A0 DC     LDY #$DC
DD10  20 34 D9  JSR $D934
DD13  A9 F7     LDA #$F7
DD15  85 5A     STA $5A
DD17  A9 C4     LDA #$C4
DD19  A0 DC     LDY #$DC
DD1B  20 67 DB  JSR $DB67
DD1E  F0 1E     BEQ $DD3E
DD20  10 12     BPL $DD34
DD22  A9 BF     LDA #$BF
DD24  A0 DC     LDY #$DC
DD26  20 67 DB  JSR $DB67
DD29  F0 02     BEQ $DD2D
DD2B  10 0E     BPL $DD3B
DD2D  20 EE D9  JSR $D9EE
DD30  C6 5A     DEC $5A
DD32  D0 EE     BNE $DD22
DD34  20 0A DA  JSR $DA0A
DD37  E6 5A     INC $5A
DD39  D0 DC     BNE $DD17
DD3B  20 2C D7  JSR $D72C
DD3E  20 A7 DB  JSR $DBA7
DD41  A2 01     LDX #$01
DD43  A5 5A     LDA $5A
DD45  18        CLC
DD46  69 0A     ADC #$0A
DD48  30 09     BMI $DD53
DD4A  C9 0B     CMP #$0B
DD4C  B0 06     BCS $DD54
DD4E  69 FF     ADC #$FF
```

```
DD51  A9 02     LDA #$02
DD53  38        SEC
DD54  E9 02     SBC #$02
DD56  85 5B     STA $5B
DD58  86 5A     STX $5A
DD5A  8A        TXA
DD5B  F0 02     BEQ $DD5F
DD5D  10 13     BPL $DD72
DD5F  A4 6E     LDY $6E
DD61  A9 2E     LDA #$2E
DD63  C8        INY
DD64  99 FF 00  STA $00FF,Y
DD67  8A        TXA
DD68  F0 06     BEQ $DD70
DD6A  A9 30     LDA #$30
DD6C  C8        INY
DD6D  99 FF 00  STA $00FF,Y
DD70  84 6E     STY $6E
DD72  A0 00     LDY #$00
DD74  A2 80     LDX #$80
DD76  A5 62     LDA ACC#1/M4
DD78  18        CLC
DD79  79 25 DE  ADC $DE25,Y
DD7C  85 62     STA ACC#1/M4
DD7E  A5 61     LDA ACC#1/M3
DD80  79 24 DE  ADC $DE24,Y
DD83  85 61     STA ACC#1/M3
DD85  A5 60     LDA ACC#1/M2
DD87  79 23 DE  ADC $DE23,Y
DD8A  85 60     STA ACC#1/M2
DD8C  A5 5F     LDA ACC#1/M1
DD8E  79 22 DE  ADC $DE22,Y
DD91  85 5F     STA ACC#1/M1
DD93  E8        INX
DD94  B0 04     BCS $DD9A
DD96  10 DE     BPL $DD76
DD98  30 02     BMI $DD9C
DD9A  30 DA     BMI $DD76
DD9C  8A        TXA
DD9D  90 04     BCC $DDA3
DD9F  49 FF     EOR #$FF
DDA1  69 0A     ADC #$0A
DDA3  69 2F     ADC #$2F
DDA5  C8        INY
DDA6  C8        INY
DDA7  C8        INY
DDA8  C8        INY
DDA9  84 44     STY Y-ADDS
DDAB  A4 6E     LDY $6E
DDAD  C8        INY
DDAE  AA        TAX
DDAF  29 7F     AND #$7F
DDB1  99 FF 00  STA $00FF,Y
DDB4  C6 5A     DEC $5A
DDB6  D0 06     BNE $DDBE
DDB8  A9 2E     LDA #$2E
DDBA  C8        INY
DDBB  99 FF 00  STA $00FF,Y
DDBE  84 6E     STY $6E
```

```
DDC2  8A          TXA
DDC3  49 FF       EOR #$FF
DDC5  29 80       AND #$80
DDC7  AA          TAX
DDC8  C0 24       CPY #$24
DDCA  F0 04       BEQ $DDD0
DDCC  C0 3C       CPY #$3C
DDCE  D0 A6       BNE $DD76
DDD0  A4 6E       LDY $6E
DDD2  B9 FF 00    LDA $00FF,Y
DDD5  88          DEY
DDD6  C9 30       CMP #$30    "0"
DDD8  F0 F8       BEQ $DDD2
DDDA  C9 2E       CMP #$2E    "-"
DDDC  F0 01       BEQ $DDDF
DDDE  C8          INY
DDDF  A9 2B       LDA #$2B    "+"
DDE1  A6 5B       LDX $5B
DDE3  F0 2E       BEQ $DE13
DDE5  10 08       BPL $DDEF
DDE7  A9 00       LDA #$00
DDE9  38          SEC
DDEA  E5 5B       SBC $5B
DDEC  AA          TAX
DDED  A9 2D       LDA #$2D    "-"
DDEF  99 01 01    STA $0101,Y
DDF2  A9 45       LDA #$45    "E"
DDF4  99 00 01    STA $0100,Y
DDF7  8A          TXA
DDF8  A2 2F       LDX #$2F
DDFA  38          SEC
DDFB  E8          INX
DDFC  E9 0A       SBC #$0A
DDFE  B0 FB       BCS $DDFB
DE00  69 3A       ADC #$3A
DE02  99 03 01    STA $0103,Y
DE05  8A          TXA
DE06  99 02 01    STA $0102,Y
DE09  A9 00       LDA #$00
DE0B  99 04 01    STA $0104,Y
DE0E  F0 08       BEQ $DE18
DE10  99 FF 00    STA $00FF,Y
DE13  A9 00       LDA #$00
DE15  99 00 01    STA $0100,Y
DE18  A9 00       LDA #$00
DE1A  A0 01       LDY #$01
DE1C  60          RTS
```

```
DE1D  80 00 00 00 00 FA 0A 1F
DE25  00 00 98 96 80 FF F0 BD
DE2D  C0 00 01 86 A0 FF FF D8
DE35  F0 00 00 03 E8 FF FF FF
DE3D  9C 00 00 00 0A FF FF FF
DE45  FF FF DF 0A 80 00 03 4B
DE4D  C0 FF FF 73 60 00 00 0E
DE55  10 FF FF FD A8 00 00 00
DE5D  3C 20 18 DB A9 1D A0 DE
```

```
DE6E  20 18 DB    JSR $DB18
```

'SQR'

```
DE63  A0 DE        LDY #$DE   +0.5
DE65  20 AE DA     JSR $DAAE
DE68  F0 70        BEQ $DEDA      '↑'  FLP ↑ FLP.
DE6A  A5 66        LDA ACC#2/E
DE6C  D0 03        BNE $DE71
DE6E  4C 05 D8     JMP $D805
DE71  A2 4B        LDX #$4B
DE73  A0 00        LDY #$00
DE75  20 E0 DA     JSR $DAE0
DE78  A5 6B        LDA ACC#2/S
DE7A  10 0F        BPL $DE8B
DE7C  20 D8 DB     JSR $DBD8
DE7F  A9 4B        LDA #$4B
DE81  A0 00        LDY #$00
DE83  20 67 DB     JSR $DB67
DE86  D0 03        BNE $DE8B
DE88  98           TYA
DE89  A4 03        LDY $03
DE8B  20 0A DB     JSR $DB0A
DE8E  98           TYA
DE8F  48           PHA
DE90  20 F6 D8     JSR $D8F6
DE93  A9 4B        LDA #$4B
DE95  A0 00        LDY #$00
DE97  20 34 D9     JSR $D934
DE9A  20 DA DE     JSR $DEDA
DE9D  68           PLA
DE9E  4A           LSR A
DE9F  90 0A        BCC $DEAB
DEA1  A5 5E        LDA ACC#1/E    MONADIC '-'
DEA3  F0 06        BEQ $DEAB
DEA5  A5 63        LDA ACC#1/S
DEA7  49 FF        EOR #$FF
DEA9  85 63        STA ACC#1/S
DEAB  60           RTS
```

```
DEAC  81 38 AA 3B 29 07 71 34
DEB4  58 3E 56 74 16 7E B3 1B
DEBC  77 2F EE E3 85 7A 1D 84
DEC4  1C 2A 7C 63 59 58 0A 7E
DECC  75 FD E7 C6 80 31 72 18
DED4  10 81 00 00 00 00 A9 AC
```

```
DEDA  A9 AC        LDA #$AC       'EXP'
DEDC  A0 DE        LDY #$DE
DEDE  20 34 D9     JSR $D934
DEE1  A5 6D        LDA ROUND
DEE3  69 50        ADC #$50
DEE5  90 03        BCC $DEEA
DEE7  20 2F DB     JSR $DB2F
DEEA  85 53        STA $53
DEEC  20 1B DB     JSR $DB1B
DEEF  A5 5E        LDA ACC#1/E
DEF1  C9 88        CMP #$88
DEF3  90 03        BCC $DEF8
DEF5  20 E0 D9     JSR $D9E0
DEF8  20 D8 DB     JSR $DBD8
DEFB  A5 03        LDA $03
DEFD  18           CLC
DEFE  69 01        ADC #$01
```

```
DF00  F0 F3        BEQ $DEF5
DF02  38           SEC
DF03  E9 01        SBC #$01
DF05  48           PHA
DF06  A2 05        LDX #$05
DF08  B5 66        LDA ACC#2/E,X
DF0A  B4 5E        LDY ACC#1/E,X
DF0C  95 5E        STA ACC#1/E,X
DF0E  94 66        STY ACC#2/E,X
DF10  CA           DEX
DF11  10 F5        BPL $DF08
DF13  A5 53        LDA $53
DF15  85 6D        STA ROUND
DF17  20 36 D7     JSR $D736
DF1A  20 A1 DE     JSR $DEA1
DF1D  A9 B1        LDA #$B1
DF1F  A0 DE        LDY #$DE
DF21  20 43 DF     JSR $DF43
DF24  A9 00        LDA #$00
DF26  85 6C        STA SGN-COMPR
DF28  68           PLA
DF29  20 C5 D9     JSR $D9C5
DF2C  60           RTS
```

SERIES EVALUATION

```
DF2D  85 6E        STA $6E
DF2F  84 6F        STY $6F
DF31  20 D6 DA     JSR $DAD6
DF34  A9 54        LDA #$54
DF36  20 34 D9     JSR $D934   MULTIPLY
DF39  20 47 DF     JSR $DF47
DF3C  A9 54        LDA #$54
DF3E  A0 00        LDY #$00
DF40  4C 34 D9     JMP $D934   MULTIPLY
```

SERIES II EVALUATION

```
DF43  85 6E        STA $6E
DF45  84 6F        STY $6F     STORE PRIMARY
DF47  20 D3 DA     JSR $DAD3
DF4A  B1 6E        LDA ($6E),Y
DF4C  85 64        STA CON-CNTHI
DF4E  A4 6E        LDY $6E
DF50  C8           INY
DF51  98           TYA
DF52  D0 02        BNE $DF56
DF54  E6 6F        INC $6F
DF56  85 6E        STA $6E
DF58  A4 6F        LDY $6F
DF5A  20 34 D9     JSR $D934   MULTIPLY
DF5D  A5 6E        LDA $6E
DF5F  A4 6F        LDY $6F
DF61  18           CLC
DF62  69 05        ADC #$05
DF64  90 01        BCC $DF67   ADD
DF66  C8           INY
DF67  85 6E        STA $6E
DF69  84 6F        STY $6F
DF6B  20 73 D7     JSR $D773
DF6E  A5 59        LDA #$59
DF70  A0 00        LDY #$00
DF72  C6 64        DEC CON-CNTHI
DF74  D0 E4        BNE $DF5A
DF76  60           RTS
```

```
DF77  98 35 44 7A 68 28 B1 46

DF7F  20 37 DB    JSR $DB37          'RND'
DF82  30 2E       BMI $DFB2
DF84  D0 17       BNE $DF9D
DF86  AD 44 E8    LDA $E844          RND(0)
DF89  85 5F       STA ACC#1/M1
DF8B  AD 48 E8    LDA $E848
DF8E  85 60       STA ACC#1/M2
DF90  AD 45 E8    LDA $E845
DF93  85 61       STA ACC#1/M3
DF95  AD 49 E8    LDA $E849
DF98  85 62       STA ACC#1/M4
DF9A  4C C2 DF    JMP $DFC2
DF9D  A9 88       LDA #$88           RND(+x)
DF9F  A0 00       LDY #$00
DFA1  20 AE DA    JSR $DAAE
DFA4  A9 77       LDA #$77
DFA6  A0 DF       LDY #$DF
DFA8  20 34 D9    JSR $D934
DFAB  A9 7B       LDA #$7B
DFAD  A0 DF       LDY #$DF
DFAF  20 73 D7    JSR $D773
DFB2  A6 62       LDX ACC#1/M4       RND(-x)
DFB4  A5 5F       LDA ACC#1/M1
DFB6  85 62       STA ACC#1/M4
DFB8  86 5F       STX ACC#1/M1
DFBA  A6 60       LDX ACC#1/M2
DFBC  A5 61       LDA ACC#1/M3
DFBE  85 60       STA ACC#1/M2
DFC0  86 61       STX ACC#1/M3
DFC2  A9 00       LDA #$00
DFC4  85 63       STA ACC#1/S
DFC6  A5 5E       LDA ACC#1/E
DFC8  85 6D       STA ROUND
DFCA  A9 80       LDA #$80
DFCC  85 5E       STA ACC#1/E
DFCE  20 E3 D7    JSR $D7E3
DFD1  A2 88       LDX #$88
DFD3  A0 00       LDY #$00
DFD5  4C E0 DA    JMP $DAE0

DFD8  A9 54       LDA #$54           'COS'
DFDA  A0 E0       LDY #$E0
DFDC  20 73 D7    JSR $D773
DFDF  20 18 DB    JSR $DB18          'SIN'
DFE2  A9 59       LDA #$59
DFE4  A0 E0       LDY #$E0
DFE6  A6 6B       LDX ACC#2/S
DFE8  20 13 DA    JSR $DA13
DFEB  20 18 DB    JSR $DB18
DFEE  20 D8 DB    JSR $DBD8
DFF1  A9 00       LDA #$00
DFF3  85 6C       STA SGN-COMPR
DFF5  20 36 D7    JSR $D736
DFF8  A9 5E       LDA #$5E
DFFA  A0 E0       LDY #$E0
DFFC  20 33 D7    JSR $D733
DFFF  A5 63       LDA ACC#1/S
E001  48          PHA
```

```
E004  20 2C D7    JSR $D72C
E007  A5 63       LDA ACC#1/S
E009  30 09       BMI $E014
E00B  A5 0C       LDA $0C
E00D  49 FF       EOR #$FF
E00F  85 0C       STA $0C
E011  20 A1 DE    JSR $DEA1
E014  A9 5E       LDA #$5E
E016  A0 E0       LDY #$E0
E018  20 73 D7    JSR $D773
E01B  68          PLA
E01C  10 03       BPL $E021
E01E  20 A1 DE    JSR $DEA1
E021  A9 63       LDA #$63
E023  A0 E0       LDY #$E0
E025  4C 2D DF    JMP $DF2D
```

```
E028  20 D6 DA    JSR $DAD6      'TAN'
E02B  A9 00       LDA #$00
E02D  85 0C       STA $0C
E02F  20 DF DF    JSR $DFDF
E032  A2 4B       LDX #$4B
E034  A0 00       LDY #$00
E036  20 D5 DF    JSR $DFD5
E039  A9 54       LDA #$54
E03B  A0 00       LDY #$00
E03D  20 AE DA    JSR $DAAE
E040  A9 00       LDA #$00
E042  85 63       STA ACC#1/S
E044  A5 0C       LDA $0C
E046  20 50 E0    JSR $E050
E049  A9 4B       LDA #$4B
E04B  A0 00       LDY #$00
E04D  4C 1B DA    JMP $DA1B
```

```
E050  48          PHA
E051  4C 11 E0    JMP $E011
```

```
E054  81 49 0F DA A2 83 49 0F
E05C  DA A2 7F 00 00 00 00 05
E064  84 E6 1A 2D 1B 86 28 07
E06C  FB F8 87 99 68 89 01 87
E074  23 35 DF E1 86 A5 5D E7
E07C  28 83 49 0F DA A2 A1 54
E084  46 8F 13 8F 52 43 89 CD
```

```
E08C  A5 63       LDA ACC#1/S    'ATN'
E08E  48          PHA
E08F  10 03       BPL $E094
E091  20 A1 DE    JSR $DEA1
E094  A5 5E       LDA ACC#1/E
E096  48          PHA
E097  C9 81       CMP #$81
E099  90 07       BCC $E0A2
E09B  A9 C8       LDA #$C8
E09D  A0 D8       LDY #$D8
E09F  20 1B DA    JSR $DA1B
E0A2  A9 BC       LDA #$BC
E0A4  A0 E0       LDY #$E0
E0A6  20 2D DF    JSR $DF2D
E0A9  68          PLA
E0AA  C9 81       CMP #$81
```

```
E0AC  90 07       BCC $E0B5
E0AE  A9 54       LDA #$54
E0B0  A0 E0       LDY #$E0
E0B2  20 33 D7    JSR $D733
E0B5  68          PLA
E0B6  10 03       BPL $E0BB
E0B8  4C A1 DE    JMP $DEA1
E0BB  60          RTS
```

```
E0BC  0B 76 B3 83 BD D3 79 1E
E0C4  F4 A6 F5 7B 83 FC B0 10
E0CC  7C 0C 1F 67 CA 7C DE 53
E0D4  CB C1 7D 14 64 70 4C 7D
E0DC  B7 EA 51 7A 7D 63 30 88
E0E4  7E 7E 92 44 99 3A 7E 4C
E0EC  CC 91 C7 7F AA AA AA 13
E0F4  81 00 00 00 00 E6 77 D0
```

SUBROUTINE TO MOVE TO ZERO PAGE ($70)

```
E0F9  E6 77       INC BASIC-ADDS
E0FB  D0 02       BNE $E0FF
E0FD  E6 78       INC BASIC-ADDS/HI
E0FF  AD 60 EA    LDA $EA60
E102  C9 3A       CMP #$3A
E104  B0 0A       BCS $E110
E106  C9 20       CMP #$20
E108  F0 EF       BEQ $E0F9
E10A  38          SEC
E10B  E9 30       SBC #$30
E10D  38          SEC
E10E  E9 D0       SBC #$D0
E110  60          RTS
```

