```
*****************************************************************
*                                                               *
* CBIOS FOR CP/M VER 2.2 FOR DISK JOCKEY 2D CONTROLLER (ALL     *
* REVS, AND MODELS A & B). HANDLES DISKETTES WITH SECTOR SIZES  *
* OF 128 BYTES SINGLE DENSITY, 256, 512, 1024 BYTES DOUBLE      *
* DENSITY. THERE ARE CONDITIONAL ASSEMBLIES FOR DISKUS HARD     *
* DISK CONTROLLER.                                              *
*                                                               *
* WRITTEN BY BOBBY DALE GIFFORD.                                *
* 12/8/80                                                       *
*                                                               *
* CUSTOMIZED BY JAY O'BRIEN                                     *
* 1/16/82                                                       *
*                                                               *
* DISK MAP OF SECTORS USED BY COLD BOOT, WARM BOOT, FIRMWARE,   *
* AND CP/M:                                                     *
*                                                               *
* TRK Ø SEC  1 = FIRST SECTOR OF COLD BOOT.          E700H      *
*     Ø      2 = COLD BOOT 256.                        80H      *
*     Ø      3 = COLD BOOT 512.                        80H      *
*     Ø      4 = COLD BOOT 1024.                       80H      *
*     Ø      5 = WARM BOOT 256.                        80H      *
*     Ø      6 = WARM BOOT 512.                        80H      *
*     Ø      7 = WARM BOOT 1024.                       80H      *
*     Ø      8 = COLD/WARM BOOT.                     2C00H      *
*     Ø      9 = FIRMWARE.                           E400H      *
*     Ø     10 = FIRMWARE+80H.                       E480H      *
*     Ø     11 = FIRMWARE+100H                       E500H      *
*     Ø     12 = FIRMWARE+180H.                      E580H      *
*     Ø     13 = FIRMWARE+200H.                      E600H      *
*     Ø     14 = FIRMWARE+280H.                      E680H      *
*     Ø     15 = FIRMWARE+300H.                      E700H      *
*     Ø     16 = FIRMWARE+380H.                      E780H      *
*     Ø     17 = CCP.                                2700H      *
*     Ø     10 = CCP+80H.                            2780H      *
*     Ø     12 = CCP+100H.                           2800H      *
*     Ø     14 = CCP+180H.                           2880H      *
*     Ø     16 = CCP+200H.                           2900H      *
*     Ø     18 = CCP+280H.                           2980H      *
*     Ø     20 = CCP+300H.                           2A00H      *
*     Ø     22 = CCP+380H.                           2A80H      *
*     Ø     24 = CCP+400H.                           2B00H      *
*     Ø     26 = CCP+480H.                           2B80H      *
*     1        = REST OF CP/M.                 2C00H-4FFFH      *
*                                                               *
*****************************************************************

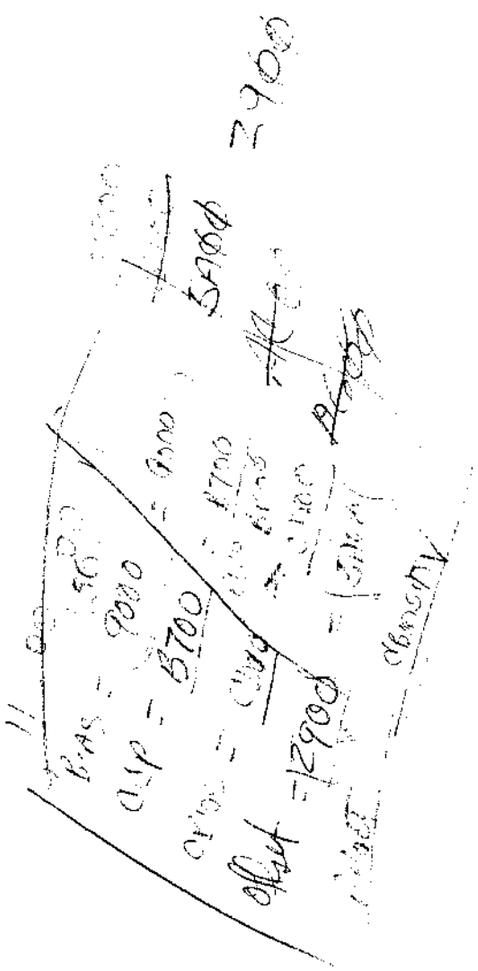
        TITLE   '*** Cbios For CP/M Ver. 2.2 ***'

*****************************************************************
*                                                               *
* THE FOLLOWING REVISION NUMBER IS IN REFERENCE TO THE CP/M     *
* 2.2 CBIOS.                                                    *
*                                                               *
*****************************************************************
```

