

TITLE 'ASM IO MODULE'
I/O MODULE FOR CP/M ASSEMBLER

```

;
;
0200      ORG      200H
0000 =    BOOT    EQU      000H      ;REBOOT LOCATION
;         I/O MODULE ENTRY POINTS
0200 C3E00C  JMP      INIT      ;INITIALIZE, START ASSEMBLER
0203 C3A10D  JMP      SETUP     ;FILE SETUP
0206 C3CA0D  JMP      GNC       ;GET NEXT CHARACTER
0209 C340E   JMP      PNC       ;PUT NEXT OUTPUT CHARACTER
020C C3AA0E  JMP      PNB       ;PUT NEXT HEX BYTE
020F C3DE0E  JMP      PCHAR     ;PRINT CONSOLE CHARACTER
0212 C3BC0C  JMP      PCON      ;PRINT CONSOLE BUFFER TO CRLF
0215 C3000F  JMP      WOBUFF     ;WRITE OUTBUFFER
0218 C32F0F  JMP      PERR      ;PLACE ERROR CHARACTER INTO PBUFF
021B C34C10  JMP      DHEX      ;PLACE HEX BYTE INTO OUTPUT BUFFER
021E C3390F  JMP      EOR       ;END OF ASSEMBLY
;         DATA FOR I/O MODULE
0221      BPC:    DS          2      ;BASE PC FOR CURRENT HEX RECORD
0223      DBL:    DS          1      ;HEX BUFFER LENGTH
0224      DBUFF:  DS         16      ;HEX BUFFER
;
;         DISK NAMES
0234      CDISK:  DS          1      ;CURRENTLY SELECTED DISK
0235      ADISK:  DS          1      ;.ASM DISK
0236      PDISK:  DS          1      ;.PRN DISK
0237      HDISK:  DS          1      ;.HEX DISK
;
;
;         COMMON EQUATES
0078 =    QBMAX   EQU      120      ;MAX PRINT SIZE
010C =    QBUFF   EQU      10CH     ;PRINT BUFFER
0184 =    QBP     EQU      QBUFF+QBMAX ;PRINT BUFFER POINTER
;
0185 =    TOKEN   EQU      QBP+1    ;CURRENT TOKEN UNDER SCAN
0186 =    VALUE   EQU      TOKEN+1  ;VALUE OF NUMBER IN BINARY
0188 =    ACCLLEN EQU      VALUE+2   ;ACCUMULATOR LENGTH
0040 =    ACMAX   EQU      64       ;MAX ACCUMULATOR LENGTH
0189 =    ACCUM   EQU      ACCLLEN+1
;
01C9 =    EVALUE  EQU      ACCUM+ACMAX ;VALUE FROM EXPRESSION ANALYSIS
;
01CB =    SYTOP   EQU      EVALUE+2  ;CURRENT SYMBOL TOP
01CD =    SYMAX   EQU      SYTOP+2   ;MAX ADDRESS+1
;
01CF =    PASS    EQU      SYMAX+2   ;CURRENT PASS NUMBER
01D0 =    FPC     EQU      PASS+1    ;FILL ADDRESS FOR DHEX ROUTINE
01D2 =    ASPC    EQU      FPC+2     ;ASSEMBLER'S PSEUDO PC
;
000D =    CR      EQU      0DH       ;CARRIAGE RETURN
000A =    LF      EQU      0AH       ;LINE FEED
001A =    EOF     EQU      1AH       ;END OF FILE MARK
;
;         DOS ENTRY POINTS

```

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1-756

```

0005 =      BDOS      EQU      5H      ;DOS ENTRY POINT
0001 =      READC     EQU      1       ;READ CONSOLE DEVICE
0002 =      WRITC     EQU      2       ;WRITE CONSOLE DEVICE
000B =      REDYC     EQU      11      ;CONSOLE CHARACTER READY
000E =      SELECT   EQU      14      ;SELECT DISK SPECIFIED BY REGISTER E
000F =      OPENF     EQU      15      ;OPEN FILE
0010 =      CLOSF     EQU      16      ;CLOSE FILE
0013 =      DELEF     EQU      19      ;DELETE FILE
0014 =      READF     EQU      20      ;READ FILE
0015 =      WRITF     EQU      21      ;WRITE FILE
0016 =      MAKEF     EQU      22      ;MAKE A FILE
0019 =      CSEL      EQU      25      ;RETURN CURRENTLY SELECTED DISK
001A =      SETDM     EQU      26      ;SET DMA ADDRESS

```

;

;

FILE AND BUFFERING PARAMETERS

```

0008 =      NSB       EQU      8       ;NUMBER OF SOURCE BUFFERS
0006 =      NPB       EQU      6       ;NUMBER OF PRINT BUFFERS
0006 =      NHB       EQU      6       ;NUMBER OF HEX BUFFERS

```

;

```

0400 =      SSIZE     EQU      NSB*128
0300 =      PSIZE     EQU      NPB*128
0300 =      HSIZE     EQU      NHB*128

```

;

;