```
E111  80 4F C7 52 58 A2 FB 9A
```

BASIC SETUP (FROM POWER-ON RESET)

```
E116  A2 FB       LDX #$FB
E118  9A          TXS
E119  A9 4C       LDA #$4C      } USR VECTOR
E11B  85 51       STA $51
E11D  85 00       STA $00
E11F  A9 23       LDA #$23
E121  A0 D1       LDY #$D1
E123  85 01       STA $01
E125  84 02       STY $02
E127  A9 28       LDA #$28
E129  85 0F       STA $0F
E12B  A9 1E       LDA #$1E
E12D  85 10       STA $10
E12F  A2 1C       LDX #$1C      } MOVE SUBRTN TO ZERO PAGE
E131  BD F8 E0    LDA $E0F8,X
E134  95 6F       STA $6F,X
E136  CA          DEX
E137  D0 F8       BNE $E131
E139  A9 03       LDA #$03
E13B  85 50       STA $50
E13D  8A          TXA
E13E  85 65       STA HI-ACC-OFLO
E140  85 0E       STA $0E
E142  85 15       STA $15
E144  48          PHA
```

```
E147  E8          INX
E148  8E FD 01    STX $01FD
E14B  8E FC 01    STX $01FC
E14E  A2 16       LDX #$16
E150  86 13       STX $13
E152  A0 04       LDY #$04
E154  85 28       STA START-BASIC
E156  84 29       STY START-BASIC+1
E158  85 11       STA FIXED-LO
E15A  84 12       STY FIXED-HI
E15C  A8          TAY
E15D  E6 11       INC FIXED-LO
E15F  D0 04       BNE $E165
E161  E6 12       INC FIXED-HI
E163  30 0F       BMI $E174
E165  A9 55       LDA #$55
E167  91 11       STA (FIXED-LO),Y
E169  D1 11       CMP (FIXED-LO),Y
E16B  D0 07       BNE $E174
E16D  0A          ASL A
E16E  91 11       STA (FIXED-LO),Y
E170  D1 11       CMP (FIXED-LO),Y
E172  F0 E9       BEQ $E15D
E174  A5 11       LDA FIXED-LO
E176  A4 12       LDY FIXED-HI
E178  85 34       STA MEM-LIMIT
E17A  84 35       STY MEM-LIMIT+1
E17C  85 30       STA STRING-LO
E17E  84 31       STY STRING-LO+1
E180  A2 00       LDX #$00
E182  A0 04       LDY #$04
E184  86 28       STX START-BASIC
E186  84 29       STY START-BASIC+1
E188  A0 00       LDY #$00
E18A  98          TYA
E18B  91 28       STA (START-BASIC),Y
E18D  E6 28       INC START-BASIC
E18F  A5 28       LDA START-BASIC
E191  A4 29       LDY START-BASIC+1
E193  20 28 C3    JSR $C328
E196  A9 C4       LDA #$C4   "### COMMODORE BASIC ###"
E198  A0 E1       LDY #$E1
E19A  20 1C CA    JSR $CA1C
E19D  A5 34       LDA MEM-LIMIT
E19F  38          SEC
E1A0  E5 28       SBC START-BASIC
E1A2  AA          TAX
E1A3  A5 35       LDA MEM-LIMIT+1
E1A5  E5 29       SBC START-BASIC+1
E1A7  20 D9 DC    JSR $DCD9
E1AA  A9 B7       LDA #$B7   " BYTES FREE"
E1AC  A0 E1       LDY #$E1
E1AE  20 1C CA    JSR $CA1C
E1B1  20 5D C5    JSR $C55D
E1B4  4C 89 C3    JMP $C389
```

MEMORY TEST

```
E1B7  BYTES FREE  ###
E1C7  COMMODORE BASIC
E1D7  ###    )_ NH"M)
```

```
E1DE  A9 7F      LDA #$7F
E1E0  8D 4E E8   STA $E84E
E1E3  A2 6D      LDX #$6D
E1E5  A9 00      LDA #$00
E1E7  95 8D      STA CLOCK,X
E1E9  CA         DEX
E1EA  10 FB      BPL $E1E7
E1EC  A9 2E      LDA #$2E
E1EE  85 90      STA $90
E1F0  A9 E6      LDA #$E6
E1F2  85 91      STA $91
E1F4  A9 03      LDA #$03
E1F6  85 B0      STA $B0
E1F8  A9 0F      LDA #$0F
E1FA  8D 10 E8   STA $E810
E1FD  0A         ASL A
E1FE  8D 40 E8   STA $E840
E201  8D 42 E8   STA $E842
E204  8E 22 E8   STX $E822
E207  8E 45 E8   STX $E845
E20A  A9 3D      LDA #$3D
E20C  8D 13 E8   STA $E813
E20F  2C 12 E8   BIT $E812
E212  A9 3C      LDA #$3C
E214  8D 21 E8   STA $E821
E217  8D 23 E8   STA $E823
E21A  8D 11 E8   STA $E811
E21D  8E 22 E8   STX $E822
E220  A9 0C      LDA #$0C
E222  8D 4C E8   STA $E84C
E225  85 A8      STA $A8
E227  85 A7      STA $A7
E229  A0 83      LDY #$83
E22B  A2 18      LDX #$18
E22D  94 E0      STY $E0,X
E22F  E0 14      CPX #$14
E231  F0 08      BEQ $E23B
E233  E0 0D      CPX #$0D
E235  F0 04      BEQ $E23B
E237  E0 07      CPX #$07
E239  D0 01      BNE $E23C
E23B  88         DEY
E23C  CA         DEX
E23D  10 EE      BPL $E22D
E23F  84 C5      STY $C5
E241  E8         INX
E242  86 9F      STX $9F
E244  86 C4      STX SCREEN-ADDRS
E246  A9 20      LDA #$20
E248  9D 00 80   STA $8000,X
E24B  9D 00 81   STA $8100,X
E24E  9D 00 82   STA $8200,X
E251  9D 00 83   STA $8300,X
E254  CA         DEX
E255  D0 F1      BNE $E248
E257  A0 00      LDY #$00
E259  84 C6      STY CURSOR-COL
E25B  84 D8      STY CURSOR-LINE
E25D  A6 D8      LDX CURSOR-LINE
```

REGISTER/ SCREEN INITIALIZATION

CLEAR SCREEN

```
E261  09 80      ORA #$80
E263  85 C5      STA $C5
E265  BD 48 E7   LDA $E748,X
E268  85 C4      STA SCREEN-ADDRS
E26A  A9 27      LDA #$27
E26C  85 D5      STA $D5
E26E  E0 18      CPX #$18
E270  F0 08      BEQ $E27A
E272  B5 E1      LDA $E1,X
E274  30 04      BMI $E27A
E276  A9 4F      LDA #$4F
E278  85 D5      STA $D5
E27A  A5 C6      LDA CURSOR-COL
E27C  C9 28      CMP #$28
E27E  90 04      BCC $E284
E280  E9 28      SBC #$28
E282  85 C6      STA CURSOR-COL
E284  60         RTS
```

INPUT FROM SCREEN/KEYBD

```
E285  AC 6F 02   LDY $026F
E288  A2 00      LDX #$00
E28A  BD 70 02   LDA $0270,X
E28D  9D 6F 02   STA $026F,X
E290  E8         INX
E291  E4 9E      CPX $9E
E293  D0 F5      BNE $E28A
E295  C6 9E      DEC $9E
E297  98         TYA
E298  58         CLI
E299  60         RTS
```

TAKE FROM KEYBOARD BUFFER

```
E29A  20 D8 E3   JSR $E3D8
E29D  A5 9E      LDA $9E
E29F  85 A7      STA $A7
E2A1  F0 FA      BEQ $E29D
```

WAIT FOR INPUT

```
E2A3  78         SEI
E2A4  A5 AA      LDA $AA
E2A6  F0 09      BEQ $E2B1
E2A8  A5 A9      LDA $A9
E2AA  A0 00      LDY #$00
E2AC  84 AA      STY $AA
E2AE  20 EA E6   JSR $E6EA
```

UNBLINK CURSOR

```
E2B1  20 85 E2   JSR $E285
E2B4  C9 83      CMP #$83
E2B6  D0 10      BNE $E2C8
E2B8  78         SEI
E2B9  A2 09      LDX #$09
E2BB  86 9E      STX $9E
E2BD  BD 60 E7   LDA $E760,X
E2C0  9D 6E 02   STA $026E,X
E2C3  CA         DEX
E2C4  D0 F7      BNE $E2BD
E2C6  F0 D5      BEQ $E29D
```

INSERT "LOAD.. RUN"

```
E2C8  C9 0D      CMP #$0D
E2CA  D0 CE      BNE $E29A
E2CC  A4 D5      LDY $D5
E2CE  84 AC      STY $AC
E2D0  B1 C4      LDA (SCREEN-ADDRS),Y
E2D2  C9 20      CMP #$20
E2D4  D0 03      BNE $E2D9
E2D6  88         DEY
```

```
E2D9  C8          INY
E2DA  84 A1       STY $A1
E2DC  A0 00       LDY #$00
E2DE  84 C6       STY CURSOR-COL
E2E0  84 CD       STY $CD
E2E2  A5 A3       LDA $A3
E2E4  30 16       BMI $E2FC
E2E6  C5 D8       CMP CURSOR-LINE
E2E8  D0 12       BNE $E2FC
E2EA  A5 A4       LDA $A4
E2EC  85 C6       STA CURSOR-COL
E2EE  C5 A1       CMP $A1
E2F0  90 0A       BCC $E2FC
E2F2  B0 2B       BCS $E31F
-------------------------------------
E2F4  98          TYA          INPUT FROM
E2F5  48          PHA
E2F6  8A          TXA            SCREEN
E2F7  48          PHA
E2F8  A5 AC       LDA $AC
E2FA  F0 A1       BEQ $E29D
E2FC  A4 C6       LDY CURSOR-COL
E2FE  B1 C4       LDA (SCREEN-ADDRS),Y
E300  85 D9       STA $D9
E302  29 3F       AND #$3F
E304  06 D9       ASL $D9
E306  24 D9       BIT $D9
E308  10 02       BPL $E30C
E30A  09 80       ORA #$80
E30C  90 04       BCC $E312
E30E  A6 CD       LDX $CD
E310  D0 04       BNE $E316
E312  70 02       BVS $E316
E314  09 40       ORA #$40
E316  E6 C6       INC CURSOR-COL
E318  20 3F E3    JSR $E33F
E31B  C4 A1       CPY $A1
E31D  D0 11       BNE $E330
E31F  A9 00       LDA #$00
E321  85 AC       STA $AC
E323  A9 0D       LDA #$0D
E325  A6 B0       LDX $B0
E327  E0 03       CPX #$03
E329  F0 03       BEQ $E32E
E32B  20 D8 E3    JSR $E3D8
E32E  A9 0D       LDA #$0D
E330  85 D9       STA $D9
E332  68          PLA
E333  AA          TAX
E334  68          PLA
E335  A8          TAY
E336  A5 D9       LDA $D9
E338  C9 DE       CMP #$DE
E33A  D0 02       BNE $E33E
E33C  A9 FF       LDA #$FF
E33E  60          RTS
-------------------------------------
E33F  C9 22       CMP #$22     QUOTE-
E341  D0 08       BNE $E34B      TEST
E343  A5 CD       LDA $CD
E345  49 01       EOR #$01
```

```
E3BD  68        PLA
E3BE  D0 BE     BNE $E37E
E3C0  B5 DF     LDA $DF,X
E3C2  30 05     BMI $E3C9
E3C4  CA        DEX
E3C5  B5 DF     LDA $DF,X
E3C7  A0 4F     LDY #$4F
E3C9  CA        DEX
E3CA  86 D8     STX CURSOR-LINE
E3CC  85 C5     STA $C5
E3CE  BD 48 E7  LDA $E748,X
E3D1  85 C4     STA SCREEN-ADDRS
E3D3  84 C6     STY CURSOR-COL
E3D5  84 D5     STY $D5
E3D7  60        RTS
```

OUTPUT CHARACTER

```
E3D8  48        PHA
E3D9  85 D9     STA $D9
E3DB  8A        TXA
E3DC  48        PHA
E3DD  98        TYA
E3DE  48        PHA
E3DF  A9 00     LDA #$00
E3E1  85 AC     STA $AC
E3E3  A4 C6     LDY CURSOR-COL
E3E5  A5 D9     LDA $D9
E3E7  10 03     BPL $E3EC
E3E9  4C 7A E4  JMP $E47A  SCREEN-CONTROL-CHAR
E3EC  C9 0D     CMP #$0D
E3EE  D0 03     BNE $E3F3
E3F0  4C 2F E5  JMP $E52F  <CR>
E3F3  C9 20     CMP #$20
E3F5  90 08     BCC $E3FF  non-printing char
E3F7  29 3F     AND #$3F
E3F9  20 3F E3  JSR $E33F  quote-test
E3FC  4C 4E E3  JMP $E34E
E3FF  A6 DC     LDX $DC    insert mode?
E401  F0 03     BEQ $E406   ..no
E403  4C 52 E3  JMP $E352   ..yes
E406  C9 14     CMP #$14   Delete?
E408  D0 1C     BNE $E426    ..no
E40A  88        DEY          yes.
E40B  84 C6     STY CURSOR-COL
E40D  10 06     BPL $E415
E40F  20 B4 E3  JSR $E3B4
E412  4C 20 E4  JMP $E420
E415  C8        INY
E416  B1 C4     LDA (SCREEN-ADDRS),Y   PERFORM 'DELETE'
E418  88        DEY
E419  91 C4     STA (SCREEN-ADDRS),Y
E41B  C8        INY
E41C  C4 D5     CPY $D5
E41E  D0 F5     BNE $E415
E420  A9 20     LDA #$20
E422  91 C4     STA (SCREEN-ADDRS),Y
E424  D0 3C     BNE $E462
E426  A6 CD     LDX $CD
E428  F0 03     BEQ $E42D
E42A  4C 52 E3  JMP $E352
E42D  C9 12     CMP #$12
E42F  D0 02     BNE $E433
```

```
E431   85 9F       STA $9F
E433   C9 13       CMP #$13
E435   D0 03       BNE $E43A
E437   20 57 E2    JSR $E257
E43A   C9 1D       CMP #$1D
E43C   D0 12       BNE $E450
E43E   C8          INY
E43F   84 C6       STY CURSOR-COL
E441   88          DEY
E442   C4 D5       CPY $D5
E444   90 07       BCC $E44D
E446   20 19 E5    JSR $E519
E449   A0 00       LDY #$00
E44B   84 C6       STY CURSOR-COL
E44D   4C 7E E3    JMP $E37E
E450   C9 11       CMP #$11
E452   D0 0E       BNE $E462
E454   18          CLC
E455   98          TYA
E456   69 28       ADC #$28
E458   A8          TAY
E459   C5 D5       CMP $D5
E45B   90 EE       BCC $E44B
E45D   F0 EC       BEQ $E44B
E45F   20 19 E5    JSR $E519
E462   4C 7E E3    JMP $E37E
E465   E8          INX
E466   85 D8       STA CURSOR-LINE
E468   98          TYA
E469   E9 28       SBC #$28
E46B   85 C6       STA CURSOR-COL
E46D   E6 D8       INC CURSOR-LINE
E46F   AD 48 E7    LDA $E748
E472   85 C4       STA SCREEN-ADDRS
E474   A5 E0       LDA $E0
E476   85 C5       STA $C5
E478   D0 E8       BNE $E462
E47A   29 7F       AND #$7F
E47C   C9 7F       CMP #$7F
E47E   D0 02       BNE $E482
E480   A9 5E       LDA #$5E
E482   C9 20       CMP #$20
E484   90 03       BCC $E489
E486   4C 4C E3    JMP $E34C
E489   C9 0D       CMP #$0D
E48B   D0 03       BNE $E490
E48D   4C 2F E5    JMP $E52F
E490   A6 CD       LDX $CD
E492   D0 30       BNE $E4C4
E494   C9 14       CMP #$14
E496   D0 28       BNE $E4C0
E498   A4 D5       LDY $D5
E49A   B1 C4       LDA (SCREEN-ADDRS),Y
E49C   C9 20       CMP #$20
E49E   D0 04       BNE $E4A4
E4A0   C4 C6       CPY CURSOR-COL
E4A2   D0 07       BNE $E4AB
E4A4   C0 4F       CPY #$4F
E4A6   F0 BA       BEQ $E462
E4A8   20 BA E5    JSR $E5BA
```

```
E4AB  A4 D5      LDY $D5
E4AD  88         DEY
E4AE  B1 C4      LDA (SCREEN-ADDRS),Y
E4B0  C8         INY
E4B1  91 C4      STA (SCREEN-ADDRS),Y
E4B3  88         DEY
E4B4  C4 C6      CPY CURSOR-COL
E4B6  D0 F5      BNE $E4AD
E4B8  A9 20      LDA #$20
E4BA  91 C4      STA (SCREEN-ADDRS),Y
E4BC  E6 DC      INC $DC
E4BE  D0 56      BNE $E516
E4C0  A6 DC      LDX $DC
E4C2  F0 05      BEQ $E4C9
E4C4  09 40      ORA #$40
E4C6  4C 52 E3   JMP $E352
E4C9  C9 11      CMP #$11
E4CB  D0 2B      BNE $E4F8
E4CD  A5 C6      LDA CURSOR-COL
E4CF  C9 28      CMP #$28
E4D1  90 06      BCC $E4D9
E4D3  E9 28      SBC #$28
E4D5  85 C6      STA CURSOR-COL
E4D7  B0 3D      BCS $E516
E4D9  A6 D8      LDX CURSOR-LINE
E4DB  F0 39      BEQ $E516
E4DD  B5 DF      LDA $DF,X
E4DF  10 07      BPL $E4E8
E4E1  C6 D8      DEC CURSOR-LINE
E4E3  20 5D E2   JSR $E25D
E4E6  90 2E      BCC $E516
E4E8  CA         DEX
E4E9  CA         DEX
E4EA  86 D8      STX CURSOR-LINE
E4EC  20 5D E2   JSR $E25D
E4EF  A5 C6      LDA CURSOR-COL
E4F1  18         CLC
E4F2  69 28      ADC #$28
E4F4  85 C6      STA CURSOR-COL
E4F6  D0 1E      BNE $E516
E4F8  C9 12      CMP #$12
E4FA  D0 04      BNE $E500
E4FC  A9 00      LDA #$00
E4FE  85 9F      STA $9F
E500  C9 1D      CMP #$1D
E502  D0 0B      BNE $E50F
E504  88         DEY
E505  84 C6      STY CURSOR-COL
E507  10 0D      BPL $E516
E509  20 B4 E3   JSR $E3B4
E50C  4C 7E E3   JMP $E37E
E50F  C9 13      CMP #$13
E511  D0 03      BNE $E516
E513  20 29 E2   JSR $E229
E516  4C 7E E3   JMP $E37E
E519  38         SEC
E51A  46 A3      LSR $A3
E51C  A6 D8      LDX CURSOR-LINE
E51E  E8         INX
E51F  E0 19      CPX #$19
```

GO TO NEXT SCREEN LINE