CBIOS7A.PRN
3/23/82
DJ AT FOCO
FLOPPIES=A,B
HD=C,D,E
V10X VIDEO
60K

2700 +A000 = C700

ED82 -A000 = 4D82
-2700
2682
-C700
2682



```
001C =          REVNUM  EQU     28              ;CBIOS REVISION NUMBER
0016 =          CPMREV  EQU     22              ;CP/M REVISION NUMBER

                ********************************************************************
                *                                                                  *
                * THE FOLLOWING EQUATES SET UP THE RELATIONSHIP BETWEEN THE        *
                * 2D FLOPPIES AND THE HARD DISK CONTROLLERS.                       *
                *                                                                  *
                ********************************************************************

0000 =          FIRST   EQU     0               ;0 = FLOPPIES ARE A,B,C,D DRIVES AND
                                                ;       HARD DISK ARE E,F,G,H
                                                ;1 = HARD DISKS ARE A,B,C,D DRIVES AND
                                                ;       FLOPPIES ARE E,F,G,H
0001 =          MAXHD   EQU     1               ;SET TO NUMBER OF HARD DISKS
0002 =          MAXFLOP EQU     2               ;SET TO NUMBER OF FLOPPIES

0001 =          M26     EQU     1               ;SET ONLY ONE OF THESE VARIABLES
0000 =          M20     EQU     0
0000 =          M10     EQU     0

                        IF      M10 OR M20
                SDELAY  EQU     0               ;SOFTWARE HEAD SETTLE DELAY (0 = NO, 1 = YES)
                        ELSE
0001 =          SDELAY  EQU     1
                        ENDIF

001A =          MREV    EQU     26*M26+20*M20+10*M10    ;HARD DISK TYPE
0003 =          LOGDSK  EQU     3*M26+3*M20+2*M10       ;LOGICAL DISKS PER DRIVE
0020 =          HDSPT   EQU     32*M26+21*M20+21*M10    ;SECTORS PER TRACK
```

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                ********************************************************************
                *                                                                  *
                * THE FOLLOWING EQUATES RELATE THE THINKER TOYS 2D CONTROLLER.     *
                * IF THE CONTROLLER IS NON STANDARD (0E000H) ONLY THE ORIGIN       *
                * EQUATE NEED BE CHANGED. THIS VERSION OF THE CBIOS WILL WORK      *
                * WITH 2D CONTROLLER BOARDS REV 0, 1, 3, 3.1, 4, MODEL B.          *
                *                                                                  *
                ********************************************************************