FILE CONTROL BLOCKS

```

0238      SCB:      DS      9       ;FILE NAME
0241 41534D      DB      'ASM'     ;FILE TYPE
0244      SCBR:     DS      1       ;REEL NUMBER (ZEROED IN SETUP)
0245      DS      19      ;MISC AND DISK MAP
0258      SCBCR:    DS      1       ;CURRENT RECORD (ZEROED IN SETUP)

```

;

```

0259      PCB:      DS      9
0262 50524E00    DB      'PRN',0
0266      DS      19
0279 00          DB      0

```

;RECORD TO WRITE NEXT

;

```

027A      HCB:      DS      9
0283 48455800    DB      'HEX',0
0287      DS      19
029A 00          DB      0

```

;

;

POINTERS AND BUFFERS

```

029B 0004      SBP:      DW      SSIZE ;NEXT CHARACTER POSITION TO READ
029D      SBUFF:    DS      SSIZE

```

;

```

069D 0000      PBP:      DW      0
069F      PBUFF:    DS      PSIZE

```

;

```

099F 0000      HBP:      DW      0
09A1      HBUFF:    DS      HSIZE

```

```

005C =      FCB      EQU      5CH     ;FILE CONTROL BLOCK ADDRESS
0001 =      FNM      EQU      1       ;POSITION OF FILE NAME.
0009 =      FLN      EQU      9       ;FILE NAME LENGTH
0080 =      BUFF     EQU      80H     ;INPUT DISK BUFFER ADDRESS

```

;

```

      SEL:      ;SELECT DISK IN REG-A
OCA1 213402    LXI      H,CDISK

```

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```
OCA4 BE      CMP      M      ;SAME?
OCA5 C8      RZ
OCA6 77      MOV      M,A    ;CHANGE CURRENT DISK
OCA7 5F      MOV      E,A
OCA8 0E0E    MVI      C,SELECT
OCAA CD0500  CALL     BDOS
OCAD C9      RET
```

;
SCANP: ;SCAN THE NEXT PARAMETER

```
OCAE 23      INX      H
OCAF 7E      MOV      A,M
OCB0 FE20    CPI
OCB2 CAB80C  JZ       SCNP0
OCB5 DE41    SBI      'A'    ;NORMALIZE
OCB7 C9      RET
OCB8 3A3402  SCNP0: LDA     CDISK
OCBB C9      RET
```

;
PCON: ;PRINT MESSAGE AT H,L TO CONSOLE DEVICE

```
OCBC 7E      MOV      A,M
OCBD CDDE0E  CALL     PCHAR
OCC0 7E      MOV      A,M
OCC1 23      INX      H
OCC2 FE0D    CPI      CR
OCC4 C2BC0C  JNZ      PCON
OCC7 3E0A    MVI      A,LF
OCC9 CDDE0E  CALL     PCHAR
OCCC C9      RET
```

;
FNAME: ;FILL NAME FROM DEFAULT FILE CONTROL BLOCK

```
OCCD 115C00  LXI      D,FCB
OCD0 0609    MVI      B,FLN
OCD2 1A      FNAMO: LDAX   D      ;GET NEXT FILE CHARACTER
OCD3 FE3F    CPI      '?'
OCD5 CABB0D  JZ       FNERR    ;FILE NAME ERROR
OCD8 77      MOV      M,A    ;STORE TO FILE CNTRL BLOCK
OCD9 23      INX      H
OCDA 13      INX      D
OCDB 05      DCR      B
OCD C2D20C  JNZ      FNAMO    ;FOR NEXT CHARACTER
OCDF C9      RET
```

;
INIT: ;SET UP STACK AND FILES, START ASSEMBLER

```
OCE0 21A00F  LXI      H,TITL
OCE3 CDBC0C  CALL     PCON
OCE6 C33F0D  JMP      SETO
```

;
OPEN: ;OPEN FILE ADDRESSED BY D,E