```
E521  D0 03     BNE $E526
E523  20 3F E5  JSR $E53F
E526  B5 E0     LDA $E0,X
E528  10 F4     BPL $E51E
E52A  86 D8     STX CURSOR-LINE
E52C  4C 5D E2  JMP $E25D
```

START NEW SCREEN LINE

```
E52F  A9 00     LDA #$00
E531  85 DC     STA $DC
E533  85 9F     STA $9F
E535  85 CD     STA $CD
E537  85 C6     STA CURSOR-COL
E539  20 19 E5  JSR $E519
E53C  4C 7E E3  JMP $E37E
```

SCROLL SCREEN UP 1 LINE

```
E53F  78        SEI
E540  A0 00     LDY #$00
E542  84 C4     STY SCREEN-ADDRS
E544  A9 80     LDA #$80
E546  85 C8     STA U-PTR+1
E548  85 C5     STA $C5
E54A  A9 28     LDA #$28
E54C  24 E1     BIT $E1
E54E  30 02     BMI $E552
E550  A9 50     LDA #$50
E552  85 C7     STA U-POINTR
E554  A9 34     LDA #$34
E556  8D 11 E8  STA $E811
E559  B1 C7     LDA (U-POINTR),Y
E55B  91 C4     STA (SCREEN-ADDRS),Y
E55D  C8        INY
E55E  D0 F9     BNE $E559
E560  E6 C8     INC U-PTR+1
E562  E6 C5     INC $C5
E564  A9 84     LDA #$84
E566  C5 C8     CMP U-PTR+1
E568  D0 EF     BNE $E559
E56A  A9 E8     LDA #$E8
E56C  85 C4     STA SCREEN-ADDRS
E56E  C6 C5     DEC $C5
E570  A9 20     LDA #$20
E572  C6 C4     DEC SCREEN-ADDRS
E574  C6 C7     DEC U-POINTR
E576  91 C4     STA (SCREEN-ADDRS),Y
E578  D0 F8     BNE $E572
E57A  A2 19     LDX #$19
E57C  86 D8     STX CURSOR-LINE
E57E  A2 00     LDX #$00
E580  C6 D8     DEC CURSOR-LINE
E582  B5 E0     LDA $E0,X
E584  29 7F     AND #$7F
E586  B4 E1     LDY $E1,X
E588  10 02     BPL $E58C
E58A  09 80     ORA #$80
E58C  95 E0     STA $E0,X
E58E  E8        INX
E58F  E0 19     CPX #$19
E591  D0 EF     BNE $E582
E593  A9 83     LDA #$83
E595  85 F8     STA $F8
E597  A5 F0     LDA $F0
```

```
E595  A9 3C      LDA #$3C
E597  8D 11 E8   STA $E811
E5A0  58         CLI
E5A1  A9 FE      LDA #$FE
E5A3  CD 12 E8   CMP $E812
E5A6  D0 0F      BNE $E5B7
E5A8  A0 08      LDY #$08
E5AA  8D 45 E8   STA $E845
E5AD  2C 4D E8   BIT $E84D
E5B0  50 FB      BVC $E5AD
E5B2  88         DEY
E5B3  D0 F5      BNE $E5AA
E5B5  84 9E      STY $9E
E5B7  A6 D8      LDX CURSOR-LINE
E5B9  60         RTS
```

OPEN NEW LINE ON SCREEN

```
E5BA  A6 D8      LDX CURSOR-LINE
E5BC  E8         INX
E5BD  78         SEI
E5BE  A9 34      LDA #$34
E5C0  8D 11 E8   STA $E811
E5C3  E0 18      CPX #$18
E5C5  F0 33      BEQ $E5FA
E5C7  90 03      BCC $E5CC
E5C9  4C 9C E3   JMP $E39C
E5CC  A2 17      LDX #$17
E5CE  B5 E1      LDA $E1,X
E5D0  09 80      ORA #$80
E5D2  85 C8      STA U-PTR+1
E5D4  B4 E0      LDY $E0,X
E5D6  30 02      BMI $E5DA
E5D8  29 7F      AND #$7F
E5DA  95 E1      STA $E1,X
E5DC  98         TYA
E5DD  09 80      ORA #$80
E5DF  85 C5      STA $C5
E5E1  A0 27      LDY #$27
E5E3  BD 49 E7   LDA $E749,X
E5E6  85 C7      STA U-POINTR
E5E8  BD 48 E7   LDA $E748,X
E5EB  85 C4      STA SCREEN-ADDRS
E5ED  B1 C4      LDA (SCREEN-ADDRS),Y
E5EF  91 C7      STA (U-POINTR),Y
E5F1  88         DEY
E5F2  10 F9      BPL $E5ED
E5F4  CA         DEX
E5F5  E4 D8      CPX CURSOR-LINE
E5F7  D0 D5      BNE $E5CE
E5F9  E8         INX
E5FA  B5 E0      LDA $E0,X
E5FC  09 80      ORA #$80
E5FE  85 C5      STA $C5
E600  29 7F      AND #$7F
E602  95 E0      STA $E0,X
E604  BD 48 E7   LDA $E748,X
E607  85 C4      STA SCREEN-ADDRS
E609  A0 27      LDY #$27
E60B  A9 20      LDA #$20
E60D  91 C4      STA (SCREEN-ADDRS),Y
E60F  88         DEY
```

```
E612  A9 3C      LDA #$3C
E614  8D 11 E8   STA $E811
E617  58         CLI
E618  4C 5D E2   JMP $E25D
-------------------------------------------
E61B  48         PHA          INTERRUPT
E61C  8A         TXA            ENTRY
E61D  48         PHA
E61E  98         TYA
E61F  48         PHA
E620  BA         TSX
E621  BD 04 01   LDA $0104,X
E624  29 10      AND #$10
E626  F0 03      BEQ $E62B
E628  6C 92 00   JMP ($0092)
E62B  6C 90 00   JMP ($0090)
-------------------------------------------
E62E  20 EA FF   JSR $FFEA    HARDWARE
E631  A5 A7      LDA $A7        INTERRUPT:
E633  D0 18      BNE $E64D
E635  C6 A8      DEC $A8      CLOCK
E637  D0 14      BNE $E64D      AND
E639  A9 14      LDA #$14     KEYBOARD
E63B  85 A8      STA $A8
E63D  A4 C6      LDY CURSOR-COL
E63F  46 AA      LSR $AA
E641  B1 C4      LDA (SCREEN-ADDRS),Y
E643  B0 04      BCS $E649
E645  E6 AA      INC $AA
E647  85 A9      STA $A9
E649  49 80      EOR #$80
E64B  91 C4      STA (SCREEN-ADDRS),Y
E64D  A2 FF      LDX #$FF
E64F  86 A6      STX $A6
E651  E8         INX
E652  86 98      STX $98
E654  A2 50      LDX #$50
E656  AD 10 E8   LDA $E810
E659  29 F0      AND #$F0
E65B  8D 10 E8   STA $E810
E65E  A0 00      LDY #$00
E660  AD 10 E8   LDA $E810
E663  0A         ASL A
E664  0A         ASL A
E665  0A         ASL A
E666  10 06      BPL $E66E  #1
E668  84 F9      STY $F9
E66A  A9 3D      LDA #$3D
E66C  D0 06      BNE $E674
E66E  A5 F9      LDA $F9
E670  D0 05      BNE $E677
E672  A9 35      LDA #$35
E674  8D 13 E8   STA $E813
E677  90 09      BCC $E682  #2
E679  84 FA      STY $FA
E67B  AD 40 E8   LDA $E840
E67E  09 10      ORA #$10
E680  D0 09      BNE $E68B
E682  A5 FA      LDA $FA
E684  D0 08      BNE $E68E
E686  AD 40 E8   LDA $E840
```

CURSOR BLINK

TEST + CONTROL CASSETTE

```
E68B  8D 40 E8    STA $E840
E68E  A0 08       LDY #$08
E690  AD 12 E8    LDA $E812
E693  CD 12 E8    CMP $E812
E696  D0 F6       BNE $E68E
E698  4A          LSR A
E699  B0 1C       BCS $E6B7
E69B  48          PHA
E69C  BD F7 E6    LDA $E6F7,X
E69F  D0 06       BNE $E6A7
E6A1  A9 01       LDA #$01
E6A3  85 98       STA $98
E6A5  D0 0F       BNE $E6B6
E6A7  C9 FF       CMP #$FF
E6A9  F0 0B       BEQ $E6B6
E6AB  C9 3C       CMP #$3C
E6AD  D0 05       BNE $E6B4
E6AF  2C 11 E8    BIT $E811
E6B2  30 02       BMI $E6B6
E6B4  86 A6       STX $A6
E6B6  68          PLA
E6B7  CA          DEX
E6B8  F0 08       BEQ $E6C2
E6BA  88          DEY
E6BB  D0 DB       BNE $E698
E6BD  EE 10 E8    INC $E810
E6C0  D0 CC       BNE $E68E
E6C2  A5 A6       LDA $A6
E6C4  C5 97       CMP $97
E6C6  F0 1C       BEQ $E6E4
E6C8  85 97       STA $97
E6CA  AA          TAX
E6CB  30 17       BMI $E6E4
E6CD  BD F7 E6    LDA $E6F7,X
E6D0  46 98       LSR $98
E6D2  90 02       BCC $E6D6
E6D4  09 80       ORA #$80
E6D6  A6 9E       LDX $9E
E6D8  9D 6F 02    STA $026F,X
E6DB  E8          INX
E6DC  E0 0A       CPX #$0A
E6DE  D0 02       BNE $E6E2
E6E0  A2 00       LDX #$00
E6E2  86 9E       STX $9E
E6E4  68          PLA
E6E5  A8          TAY
E6E6  68          PLA
E6E7  AA          TAX
E6E8  68          PLA
E6E9  40          RTI
E6EA  A8          TAY
E6EB  AD 40 E8    LDA $E840
E6EE  29 20       AND #$20
E6F0  D0 F9       BNE $E6EB
E6F2  98          TYA
E6F3  A4 C6       LDY CURSOR-COL
E6F5  91 C4       STA (SCREEN-ADDRS),Y
E6F7  60          RTS
```

KEYBOARD TEST

SHIFT KEY

"<"

NEXT KYBD ROW

KEY ALREADY LOGGED?

SHIFTED?

PRINT TO SCREEN

```
E700  2D 30 00 3E FF 5D 40 00
E708  28 32 FF 3F 2C 4E 56 58
E710  33 31 0D 3B 4D 42 43 5A
E718  2A 35 FF 3A 4B 48 46 53
E720  36 34 FF 4C 4A 47 44 41
E728  2F 38 FF 50 49 59 52 57
E730  39 37 5E 4F 55 54 45 51
E738  14 11 FF 29 5C 27 24 22
E740  1D 13 5F 28 26 25 23 21
E748  00 28 50 78 A0 C8 F0 18
E750  40 68 90 B8 E0 08 30 58
E758  80 A8 D0 F8 20 48 70 98
E760  C0 4C 4F 41 44 0D 52 55
E768  4E 0D A2 01 B5 FA 48 B5
```

KEYBOARD MATRIX

```
E76A  A2 01     LDX #$01
E76C  B5 FA     LDA $FA,X
E76E  48        PHA
E76F  B5 FB     LDA START-ADDS,X
E771  20 75 E7  JSR $E775
E774  68        PLA
E775  48        PHA
E776  4A        LSR A
E777  4A        LSR A
E778  4A        LSR A
E779  4A        LSR A
E77A  20 8D E7  JSR $E78D
E77D  AA        TAX
E77E  68        PLA
E77F  29 0F     AND #$0F
E781  20 8D E7  JSR $E78D
E784  48        PHA
E785  8A        TXA
E786  20 D2 FF  JSR $FFD2  OUTPUT
E789  68        PLA
E78A  4C D2 FF  JMP $FFD2  OUTPUT
```

MLM: OUTPUT — .. 4 HEX DIGITS .. 2 HEX DIGITS .. 2 ASCII CHARACTERS

```
E78D  18        CLC
E78E  69 F6     ADC #$F6
E790  90 02     BCC $E794
E792  69 06     ADC #$06
E794  69 3A     ADC #$3A
E796  60        RTS
```

MLM: BINARY → ASCII DIGIT

```
E797  A2 02     LDX #$02
E799  B5 FA     LDA $FA,X
E79B  48        PHA
E79C  B5 FC     LDA START-ADS-HI,X
E79E  95 FA     STA $FA,X
E7A0  68        PLA
E7A1  95 FC     STA START-ADS-HI,X
E7A3  CA        DEX
E7A4  D0 F3     BNE $E799
E7A6  60        RTS
```

MLM: SWAP TMPØ ↔ TMP2

```
E7A7  20 B6 E7  JSR $E7B6
E7AA  90 02     BCC $E7AE
E7AC  85 FC     STA START-ADS-HI
E7AE  20 B6 E7  JSR $E7B6
E7B1  90 02     BCC $E7B5
E7B3  85 FB     STA START-ADDS
```

MLM: GET 2-BYTE HEX INPUT

```
E7B8  8D 00 01    STA $0100
E7BB  20 EB E7    JSR $E7EB     SCAN
E7BE  C9 20       CMP #$20       UP TO
E7C0  D0 09       BNE $E7CB     2 SPACES
E7C2  20 EB E7    JSR $E7EB
E7C5  C9 20       CMP #$20
E7C7  D0 0F       BNE $E7D8
E7C9  18          CLC
E7CA  60          RTS
-------------------------------------------
E7CB  20 E0 E7    JSR $E7E0     MLM:
E7CE  0A          ASL A          PACK 2
E7CF  0A          ASL A         ASCII HEX
E7D0  0A          ASL A          CHARACTERS
E7D1  0A          ASL A            INTO 1 BYTE
E7D2  8D 00 01    STA $0100
E7D5  20 EB E7    JSR $E7EB
E7D8  20 E0 E7    JSR $E7E0
E7DB  0D 00 01    ORA $0100
E7DE  38          SEC
E7DF  60          RTS
-------------------------------------------
E7E0  C9 3A       CMP #$3A       MLM:
E7E2  08          PHP           CONVERT
E7E3  29 0F       AND #$0F       ASCII
E7E5  28          PLP           → BINARY
E7E6  90 02       BCC $E7EA       DIGIT
E7E8  69 08       ADC #$08
E7EA  60          RTS
-------------------------------------------
E7EB  20 CF FF    JSR $FFCF "INPUT" MLM:
E7EE  C9 0D       CMP #$0D       GET
E7F0  D0 F8       BNE $E7EA      CHARACTER:
E7F2  68          PLA           ABORT ON <CR>
E7F3  68          PLA
E7F4  4C 54 FD    JMP $FD54
-------------------------------------------
E7F7  A9 3F       LDA #$3F       MLM:
E7F9  20 D2 FF    JSR $FFD2 OUTPUT  PRINT "?"
E7FC  4C 56 FD    JMP $FD56
-------------------------------------------
```

```
F000 TOO MANY FILESFI
F010 LE OPENFILE NOT
F020 OPENFILE NOT FOU
F030 ND SEARCHING FOR
F040   PRESS PLAY & R
F050 ECORD ON TAPE #
F060 LOAD WRITING  VE
F070 RIFYDEVICE NOT P
F080 RESENTNOT INPUT
F090 FILENOT OUTPUT F
F0A0 ILE FOUND  OK  R
F0B0 EADY.  )@P ) H-@H
```

```
F0B6  A9 40       LDA #$40 SEND "TALK"     SET UP
F0B8  D0 02       BNE $F0BC                IEEE
F0BA  A9 20       LDA #$20 SEND "LISTEN"
F0BC  48          PHA
F0BD  AD 40 E8    LDA $E840   }
F0C0  09 02       ORA #$02    } NRFD
F0C2  8D 40 E8    STA $E840   }
F0C5  A9 3C       LDA #$3C    } NDAC
F0C7  8D 21 E8    STA $E821   }
```