                        IF      MAXFLOP NE 0    ;INCLUDE DISCUS 2D ?
F000 =          ORIGIN  EQU     0F000H
F400 =          DJRAM   EQU     ORIGIN+400H     ;DISK JOCKEY 2D RAM ADDRESS
F400 =          DJBOOT  EQU     DJRAM           ;DISK JOCKEY 2D INITIALIZATION
F003 =          DJCIN   EQU     ORIGIN+3H       ;DISK JOCKEY 2D CHARACTER INPUT ROUTINE
F006 =          DJCOUT  EQU     ORIGIN+6H       ;DISK JOCKEY 2D CHARACTER OUTPUT ROUTINE
F409 =          DJHOME  EQU     DJRAM+9H        ;DISK JOCKEY 2D TRACK ZERO SEEK
F40C =          DJTRK   EQU     DJRAM+0CH       ;DISK JOCKEY 2D TRACK SEEK ROUTINE
F40F =          DJSEC   EQU     DJRAM+0FH       ;DISK JOCKEY 2D SET SECTOR ROUTINE
F412 =          DJDMA   EQU     DJRAM+012H      ;DISK JOCKEY 2D SET DMA ADDRESS
F415 =          DJREAD  EQU     DJRAM+15H       ;DISK JOCKEY 2D READ ROUTINE
F418 =          DJWRITE EQU     DJRAM+18H       ;DISK JOCKEY 2D WRITE ROUTINE
F41B =          DJSEL   EQU     DJRAM+1BH       ;DISK JOCKEY 2D SELECT DRIVE ROUTINE
F021 =          DJTSTAT EQU     ORIGIN+21H      ;DISK JOCKEY 2D TERMINAL STATUS ROUTINE
```

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F427 =          DJSTAT  EQU     DJRAM+27H       ;DISK JOCKEY 2D STATUS ROUTINE
F42A =          DJERR   EQU     DJRAM+2AH       ;DISK JOCKEY 2D ERROR, FLASH LED
F42D =          DJDEN   EQU     DJRAM+2DH       ;DISK JOCKEY 2D SET DENSITY ROUTINE
F430 =          DJSIDE  EQU     DJRAM+30H       ;DISK JOCKEY 2D SET SIDE ROUTINE
0008 =          DBLSID  EQU     8               ;SIDE BIT FROM CONTROLLER
                ENDIF

                ;*****************************************************************
                ;*                                                               *
                ;* THE FOLLOWING EQUATES ARE FOR THE DISKUS HARD DISK WANTED.    *
                ;*                                                               *
                ;*****************************************************************

                IF      MAXHD NE 0      ;WANT HARD DISK INCLUDED ?
0050 =          HDORG   EQU     50H             ;HARD DISK CONTROLLER ORIGIN
0050 =          HDSTAT  EQU     HDORG           ;HARD DISK STATUS
0050 =          HDCNTL  EQU     HDORG           ;HARD DISK CONTROL
0053 =          HDDATA  EQU     HDORG+3         ;HARD DISK DATA
0052 =          HDFUNC  EQU     HDORG+2         ;HARD DISK FUNCTION
0051 =          HDCMND  EQU     HDORG+1         ;HARD DISK COMMAND
0051 =          HDRESLT EQU     HDORG+1         ;HARD DISK RESULT
0002 =          RETRY   EQU     2               ;RETRY BIT OF RESULT
0001 =          TKZERO  EQU     1               ;TRACK ZERO BIT OF STATUS
0002 =          OPDONE  EQU     2               ;OPERACTION DONE BIT OF STATUS
0004 =          COMPLT  EQU     4               ;COMPLETE BIT OF STATUS
0008 =          TMOUT   EQU     8               ;TIME OUT BIT OF STATUS
0010 =          WFAULT  EQU     10H             ;WRITE FAULT BIT OF STATUS
0020 =          DRVRDY  EQU     20H             ;DRIVE READY BIT OF STATUS
0040 =          INDEX   EQU     40H             ;INDEX BIT OF STATUS
0004 =          PSTEP   EQU     4               ;STEP BIT OF FUNCTION
00FB =          NSTEP   EQU     0FBH            ;STEP BIT MASK OF FUNCTION
0004 =          HDRLEN  EQU     4               ;SECTOR HEADER LENGTH
0200 =          SECLEN  EQU     512             ;SECTOR DATA LENGTH
000F =          WENABL  EQU     0FH             ;WRITE ENABLE
000B =          WRESET  EQU     0BH             ;WRITE RESET OF FUNCTION
0005 =          SCENBL  EQU     5               ;CONTROLLER CONTROL
0007 =          DSKCLK  EQU     7               ;DISK CLOCK FOR CONTROL
00F7 =          MDIR    EQU     0F7H            ;DIRECTION MASK FOR FUNCTION
00FC =          NULL    EQU     0FCH            ;NULL COMMAND
0000 =          IDBUFF  EQU     0               ;INITIALIZE DATA COMMAND
0008 =          ISBUFF  EQU     8               ;INITIALIZE HEADER COMMAND
0001 =          RSECT   EQU     1               ;READ SECTOR COMMAND
0005 =          WSECT   EQU     5               ;WRITE SECTOR COMMAND
                ENDIF

                ;*****************************************************************
                ;*                                                               *
                ;* CP/M SYSTEM EQUATES. IF RECONFIGURATION OF THE CP/M SYSTEM    *
                ;* IS BEING DONE, THE CHANGES CAN BE MADE TO THE FOLLOWING       *
                ;* EQUATES.                                                      *
                ;*                                                               *
                ;*****************************************************************

003C =          MSIZE   EQU     60              ;MEMORY SIZE OF TARGET CP/M
A000 =          BIAS    EQU     (MSIZE-20)*1024 ;MEMORY OFFSET FROM 20K SYSTEM
C700 =          CCP     EQU     2700H+BIAS      ;CONSOLE COMMAND PROCESSOR
```