```
OCE9 0E0F    MVI      C,OPENF
OCEB CD0500  CALL     BDOS
OCEE FEFF    CPI      255
OCF0 C0      RNZ
OCF1 21B90F  ; OPEN ERROR
OCF4 CDBC0C  LXI      H,ERROP
OCF7 C30000  CALL     PCON
JMP      BOOT
```

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```

;
CLOSE: ;CLOSE FILE ADDRESSED BY D,E
OCFA 0E10      MVI      C,CLOSF
OCFC CD0500     CALL     BDOS
OCFF FEFF      CPI      255
OD01 C0        RNZ      ;CLOSE OK
OD02 212910     LXI      H,ERRCL
OD05 CDBC0C     CALL     PCON
OD08 C30000     JMP      BOOT

;
DELETE: ;DELETE FILE ADDRESSED BY D,E
OD0B 0E13      MVI      C,DELEF
OD0D C30500     JMP      BDOS

;
MAKE: ;MAKE FILE ADDRESSED BY D,E
OD10 0E16      MVI      C,MAKEF
OD12 CD0500     CALL     BDOS
OD15 FEFF      CPI      255
OD17 C0        RNZ
; MAKE ERROR
OD18 21D00F     LXI      H,ERRMA
OD1B CDBC0C     CALL     PCON
OD1E C30000     JMP      BOOT

;
SELA: LDA      ADISK
OD21 3A3502     CALL     SEL
OD24 CDA10C     RET
OD27 C9

;
NPR: ;RETURN ZERO FLAG IF NO PRINT FILE
OD28 3A3602     LDA      PDISK
OD2B FE19      CPI      'Z'-'A'
OD2D C8        RZ
OD2E FE17      CPI      'X'-'A' ;CONSOLE
OD30 C9        RET

;
SELP: LDA      PDISK
OD31 3A3602     CALL     SEL
OD34 CDA10C     RET
OD37 C9

;
SELH: LDA      HDISK
OD38 3A3702     CALL     SEL
OD3B CDA10C     RET
OD3E C9

;
SET0: ;SET UP FILES FOR INPUT AND OUTPUT
OD3F 3A5C00     LDA      FCB ;GET FIRST CHARACTER
OD42 FE20      CPI      ' ' ;MAY HAVE FORGOTTEN NAME
OD44 CABB0D     JZ      FmERR ;FILE NAME ERROR
OD47 0E19      MVI      C,CSEL ;CURRENT DISK?
OD49 CD0500     CALL     BDOS ;GET IT TO REG-A
OD4C 323402     STA      CDISK

;
; SCAN PARAMETERS
OD4F 216400     LXI      H,FCB+FLN-1
OD52 CDAE0C     CALL     SCNP
OD55 323502     STA      ADISK
OD58 CDAE0C     CALL     SCNP

```

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```

OD5B 323702      STA      HDISK
OD5E CDAE0C      CALL     SCNP
OD61 323602      STA      PDISK

;

OD64 213802      LXI      H,SCB      ;ADDRESS SOURCE FILE CONTROL BLOCK
OD67 CDCD0C      CALL     FNAME      ;FILE NAME OBTAINED FROM DEFAULT FCB

;

OD6A CD280D      CALL     NPR        ;Z OR X?
OD6D CA830D      JZ       NOPR
OD70 215902      LXI      H,PCB      ;ADDRESS PRINT FILE CONTROL BLOCK
OD73 E5          PUSH     H          ;SAVE A COPY FOR OPEN
OD74 E5          PUSH     H          ;SAVE A COPY FOR DELETE
OD75 CDCD0C      CALL     FNAME      ;FILL PCB
OD78 CD310D      CALL     SELP
OD7B D1          POP      D          ;FCB ADDRESS
OD7C CD0B0D      CALL     DELETE
OD7F D1          POP      D          ;FCB ADDRESS
OD80 CD100D      CALL     MAKE

;
NOPR:            ;TEST FOR HEX FILE
OD83 3A3702      LDA      HDISK
OD86 FE19        CPI      'Z'-'A'
OD88 CA9E0D      JZ       NOHEX
OD8B 217A02      LXI      H,HCB
OD8E E5          PUSH     H
OD8F E5          PUSH     H
OD90 CDCD0C      CALL     FNAME
OD93 CD380D      CALL     SELH
OD96 D1          POP      D
OD97 CD0B0D      CALL     DELETE
OD9A D1          POP      D
OD9B CD100D      CALL     MAKE

;
;
OD9E C30011      NOHEX:   JMP      ENDMOD

;
SETUP:           ;SETUP INPUT FILE FOR SOURCE PROGRAM
ODA1 210004      LXI      H,SSIZE
ODA4 229B02      SHLD     SBP        ;CAUSE IMMEDIATE READ
ODA7 AF          XRA      A          ;ZERO VALUE
ODA8 324402      STA      SCBR       ;CLEAR REEL NUMBER
ODAB 325802      STA      SCBCR      ;CLEAR CURRENT RECORD
ODAE 322302      STA      DBL        ;CLEAR HEX BUFFER LENGTH
ODB1 CD210D      CALL     SELA
ODB4 113802      LXI      D,SCB
ODB7 CDE90C      CALL     OPEN

;

ODBA C9          RET

;
FNERR:           ;FILE NAME ERROR
ODBB 21E30F      LXI      H,ERRFN
ODBE CDBC0C      CALL     PCON
ODC1 C30000      JMP      BOOT

;
;
GCOMP:           ;COMPARE D,E AGAINST H,L

```

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```

ODC4 7A      MOV    A,D
ODC5 BC      CMP    H
ODC6 C0      RNZ
ODC7 7B      MOV    A,E
ODC8 BD      CMP    L
ODC9 C9      RET

```

```

;
GNC:          ;GET NEXT CHARACTER FROM SOURCE BUFFER

```

```

ODCA C5      PUSH    B
ODCB D5      PUSH    D
ODCC E5      PUSH    H          ;ENVIRONMENT SAVED
ODCD 2A9B02  LHLD    SBP
ODD0 110004  LXI     D,SSIZE
ODD3 CDC40D  CALL    GCOMP
ODD6 C2190E  JNZ     GNC2