```
F0CC  F0 11      BEQ $F0DF
F0CE  A9 34      LDA #$34     } EOI ON
F0D0  8D 11 E8   STA $E811    }
F0D3  20 EE F0   JSR $F0EE        SEND PREVIOUS
F0D6  A9 00      LDA #$00           CHARACTER WITH "EOI"
F0D8  85 A0      STA $A0
F0DA  A9 3C      LDA #$3C     } EOI off
F0DC  8D 11 E8   STA $E811    }
F0DF  68         PLA
F0E0  05 D4      ORA DEVICE
F0E2  85 A5      STA $A5          CHANNEL COMMAND
F0E4  AD 40 E8   LDA $E840    } WAIT FOR
F0E7  10 FB      BPL $F0E4    }    DAV in to turn off
F0E9  29 FB      AND #$FB     } ATN ON
F0EB  8D 40 E8   STA $E840    }
F0EE  A9 3C      LDA #$3C     } DAV
F0F0  8D 23 E8   STA $E823    }
F0F3  AD 40 E8   LDA $E840    } NRFD?
F0F6  29 41      AND #$41     } NDAC?
F0F8  C9 41      CMP #$41     }
F0FA  F0 41      BEQ $F13D    "DEVICE NOT PRESENT"
F0FC  A5 A5      LDA $A5      } SEND CHANNEL
F0FE  49 FF      EOR #$FF     }    COMMAND OR DATA
F100  8D 22 E8   STA $E822    }
F103  2C 40 E8   BIT $E840
F106  50 FB      BVC $F103        NRFD?
F108  A9 34      LDA #$34     } DAV   SIGNAL "DATA
F10A  8D 23 E8   STA $E823    }          AVAILABLE
F10D  A9 FF      LDA #$FF     } SET TIMER 1
F10F  8D 45 E8   STA $E845    }
F112  AD 40 E8   LDA $E840
F115  2C 4D E8   BIT $E84D        T1?
F118  70 1C      BVS $F136        "TIMEOUT"
F11A  4A         LSR A
F11B  90 F5      BCC $F112        NDAC in?
F11D  A9 3C      LDA #$3C     } DAV   SIGNAL "DATA
F11F  8D 23 E8   STA $E823    }          UNAVAILABLE"
F122  A9 FF      LDA #$FF     } CLEAR OUTPUT BUS
F124  8D 22 E8   STA $E822    }
F127  60         RTS
-------------------------------------------------------------
F128  85 A5      STA $A5                  OUTPUT IMMEDIATE
F12A  20 EE F0   JSR $F0EE                TO IEEE + CLEAR ATN
F12D  AD 40 E8   LDA $E840    } ATN OFF
F130  09 04      ORA #$04     }
F132  8D 40 E8   STA $E840    }
F135  60         RTS
-------------------------------------------------------------
F136  A9 01      LDA #$01     WRITE TIMEOUT
F138  20 7F FB   JSR $FB7F
F13B  D0 E0      BNE $F11D
-------------------------------------------------------------
F13D  A9 80      LDA #$80     DEVICE NOT PRESENT
F13F  30 F7      BMI $F138
-------------------------------------------------------------
F141  A9 02      LDA #$02     TIMEOUT ON READ
F143  20 7F FB   JSR $FB7F
F146  AD 40 E8   LDA $E840    } NRFD
F149  29 FD      AND #$FD     }
F14B  8D 40 E8   STA $E840    }
F14E  A9 34      LDA #$34     } NDAC : true
F150  8D 21 E8   STA $E821    }
```

SEND IEEE BYTE

```
F156  B9 00 F0    LDA $F000,Y    SEND CANNED
F159  08          PHP              MESSAGE
F15A  29 7F       AND #$7F
F15C  20 D8 E3    JSR $E3D8
F15F  C8          INY
F160  28          PLP
F161  10 F3       BPL $F156
F163  60          RTS
-------------------------------------------------
F164  85 A5       STA $A5        OUTPUT IMMEDIATE
F166  20 EE F0    JSR $F0EE        TO IEEE
F169  20 46 F1    JSR $F146        AND CLEAR
F16C  4C 2D F1    JMP $F12D
-------------------------------------------------
F16F  24 A0       BIT $A0        OUTPUT
F171  30 04       BMI $F177        CHAR
F173  C6 A0       DEC $A0          TO
F175  D0 05       BNE $F17C        IEEE
F177  48          PHA              (deferred)
F178  20 EE F0    JSR $F0EE
F17B  68          PLA
F17C  85 A5       STA $A5
F17E  60          RTS
-------------------------------------------------
F17F  A9 5F       LDA #$5F       SEND "UNTALK"   DROP
F181  D0 02       BNE $F185
F183  A9 3F       LDA #$3F       SEND "UNLISTN"  IEEE
F185  EA          NOP                            CHANNEL
F186  EA          NOP
F187  20 BC F0    JSR $F0BC
F18A  D0 A1       BNE $F12D
-------------------------------------------------
F18C  A9 34       LDA #$34       } NDAC          INPUT
F18E  8D 21 E8    STA $E821      }
F191  AD 40 E8    LDA $E840      } NRFD          IEEE
F194  09 02       ORA #$02       }
F196  8D 40 E8    STA $E840      }               BYTE
F199  A9 FF       LDA #$FF       } TIMER 1
F19B  8D 45 E8    STA $E845      }
F19E  2C 4D E8    BIT $E84D
F1A1  70 9E       BVS $F141      "TIMEOUT ON READ"
F1A3  2C 40 E8    BIT $E840      DAV?
F1A6  30 F6       BMI $F19E
F1A8  AD 40 E8    LDA $E840      } NRFD
F1AB  29 FD       AND #$FD       }
F1AD  8D 40 E8    STA $E840      }
F1B0  2C 10 E8    BIT $E810      EOI?
F1B3  70 05       BVS $F1BA
F1B5  A9 40       LDA #$40       "EOI LINE"
F1B7  20 7F FB    JSR $FB7F
F1BA  AD 20 E8    LDA $E820      ACCEPT INPUT BYTE
F1BD  49 FF       EOR #$FF
F1BF  48          PHA
F1C0  A9 3C       LDA #$3C       } NDAC    SEND "ACCEPTED"
F1C2  8D 21 E8    STA $E821      }
F1C5  2C 40 E8    BIT $E840      } DAV?    WAIT FOR ACK. (DAV off)
F1C8  10 FB       BPL $F1C5      }
F1CA  A9 34       LDA #$34       } NDAC
F1CC  8D 21 E8    STA $E821      }
F1CF  68          PLA
F1D0  60          RTS
-------------------------------------------------
F1D1  A9 00       LDA #$00       GET
```

```
F1D7   D0 17      BNE $F1F0
F1D9   A5 9E      LDA $9E
F1DB   F0 51      BEQ $F22E
F1DD   78         SEI
F1DE   4C 85 E2   JMP $E285
```

INPUT

```
F1E1   A5 AF      LDA $AF
F1E3   D0 0B      BNE $F1F0
F1E5   A5 C6      LDA CURSOR-COL
F1E7   85 A4      STA $A4
F1E9   A5 D8      LDA CURSOR-LINE
F1EB   85 A3      STA $A3
F1ED   4C F4 E2   JMP $E2F4
F1F0   C9 03      CMP #$03
F1F2   D0 09      BNE $F1FD
F1F4   85 AC      STA $AC
F1F6   A5 D5      LDA $D5
F1F8   85 A1      STA $A1
F1FA   4C F4 E2   JMP $E2F4
F1FD   B0 29      BCS $F228
F1FF   86 AD      STX $AD
F201   20 15 F2   JSR $F215
F204   48         PHA
F205   20 15 F2   JSR $F215
F208   D0 05      BNE $F20F
F20A   A9 40      LDA #$40
F20C   20 7F FB   JSR $FB7F
F20F   D6 BA      DEC $BA,X
F211   A6 AD      LDX $AD
F213   68         PLA
F214   60         RTS
```

.... FROM SCREEN

...FROM CASSETTE

INPUT CHAR FROM TAPE

```
F215   20 06 F8   JSR $F806
F218   D0 0B      BNE $F225
F21A   20 55 F8   JSR $F855
F21D   A6 D4      LDX DEVICE
F21F   A9 00      LDA #$00
F221   95 BA      STA $BA,X
F223   F0 F0      BEQ $F215
F225   B1 D6      LDA (BUFR-ADDS),Y
F227   60         RTS
F228   A5 96      LDA ST
F22A   F0 03      BEQ $F22F
F22C   A9 0D      LDA #$0D
F22E   60         RTS
F22F   4C 8C F1   JMP $F18C
```

...FROM IEEE

TERMINATE IEEE IF ERROR OR EOT

OUTPUT CHAR

```
F232   48         PHA
F233   A5 B0      LDA $B0
F235   C9 03      CMP #$03
F237   D0 04      BNE $F23D
F239   68         PLA
F23A   4C D8 E3   JMP $E3D8
F23D   30 04      BMI $F243
F23F   68         PLA
F240   4C 6F F1   JMP $F16F
F243   68         PLA
F244   85 B4      STA $B4
F246   C9 0A      CMP #$0A
F248   F0 E4      BEQ $F22E
F24A   48         PHA
F24B   8A         TXA
```

...TO SCREEN

...TO IEEE

KILL LINE-FEED TO CASSETTE

```
F24D  98          TYA
F24E  48          PHA
F24F  20 06 F8    JSR $F806
F252  D0 10       BNE $F264
F254  20 86 F8    JSR $F886
F257  A6 D4       LDX DEVICE
F259  A9 01       LDA #$01
F25B  95 BA       STA $BA,X
F25D  A0 00       LDY #$00
F25F  A9 02       LDA #$02
F261  91 D6       STA (BUFR-ADDS),Y
F263  C8          INY
F264  A5 B4       LDA $B4
F266  91 D6       STA (BUFR-ADDS),Y
F268  68          PLA
F269  A8          TAY
F26A  68          PLA
F26B  AA          TAX
F26C  68          PLA
F26D  60          RTS
```

```
F26E  A9 00       LDA #$00
F270  85 AE       STA $AE
F272  A5 B0       LDA $B0
F274  C9 04       CMP #$04
F276  90 03       BCC $F27B
F278  20 83 F1    JSR $F183   SEND "UNLISTEN"
F27B  A5 AF       LDA $AF
F27D  C9 04       CMP #$04
F27F  90 03       BCC $F284
F281  20 7F F1    JSR $F17F   SEND "UNTALK"
F284  A9 03       LDA #$03
F286  85 B0       STA $B0
F288  A9 00       LDA #$00
F28A  85 AF       STA $AF
F28C  60          RTS
```

ABORT ALL FILES

RESTORE DEFAULT I/O

```
F28D  A6 AE       LDX $AE
F28F  CA          DEX
F290  30 16       BMI $F2A8
F292  DD 51 02    CMP $0251,X
F295  F0 11       BEQ $F2A8
F297  D0 F6       BNE $F28F
```

FIND FILE TABLE ENTRY

```
F299  BD 51 02    LDA $0251,X
F29C  85 D2       STA LOGICAL-FILE
F29E  BD 5B 02    LDA $025B,X
F2A1  85 D4       STA DEVICE
F2A3  BD 65 02    LDA $0265,X
F2A6  85 D3       STA SECNDY-ADDS
F2A8  60          RTS
```

SET PARAMETERS FROM FILE TABLE

```
F2A9  20 CE F4    JSR $F4CE
F2AC  A5 D2       LDA LOGICAL-FILE
F2AE  20 8D F2    JSR $F28D
F2B1  D0 4D       BNE $F300
F2B3  20 99 F2    JSR $F299
F2B6  8A          TXA
F2B7  48          PHA
F2B8  A5 D4       LDA DEVICE
F2BA  F0 28       BEQ $F2E4
F2BC  C9 03       CMP #$03
```

SET I/O FROM FILE TABLE

```
F2C2  A5 D3      LDA SECNDY-ADDS     CLOSE
F2C4  29 0F      AND #$0F             CASSETTE
F2C6  F0 1C      BEQ $F2E4
F2C8  20 56 F6   JSR $F656
F2CB  A9 00      LDA #$00
F2CD  20 44 F2   JSR $F244
F2D0  20 86 F8   JSR $F886
F2D3  A5 D3      LDA SECNDY-ADDS
F2D5  C9 62      CMP #$62
F2D7  D0 0B      BNE $F2E4
F2D9  A9 05      LDA #$05
F2DB  20 DA F5   JSR $F5DA
F2DE  4C E4 F2   JMP $F2E4
-------------------------------------------------
F2E1  20 F0 F6   JSR $F6F0           CLOSE IEEE DEVICE
F2E4  68         PLA
F2E5  AA         TAX
F2E6  C6 AE      DEC $AE
F2E8  E4 AE      CPX $AE
F2EA  F0 14      BEQ $F300           CLEAR
F2EC  A4 AE      LDY $AE               ITEM
F2EE  B9 51 02   LDA $0251,Y             FROM
F2F1  9D 51 02   STA $0251,X              FILE
F2F4  B9 5B 02   LDA $025B,Y              TABLE
F2F7  9D 5B 02   STA $025B,X
F2FA  B9 65 02   LDA $0265,Y
F2FD  9D 65 02   STA $0265,X
F300  60         RTS
-------------------------------------------------
F301  A5 9B      LDA $9B             TEST
F303  C9 EF      CMP #$EF            STOP
F305  D0 07      BNE $F30E           KEY
F307  08         PHP
F308  20 72 F2   JSR $F272
F30B  85 9E      STA $9E
F30D  28         PLP
F30E  60         RTS
-------------------------------------------------
F30F  20 01 F3   JSR $F301           ACTION
F312  4C 3F C7   JMP $C73F             'STOP'
-------------------------------------------------
F315  20 1D F3   JSR $F31D           SEND MESSAGE
F318  D0 F4      BNE $F30E           IF DIRECT
F31A  4C 56 F1   JMP $F156
-------------------------------------------------
F31D  A5 78      LDA BASIC-ADDS/HI   TEST DIRECT
F31F  C9 02      CMP #$02
F321  60         RTS
-------------------------------------------------
F322  A5 D4      LDA DEVICE
F324  D0 03      BNE $F329                        PERFORM
F326  4C 03 CE   JMP $CE03           "SYNTAX ERR"  PROGRAM
F329  C9 03      CMP #$03                          LOAD
F32B  F0 F9      BEQ $F326           "SYNTAX ERR"
F32D  90 66      BCC $F395
F32F  A9 60      LDA #$60                ...FROM IEEE
F331  85 D3      STA SECNDY-ADDS
F333  A4 D1      LDY NAME-LEN
F335  D0 03      BNE $F33A
F337  4C 03 CE   JMP $CE03           "SYNTAX ERROR"
-------------------------------------------------
F33A  20 0A F4   JSR $F40A              "SEARCHING"
F33D  20 66 F4   JSR $F466           SEND NAME TO IEEE
F340  20 B6 F0   JSR $F0B6              SEND 'TALK'
F343  A5 D3      LDA SECNDY-ADDS
F345  20 28 F1   JSR $F128
```

```
F34B  85 FB      STA START-ADDS
F34D  20 8C F1   JSR $F18C
F350  85 FC      STA START-ADS-HI ----------
F352  20 2E F4   JSR $F42E
F355  A9 FD      LDA #$FD
F357  25 96      AND ST
F359  85 96      STA ST
F35B  20 0F F3   JSR $F30F
F35E  20 8C F1   JSR $F18C
F361  AA         TAX
F362  A5 96      LDA ST
F364  4A         LSR A
F365  4A         LSR A
F366  B0 ED      BCS $F355
F368  8A         TXA
F369  A4 9D      LDY $9D
F36B  F0 0B      BEQ $F378
F36D  88         DEY
F36E  D1 FB      CMP (START-ADDS),Y
F370  F0 08      BEQ $F37A
F372  A2 10      LDX #$10
F374  86 96      STX ST
F376  D0 02      BNE $F37A
F378  91 FB      STA (START-ADDS),Y
F37A  E6 FB      INC START-ADDS
F37C  D0 02      BNE $F380
F37E  E6 FC      INC START-ADS-HI
F380  24 96      BIT ST
F382  50 D1      BVC $F355
F384  EA         NOP
F385  EA         NOP
F386  EA         NOP
F387  A5 FB      LDA START-ADDS
F389  85 C9      STA $C9
F38B  A5 FC      LDA START-ADS-HI
F38D  85 CA      STA $CA
F38F  20 7F F1   JSR $F17F   SEND "UNTALK"
F392  4C F0 F6   JMP $F6F0
F395  20 56 F6   JSR $F656   TAPE: SET BUFF
F398  20 12 F8   JSR $F812
F39B  20 0A F4   JSR $F40A
F39E  A5 D1      LDA NAME-LEN
F3A0  F0 08      BEQ $F3AA
F3A2  20 94 F4   JSR $F494
F3A5  D0 08      BNE $F3AF
F3A7  4C 6E F5   JMP $F56E   "FILE NOT FOUND"
F3AA  20 A6 F5   JSR $F5A6
F3AD  F0 F8      BEQ $F3A7
F3AF  E0 01      CPX #$01
F3B1  D0 EB      BNE $F39E
F3B3  A5 96      LDA ST
F3B5  29 10      AND #$10
F3B7  D0 74      BNE $F42D
F3B9  20 3C F6   JSR $F63C
F3BC  20 2E F4   JSR $F42E
F3BF  4C 5E F8   JMP $F85E
F3C2  A9 00      LDA #$00        'LOAD'
F3C4  85 90      STA $90
F3C6  20 2E F4   JSR $F42E
```

```
F3CC  A9 FF     LDA #$FF
F3CE  C5 9B     CMP $9B
F3D0  D0 FC     BNE $F3CE
F3D2  C5 9B     CMP $9B
F3D4  D0 F8     BNE $F3CE
F3D6  20 22 F3  JSR $F322
F3D9  A5 9D     LDA $9D
F3DB  D0 50     BNE $F42D
F3DD  20 E6 F8  JSR $F8E6
F3E0  A5 96     LDA ST
F3E2  29 10     AND #$10
F3E4  F0 09     BEQ $F3EF
F3E6  A0 00     LDY #$00
F3E8  84 9E     STY $9E
F3EA  A0 60     LDY #$60    "LOAD ERROR"
F3EC  4C 70 F5  JMP $F570
F3EF  A0 AE     LDY #$AE
F3F1  20 15 F3  JSR $F315
F3F4  20 1D F3  JSR $F31D
F3F7  D0 0B     BNE $F404
F3F9  A5 CA     LDA $CA
F3FB  85 2B     STA END-BASIC+1
F3FD  A5 C9     LDA $C9
F3FF  85 2A     STA END-BASIC
F401  4C 39 C4  JMP $C439
F404  20 A7 C5  JSR $C5A7
F407  4C 90 C5  JMP $C590
F40A  20 1D F3  JSR $F31D        PRINT "SEARCHING"...
F40D  D0 1E     BNE $F42D
F40F  A0 32     LDY #$32    "SEARCHING FOR..."
F411  20 56 F1  JSR $F156
F414  A5 D1     LDA NAME-LEN
F416  F0 15     BEQ $F42D
F418  A0 3D     LDY #$3D        "..FOR..."
F41A  20 56 F1  JSR $F156
F41D  A4 D1     LDY NAME-LEN
F41F  F0 0C     BEQ $F42D
F421  A0 00     LDY #$00
F423  B1 DA     LDA ($DA),Y
F425  20 D2 FF  JSR $FFD2 OUTPUT
F428  C8        INY
F429  C4 D1     CPY NAME-LEN
F42B  D0 F6     BNE $F423
F42D  60        RTS
F42E  A0 5F     LDY #$5F        PRINT "LOADING"
F430  A5 9D     LDA $9D             OR "VERIFYING"
F432  F0 02     BEQ $F436
F434  A0 6D     LDY #$6D
F436  20 15 F3  JSR $F315
F439  A0 39     LDY #$39
F43B  4C 15 F3  JMP $F315
F43E  A2 00     LDX #$00        GET 'LOAD'
F440  86 96     STX ST              'SAVE', 'VERIFY'
F442  86 D1     STX NAME-LEN            PARAMETERS
F444  86 D3     STX SECNDY-ADDS
F446  E8        INX
F447  86 D4     STX DEVICE
F449  20 0F F5  JSR $F50F
```