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CP/M MACRO ASSEM 2.0     #004     *** Cbios For CP/M Ver. 2.2 ***

CF00 =          BDOS     EQU      CCP+800H          ;BDOS ADDRESS
DD00 =          BIOS     EQU      CCP+1600H         ;CBIOS ADDRESS
4A00 =          OFFSETC  EQU      2700H-BIOS        ;OFFSET FOR SYSGEN
0004 =          CDISK    EQU      4                 ;ADDRESS OF LAST LOGGED DISK
0080 =          BUFF     EQU      80H               ;DEFAULT BUFFER ADDRESS
0100 =          TPA      EQU      100H              ;TRANSIENT MEMORY
00C0 =          INTIOBY  EQU      192               ;INITIAL IOBYTE
0003 =          IOBYTE   EQU      3                 ;IOBYTE LOCATION
0000 =          WBOT     EQU      0                 ;WARM BOOT JUMP ADDRESS
0005 =          ENTRY    EQU      5                 ;BDOS ENTRY JUMP ADDRESS

                ************************************************************
                *                                                          *
                * THE FOLLOWING ARE INTERNAL CBIOS EQUATES. MOST ARE MISC. *
                * CONSTANTS.                                               *
                *                                                          *
                ************************************************************

000A =          RETRIES  EQU      10                ;MAX RETRIES ON DISK I/O BEFORE ERROR
000D =          ACR      EQU      0DH               ;A CARRIAGE RETURN
000A =          ALF      EQU      0AH               ;A LINE FEED
001A =          CLEAR    EQU      1AH               ;CLEAR SCREEN FOR VIO-X
0003 =          AETX     EQU      3                 ;ETX CHARACTER
0006 =          AACK     EQU      6                 ;ACK CHARACTER

                ************************************************************
                *                                                          *
                * THE JUMP TABLE BELOW MUST REMAIN IN THE SAME ORDER, THE  *
                * ROUTINES MAY BE CHANGED, BUT THE FUNCTION EXECUTED MUST BE *
                * THE SAME.                                                *
                *                                                          *
                ************************************************************

DD00                     ORG      BIOS              ;CBIOS STARTING ADDRESS

DD00 C3DAE5              JMP      CBOOT             ;COLD BOOT ENTRY POINT
DD03 C3BCDE     WBOOTE   JMP      WBOOT             ;WARM BOOT ENTRY POINT
DD06 C336DD              JMP      CONST             ;CONSOLE STATUS ROUTINE
DD09 C342DD              JMP      CONIN             ;CONSOLE INPUT
DD0C C357DD     COUT     JMP      CONOUT            ;CONSOLE OUTPUT
DD0F C377DD              JMP      LIST              ;LIST DEVICE OUTPUT
DD12 C36CDD              JMP      PUNCH             ;PUNCH DEVICE OUTPUT
DD15 C362DD              JMP      READER            ;READER DEVICE INPUT
DD18 C351DF              JMP      HOME              ;HOME DRIVE
DD1B C393DF              JMP      SETDRV            ;SELECT DISK
DD1E C353DF              JMP      SETTRK            ;SET TRACK
DD21 C345DF              JMP      SETSEC            ;SET SECTOR
DD24 C34BDF              JMP      SETDMA            ;SET DMA ADDRESS
DD27 C399E0              JMP      READ              ;READ THE DISK
DD2A C392E0              JMP      WRITE             ;WRITE THE DISK
DD2D C382DD              JMP      LISTST            ;LIST DEVICE STATUS
DD30 C358DF              JMP      SECTRAN           ;SECTOR TRANSLATION

                         IF       MAXFLOP NE 0
DD33 C31BF4     DJDRV    JMP      DJSEL             ;HOOK FOR SINGLE.COM PROGRAM
                         ELSE
```