```

```

;
;          READ ANOTHER BUFFER

```

```

ODD9 CD210D  CALL    SELA
ODDC 210000  LXI     H,0
ODDF 229B02  SHLD    SBP
ODE2 0608    MVI     B,NSB      ;NUMBER OF SOURCE BUFFERS
ODE4 219D02  LXI     H,SBUF

```

```

GNC0:        ;READ 128 BYTES

```

```

ODE7 C5      PUSH    B          ;SAVE COUNT
ODE8 E5      PUSH    H          ;SAVE BUFFER ADDRESS
ODE9 0E14    MVI     C,READF
ODEB 113802  LXI     D,SCB
ODEE CD0500  CALL    BDOS      ;PERFORM THE READ
ODF1 E1      POP     H          ;RESTORE BUFFER ADDRESS
ODF2 C1      POP     B          ;RESTORE BUFFER COUNT
ODF3 B7      ORA     A          ;SET FLAGS
ODF4 0E80    MVI     C,128
ODF6 C20D0E  JNZ     GNC1

```

```

;          NORMAL READ OCCURRED

```

```

ODF9 118000  LXI     D,BUFF      ;SOURCE BUFFER ADDRESS
ODFC 0E80    MVI     C,128

```

```

MOV0:        LDAX   D          ;GET CHARACTER
              MOV    M,A        ;STORE CHARACTER

```

```

ODFF 77      INX     D
OE00 13      INX     H
OE01 23      DCR     C
OE02 0D      JNZ     MOV0
OE03 C2FE0D  JNZ     MOV0

```

```

;          BUFFER LOADED, TRY NEXT BUFFER

```

```

OE06 05      DCR     B
OE07 C2E70D  JNZ     GNC0
OE0A C3190E  JMP     GNC2

```

```

;
GNC1:        ;EOF OR ERROR

```

```

OE0D FE03    CPI     3          ;ALLOW 0,1,2
OE0F D22B0E  JNC     FRERR      ;FILE READ ERROR
OE12 361A    MVI     M,EOF      ;STORE AND END OF FILE CHARACTER
OE14 23      INX     H
OE15 0D      DCR     C
OE16 C2120E  JNZ     GNCE      ;FILL CURRENT BUFFER WITH EOF'S

```

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```

GNC2: ;GET CHARACTER TO ACCUMULATOR AND RETURN
0E19 119D02 LXI D,SBUFF
0E1C 2A9B02 LHLD SBP
0E1F E5 PUSH H ;SAVE CURRENT SBP
0E20 23 INX H ;READY FOR NEXT READ
0E21 229B02 SHLD SBP
0E24 E1 POP H ;RESTORE PREVIOUS SBP
0E25 19 DAD D ;ABSOLUTE ADDRESS OF CHARACTER
0E26 7E MOV A,M ;GET IT
0E27 E1 POP H
0E28 D1 POP D
0E29 C1 POP B
0E2A C9 RET

;
0E2B 21FA0F FRERR: LXI H,ERRFR
0E2E CDBC0C CALL PCON ;PRINT READ ERROR MESSAGE
0E31 C30000 JMP BOOT

;
PNC: ;SAME AT PNCF, BUT ENVIRONMENT IS SAVED FIRST
0E34 C5 PUSH B
; CHECK FOR CONSOLE OUTPUT / NO OUTPUT
0E35 47 MOV B,A ;SAVE CHARACTER
0E36 3A3602 LDA PDISK ;Z OR X?
0E39 FE19 CPI 'Z'-'A' ;Z NO OUTPUT
0E3B CA510E JZ PNRET

;
0E3E FE17 CPI 'X'-'A'
0E40 78 MOV A,B ;RECOVER CHAR FOR CON OUT
0E41 C24A0E JNZ PNGO
0E44 CDDE0E CALL PCHAR
0E47 C3510E JMP PNRET

;
; NOT X OR Z, SO PRINT IT
0E4A D5 PNGO: PUSH D
0E4B E5 PUSH H
0E4C CD530E CALL PNCF
0E4F E1 POP H
0E50 D1 POP D
0E51 C1 PNRET: POP B
0E52 C9 RET

;
PNCF: ;PRINT NEXT CHARACTER
0E53 2A9D06 LHLD PBP
0E56 EB XCHG
0E57 219F06 LXI H,PBUFF
0E5A 19 DAD D
0E5B 77 MOV M,A ;CHARACTER STORED AT PBP IN PBUFF
0E5C EB XCHG ;PBP TO H,L
0E5D 23 INX H ;POINT TO NEXT CHARACTER
0E5E 229D06 SHLD PBP ;REPLACE IT
0E61 EB XCHG
0E62 210003 LXI H,PSIZE
0E65 CDC40D CALL GCOMP ;AT END OF BUFFER?
0E68 C0 RNZ ;RETURN IF NOT