```
F452  20 60 F4    JSR $F460
F455  86 D4       STX DEVICE
F457  20 0E F5    JSR $F50E
F45A  20 60 F4    JSR $F460
F45D  86 D3       STX SECNDY-ADDS
F45F  60          RTS
```

```
F460  20 16 F5    JSR $F516    GET ANOTHER BYTE PARAMETER
F463  4C 78 D6    JMP $D678
```

```
F466  A5 D3       LDA SECNDY-ADDS      SEND
F468  30 F5       BMI $F45F            PRGM NAME
F46A  A4 D1       LDY NAME-LEN          TO IEEE
F46C  F0 F1       BEQ $F45F
F46E  20 BA F0    JSR $F0BA    SEND "LISTEN"
F471  A5 D3       LDA SECNDY-ADDS
F473  09 F0       ORA #$F0     SEND "Fn" SECONDARY TO OPEN
F475  20 28 F1    JSR $F128
F478  A5 96       LDA ST
F47A  10 05       BPL $F481
F47C  A0 74       LDY #$74     "DEVICE NOT PRESENT"
F47E  4C 70 F5    JMP $F570
F481  A5 D1       LDA NAME-LEN
F483  F0 0C       BEQ $F491
F485  A0 00       LDY #$00
F487  B1 DA       LDA ($DA),Y
F489  20 6F F1    JSR $F16F    OUTPUT TO IEEE
F48C  C8          INY
F48D  C4 D1       CPY NAME-LEN
F48F  D0 F6       BNE $F487
F491  4C 83 F1    JMP $F183    SEND "UNLISTEN"
```

```
F494  20 A6 F5    JSR $F5A6    FIND SPECIFIC
F497  F0 1D       BEQ $F4B6     TAPE
F499  A0 05       LDY #$05       HEADER
F49B  84 B5       STY $B5
F49D  A0 00       LDY #$00
F49F  84 B4       STY $B4
F4A1  C4 D1       CPY NAME-LEN
F4A3  F0 10       BEQ $F4B5
F4A5  B1 DA       LDA ($DA),Y
F4A7  A4 B5       LDY $B5
F4A9  D1 D6       CMP (BUFR-ADDS),Y
F4AB  D0 E7       BNE $F494
F4AD  E6 B4       INC $B4
F4AF  E6 B5       INC $B5
F4B1  A4 B4       LDY $B4
F4B3  D0 EC       BNE $F4A1
F4B5  98          TYA
F4B6  60          RTS
```

```
F4B7  A9 01       LDA #$01     'VERIFY'
F4B9  85 9D       STA $9D
F4BB  20 C6 F3    JSR $F3C6
F4BE  A5 96       LDA ST
F4C0  29 10       AND #$10
F4C2  F0 05       BEQ $F4C9
F4C4  A0 6E       LDY #$6E     "VERIFY ERROR"
F4C6  4C 70 F5    JMP $F570
F4C9  A0 AA       LDY #$AA     "OK"
F4CB  4C 56 F1    JMP $F156
```

```
F4CE  A2 00       LDX #$00     GET PARAMETERS
F4D0  86 D3       STX SECNDY-ADDS   FOR 'OPEN','CLOSE'
```

```
F4D4  86 D1      STX NAME-LEN
F4D6  E8         INX
F4D7  86 D4      STX DEVICE
F4D9  20 19 F5   JSR $F519
F4DC  20 78 D6   JSR $D678
F4DF  86 D2      STX LOGICAL-FILE
F4E1  20 0E F5   JSR $F50E    QUIT?
F4E4  20 60 F4   JSR $F460
F4E7  86 D4      STX DEVICE
F4E9  E0 03      CPX #$03
F4EB  90 02      BCC $F4EF
F4ED  C6 D3      DEC SECNDY-ADDS
F4EF  20 0E F5   JSR $F50E    QUIT?
F4F2  20 60 F4   JSR $F460
F4F5  86 D3      STX SECNDY-ADDS
F4F7  20 0E F5   JSR $F50E    QUIT?
F4FA  20 16 F5   JSR $F516
F4FD  20 9F CC   JSR $CC9F
F500  20 7D D5   JSR $D57D
F503  85 D1      STA NAME-LEN
F505  A5 1F      LDA POINTER
F507  85 DA      STA $DA
F509  A5 20      LDA POINTER-HI
F50B  85 DB      STA $DB
F50D  60         RTS
-------------------------------------------------------
F50E  20 76 00   JSR $0076        ABORT CALLING
F511  D0 02      BNE $F515        SUBRTN IF
F513  68         PLA                 END-OF-LINE
F514  68         PLA
F515  60         RTS
-------------------------------------------------------
F516  20 F8 CD   JSR $CDF8        CONFIRM ',' ...
F519  20 76 00   JSR $0076
F51C  D0 F7      BNE $F515
F51E  4C 03 CE   JMP $CE03  "SYNTAX ERROR"
-------------------------------------------------------
F521  20 CE F4   JSR $F4CE        'OPEN'
F524  A5 D2      LDA LOGICAL-FILE
F526  F0 F6      BEQ $F51E
F528  A0 0E      LDY #$0E
F52A  20 8D F2   JSR $F28D
F52D  F0 41      BEQ $F570
F52F  A6 AE      LDX $AE
F531  A0 00      LDY #$00
F533  84 96      STY ST
F535  E0 0A      CPX #$0A
F537  F0 37      BEQ $F570
F539  E6 AE      INC $AE
F53B  A5 D2      LDA LOGICAL-FILE
F53D  9D 51 02   STA $0251,X
F540  A5 D3      LDA SECNDY-ADDS
F542  09 60      ORA #$60
F544  85 D3      STA SECNDY-ADDS
F546  9D 65 02   STA $0265,X
F549  A5 D4      LDA DEVICE
F54B  9D 5B 02   STA $025B,X
F54E  F0 55      BEQ $F5A5
F550  C9 03      CMP #$03
F552  F0 51      BEQ $F5A5
F554  90 03      BCC $F559
F556  4C 66 F4   JMP $F466
F559  A5 D3      LDA SECNDY-ADDS     HANDLE HEADR INPUT/OUTPUT
```

```
F55B  29 0F     AND #$0F
F55D  D0 2B     BNE $F58A
F55F  20 12 F8  JSR $F812  "PRESS PLAY"
F562  20 0A F4  JSR $F40A
F565  A5 D1     LDA NAME-LEN
F567  F0 1A     BEQ $F583
F569  20 94 F4  JSR $F494  FIND SPECIFIC HEADER
F56C  D0 24     BNE $F592
F56E  A0 24     LDY #$24  "FILE NOT FOUND"
F570  20 6E F2  JSR $F26E                    OUTPUT
F573  A9 0D     LDA #$0D                     ERROR
F575  20 D2 FF  JSR $FFD2 OUTPUT <CR>         ADVICE
F578  A9 3F     LDA #$3F
F57A  20 D2 FF  JSR $FFD2 OUTPUT "?"
F57D  20 56 F1  JSR $F156
F580  4C 77 C3  JMP $C377
F583  20 A6 F5  JSR $F5A6
F586  F0 E6     BEQ $F56E "FILE NOT FOUND"
F588  D0 08     BNE $F592
F58A  20 47 F8  JSR $F847  "PRESS PLAY & RECORD"
F58D  A9 04     LDA #$04
F58F  20 DA F5  JSR $F5DA
F592  A6 D4     LDX DEVICE
F594  A9 BF     LDA #$BF
F596  A4 D3     LDY SECNDY-ADDS
F598  C0 60     CPY #$60
F59A  F0 07     BEQ $F5A3
F59C  A0 00     LDY #$00
F59E  A9 02     LDA #$02
F5A0  91 D6     STA (BUFR-ADDS),Y
F5A2  98        TYA
F5A3  95 BA     STA $BA,X
F5A5  60        RTS
F5A6  A5 9D     LDA $9D                      FIND
F5A8  48        PHA                          ANY
F5A9  20 55 F8  JSR $F855                    TAPE
F5AC  A0 00     LDY #$00                     HEADER
F5AE  B1 D6     LDA (BUFR-ADDS),Y
F5B0  C9 05     CMP #$05
F5B2  F0 21     BEQ $F5D5
F5B4  C9 01     CMP #$01
F5B6  F0 04     BEQ $F5BC
F5B8  C9 04     CMP #$04
F5BA  D0 ED     BNE $F5A9
F5BC  AA        TAX
F5BD  20 1D F3  JSR $F31D
F5C0  D0 11     BNE $F5D3
F5C2  A0 A3     LDY #$A3   "FOUND"
F5C4  20 56 F1  JSR $F156
F5C7  A0 05     LDY #$05
F5C9  B1 D6     LDA (BUFR-ADDS),Y
F5CB  20 D2 FF  JSR $FFD2  OUTPUT
F5CE  C8        INY
F5CF  C0 15     CPY #$15
F5D1  D0 F6     BNE $F5C9
F5D3  A0 01     LDY #$01
F5D5  68        PLA
F5D6  85 9D     STA $9D
F5D8  98        TYA
```

```
F5DA  85 B4       STA $B4
F5DC  20 56 F6    JSR $F656
F5DF  A5 FC       LDA START-ADS-HI
F5E1  48          PHA
F5E2  A5 FB       LDA START-ADDS
F5E4  48          PHA
F5E5  A5 CA       LDA $CA
F5E7  48          PHA
F5E8  A5 C9       LDA $C9
F5EA  48          PHA
F5EB  A0 BF       LDY #$BF
F5ED  A9 20       LDA #$20
F5EF  91 D6       STA (BUFR-ADDS),Y
F5F1  88          DEY
F5F2  D0 FB       BNE $F5EF
F5F4  A5 B4       LDA $B4
F5F6  91 D6       STA (BUFR-ADDS),Y
F5F8  C8          INY
F5F9  A5 FB       LDA START-ADDS
F5FB  91 D6       STA (BUFR-ADDS),Y
F5FD  C8          INY
F5FE  A5 FC       LDA START-ADS-HI
F600  91 D6       STA (BUFR-ADDS),Y
F602  C8          INY
F603  A5 C9       LDA $C9
F605  91 D6       STA (BUFR-ADDS),Y
F607  C8          INY
F608  A5 CA       LDA $CA
F60A  91 D6       STA (BUFR-ADDS),Y
F60C  C8          INY
F60D  84 B5       STY $B5
F60F  A0 00       LDY #$00
F611  84 B4       STY $B4
F613  A4 B4       LDY $B4
F615  C4 D1       CPY NAME-LEN
F617  F0 0C       BEQ $F625
F619  B1 DA       LDA ($DA),Y
F61B  A4 B5       LDY $B5
F61D  91 D6       STA (BUFR-ADDS),Y
F61F  E6 B4       INC $B4
F621  E6 B5       INC $B5
F623  D0 EE       BNE $F613
F625  20 6C F6    JSR $F66C
F628  A9 69       LDA #$69
F62A  85 C3       STA $C3
F62C  20 90 F8    JSR $F890
F62F  68          PLA
F630  85 C9       STA $C9
F632  68          PLA
F633  85 CA       STA $CA
F635  68          PLA
F636  85 FB       STA START-ADDS
F638  68          PLA
F639  85 FC       STA START-ADS-HI
F63B  60          RTS
F63C  20 E6 F8    JSR $F8E6
F63F  A2 00       LDX #$00
F641  A0 01       LDY #$01
      B1 D6       LDA (BUFR-ADDS),Y
```

WRITE TAPE HEADER

GET S+E ADDRESS

```
F647  E8          INX
F648  C8          INY
F649  E0 04       CPX #$04
F64B  D0 F6       BNE $F643
F64D  A5 C7       LDA U-POINTR
F64F  85 FB       STA START-ADDS
F651  A5 C8       LDA U-PTR+1
F653  85 FC       STA START-ADS-HI
F655  60          RTS
```

SET BUFFER ADDRESS

```
F656  A9 7A       LDA #$7A
F658  85 D6       STA BUFR-ADDS
F65A  A9 02       LDA #$02
F65C  85 D7       STA BUF-ADS+1
F65E  A5 D4       LDA DEVICE
F660  4A          LSR A
F661  B0 08       BCS $F66B
F663  A9 3A       LDA #$3A
F665  85 D6       STA BUFR-ADDS
F667  A9 03       LDA #$03
F669  85 D7       STA BUF-ADS+1
F66B  60          RTS
```

SET BUFF S+E POINTERS

```
F66C  20 E6 F8    JSR $F8E6
F66F  20 56 F6    JSR $F656
F672  A5 D6       LDA BUFR-ADDS
F674  85 FB       STA START-ADDS
F676  18          CLC
F677  69 C0       ADC #$C0
F679  85 C9       STA $C9
F67B  A5 D7       LDA BUF-ADS+1
F67D  85 FC       STA START-ADS-HI
F67F  69 00       ADC #$00
F681  85 CA       STA $CA
F683  60          RTS
```

'SYS'

```
F684  20 8B CC    JSR $CC8B
F687  20 D2 D6    JSR $D6D2
F68A  6C 11 00    JMP ($0011)
```

SET PROGRAM 'SAVE' POINTERS

```
F68D  A5 2A       LDA END-BASIC
F68F  85 C9       STA $C9
F691  A5 2B       LDA END-BASIC+1
F693  85 CA       STA $CA
F695  A5 29       LDA START-BASIC+1
F697  85 FC       STA START-ADS-HI
F699  A5 28       LDA START-BASIC
F69B  85 FB       STA START-ADDS
F69D  60          RTS
```

'SAVE'

```
F69E  20 3E F4    JSR $F43E
F6A1  20 8D F6    JSR $F68D
F6A4  A5 D4       LDA DEVICE
F6A6  D0 05       BNE $F6AD
F6A8  A0 74       LDY #$74    "DEVICE NOT PRESENT"
F6AA  4C 70 F5    JMP $F570
F6AD  C9 03       CMP #$03
F6AF  F0 F7       BEQ $F6A8
F6B1  90 50       BCC $F703
F6B3  A9 61       LDA #$61
F6B5  85 D3       STA SECNDY-ADDS
F6B7  A4 D1       LDY NAME-LEN
F6B9  D0 03       BNE $F6BE
F6BB  4C 03 CE    JMP $CE03   "SYNTAX ERROR"
```

---TO IEEE

```
F6C1  20 BA F0    JSR $F0BA    SEND "LISTEN"
F6C4  A5 D3       LDA SECNDY-ADDS
F6C6  20 28 F1    JSR $F128
F6C9  A0 00       LDY #$00
F6CB  20 76 FB    JSR $FB76
F6CE  A5 C7       LDA U-POINTR   }
F6D0  20 6F F1    JSR $F16F      } SEND
F6D3  A5 C8       LDA U-PTR+1    }  START-ADDRESS
F6D5  20 6F F1    JSR $F16F      }
F6D8  20 C6 FC    JSR $FCC6      } END?
F6DB  F0 10       BEQ $F6ED      }
F6DD  B1 C7       LDA (U-POINTR),Y
F6DF  20 6F F1    JSR $F16F
F6E2  20 0F F3    JSR $F30F
F6E5  E6 C7       INC U-POINTR
F6E7  D0 EF       BNE $F6D8
F6E9  E6 C8       INC U-PTR+1
F6EB  D0 EB       BNE $F6D8
F6ED  20 83 F1    JSR $F183    SEND "UNLISTEN"
F6F0  24 D3       BIT SECNDY-ADDS
F6F2  30 78       BMI $F76C
F6F4  20 BA F0    JSR $F0BA    SEND "LISTEN"
F6F7  A5 D3       LDA SECNDY-ADDS
F6F9  29 EF       AND #$EF
F6FB  09 E0       ORA #$E0     SEND 'En' SECONDARY TO CLOSE
F6FD  20 28 F1    JSR $F128
F700  4C 83 F1    JMP $F183    SEND "UNLISTEN"
F703  20 56 F6    JSR $F656                          ...TO CASSETTE
F706  20 47 F8    JSR $F847
F709  20 1D F3    JSR $F31D
F70C  D0 08       BNE $F716
F70E  A0 64       LDY #$64     "WRITING"
F710  20 56 F1    JSR $F156
F713  20 1D F4    JSR $F41D
F716  A9 01       LDA #$01
F718  20 DA F5    JSR $F5DA
F71B  20 89 F8    JSR $F889
F71E  A5 D3       LDA SECNDY-ADDS
F720  29 02       AND #$02
F722  F0 48       BEQ $F76C
F724  A9 05       LDA #$05
F726  4C DA F5    JMP $F5DA
F729  E6 99       INC $99                  UPDATE
F72B  A5 99       LDA $99                    CLOCK
F72D  D0 02       BNE $F731
F72F  E6 9A       INC $9A
F731  C9 6F       CMP #$6F
F733  D0 06       BNE $F73B
F735  A5 9A       LDA $9A
F737  C9 02       CMP #$02
F739  F0 21       BEQ $F75C
F73B  E6 8F       INC CLOCK+2
F73D  D0 06       BNE $F745
F73F  E6 8E       INC CLOCK+1
F741  D0 02       BNE $F745
F743  E6 8D       INC CLOCK
F745  A2 00       LDX #$00
F747  B5 8D       LDA CLOCK,X
F749  D5 6D F7    CMP $F76D,X
```

```
F74E  E8          INX
F74F  E0 03       CPX #$03
F751  D0 F4       BNE $F747
F753  A9 00       LDA #$00
F755  95 8C       STA $8C,X
F757  CA          DEX
F758  D0 FB       BNE $F755
F75A  F0 06       BEQ $F762
F75C  A9 00       LDA #$00
F75E  85 99       STA $99
F760  85 9A       STA $9A
F762  AD 12 E8    LDA $E812
F765  CD 12 E8    CMP $E812
F768  D0 F8       BNE $F762
F76A  85 9B       STA $9B
F76C  60          RTS
```