```
                        JMP     DONOP
                        ENDIF

                ;*****************************************************************
                ;*                                                               *
                ;* TERMINAL DRIVER ROUTINES. IOBYTE IS INITIALIZED BY THE COLD   *
                ;* BOOT ROUTINE, TO MODIFY, CHANGE THE "INTIOBY" EQUATE. THE     *
                ;* I/O ROUTINES THAT FOLLOW ALL WORK EXACTLY THE SAME WAY. USING *
                ;* IOBYTE, THEY OBTAIN THE ADDRESS TO JUMP TO IN ORDER TO EXECUTE*
                ;* THE DESIRED FUNCTION. THERE IS A TABLE WITH FOUR ENTRIES FOR  *
                ;* EACH OF THE POSSIBLE ASSIGNMENTS FOR EACH DEVICE. TO MODIFY   *
                ;* THE I/O ROUTINES FOR A DIFFERENT I/O CONFIGURATION, JUST      *
                ;* CHANGE THE ENTRIES IN THE TABLES.                             *
                ;*                                                               *
                ;*****************************************************************

F003 =          CITTY   EQU     DJCIN           ;INPUT FROM THE DISK JOCKEY 2D
F006 =          COTTY   EQU     DJCOUT          ;OUTPUT TO THE DISK JOCKEY 2D

                ;*****************************************************************
                ;*                                                               *
                ;* CONST: GET THE STATUS FOR THE CURRENTLY ASSIGNED CONSOLE      *
                ;*        DEVICE. THE CONSOLE DEVICE CAN BE GOTTEN FROM IOBYTE,  *
                ;*        THEN A JUMP TO THE CORRECT CONSOLE STATUS ROUTINE IS   *
                ;*        PERFORMED.                                             *
                ;*                                                               *
                ;*****************************************************************

DD36 21B0DD     CONST   LXI     H,CSTBLE        ;BEGINNING OF JUMP TABLE
DD39 C348DD             JMP     CONIN1          ;SELECT CORRECT JUMP

                ;*****************************************************************
                ;*                                                               *
                ;* CSREADER: IF THE CONSOLE IS ASSIGNED TO THE READER THEN A     *
                ;*           JUMP WILL BE MADE HERE, WHERE ANOTHER JUMP WILL     *
                ;*           OCCUR TO THE CORRECT READER STATUS.                 *
                ;*                                                               *
                ;*****************************************************************

DD3C 21B8DD     CSREADR LXI     H,CSRTBLE       ;BEGINNING OF READER STATUS TABLE
DD3F C365DD             JMP     READERA

                ;*****************************************************************
                ;*                                                               *
                ;* CONIN: TAKE THE CORRECT JUMP FOR THE CONSOLE INPUT ROUTINE.   *
                ;*        THE JUMP IS BASED ON THE TWO LEAST SIGNIFICANT BITS OF *
                ;*        IOBYTE.                                                *
                ;*                                                               *
                ;*****************************************************************

DD42 CD0CE1     CONIN   CALL    FLUSH           ;FLUSH THE DISK BUFFER
DD45 2188DD             LXI     H,CITBLE        ;BEGINNING OF CHARACTER INPUT TABLE

                ;
                ; ENTRY AT CONIN1 WILL DECODE THE TWO LEAST SIGNIFICANT BITS
                ; OF IOBYTE. THIS IS USED BY CONIN,CONOUT, AND CONST.
```