;
; OVERFLOW, WRITE BUFFER

```

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```

0E69 CD310D      CALL    SELP
0E6C 210000      LXI      H,0
0E6F 229D06      SHLD     PBP
0E72 219F06      LXI      H,PBUFF
0E75 115902      LXI      D,PCB      ;D,E ADDRESS FILE CONTROL BLOCK
0E78 0606        MVI      B,NPB      ;NUMBER OF BUFFERS TO B
;               (DROP THROUGH TO WBUFF)
;
WBUFF:           ;WRITE BUFFERS STARTING AT H,L FOR B BUFFERS
;               CHECK FOR EOF'S
0E7A 7E          MOV      A,M
0E7B FE1A        CPI      EOF
0E7D C8          RZ              ;DON'T DO THE WRITE
;
0E7E C5          PUSH     B      ;SAVE NUMBER OF BUFFERS
0E7F D5          PUSH     D      ;SAVE FCB ADDRESS
0E80 0E80        MVI      C,128  ;READY FOR MOVE
0E82 118000      LXI      D,BUFF
WBUF0:           ;MOVE TO BUFFER
0E85 7E          MOV      A,M      ;GET CHARACTER
0E86 12          STAX     D      ;PUT CHARACTER
0E87 23          INX      H
0E88 13          INX      D
0E89 0D          DCR      C
0E8A C2850E      JNZ      WBUF0
;
;               WRITE BUFFER
0E8D D1          POP      D      ;RECOVER FCB ADDRESS
0E8E D5          PUSH     D      ;SAVE IT AGAIN FOR LATER
0E8F E5          PUSH     H      ;SAVE BUFFER ADDRESS
0E90 0E15        MVI      C,WRITE ;DOS WRITE FUNCTION
0E92 CD0500      CALL     BDOS
0E95 E1          POP      H      ;RECOVER BUFFER ADDRESS
0E96 D1          POP      D      ;RECOVER FCB ADDRESS
0E97 C1          POP      B      ;RECOVER BUFFER COUNT
0E98 B7          ORA      A      ;SET ERROR RETURN FLAGS
0E99 C2A10E      JNZ      FWERR
;
;               WRITE OK
0E9C 05          DCR      B
0E9D C8          RZ              ;RETURN IF NO MORE BUFFERS TO WRITE
0E9E C37A0E      JMP      WBUFF
;
FWERR:           ;ERROR IN WRITE
0EA1 211110      LXI      H,ERRFW
0EA4 CDBC0C      CALL     PCON    ;ERROR MESSAGE OUT
0EA7 C3770F      JMP      EORC    ;TO CLOSE AND REBOOT
;
;
PNB:             ;PUT NEXT HEX BYTE
0EAA C5          PUSH     B
0EAB D5          PUSH     D
0EAC E5          PUSH     H
0EAD CDB40E      CALL     PNBFF
0EB0 E1          POP      H
0EB1 D1          POP      D

```

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```

OEB2 C1      POP      B
OEB3 C9      RET

;
PNBF:        ;PUT NEXT BYTE
;            (SIMILAR TO THE PNCF SUBROUTINE)
OEB4 2A9F09  LHL      HBP
OEB7 EB      XCHG
OEB8 21A109  LXI      H,HBUFF
OEBB 19      DAD      D
OEEC 77      MOV      M,A      ;CHARACTER STORED AT HBP IN HBUFF
OEBD EB      XCHG
OEBE 23      INX      H      ;HBP INCREMENTED
OEBF 229F09  SHLD     HBP
OEC2 EB      XCHG      ;BACK TO D,E
OEC3 210003  LXI      H,HSIZE
OEC6 CDC40D  CALL     GCOMP ;EQUAL?
OEC9 C0      RNZ

```

```

;
;            OVERFLOW, WRITE BUFFERS
OECA CD380D  CALL     SELH
OECD 210000  LXI      H,0
OED0 229F09  SHLD     HBP
OED3 21A109  LXI      H,HBUFF
OED6 117A02  LXI      D,HCB ;FILE CONTROL BLOCK FOR HEX FILE
OED9 0606    MVI      B,NHB
OEDB C37A0E  JMP      WBUFF ;WRITE BUFFERS

```

```

;
PCHAR:      ;PRINT CHARACTER IN REGISTER A
OEDE C5      PUSH     B
OEDF D5      PUSH     D
OEE0 E5      PUSH     H
OEE1 0E02    MVI      C,WRITC
OEE3 5F      MOV      E,A
OEE4 CD0500  CALL     BDOS
OEE7 E1      POP      H
OEE8 D1      POP      D
OEE9 C1      POP      B
OEFA C9      RET

```

```

;
WOCHAR:     ;WRITE CHARACTER IN REG-A WITH REFLECT AT CONSOLE IF ERROR
OEEB 4F      MOV      C,A      ;SAVE THE CHAR
OEEC CD340E  CALL     PNC      ;PRINT CHAR
OEEF 3A0C01  LDA      QBUFF
OEF2 FE20    CPI
OEF4 C8      RZ
;            ERROR IN LINE
OEF5 3A3602  LDA      PDISK
OEF8 FE17    CPI      'X'-'A'
OEFA C8      RZ      ;ALREADY PRINTED IF 'X'
;
OEFB 79      MOV      A,C      ;RECOVER CHARACTER
OEEC CDDE0E  CALL     PCHAR ;PRINT IT
OEEF C9      RET

```