```
F76D  4F 1A 01 48 8A 48 98 48
```

```
F770  48          PHA
F771  8A          TXA
F772  48          PHA
F773  98          TYA
F774  48          PHA
F775  A9 00       LDA #$00
F777  85 96       STA ST
F779  8A          TXA
F77A  20 8D F2    JSR $F28D
F77D  F0 05       BEQ $F784
F77F  A0 17       LDY #$17
F781  4C 70 F5    JMP $F570
F784  20 99 F2    JSR $F299
F787  A5 D4       LDA DEVICE
F789  F0 10       BEQ $F79B
F78B  C9 03       CMP #$03
F78D  F0 0C       BEQ $F79B
F78F  B0 0F       BCS $F7A0
F791  A6 D3       LDX SECNDY-ADDS
F793  E0 60       CPX #$60
F795  F0 04       BEQ $F79B
F797  A0 86       LDY #$86
F799  D0 E6       BNE $F781
F79B  85 AF       STA $AF
F79D  4C 68 F2    JMP $F268
F7A0  48          PHA
F7A1  20 B6 F0    JSR $F0B6
F7A4  A5 D3       LDA SECNDY-ADDS
F7A6  10 06       BPL $F7AE
F7A8  20 69 F1    JSR $F169
F7AB  4C B1 F7    JMP $F7B1
F7AE  20 64 F1    JSR $F164
F7B1  A5 96       LDA ST
F7B3  10 03       BPL $F7B8
F7B5  4C 7C F4    JMP $F47C
F7B8  68          PLA
F7B9  4C 9B F7    JMP $F79B
F7BC  48          PHA
F7BD  8A          TXA
```

SET INPUT DEVICE

FIND FILE TABLE

"FILE NOT OPEN"

GET FILE DATA

"NOT INPUT FILE"

... KEYBOARD

... IEEE DEVICE

SET OUTPUT

```
F7C0  48        PHA
F7C1  A9 00     LDA #$00
F7C3  85 96     STA ST
F7C5  8A        TXA
F7C6  20 8D F2  JSR $F28D
F7C9  D0 B4     BNE $F77F
F7CB  20 99 F2  JSR $F299
F7CE  A5 D4     LDA DEVICE
F7D0  D0 04     BNE $F7D6
F7D2  A0 94     LDY #$94
F7D4  D0 AB     BNE $F781
F7D6  C9 03     CMP #$03
F7D8  F0 0C     BEQ $F7E6
F7DA  10 0F     BPL $F7EB
F7DC  A6 D3     LDX SECNDY-ADDS
F7DE  E0 60     CPX #$60
F7E0  D0 04     BNE $F7E6
F7E2  A0 94     LDY #$94
F7E4  D0 9B     BNE $F781
F7E6  85 B0     STA $B0
F7E8  4C 68 F2  JMP $F268
F7EB  48        PHA
F7EC  20 BA F0  JSR $F0BA   SEND "LISTEN"
F7EF  A5 D3     LDA SECNDY-ADDS
F7F1  10 05     BPL $F7F8
F7F3  20 2D F1  JSR $F12D
F7F6  D0 03     BNE $F7FB
F7F8  20 28 F1  JSR $F128
F7FB  A5 96     LDA ST
F7FD  10 03     BPL $F802
F7FF  4C 7C F4  JMP $F47C
F802  68        PLA
F803  4C E6 F7  JMP $F7E6
F806  20 56 F6  JSR $F656   BUMP TAPE
F809  A6 D4     LDX DEVICE   BUFFER
F80B  F6 BA     INC $BA,X     POINTER
F80D  B4 BA     LDY $BA,X
F80F  C0 C0     CPY #$C0
F811  60        RTS
F812  20 35 F8  JSR $F835   WAIT
F815  F0 2F     BEQ $F846   FOR
F817  A0 41     LDY #$41 "PRESS PLAY"   'PLAY'
F819  20 56 F1  JSR $F156
F81C  A0 56     LDY #$56 "ON TAPE #"
F81E  20 56 F1  JSR $F156
F821  A5 D4     LDA DEVICE
F823  09 30     ORA #$30
F825  20 D8 E3  JSR $E3D8
F828  20 F0 F8  JSR $F8F0
F82B  20 35 F8  JSR $F835
F82E  D0 F8     BNE $F828
F830  A0 AA     LDY #$AA    "OK"
F832  4C 56 F1  JSR $F156
F835  A9 10     LDA #$10    TEST
F837  A6 D4     LDX DEVICE   CASSETTE
F839  CA        DEX
F83A  F0 02     BEQ $F83E
F83C  A9 20     LDA #$20
```

```
F843  2C 10 E8    BIT $E810
F846  60          RTS
-------------------------------------------
F847  20 35 F8    JSR $F835
F84A  F0 FA       BEQ $F846
F84C  A0 41       LDY #$41 "PRESS
F84E  20 56 F1    JSR $F156 PLAY
F851  A0 4D       LDY #$4D "&
F853  D0 C4       BNE $F819  RECORD"
-------------------------------------------
F855  A9 00       LDA #$00
F857  85 96       STA ST
F859  85 9D       STA $9D
F85B  20 6C F6    JSR $F66C
F85E  20 E6 F8    JSR $F8E6
F861  20 12 F8    JSR $F812
F864  78          SEI
F865  A9 00       LDA #$00
F867  85 C2       STA $C2
F869  85 CE       STA $CE
F86B  85 CB       STA $CB
F86D  85 C0       STA $C0
F86F  85 C1       STA $C1
F871  85 B2       STA $B2
F873  A6 D4       LDX DEVICE
F875  CA          DEX
F876  F0 07       BEQ $F87F
F878  A9 90       LDA #$90
F87A  8D 4E E8    STA $E84E
F87D  D0 03       BNE $F882
F87F  EE 11 E8    INC $E811
F882  A2 0E       LDX #$0E
F884  D0 15       BNE $F89B
-------------------------------------------
F886  20 6C F6    JSR $F66C
F889  20 E6 F8    JSR $F8E6
F88C  A9 14       LDA #$14
F88E  85 C3       STA $C3
F890  20 47 F8    JSR $F847
F893  78          SEI
F894  A9 A0       LDA #$A0
F896  8D 4E E8    STA $E84E
F899  A2 08       LDX #$08
F89B  20 9B FC    JSR $FC9B
F89E  A9 02       LDA #$02
F8A0  85 DE       STA $DE
F8A2  20 84 FB    JSR $FB84
F8A5  CE 13 E8    DEC $E813
F8A8  A6 D4       LDX DEVICE
F8AA  CA          DEX
F8AB  D0 09       BNE $F8B6
F8AD  A9 34       LDA #$34
F8AF  8D 13 E8    STA $E813
F8B2  85 F9       STA $F9
F8B4  D0 0A       BNE $F8C0
-------------------------------------------
F8B6  AD 40 E8    LDA $E840
F8B9  86 FA       STX $FA
F8BB  29 EF       AND #$EF
F8BD  8D 40 E8    STA $E840
F8C0  A2 FF       LDX #$FF
      A0 FF       LDY #$FF
```

WAIT FOR 'RECORD'

INITIATE TAPE READ

INITIATE TAPE WRITE

(COMMON TAPE I/O CODE)

```
F8C7  CA          DEX
F8C8  D0 F8       BNE $F8C2
F8CA  8D 49 E8    STA $E849
F8CD  58          CLI
F8CE  A9 E6       LDA #$E6
F8D0  C5 91       CMP $91        WAIT
F8D2  F0 11       BEQ $F8E5        FOR
F8D4  20 F0 F8    JSR $F8F0        I/O
F8D7  2C 13 E8    BIT $E813      COMPLETION
F8DA  10 F2       BPL $F8CE
F8DC  2C 12 E8    BIT $E812
F8DF  20 29 F7    JSR $F729
F8E2  4C CE F8    JMP $F8CE
F8E5  60          RTS
-------------------------------------------
F8E6  20 F0 F8    JSR $F8F0
F8E9  A9 E6       LDA #$E6       I/O
F8EB  C5 91       CMP $91      COMPLETE
F8ED  D0 F7       BNE $F8E6      TEST
F8EF  60          RTS
-------------------------------------------
F8F0  20 01 F3    JSR $F301
F8F3  D0 08       BNE $F8FD      TEST
F8F5  20 7B FC    JSR $FC7B      STOP
F8F8  20 84 F2    JSR $F284        KEY
F8FB  85 0E       STA $0E
F8FD  4C 3F C7    JMP $C73F
-------------------------------------------
F900  86 CC       STX TIMING
F902  A5 CB       LDA $CB        TAPE
F904  0A          ASL A          READ
F905  0A          ASL A
F906  18          CLC            TIMING
F907  65 CB       ADC $CB
F909  18          CLC            ADJUST
F90A  65 CC       ADC TIMING
F90C  85 CC       STA TIMING
F90E  A9 00       LDA #$00
F910  24 CB       BIT $CB
F912  30 01       BMI $F915
F914  2A          ROL A
F915  06 CC       ASL TIMING
F917  2A          ROL A
F918  06 CC       ASL TIMING
F91A  2A          ROL A
F91B  AA          TAX
F91C  AD 48 E8    LDA $E848
F91F  C9 15       CMP #$15
F921  90 F9       BCC $F91C
F923  65 CC       ADC TIMING
F925  8D 44 E8    STA $E844
F928  8A          TXA
F929  6D 49 E8    ADC $E849
F92C  8D 45 E8    STA $E845
F92F  58          CLI
F930  60          RTS
-------------------------------------------
F931  AE 49 E8    LDX $E849 T2H  READ
F934  A0 FF       LDY #$FF       TAPE
F936  98          TYA
F937  ED 48 E8    SBC $E848 T2L    BITS
F93A  EC 49 E8    CPX $E849
F93D  D0 F5       BNE $F934
```

```
F941  AA           TAX
F942  8C 48 E8     STY $E848
F945  8C 49 E8     STY $E849
F948  98           TYA
F949  E5 CC        SBC TIMING
F94B  86 CC        STX TIMING
F94D  4A           LSR A          COMPUTE ELAPSED TIME SINCE LAST CYCLE FROM TAPE
F94E  66 CC        ROR TIMING
F950  4A           LSR A
F951  66 CC        ROR TIMING
F953  A5 CB        LDA $CB
F955  18           CLC
F956  69 3C        ADC #$3C
F958  2C 40 E8     BIT $E840      } CLEAR INTERRUPT SOURCE
F95B  2C 10 E8     BIT $E810      }
F95E  C5 CC        CMP TIMING
F960  B0 4A        BCS $F9AC
F962  A6 B2        LDX $B2        BYTE READY?
F964  F0 03        BEQ $F969
F966  4C 57 FA     JMP $FA57      YES, HANDLE BYTE
F969  A6 B7        LDX $B7
F96B  30 1B        BMI $F988
F96D  A2 00        LDX #$00
F96F  69 30        ADC #$30
F971  65 CB        ADC $CB
F973  C5 CC        CMP TIMING
F975  B0 1C        BCS $F993      "SHORT" CYCLE
F977  E8           INX
F978  69 26        ADC #$26
F97A  65 CB        ADC $CB
F97C  C5 CC        CMP TIMING
F97E  B0 17        BCS $F997      "LONG" CYCLE
F980  69 2C        ADC #$2C
F982  65 CB        ADC $CB
F984  C5 CC        CMP TIMING
F986  90 03        BCC $F98B
F988  4C 07 FA     JMP $FA07
F98B  A5 CE        LDA $CE
F98D  F0 1D        BEQ $F9AC      EXIT IF SCANNING
F98F  85 BE        STA $BE
F991  D0 19        BNE $F9AC
F993  E6 BF        INC $BF        COUNT "SHORTS"
F995  B0 02        BCS $F999
F997  C6 BF        DEC $BF        UN-COUNT "SHORTS"
F999  38           SEC
F99A  E9 13        SBC #$13
F99C  E5 CC        SBC TIMING
F99E  65 9C        ADC $9C        LOG TIMING "ERROR"
F9A0  85 9C        STA $9C
F9A2  A5 B9        LDA $B9
F9A4  49 01        EOR #$01
F9A6  85 B9        STA $B9
F9A8  F0 21        BEQ $F9CB
F9AA  86 D9        STX $D9        LOG EVERY SECOND CYCLE
F9AC  A5 CE        LDA $CE
F9AE  F0 18        BEQ $F9C8      ..IF SCANNING
F9B0  2C 4D E8     BIT $E84D      T1 INTERRUPT?
F9B3  50 13        BVC $F9C8
```

```
F9B9  A5 B7        LDA $B7
F9BB  10 31        BPL $F9EE
F9BD  30 C9        BMI $F988
F9BF  A2 A6        LDX #$A6
F9C1  20 00 F9     JSR $F900
F9C4  A5 B1        LDA $B1
F9C6  D0 C3        BNE $F98B
F9C8  4C E4 E6     JMP $E6E4
F9CB  A5 9C        LDA $9C
F9CD  F0 08        BEQ $F9D7
F9CF  30 04        BMI $F9D5
F9D1  C6 CB        DEC $CB      ADJUST
F9D3  C6 CB        DEC $CB        TIMING
F9D5  E6 CB        INC $CB        TRACKING
F9D7  A9 00        LDA #$00
F9D9  85 9C        STA $9C
F9DB  E4 D9        CPX $D9      LEGAL SHORT/LONG
F9DD  D0 0F        BNE $F9EE      PAIR?
F9DF  8A           TXA
F9E0  D0 A9        BNE $F98B
F9E2  A5 BF        LDA $BF
F9E4  30 C6        BMI $F9AC
F9E6  C9 10        CMP #$10
F9E8  90 C2        BCC $F9AC
F9EA  85 AB        STA $AB
F9EC  B0 BE        BCS $F9AC
F9EE  8A           TXA          BIT RECEIVED: STORE
F9EF  45 B1        EOR $B1      PARITY
F9F1  85 B1        STA $B1
F9F3  A5 CE        LDA $CE
F9F5  F0 D1        BEQ $F9C8    ... IF SCAN-MODE
F9F7  C6 B7        DEC $B7      ONE LESS BIT TO COME
F9F9  30 C4        BMI $F9BF
F9FB  46 D9        LSR $D9
F9FD  66 DF        ROR $DF      STORE BIT
F9FF  A2 DA        LDX #$DA     SET TIMING
FA01  20 00 F9     JSR $F900
FA04  4C E4 E6     JMP $E6E4
FA07  A5 AB        LDA $AB
FA09  F0 04        BEQ $FA0F    LEADER
FA0B  A5 CE        LDA $CE        AND
FA0D  F0 07        BEQ $FA16      SCAN-MODE?
FA0F  A5 B7        LDA $B7      FULL BYTE REC'D?
FA11  30 03        BMI $FA16
FA13  4C 97 F9     JMP $F997
FA16  46 CC        LSR TIMING   CALCULATE
FA18  A9 93        LDA #$93       EXPECTED
FA1A  38           SEC              TIMING
FA1B  E5 CC        SBC TIMING       FOR NEXT
FA1D  65 CB        ADC $CB            BIT
FA1F  0A           ASL A
FA20  AA           TAX
FA21  20 00 F9     JSR $F900
FA24  E6 B2        INC $B2      FLAG BYTE READY
FA26  A5 CE        LDA $CE
FA28  D0 11        BNE $FA3B
FA2A  A5 AB        LDA $AB
FA2C  F0 26        BEQ $FA54
FA2E  85 BE        STA $BE      LOC TEMPORARY
FA30  A9 00        LDA #$00       ERROR
```

```
FA32  85 AB      STA $AB
FA34  A9 C0      LDA #$C0
FA36  8D 4E E8   STA $E84E   ARM T1 INTERRUPT
FA39  85 CE      STA $CE
FA3B  A5 AB      LDA $AB
FA3D  85 CF      STA $CF
FA3F  F0 09      BEQ $FA4A
FA41  A9 00      LDA #$00
FA43  85 CE      STA $CE
FA45  A9 40      LDA #$40
FA47  8D 4E E8   STA $E84E   DISARM T1 INT.
FA4A  A5 DF      LDA $DF
FA4C  85 DD      STA $DD
FA4E  A5 BE      LDA $BE     COPY RECEIVED
FA50  05 BF      ORA $BF       CHARACTER TO BUFFER
FA52  85 D0      STA $D0
FA54  4C E4 E6   JMP $E6E4
-------------------------------------------
FA57  20 84 FB   JSR $FB84   READ
FA5A  85 B2      STA $B2       TAPE
FA5C  A2 DA      LDX #$DA      CHARACTERS
FA5E  20 00 F9   JSR $F900
FA61  A5 DE      LDA $DE
FA63  F0 02      BEQ $FA67
FA65  85 BD      STA $BD
FA67  A9 0F      LDA #$0F
FA69  24 C2      BIT $C2
FA6B  10 17      BPL $FA84
FA6D  A5 CF      LDA $CF
FA6F  D0 0C      BNE $FA7D
FA71  A6 DE      LDX $DE
FA73  CA         DEX
FA74  D0 0B      BNE $FA81
FA76  A9 08      LDA #$08
FA78  20 7F FB   JSR $FB7F
FA7B  D0 04      BNE $FA81
FA7D  A9 00      LDA #$00    READ COMPLETE
FA7F  85 C2      STA $C2
FA81  4C E4 E6   JMP $E6E4
-------------------------------------------
FA84  70 31      BVS $FAB7   INPUT-MODE?
FA86  D0 18      BNE $FAA0   COUNTDOWN-MODE?
FA88  A5 CF      LDA $CF     SEARCH-MODE.
FA8A  D0 F5      BNE $FA81
FA8C  A5 D0      LDA $D0
FA8E  D0 F1      BNE $FA81
FA90  A5 BD      LDA $BD     FIRST OR SECOND PASS?
FA92  4A         LSR A         SECOND -> CARRY
FA93  A5 DD      LDA $DD       LOOK FOR COUNTDOWN
FA95  30 03      BMI $FA9A
FA97  90 18      BCC $FAB1
FA99  18         CLC
FA9A  B0 15      BCS $FAB1
FA9C  29 0F      AND #$0F    EXTRACT COUNT
FA9E  85 C2      STA $C2     LOG COUNT
FAA0  C6 C2      DEC $C2     TRACK COUNTDOWN
FAA2  D0 DD      BNE $FA81     COMPLETE?
FAA4  A9 40      LDA #$40    SET INPUT-MODE
FAA6  85 C2      STA $C2
FAA8  20 76 FB   JSR $FB76
FAAB  A9 00      LDA #$00
FAAD  85 C3      STA $C3     CLEAR CHECKSUM
```