```
                        *
DD48 3A0300     CONIN1  LDA     IOBYTE
DD4B 17                 RAL
                        *
                        * ENTRY AT SELDEV WILL FORM AN OFFSET INTO THE TABLE POINTED
                        * TO BY H&L AND THEN PICK UP THE ADDRESS AND JUMP THERE.
                        *
DD4C E606       SELDEV  ANI     6H              ;STRIP OFF UNWANTED BITS
DD4E 1600               MVI     D,0             ;FORM OFFSET
DD50 5F                 MOV     E,A
DD51 19                 DAD     D               ;ADD OFFSET
DD52 7E                 MOV     A,M             ;PICK UP HIGH BYTE
DD53 23                 INX     H
DD54 66                 MOV     H,M             ;PICK UP LOW BYTE
DD55 6F                 MOV     L,A             ;FORM ADDRESS
DD56 E9                 PCHL                    ;GO THERE !
                        ************************************************************
                        *                                                          *
                        * CONOUT: TAKE THE PROPER BRANCH ADDRESS BASED ON THE TWO LEAST *
                        *         SIGNIFICANT BITS OF IOBYTE.                      *
                        *                                                          *
                        ************************************************************
DD57 C5         CONOUT  PUSH    B               ;SAVE THE CHARACTER
DD58 CD0CE1             CALL    FLUSH           ;FLUSH THE DISK BUFFER
DD5B C1                 POP     B               ;RESTORE THE CHARACTER
DD5C 2190DD             LXI     H,COTBLE        ;BEGINNING OF THE CHARACTER OUT TABLE
DD5F C348DD             JMP     CONIN1          ;DO THE DECODE
                        ************************************************************
                        *                                                          *
                        * READER: SELECT THE CORRECT READER DEVICE FOR INPUT. THE  *
                        *         READER IS SELECTED FROM BITS 2 AND 3 OF IOBYTE.  *
                        *                                                          *
                        ************************************************************
DD62 21A8DD     READER  LXI     H,RTBLE         ;BEGINNING OF READER INPUT TABLE
                        *
                        * ENTRY AT READERA WILL DECODE BITS 2 & 3 OF IOBYTE, USED
                        * BY CSREADER.
                        *
DD65 3A0300     READERA LDA     IOBYTE
                        *
                        * ENTRY AT READER1 WILL SHIFT THE BITS INTO POSITION, USED
                        * BY LIST AND PUNCH.
                        *
DD68 1F         READR1  RAR
DD69 C34CDD             JMP     SELDEV
```

```
                ;*****************************************************************
                ;*                                                               *
                ;* PUNCH: SELECT THE CORRECT PUNCH DEVICE. THE SELECTION COMES   *
                ;*        FROM BITS 4&5 OF IOBYTE.                               *
                ;*                                                               *
                ;*****************************************************************

DD6C 21A0DD     PUNCH   LXI     H,PTBLE         ;BEGINNING OF PUNCH TABLE
DD6F 3A0300             LDA     IOBYTE

                ;
                ; ENTRY AT PNCH1 ROTATES BITS A LITTLE MORE IN PREP FOR
                ; SELDEV, USED BY LIST.
                ;

DD72 1F         PNCH1   RAR
DD73 1F                 RAR
DD74 C368DD             JMP     READR1

                ;*****************************************************************
                ;*                                                               *
                ;* LIST: SELECT A LIST DEVICE BASED ON BITS 6&7 OF IOBYTE        *
                ;*                                                               *
                ;*****************************************************************

DD77 2198DD     LIST    LXI     H,LTBLE         ;BEGINNING OF THE LIST DEVICE ROUTINES
DD7A 3A0300     LIST1   LDA     IOBYTE
DD7D 1F                 RAR
DD7E 1F                 RAR
DD7F C372DD             JMP     PNCH1

                ;*****************************************************************
                ;*                                                               *
                ;* LISTST: GET THE STATUS OF THE CURRENTLY ASSIGNED LIST DEVICE  *
                ;*                                                               *
                ;*****************************************************************

DD82 21C0DD     LISTST  LXI     H,LSTBLE        ;BEGINNING OF THE LIST DEVICE STATUS
DD85 C37ADD             JMP     LIST1

                ;*****************************************************************
                ;*                                                               *
                ;* IF CUSTOMIZING I/O ROUTINES IS BEING PERFORMED, THE TABLE     *
                ;* BELOW SHOULD BE MODIFIED TO REFLECT THE CHANGES. ALL I/O      *
                ;* DEVICES ARE DECODED OUT OF IOBYTE AND THE JUMP IS TAKEN FROM  *
                ;* THE FOLLOWING TABLES.                                         *
                ;*                                                               *
                ;*****************************************************************

                ;
                ; CONSOLE INPUT TABLE
                ;

DD88 F3DD       CITBLE  DW      CIUC1           ;INPUT FROM USER CONSOLE 1 (CURRENTLY
                                                ;       SWBD PARALLEL PORT 4)
```

```
DD8A 08DE               DW      CICRT           ;INPUT FROM CRT (CURRENTLY SWITCHBOARD
                                                ;       SERIAL PORT 1)
DD8C 62DD               DW      READER          ;INPUT FROM READER (DEPENDS ON READER
                                                ;       SELECTION)
DD8E 03F0               DW      CITTY           ;INPUT FROM TTY (CURRENTLY INPUT FROM
                                                ;       DISK JOCKEY 2D)