```

;
WOBUFF:     ;WRITE THE OUTPUT BUFFER TO THE PRINT FILE
OF00 3A8401  LDA      QBP      ;GET CHARACTER COUNT

```

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```

OF03 210C01      LXI      H,QBUFF ;BASE OF BUFFER
OF06 B7          WOB0:   ORA      A      ;ZERO COUNT?
OF07 CA150F      JZ       WOB0
;
OF0A 47          ;      NOT END, SAVE COUNT AND GET CHARACTER
OF0B 7E          MOV      B,A      ;SAVE COUNT
OF0C CDEB0E      MOV      A,M
OF0F 23          CALL     WOCHAR ;WRITE CHARACTER
OF10 78          INX      H      ;ADDRESS NEXT CHARACTER OF BUFFER
OF11 3D          MOV      A,B      ;GET COUNT
OF12 C3060F      DCR      A
;
;
WOB0:            ;END OF PRINT - ZERO QBP
OF15 328401      STA      QBP
;
FOLLOW BY CR LF
OF18 3E0D        MVI      A,CR
OF1A CDEB0E      CALL     WOCHAR
OF1D 3E0A        MVI      A,LF
OF1F CDEB0E      CALL     WOCHAR
OF22 210C01      LXI      H,QBUFF
OF25 3E78        MVI      A,QBMAX ;READY TO BLANK OUT
OF27 3620        WOB2:   MVI      M,
OF29 23          INX      H
OF2A 3D          DCR      A
OF2B C2270F      JNZ      WOB2
OF2E C9          RET
;
;
PERR:            ;FILL QBUFF ERROR MESSAGE POSITION
OF2F 47          MOV      B,A      ;SAVE CHARACTER
OF30 210C01      LXI      H,QBUFF
OF33 7E          MOV      A,M
OF34 FE20        CPI
OF36 C0          RNZ      ;DON'T CHANGE IT IF ALREADY SET
OF37 70          MOV      M,B      ;STORE ERROR CHARACTER
OF38 C9          RET
;
;
EOR:             ;END OF ASSEMBLER
OF39 CD280D      CALL     NPR      ;Z OR A?
OF3C CA4F0F      JZ       EOPR
;
FILL OUTPUT FILES WITH EOF'S
OF3F 2A9D06      EOR2:   LHLD     PBP
OF42 7D          MOV      A,L
OF43 B4          ORA      H      ;VALUE ZERO?
OF44 CA4F0F      JZ       EOPR
OF47 3E1A        MVI      A,EOF    ;CTL-Z IS END OF FILE
OF49 CD340E      CALL     PNC      ;PUT ENDFILES IN PRINT BUFFER
OF4C C33F0F      JMP      EOR2     ;EVENTUALLY BUFFER IS WRITTEN
;
;
EOPR:            ;END OF PRINT FILE, CHECK HEX
OF4F 3A3702      LDA      HDISK
OF52 FE19        CPI      'Z'-'A'
OF54 CA770F      JZ       EORC
EOR0:            ;WRITE TERMINATING RECORD INTO HEX FILE
OF57 3A2302      LDA      DBL      ;MAY BE ZERO ALREADY
OF5A B7          ORA      A

```

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```

0F5B C4B810      CNZ      WHEX      ;WRITE HEX BUFFER IF NOT ZERO
0F5E 2AD001      LHLD     FPC       ;GET CURRENT FPC AS LAST ADDRESS
0F61 222102      SHLD     BPC       ;RECORD LENGTH ZERO, BASE ADDRESS 0000
0F64 CDB810      CALL     WHEX      ;WRITE HEX BUFFER

```

;

;

NOW CLEAR OUTPUT BUFFER FOR HEX FILE

```

0F67 2A9F09      EOR1:    LHLD     HBP
0F6A 7D          MOV      A,L
0F6B B4          ORA      H
0F6C CA770F      JZ       EORC
0F6F 3E1A        MVI      A,EOF
0F71 CDAA0E      CALL     PNB
0F74 C3670F      JMP      EOR1

```

;

;

CLOSE FILES AND TERMINATE

EORC:

```

0F77 CD280D      CALL     NPR
0F7A CA860F      JZ       EORPC
0F7D CD310D      CALL     SELP
0F80 115902      LXI      D,PCB
0F83 CDFA0C      CALL     CLOSE

```

EORPC:

```

0F86 3A3702      LDA      HDISK
0F89 FE19        CPI      'Z'- 'A'
0F8B CA970F      JZ       EORHC
0F8E CD380D      CALL     SELH
0F91 117A02      LXI      D,HCB
0F94 CDFA0C      CALL     CLOSE

```

;

EORHC:

```

0F97 213C10      LXI      H,ENDA
0F9A CDBC0C      CALL     PCON
0F9D C30000      JMP      BOOT

```

;