```
FAAF  F0 D0        BEQ  $FA81
FAB1  A9 80        LDA  #$80      COUNTDOWN ~~error~~. PASS 2
FAB3  85 C2        STA  $C2
FAB5  D0 CA        BNE  $FA81
FAB7  A5 CF        LDA  $CF
FAB9  F0 0A        BEQ  $FAC5
FABB  A9 04        LDA  #$04
FABD  20 7F FB     JSR  $FB7F
FAC0  A9 00        LDA  #$00
FAC2  4C 46 FB     JMP  $FB46
FAC5  20 C6 FC     JSR  $FCC6     TEST MEMORY-LIMIT
FAC8  D0 03        BNE  $FACD     ...NOT YET
FACA  4C 44 FB     JMP  $FB44     YES, FLAG IT
FACD  A6 BD        LDX  $BD       WHICH PASS?
FACF  CA           DEX
FAD0  F0 2D        BEQ  $FAFF     PASS 2...
FAD2  A5 9D        LDA  $9D       LOAD OR VERIFY?
FAD4  F0 0C        BEQ  $FAE2     ...IF LOAD
FAD6  A0 00        LDY  #$00
FAD8  A5 DD        LDA  $DD
FADA  D1 C7        CMP  (U-POINTR),Y   VERIFY
FADC  F0 04        BEQ  $FAE2
FADE  A9 01        LDA  #$01
FAE0  85 D0        STA  $D0
FAE2  A5 D0        LDA  $D0       ANY ERRORS?
FAE4  F0 4C        BEQ  $FB32     NO...
FAE6  A2 3D        LDX  #$3D
FAE8  E4 C0        CPX  $C0       MAXIMUM ERRORS?
FAEA  90 3F        BCC  $FB2B
FAEC  A6 C0        LDX  $C0
FAEE  A5 C8        LDA  U-PTR+1
FAF0  9D 01 01     STA  $0101,X
FAF3  A5 C7        LDA  U-POINTR
FAF5  9D 00 01     STA  $0100,X
FAF8  E8           INX
FAF9  E8           INX
FAFA  86 C0        STX  $C0
FAFC  4C 32 FB     JMP  $FB32
FAFF  A6 C1        LDX  $C1
FB01  E4 C0        CPX  $C0
FB03  F0 37        BEQ  $FB3C
FB05  A5 C7        LDA  U-POINTR
FB07  DD 00 01     CMP  $0100,X
FB0A  D0 30        BNE  $FB3C
FB0C  A5 C8        LDA  U-PTR+1
FB0E  DD 01 01     CMP  $0101,X
FB11  D0 29        BNE  $FB3C
FB13  E6 C1        INC  $C1
FB15  E6 C1        INC  $C1
FB17  A5 9D        LDA  $9D
FB19  F0 0C        BEQ  $FB27
FB1B  A5 DD        LDA  $DD
FB1D  A0 00        LDY  #$00
FB1F  D1 C7        CMP  (U-POINTR),Y
FB21  F0 19        BEQ  $FB3C
FB23  A9 01        LDA  #$01
FB25  85 D0        STA  $D0
FB27  A5 D0        LDA  $D0
FB29  F0 07        BEQ  $FB32
```

LOG READ ERROR PASS 1

VERIFY ERROR PASS 2

```
FB2D  20 7F FB    JSR $FB7F
FB30  D0 0A       BNE $FB3C
FB32  A5 9D       LDA $9D
FB34  D0 06       BNE $FB3C
FB36  A5 DD       LDA $DD
FB38  A0 00       LDY #$00
FB3A  91 C7       STA (U-POINTR),Y
FB3C  E6 C7       INC U-POINTR
FB3E  D0 33       BNE $FB73
FB40  E6 C8       INC U-PTR+1
FB42  D0 2F       BNE $FB73
FB44  A9 80       LDA #$80
FB46  85 C2       STA $C2
FB48  A6 DE       LDX $DE
FB4A  CA          DEX
FB4B  30 02       BMI $FB4F
FB4D  86 DE       STX $DE
FB4F  C6 BD       DEC $BD
FB51  F0 08       BEQ $FB5B
FB53  A5 C0       LDA $C0
FB55  D0 1C       BNE $FB73
FB57  85 DE       STA $DE
FB59  F0 18       BEQ $FB73
FB5B  20 7B FC    JSR $FC7B
FB5E  20 76 FB    JSR $FB76
FB61  A0 00       LDY #$00
FB63  84 C3       STY $C3
FB65  20 B4 FC    JSR $FCB4
FB68  A5 C3       LDA $C3
FB6A  45 DD       EOR $DD
FB6C  F0 05       BEQ $FB73
FB6E  A9 20       LDA #$20
FB70  20 7F FB    JSR $FB7F
FB73  4C E4 E6    JMP $E6E4
```

CORRECT ERROR (LOAD) PASS 2

```
FB76  A5 FC       LDA START-ADS-HI
FB78  85 C8       STA U-PTR+1
FB7A  A5 FB       LDA START-ADDS
FB7C  85 C7       STA U-POINTR
FB7E  60          RTS
```

SET READ ADDRS TO START

```
FB7F  05 96       ORA ST
FB81  85 96       STA ST
FB83  60          RTS
```

FLAC ERROR

```
FB84  A9 08       LDA #$08
FB86  85 B7       STA $B7
FB88  A9 00       LDA #$00
FB8A  85 B9       STA $B9
FB8C  85 BE       STA $BE
FB8E  85 B1       STA $B1
FB90  85 BF       STA $BF
FB92  60          RTS
```

RESET 8-COUNT FOR NEW BYTE

```
FB93  A5 DD       LDA $DD
FB95  4A          LSR A
FB96  A9 60       LDA #$60
FB98  90 02       BCC $FB9C
FB9A  A9 B0       LDA #$B0
FB9C  A2 00       LDX #$00
FB9E  8D 48 E8    STA $E848
FBA1  8E 49 E8    STX $E849
FBA4  A0 40 E8    LDA $E840
```

SUBRTN: WRITE A BIT TO TAPE

```
FBA9  8D 40 E8    STA $E840
FBAC  29 08       AND #$08
FBAE  60          RTS
-------------------------------------------
FBAF  38          SEC                    TAPE
FBB0  66 C8       ROR U-PTR+1            WRITE:
FBB2  30 3C       BMI $FBF0
-------------------------------------------
FBB4  A5 BE       LDA $BE
FBB6  D0 12       BNE $FBCA
FBB8  A9 10       LDA #$10
FBBA  A2 01       LDX #$01
FBBC  20 9E FB    JSR $FB9E              BYTE
FBBF  D0 2F       BNE $FBF0              MARKER
FBC1  E6 BE       INC $BE
FBC3  A5 C8       LDA U-PTR+1
FBC5  10 29       BPL $FBF0
FBC7  4C 41 FC    JMP $FC41
-------------------------------------------
FBCA  A5 BF       LDA $BF
FBCC  D0 09       BNE $FBD7
FBCE  20 9A FB    JSR $FB9A              START
FBD1  D0 1D       BNE $FBF0              BIT
FBD3  E6 BF       INC $BF
FBD5  D0 19       BNE $FBF0
FBD7  20 93 FB    JSR $FB93
FBDA  D0 14       BNE $FBF0
FBDC  A5 B9       LDA $B9
FBDE  49 01       EOR #$01
FBE0  85 B9       STA $B9
FBE2  F0 0F       BEQ $FBF3
FBE4  A5 DD       LDA $DD
FBE6  49 01       EOR #$01
FBE8  85 DD       STA $DD
FBEA  29 01       AND #$01
FBEC  45 B1       EOR $B1
FBEE  85 B1       STA $B1
FBF0  4C E4 E6    JMP $E6E4
-------------------------------------------
FBF3  46 DD       LSR $DD
FBF5  C6 B7       DEC $B7
FBF7  A5 B7       LDA $B7
FBF9  F0 3D       BEQ $FC38
FBFB  10 F3       BPL $FBF0
FBFD  20 84 FB    JSR $FB84
FC00  58          CLI
FC01  A5 BA       LDA $BA
FC03  F0 12       BEQ $FC17
FC05  A2 00       LDX #$00
FC07  86 D9       STX $D9
FC09  C6 BA       DEC $BA                COUNTDOWN
FC0B  A6 DE       LDX $DE
FC0D  E0 02       CPX #$02
FC0F  D0 02       BNE $FC13
FC11  09 80       ORA #$80
FC13  85 DD       STA $DD
FC15  D0 D9       BNE $FBF0
FC17  20 C6 FC    JSR $FCC6
FC1A  90 0A       BCC $FC26
      D0 91       BNE $FBAF
      E6 C8       INC U-PTR+1
```

```
FC26  A0 00      LDY #$00
FC28  B1 C7      LDA (U-POINTR),Y   DATA
FC2A  85 DD      STA $DD
FC2C  45 D9      EOR $D9
FC2E  85 D9      STA $D9
FC30  E6 C7      INC U-POINTR
FC32  D0 BC      BNE $FBF0
FC34  E6 C8      INC U-PTR+1
FC36  D0 B8      BNE $FBF0
FC38  A5 B1      LDA $B1
FC3A  49 01      EOR #$01
FC3C  85 DD      STA $DD
FC3E  4C E4 E6   JMP $E6E4
-------------------------------------------
FC41  C6 DE      DEC $DE
FC43  D0 03      BNE $FC48
FC45  20 A6 FC   JSR $FCA6
FC48  A9 50      LDA #$50
FC4A  85 BD      STA $BD
FC4C  A2 08      LDX #$08
FC4E  78         SEI
FC4F  20 9B FC   JSR $FC9B
FC52  D0 EA      BNE $FC3E
FC54  A9 78      LDA #$78
FC56  20 9C FB   JSR $FB9C      WRITE
FC59  D0 E3      BNE $FC3E        TAPE
FC5B  C6 BD      DEC $BD          LEADER
FC5D  D0 DF      BNE $FC3E
FC5F  20 84 FB   JSR $FB84
FC62  C6 C3      DEC $C3
FC64  10 D8      BPL $FC3E
FC66  A2 0A      LDX #$0A
FC68  20 9B FC   JSR $FC9B
FC6B  58         CLI
FC6C  E6 C3      INC $C3
FC6E  A5 DE      LDA $DE
FC70  F0 24      BEQ $FC96
FC72  20 76 FB   JSR $FB76
FC75  A2 09      LDX #$09
FC77  86 BA      STX $BA
FC79  D0 82      BNE $FBFD
-------------------------------------------
FC7B  08         PHP
FC7C  78         SEI             TERMINATE
FC7D  20 A6 FC   JSR $FCA6         TAPE:
FC80  A9 7F      LDA #$7F        RESTORE
FC82  8D 4E E8   STA $E84E         NORMAL
FC85  A9 3C      LDA #$3C          VECTOR
FC87  8D 11 E8   STA $E811
FC8A  A9 3D      LDA #$3D
FC8C  8D 13 E8   STA $E813
FC8F  A2 0C      LDX #$0C
FC91  20 9B FC   JSR $FC9B
FC94  28         PLP
FC95  60         RTS
-------------------------------------------
FC96  20 7B FC   JSR $FC7B      SET
FC99  F0 A3      BEQ $FC3E       INTERRUPT
FC9B  BD 01 FD   LDA $FD01,X       VECTOR
FC9E  85 90      STA $90
FCA0  BD 02 FD   LDA $FD02,X
FCA3  85 91      STA $91
```

```
FCA6  A9 3C       LDA #$3C      TURN
FCA8  8D 13 E8    STA $E813     OFF
FCAB  AD 40 E8    LDA $E840     MOTORS
FCAE  09 10       ORA #$10
FCB0  8D 40 E8    STA $E840
FCB3  60          RTS
-------------------------------------------------
FCB4  B1 C7       LDA (U-POINTR),Y   CHECKSUM
FCB6  45 C3       EOR $C3            CALCULATION
FCB8  85 C3       STA $C3
FCBA  E6 C7       INC U-POINTR
FCBC  D0 02       BNE $FCC0
FCBE  E6 C8       INC U-PTR+1
FCC0  20 C6 FC    JSR $FCC6
FCC3  D0 EF       BNE $FCB4
FCC5  60          RTS
-------------------------------------------------
FCC6  A5 C8       LDA U-PTR+1        CHECK:
FCC8  C5 CA       CMP $CA            POINTER
FCCA  D0 04       BNE $FCD0          AT
FCCC  A5 C7       LDA U-POINTR       LIMIT?
FCCE  C5 C9       CMP $C9
FCD0  60          RTS
-------------------------------------------------
FCD1  A2 FF       LDX #$FF      POWER-ON
FCD3  9A          TXS           RESET
FCD4  D8          CLD
FCD5  20 DE E1    JSR $E1DE
FCD8  A9 89       LDA #$89   }
FCDA  85 94       STA $94    }  NMI VECTOR  => WARM START
FCDC  A9 C3       LDA #$C3   }
FCDE  85 95       STA $95    }
FCE0  A9 17       LDA #$17   }
FCE2  85 92       STA $92    }  SOFTWARE INT. (BRK)  => MLM
FCE4  A9 FD       LDA #$FD   }
FCE6  85 93       STA $93    }
FCE8  A9 F7       LDA #$F7   }
FCEA  8D FA 03    STA $03FA  }  MLM OP-CODE EXTENSION
FCED  A9 E7       LDA #$E7   }
FCEF  8D FB 03    STA $03FB  }
FCF2  58          CLI
FCF3  AD 10 E8    LDA $E810     DIAGNOSIC PIN?
FCF6  30 03       BMI $FCFB
FCF8  4C 11 FD    JMP $FD11
FCFB  4C 16 E1    JMP $E116
-------------------------------------------------
FCFE  6C 94 00    JMP ($0094)

FD01  00 00 00 00 00 00 00 00
FD09  54 FC B4 FB 2E E6 31 F9

-------------------------------------------------
FD11  A9 43       LDA #$43  *C   MACHINE
FD13  85 B5       STA $B5        LANGUAGE
FD15  D0 16       BNE $FD2D      MON
FD17  A9 42       LDA #$42  *B
FD19  85 B5       STA $B5
FD1B  D8          CLD
FD1C  4A          LSR A
FD1D  68          PLA
FD1E  8D 05 02    STA $0205
FD21  68          PLA
FD22  8D 04 02    STA $0204
FD25  68          PLA
```

```
FD29  68        PLA
FD2A  8D 02 02  STA $0202
FD2D  68        PLA
FD2E  69 FF     ADC #$FF
FD30  8D 01 02  STA $0201
FD33  68        PLA
FD34  69 FF     ADC #$FF
FD36  8D 00 02  STA $0200
FD39  A5 90     LDA $90
FD3B  8D 08 02  STA $0208
FD3E  A5 91     LDA $91
FD40  8D 07 02  STA $0207
FD43  BA        TSX
FD44  8E 06 02  STX $0206
FD47  58        CLI
FD48  20 D0 FD  JSR $FDD0
FD4B  A6 B5     LDX $B5
FD4D  A9 2A     LDA #$2A    "*"
FD4F  20 84 E7  JSR $E784
FD52  A9 52     LDA #$52    'R'
FD54  D0 1A     BNE $FD70
FD56  A9 02     LDA #$02
FD58  85 77     STA BASIC-ADDS
FD5A  A9 00     LDA #$00
FD5C  85 DE     STA $DE
FD5E  A2 0D     LDX #$0D    <CR>
FD60  A9 2E     LDA #$2E    '.'
FD62  20 84 E7  JSR $E784
FD65  20 EB E7  JSR $E7EB
FD68  C9 2E     CMP #$2E    "."
FD6A  F0 F9     BEQ $FD65
FD6C  C9 20     CMP #$20    "space
FD6E  F0 F5     BEQ $FD65
FD70  A2 07     LDX #$07
FD72  DD E0 FD  CMP $FDE0,X
FD75  D0 0B     BNE $FD82
FD77  86 B4     STX $B4
FD79  BD E8 FD  LDA $FDE8,X
FD7C  48        PHA
FD7D  BD F0 FD  LDA $FDF0,X
FD80  48        PHA
FD81  60        RTS
FD82  CA        DEX
FD83  10 ED     BPL $FD72
FD85  6C FA 03  JMP ($03FA)
FD88  A5 FB     LDA START-ADDS
FD8A  8D 01 02  STA $0201
FD8D  A5 FC     LDA START-ADS-HI
FD8F  8D 00 02  STA $0200
FD92  60        RTS
FD93  85 B5     STA $B5
FD95  A9 00     LDY #$00
FD97  20 CD FD  JSR $FDCD
FD9A  B1 FB     LDA (START-ADDS),Y
FD9C  20 75 E7  JSR $E775
FD9F  20 D5 FD  JSR $FDD5
FDA2  C6 B5     DEC $B5
FDA4  D0 F1     BNE $FD97
FDA6  60        RTS
```

USER PROMPT + COMMAND INPUT

PROMPT

SET PC ADDRS.

DISPLAY MEMORY

```
FDAA  90 0D       BCC  #FDB9
FDAC  A2 00       LDX  #$00          MODIFY
FDAE  81 FB       STA  (START-ADDS,X)  MEMORY
FDB0  C1 FB       CMP  (START-ADDS,X)
FDB2  F0 05       BEQ  #FDB9
FDB4  68          PLA
FDB5  68          PLA
FDB6  4C F7 E7    JMP  #E7F7         "?"
-------------------------------------------
FDB9  20 D5 FD    JSR  #FDD5
FDBC  C6 B5       DEC  $B5
FDBE  60          RTS
-------------------------------------------
FDBF  A9 02       LDA  #$02          SET POINTER
FDC1  85 FB       STA  START-ADDS      TO
FDC3  A9 02       LDA  #$02            REGISTERS
FDC5  85 FC       STA  START-ADS-HI
FDC7  A9 05       LDA  #$05
FDC9  60          RTS
-------------------------------------------
FDCA  20 CD FD    JSR  #FDCD         SEND 2 SPACES
FDCD  A9 20       LDA  #$20          SEND SPACE
FDCF  2C A9 0D    BIT  $0DA9
FDD0  A9 0D       LDA  #$0D          SEND <CR>
FDD2  4C D2 FF    JMP  #FFD2 OUTPUT
-------------------------------------------
FDD5  E6 FB       INC  START-ADDS    BUMP
FDD7  D0 06       BNE  #FDDF           POINTER
FDD9  E6 FC       INC  START-ADS-HI
FDDB  D0 02       BNE  #FDDF
FDDD  E6 DE       INC  $DE
FDDF  60          RTS
-------------------------------------------

FDE0  3A 3B 52 4D 47 58 4C 53
FDE8  FE FE FE FE FE FF FF FF    MLM COMMANDS
FDF0  B8 96 22 57 CE 06 10 10
FDF8  0D 20 20 20 20 20 50 43
FE00  20 20 49 52 51 20 20 53    .R TITLES
FE08  52 20 41 43 20 58 52 20
FE10  59 52 20 53 50 98 48 20

-------------------------------------------
FE15  98          TYA                SEND ".:" .R ".;"
FE16  48          PHA
FE17  20 D0 FD    JSR  #FDD0
FE1A  68          PLA
FE1B  A2 2E       LDX  #$2E          "."
FE1D  20 84 E7    JSR  #E784
FE20  4C CA FD    JMP  #FDCA
-------------------------------------------
FE23  A2 00       LDX  #$00                '.R'
FE25  BD F8 FD    LDA  #FDF8,X
FE28  20 D2 FF    JSR  #FFD2 OUTPUT
FE2B  E8          INX
FE2C  E0 1D       CPX  #$1D
FE2E  D0 F5       BNE  #FE25
FE30  A0 3B       LDY  #$3B
FE32  20 15 FE    JSR  #FE15
FE35  AD 00 02    LDA  $0200
FE38  20 75 E7    JSR  #E775
FE3B  AD 01 02    LDA  $0201
FE3E  20 75 E7    JSR  #E775
      20 CD FD    JSR  #FDCD
      AD 07 02    LDA  $0207
```

```
FE4A  AD 08 02    LDA $0208
FE4D  20 75 E7    JSR $E775
FE50  20 BF FD    JSR $FDBF
FE53  20 93 FD    JSR $FD93
FE56  F0 39       BEQ $FE91
FE58  20 EB E7    JSR $E7EB      'M'
FE5B  20 A7 E7    JSR $E7A7
FE5E  90 34       BCC $FE94
FE60  20 97 E7    JSR $E797
FE63  20 EB E7    JSR $E7EB
FE66  20 A7 E7    JSR $E7A7
FE69  90 29       BCC $FE94
FE6B  20 97 E7    JSR $E797
FE6E  20 01 F3    JSR $F301
FE71  F0 1E       BEQ $FE91
FE73  A6 DE       LDX $DE
FE75  D0 1A       BNE $FE91
FE77  38          SEC
FE78  A5 FD       LDA $FD
FE7A  E5 FB       SBC START-ADDS
FE7C  A5 FE       LDA $FE
FE7E  E5 FC       SBC START-ADS-HI
FE80  90 0F       BCC $FE91
FE82  A0 3A       LDY #$3A
FE84  20 15 FE    JSR $FE15
FE87  20 6A E7    JSR $E76A
FE8A  A9 08       LDA #$08
FE8C  20 93 FD    JSR $FD93
FE8F  F0 DD       BEQ $FE6E
FE91  4C 56 FD    JMP $FD56
FE94  4C F7 E7    JMP $E7F7
FE97  20 B6 E7    JSR $E7B6      ALTER ';'
FE9A  20 A7 E7    JSR $E7A7        REGISTERS
FE9D  90 03       BCC $FEA2
FE9F  20 88 FD    JSR $FD88
FEA2  20 CF FF    JSR $FFCF  INPUT
FEA5  20 A7 E7    JSR $E7A7
FEA8  90 0A       BCC $FEB4
FEAA  A5 FB       LDA START-ADDS
FEAC  8D 08 02    STA $0208
FEAF  A5 FC       LDA START-ADS-HI
FEB1  8D 07 02    STA $0207
FEB4  20 BF FD    JSR $FDBF
FEB7  D0 0A       BNE $FEC3
FEB9  20 B6 E7    JSR $E7B6      ALTER ':'
FEBC  20 A7 E7    JSR $E7A7        MEMORY
FEBF  90 D3       BCC $FE94
FEC1  A9 08       LDA #$08
FEC3  85 B5       STA $B5
FEC5  20 EB E7    JSR $E7EB
FEC8  20 A7 FD    JSR $FDA7
FECB  D0 F8       BNE $FEC5
FECD  F0 C2       BEQ $FE91
FECF  20 CF FF    JSR $FFCF  INPUT      'G'
FED2  C9 0D       CMP #$0D
FED4  F0 0C       BEQ $FEE2
FED6  C9 20       CMP #$20
FED8  D0 BA       BNE $FE94
FEDA  20 47 E7    JSR $E747
```

```
FEDF  20 88 FD    JSR $FD88
FEE2  AE 06 02    LDX $0206
FEE5  9A          TXS
FEE6  78          SEI
FEE7  AD 07 02    LDA $0207
FEEA  85 91       STA $91
FEEC  AD 08 02    LDA $0208
FEEF  85 90       STA $90
FEF1  AD 00 02    LDA $0200
FEF4  48          PHA
FEF5  AD 01 02    LDA $0201
FEF8  48          PHA
FEF9  AD 02 02    LDA $0202
FEFC  48          PHA
FEFD  AD 03 02    LDA $0203
FF00  AE 04 02    LDX $0204
FF03  AC 05 02    LDY $0205
FF06  40          RTI
-------------------------------------------------------------
FF07  4E 06 02    LDX $0206        'X'
FF0A  9A          TXS
FF0B  4C 89 C3    JMP $C389
-------------------------------------------------------------
FF0E  4C F7 E7    JMP $E7F7  "?"
FF11  A0 01       LDY #$01         '.S', '.L'
FF13  84 D4       STY DEVICE
FF15  88          DEY
FF16  84 D1       STY NAME-LEN
FF18  84 9D       STY $9D
FF1A  A9 02       LDA #$02
FF1C  85 DB       STA $DB
FF1E  A9 07       LDA #$07
FF20  85 DA       STA $DA
FF22  20 CF FF    JSR $FFCF  INPUT
FF25  C9 20       CMP #$20
FF27  F0 F9       BEQ $FF22
FF29  C9 0D       CMP #$0D
FF2B  F0 1A       BEQ $FF47  OK TO LOAD
FF2D  C9 22       CMP #$22
FF2F  D0 DD       BNE $FF0E  "?"
FF31  20 CF FF    JSR $FFCF  INPUT
FF34  C9 22       CMP #$22
FF36  F0 24       BEQ $FF5C
FF38  C9 0D       CMP #$0D
FF3A  F0 0B       BEQ $FF47
FF3C  91 DA       STA ($DA),Y
FF3E  E6 D1       INC NAME-LEN
FF40  C8          INY
FF41  C0 10       CPY #$10
FF43  F0 C9       BEQ $FF0E  "?"
FF45  D0 EA       BNE $FF31
FF47  A5 B4       LDA $B4
FF49  C9 06       CMP #$06
FF4B  D0 E2       BNE $FF2F  "?"
FF4D  20 22 F3    JSR $F322
FF50  20 E6 F8    JSR $F8E6
FF53  A5 96       LDA ST
FF55  29 10       AND #$10
FF57  D0 F2       BNE $FF4B  "?"
FF59  4C 56 FD    JMP $FD56
```

GET PROGRAM NAME

```
                        BEQ  $FF47   OK TO LOAD
FF61  F0 E4             CMP  #$2C
FF63  C9 2C             BNE  $FF57   "?"
FF65  D0 F0             JSR  $E7B6
FF67  20 B6 E7          AND  #$0F                 GET
FF6A  29 0F             BEQ  $FF43   "?"          DEVICE
FF6C  F0 D5             CMP  #$03
FF6E  C9 03             BEQ  $FF6C   "?"
FF70  F0 FA             STA  DEVICE
FF72  85 D4             JSR  $FFCF   INPUT
FF74  20 CF FF          CMP  #$0D
FF77  C9 0D             BEQ  $FF47   OK TO LOAD
FF79  F0 CC             CMP  #$2C
FF7B  C9 2C             BNE  $FF65   "?"
FF7D  D0 E6             JSR  $E7A7   INPUT TO TMP
FF7F  20 A7 E7          JSR  $E797   SWAP TMP0,TMP2
FF82  20 97 E7          JSR  $FFCF   INPUT
FF85  20 CF FF          CMP  #$2C
FF88  C9 2C             BNE  $FF7D   "?"
FF8A  D0 F1             JSR  $E7A7   INPUT TO TMP
FF8C  20 A7 E7          LDA  START-ADDS
FF8F  A5 FB             STA  $C9
FF91  85 C9             LDA  START-ADS-HI
FF93  A5 FC             STA  $CA
FF95  85 CA             JSR  $E797
FF97  20 97 E7          JSR  $FFCF   INPUT
FF9A  20 CF FF          CMP  #$20
FF9D  C9 20             BEQ  $FF9A
FF9F  F0 F9             CMP  #$0D
FFA1  C9 0D             BNE  $FF8A   "?"
FFA3  D0 E5             LDA  $B4
FFA5  A5 B4             CMP  #$07
FFA7  C9 07             BNE  $FFA3   "?"
FFA9  D0 F8             JSR  $F6A4
FFAB  20 A4 F6          JMP  $FD56
FFAE  4C 56 FD
```

```
FFB1 C.  0978 CBM ***L

FFC0  4C 21 F5    JMP  $F521   OPEN
FFC3  4C A9 F2    JMP  $F2A9   CLOSE
FFC6  4C 70 F7    JMP  $F770   Set input device
FFC9  4C BC F7    JMP  $F7BC   Set output device
FFCC  4C 72 F2    JMP  $F272   Restore default I/O devices
FFCF  4C E1 F1    JMP  $F1E1   Input character  FROM SCREEN
FFD2  4C 32 F2    JMP  $F232   Output character TO SCREEN
FFD5  4C C2 F3    JMP  $F3C2   LOAD
FFD8  4C 9E F6    JMP  $F69E   SAVE
FFDB  4C B7 F4    JMP  $F4B7   VERIFY
FFDE  4C 84 F6    JMP  $F684   SYS
FFE1  4C 0F F3    JMP  $F30F   Test Stop key
FFE4  4C D1 F1    JMP  $F1D1   Get character (FROM KEYBOARD)
FFE7  4C 6E F2    JMP  $F26E   Abort all I/O activity
FFEA  4C 29 F7    JMP  $F729   Clock update

FFF0  AA AA AA AA AA AA AA AA
FFF8  AA AA FE FC D1 FC 1B E6
                  NMI   Reset  Interrupt
```

System variables memory map (RAM) - New ROM machines.

0000-0002	0-2	USR Jump instruction lo-hi
0003	3	General counter for Basic. Search character ':' or endline
0004	4	Scan-between-quotes flag. 00 as delimeter
0005	5	Basic input buffer pointer; # subscripts
0006	6	Default DIM flag. First character of array name
0007	7	Variable flag, type: FF=string, 00=numeric
0008	8	Integer flag, type: 80=integer, 00=floating point
0009	9	DATA scan flag; LIST quote flag; memory flag
000A	10	Subscript flag; FNx flag
000B	11	Flags for input or read, 0==input: 64=get: 152=read
000C	12	ATN sign flag: comparison evaluation flag
000D	13	input flag; suppress output if negative
000E	14	current I/O device for prompt-suppress
0011-0012	17-18	Basic integer address (for SYS, GOTO etc)
0013	19	Temporary string descriptor stack pointer
0014-0015	20-21	Last temporary string vector
0016-001E	22-30	Stack of descriptors for temporary strings
001F-0020	31-32	Pointer for number transfer
0021-0022	33-34	Misc.number pointer
0023-0027	35-39	product staging area for multiplication
0028-0029	40-41	Pointer: Start-of-Basic memory
002A-002B	42-43	Pointer: End-of-Basic, Start-of-Variables
002C-002D	44-45	Pointer:End-of-Variables,Start-of-Arrays
002E-002F	46-47	Pointer: End-of-Arrays
0030-0031	48-49	Pointer: Bottom-of-Strings (moving down)
0032-0033	50-51	Utility string pointer
0034-0035	52-53	Pointer: Limit of Basic Memory
0036-0037	54-55	Current Basic line number
0038-0039	56-57	Previous Basic line number
003A-003B	58-59	Pointer to Basic statement (for CONT)
003C-003D	60-61	Line number, current DATA line
003E-003F	62-63	Pointer to current DATA item
0040-0041	64-65	Input vector
0042-0043	66-67	Current variable name
0044-0045	68-69	Current variable address
0046-0047	70-71	Variable pointer for FOR/Next
0048-0049	72-73	Y save register-new operator save; current operator pointer

004A	74	Special mask for current operator; comparison symbol
004B-004C	75-76	Misc numeric work area; function definition pointer,lo-hi
004D-004E	77-78	Work area; pointer to string description
004F	79	Length of above string
0050	80	constant used by garbage collect routine, 3 or 7
0051-0053	81-83	Jump vector for functions
0054-0058	84-88	Misc numeric storage area
0059-005D	89-93	Misc numeric storage area
005E-0063	94-99	Accumulator#1: E,M,M,M,M,S
0064	100	Series evaluation constant pointer
0065	101	Accumulator hi-order propogation word
0066-006B	102-107	Accumulator#2
006C	108	Sign comparison, primary vs. secondary
006D	109	Low-order rounding byte for Acc#1
006E-006F	110-111	Cassette buffer length/Series Pointer
0070-0087	112-135	Subrtn: Get Basic Char; 77,78=pointer
0088-008C	136-140	RND storage and work area
008D-008F	141-143	Jiffy clock for TI and TI$
0090-0091	144-145	IRQ RAM vector,lo-hi; hardware interrupt vector
0092-0093	146-147	Break interrupt vector
0094-0095	148-149	NMI RAM interrupt vector,lo-hi
0096	150	Status word ST
0097	151	Which key depressed: 255=no key
0098	152	Shift key: 1 if depressed
0099-009A	153-154	Clock correction factor;lsb-msb; 1/30 sec increment
009B	155	Keyswitch PIA duplicate of 59410 : STOP and RVS flags
009C	156	Timing constant buffer
009D	157	Load=0, Verify=1
009E	158	# characters in keyboard buffer
009F	159	Screen reverse flag
00A0	160	IEEE-488 output flag: FF=character waiting
00A1	161	End-of-line-for-input pointer
00A3-00A4	163-164	Cursor log (row,column)
00A5	165	IEEE-488 output character buffer
00A6	166	Key image
00A7	167	0=flashing cursor, else no cursor
00A8	168	Countdown for cursor timing
00A9	169	Character under cursor
00AA	170	Cursor blink flag
00AB	171	EOT bit received

00AC	172	Input from screen/input from keyboard
00AD	173	X save flag
00AE	174	How many open files; pointer into file table
00AF	175	Input device, normally 0
00B0	176	Output CMD device, normally default of 3
00B1	177	Tape character parity
00B2	178	Byte reveived flag
00B4	180	Tape buffer character
00B5	181	Pointer in filename transfer
00B7	183	Serial bit count
00B9	185	Cycle counter
00BA	186	Countdown for tape write; sync on tape header
00BB	187	Tape buffer#1 count
00BC	188	Tape buffer#2 count
00BD	189	Write leader count; Read pass1/pass2
00BE	190	Write new byte; Read error flag
00BF	191	Write start bit; Read bit seq error
00C0	192	Pass 1 error log pointer
00C1	193	Pass 2 error correction pointer
00C2	194	Current function; 0-Scan; 1-15=Count; $40=Load; $80=End
00C3	195	Read checksum; Write leader length
00C4-00C5	196-197	Pointer to screen line
00C6	198	Column position of cursor on above line (0-79)
00C7-00C8	199-200	Utility pointer: tape buffer,scrolling
00C9-00CA	201-202	Tape end address/end of current program
00CB-00CC	203-204	Tape timing constants
00CD	205	Flag for quote mode 0=direct cursor, else programmed cursor
00CE	206	Timer 1 enabled for tape read; 00=disabled
00CF	207	EOT signal received from tape
00D0	208	Read character error
00D1	209	# characters in file name
00D2	210	Current logical file number
00D3	211	Current secondary addrs, or R/W command
00D4	212	Current device number
00D5	213	Line length (40 or 80) for screen
00D6-00D7	214-215	Start of tape buffer, address
00D8	216	Line where cursor lives
00D9	217	Last key input; buffer checksum; bit buffer
00DA-00DB	218-219	Pointer to current file name
00DC	220	Number of keyboard INSERTs outstanding

00DD	221	Write shift word/Receive input character
00DE	222	#blocks remaining to write/read
00DF	223	Serial word buffer
00E0-00F8	224-248	Screen line table: hi order address & line wrap
00F9	249	Interrupt driver flag for cassette#1 status switch
00FA	250	Interrupt driver flag for cassette#2 status switch
00FB-00FC	251-252	Tape start address
0100-010A	256-266	Binary to ASII conversion area
0100-013E	256-318	Tape read error log for correction
0100-01FF	256-511	Processor stack area
0200-0250	512-592	Basic input buffer
0200-0201	512-513	Program counter
0202	514	is processor status
0203	515	is accumulator
0204	516	X index
0205	517	Y index
0206	518	stack pointer
0207-0208	519-520	user modifiable IRQ
0251-025A	593-602	Logical file number table
025B-0264	603-612	Device number table
0265-026E	613-622	Secondary address, or R/W cmd, table
026F-0278	623-632	Keyboard input buffer
027A-0339	634-825	Tape#1 buffer
033A-03F9	826-1017	Tape#2 buffer
03FA-03FB	1018-1019	Vector for Machine Language Monitor
0400-7FFF	1024-32767	Available RAM including expansion
8000-8FFF	32768-36863	Video RAM
9000-BFFF	36864-49151	Available ROM expansion area
C000-E0F8	49152-57592	Microsoft Basic interpreter
E0F9-E7FF	57593-59391	Keyboard, screen, interrupt programs
E810-E813	59408-59411	PIA 1 - Keyboard I/O
E820-E823	59424-59427	PIA 2 - IEEE-488 I/O
E840-E84F	59456-59471	VIA - I/O and timers
F000-FFFF	61440-65535	Reset, tape, diagnostics, monitor

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