```

0FA0 43502F4D20TITL: DB      'CP/M ASSEMBLER - VER 1.4',CR
0FB9 4E4F20534FERROP: DB      'NO SOURCE FILE PRESENT',CR
0FD0 4E4F204449ERRMA: DB      'NO DIRECTORY SPACE',CR
0FE3 534F555243ERRFN: DB      'SOURCE FILE NAME ERROR',CR
OFFA 534F555243ERRFR: DB      'SOURCE FILE READ ERROR',CR
1011 4F55545055ERRFW: DB      'OUTPUT FILE WRITE ERROR',CR
1029 43414E4E4FERRCL: DB      'CANNOT CLOSE FILES',CR
103C 454E44204FENDA: DB      'END OF ASSEMBLY',CR

```

;

DHEX: ;DATA TO HEX BUFFER (BYTE IN REG-A)

```

104C C5          PUSH     B
104D 47          MOV      B,A      ;HOLD CHARACTER FOR 'Z' TEST
104E 3A3702      LDA      HDISK
1051 FE19        CPI      'Z'- 'A'
1053 78          MOV      A,B      ;RECOVER CHARACTER
1054 CA9810      JZ       DHRET
1057 D5          PUSH     D      ;ENVIRONMENT SAVED
1058 F5          PUSH     PSW     ;SAVE DATA BYTE
1059 212302      LXI      H,DBL    ;CURRENT LENGTH
105C 7E          MOV      A,M      ;TO ACCUM
105D B7          ORA      A      ;ZERO?
105E CA8410      JZ       DHEX3

```

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```

;
; LENGTH NOT ZERO, MAY BE FULL BUFFER
1061 FE10 CPI 16
1063 DA6C10 JC DHEX1 ;BR IF LESS THAN 16 BYTES
; BUFFER FULL, DUMP IT
1066 CDB810 CALL WHEX ;DBL = 0 UPON RETURN
1069 C38410 JMP DHEX3 ;SET BPC AND DATA BYTE
;
DHEX1: ;PARTIAL BUFFER IN PROGRESS, CHECK FOR SEQUENTIAL BYTE LOAD
106C 2AD001 LHLD FPC
106F EB XCHG
1070 2A2102 LHLD BPC ;BASE PC IN H,L
1073 4F MOV C,A ;CURRENT LENGTH OF BUFFER
1074 0600 MVI B,0 ;IS IN B,C
1076 09 DAD B ;BPC+DBL TO H,L
1077 7B MOV A,E ;READY FOR COMPARE
1078 BD CMP L ;EQUAL?
1079 C28110 JNZ DHEX2 ;BR IF NOT
107C 7A MOV A,D ;CHECK HO BYTE
107D BC CMP H
107E CA8A10 JZ DHEX4 ;BR IF SAME ADDRESS
;
DHEX2: ;NON SEQUENTIAL ADDRESS, DUMP AND CHANGE BASE ADDRESS
1081 CDB810 CALL WHEX
DHEX3: ;SET NEW BASE
1084 2AD001 LHLD FPC
1087 222102 SHLD BPC
;
DHEX4: ;STORE DATA BYTE AND INC DBL
108A 212302 LXI H,DBL
108D 5E MOV E,M ;LENGTH TO REG-E
108E 34 INR M ;DBL=DBL+1
108F 1600 MVI D,0 ;HIGH ORDER ZERO FOR DOUBLE ADD
1091 212402 LXI H,DBUFF
1094 19 DAD D ;DBUFF+DBL TO H,L
1095 F1 POP PSW ;RESTORE DATA BYTE
1096 77 MOV M,A ;INTO DATA BUFFER
1097 D1 POP D
1098 C1 DHRET: POP B ;ENVIRONMENT RESTORED
1099 C9 RET
;
WRC: ;WRITE CHARACTER WITH CHECK SUM IN D
109A F5 PUSH PSW
109B 0F RRC
109C 0F RRC
109D 0F RRC
109E 0F RRC
109F E60F ANI OFH
10A1 CDAF10 CALL HEXC ;OUTPUT HEX CHARACTER
10A4 F1 POP PSW ;RESTORE BYTE
10A5 F5 PUSH PSW ;SAVE A VERSION
10A6 E60F ANI OFH
10A8 CDAF10 CALL HEXC ;WRITE LOW NIBBLE
10AB F1 POP PSW ;RESTORE BYTE
10AC 82 ADD D ;COMPUTE CHECKSUM
10AD 57 MOV D,A ;SAVE CS

```

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```

10AE C9          RET
;
HEXC:           ;WRITE CHARACTER
10AF C690        ADI      90H
10B1 27          DAA
10B2 CE40        ACI      40H
10B4 27          DAA
10B5 C3AA0E      JMP      PNB      ;PUT BYTE
;
WHEX:           ;WRITE CURRENT HEX BUFFER
10B8 3E3A        MVI      A,': ' ;RECORD HEADER
10BA CDAA0E      CALL     PNB      ;PUT BYTE
10BD 212302      LXI      H,DBL    ;RECORD LENGTH ADDRESS
10C0 5E          MOV      E,M      ;LENGTH TO REG-E
10C1 AF          XRA      A        ;ZERO TO REG-A
10C2 57          MOV      D,A      ;CLEAR CHECKSUM
10C3 77          MOV      M,A      ;LENGTH IS ZEROED FOR NEXT WRITE
10C4 2A2102      LHLD     BPC      ;BASE ADDRESS FOR RECORD
10C7 7B          MOV      A,E      ;LENGTH TO A
10C8 CD9A10      CALL     WRC      ;WRITE HEX VALUE
10CB 7C          MOV      A,H      ;HIGH ORDER BASE ADDR
10CC CD9A10      CALL     WRC      ;WRITE HO BYTE
10CF 7D          MOV      A,L      ;LOW ORDER BASE ADDR
10D0 CD9A10      CALL     WRC      ;WRITE LO BYTE
10D3 AF          XRA      A        ;ZERO TO A
10D4 CD9A10      CALL     WRC      ;WRITE RECORD TYPE 00
10D7 7B          MOV      A,E      ;CHECK FOR LENGTH 0
10D8 B7          ORA      A
10D9 CAE810      JZ       WHEX1
;
;           NON - ZERO, WRITE DATA BYTES
10DC 212402      LXI      H,DBUFF
10DF 7E          WHEX0: MOV      A,M      ;GET BYTE
10E0 23          INX      H
10E1 CD9A10      CALL     WRC      ;WRITE DATA BYTE
10E4 1D          DCR      E        ;END OF BUFFER?
10E5 C2DF10      JNZ      WHEX0
;
;           END OF DATA BYTES, WRITE CHECK SUM
10E8 AF          WHEX1: XRA      A
10E9 92          SUB      D        ;COMPUTE CHECKSUM
10EA CD9A10      CALL     WRC
;
;           SEND CRLF AT END OF RECORD
10ED 3E0D        MVI      A,CR
10EF CDAA0E      CALL     PNB
10F2 3E0A        MVI      A,LF
10F4 CDAA0E      CALL     PNB
10F7 C9          RET
;
;
1100 =          ENDMOD EQU      ($ AND OFFEOH)+20H
10F8          END

```

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0188 ACCLN	0189 ACCUM	0040 ACDAX	0235 ADISK	01D2 ASPC
0005 BDOS	0000 BOOT	0221 BPC	0080 BUFF	0234 CDISK
0CFA CLOSE	0010 CLOSF	000D CR	0019 CSEL	0223 DBL
0224 DBUFF	0013 DELEF	0D0B DELETE	104C DHEX	106C DHEX1
1081 DHEX2	1084 DHEX3	108A DHEX4	1098 DHRET	103C ENDA
1100 ENDMOD	001A EOF	0F4F EOPR	0F39 EOR	0F57 EORO
0F67 EOR1	0F3F EOR2	0F77 EORC	0F97 EORHC	0F86 EORPC
1029 ERRCL	0FE3 ERRFN	0FFA ERRFR	1011 ERRFW	0FD0 ERRMA
0FB9 ERROP	01C9 EVALUE	005C FCB	0009 FLN	0CD2 FNAME
0CCD FNAME	0DBB FNERR	0001 FNM	01D0 FPC	0E2B FRERR
0EA1 FWERR	0DC4 GCOMP	0DCA GNC	0DE7 GNC0	0E0D GNC1
0E19 GNC2	0E12 GNCE	099F HBP	09A1 HBUFF	027A HCB
0237 HDISK	10AF HEXC	0300 HSIZE	0CE0 INIT	000A LF
0016 MAKEF	0D10 MAKE	0DFE MOV0	0006 NHB	0D9E NOHEX
0D83 NOPR	0006 NPB	0D28 NPR	0008 NSB	000F OPENF
0CE9 OPEN	01CF PASS	069D PBP	069F PBUFF	0259 PCB
0EDE PCHAR	0CBC PCON	0236 PDISK	0F2F PERR	0EAA PNB
0EB4 PNB	0E34 PNC	0E53 PNCF	0E4A PNGO	0E51 PNRET
0300 PSIZE	0078 QBMAX	0184 QBP	010C QBUFF	0001 READC
0014 READF	000B REDYC	029B SBP	029D SBUFF	0238 SCB
0258 SCBCR	0244 SCBR	0CAE SCNP	0CB8 SCNPO	0D21 SELA
000E SELECT	0CA1 SEL	0D38 SELH	0D31 SELP	0D3F SET0
001A SETDM	0DA1 SETUP	0400 SSIZE	01CD SYMAX	01CB SYTOP
0FA0 TITL	0185 TOKEN	0186 VALUE	0E85 WBUF0	0E7A WBUFF
10B8 WHEX	10DF WHEX0	10E8 WHEX1	0F06 WOBO	0F27 WOB2
0F15 WOB	0F00 WOBUFF	0EEB WOCHAR	109A WRC	0002 WRITC
0015 WRITF				

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