                *
                * CONSOLE OUTPUT TABLE
                *

DD90 3BDE       COTBLE  DW      COCRT           ;OUTPUT TO CRT
                                                ;
DD92 3BDE               DW      COCRT           ;OUTPUT TO CRT
                                                ;
DD94 77DD               DW      LIST            ;OUTPUT TO LIST DEVICE (DEPENDS ON
                                                ;       BITS 6&7 OF IOBYTE)
DD96 06F0               DW      COTTY           ;OUTPUT TO TTY (CURRENTLY OUTPUT TO
                                                ;       DISK JOCKEY 2D)
                *
                * LIST DEVICE TABLE
                *

DD98 06F0       LTBLE   DW      COTTY           ;OUTPUT TO TTY (CURRENTLY ASSIGNED
                                                ;       BY INTIOBY,OUTPUT TO 2D)
DD9A 46DE               DW      COPTR           ;OUTPUT TO PRINTER      OK!
                                                ;
DD9C C9DD               DW      COLPT           ;OUTPUT TO LINE PRINTER (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)
DD9E D4DD               DW      COUL1           ;OUTPUT TO USER LINE PRINTER 1 (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)   1851
                *
                * PUNCH DEVICE TABLE
                *

DDA0 06F0       PTBLE   DW      COTTY           ;OUTPUT TO THE TTY (CURRENTLY ASSIGNED
                                                ;       BY INTIOBY,OUTPUT TO 2D)
DDA2 46DE               DW      COPTR           ;OUTPUT TO PRINTER
                                                ;
DDA4 C9DD               DW      COUP1           ;OUTPUT TO USER PUNCH 1 (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)
DDA6 C9DD               DW      COUP2           ;OUTPUT TO USER PUNCH 2 (CURRNTLLY
                                                ;       SWITCHBOARD SERIAL PORT 1)
                *
                * READER DEVICE INPUT TABLE
                *

DDA8 03F0       RTBLE   DW      CITTY           ;INPUT FROM TTY (CURRENTLY ASSIGNED
                                                ;       BY INTIOBY, INPUT FROM 2D)
DDAA 08DE               DW      CIPTR           ;INPUT FROM PAPER TAPE READER (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)
DDAC 08DE               DW      CIUR1           ;INPUT FROM USER READER 1 (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)
DDAE 08DE               DW      CIUR2           ;INPUT FROM USER READER 2 (CURRENTLY
```

```
                                        ;       SWITCHBOARD SERIAL PORT 1)

                *
                * CONSOLE STATUS TABLE
                *

DDB0 FFDD       CSTBLE  DW      CSUC1           ;STATUS FROM SWBD PARALLEL PORT 4, AS
                                                ;       READ FROM ATTN BIT 0)
DDB2 1CDE               DW      CSCRT           ;STATUS FROM CRT (CURRENTLY SWITCHBOARD
                                                ;       SERIAL PORT 1)
DDB4 3CDD               DW      CSREADR         ;STATUS FROM READER (DEPENDS ON READER DEVICE )
                                                ;
DDB6 14DE               DW      CSTTY           ;STATUS OF TTY (CURRENTLY STSTUS FROM
                                                ;       DISK JOCKEY 2D)
                *
                * STATUS FROM READER DEVICE
                *

DDB8 14DE       CSRTBLE DW      CSTTY           ;STATUS FROM TTY (CURRENTLY ASSIGNED
                                                ;       BY INTIOBY, STATUS OF 2D)
DDBA 1CDE               DW      CSPTR           ;STATUS FROM PAPER TAPE READER (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)
DDBC 1CDE               DW      CSUR1           ;STATUS FROM USER READER 1 (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)
DDBE 1CDE               DW      CSUR2           ;STATUS OF USER READER 2 (CURRENTLY
                                                ;       SWITCHBOARD SERIAL PORT 1)

                *
                * STATUS FROM LIST DEVICE
                *

DDC0 2ADE       LSTBLE  DW      READY           ;CONSOLE ALWAYS READY
DDC2 2ADE               DW      READY           ;GET LIST STATUS
DDC4 25DE               DW      LSLPT
DDC6 25DE               DW      LSLPT

                ********************************************************************
                *                                                                  *
                * ROUTINES FOR MY SYSTEM.  J. J. O'BRIEN                           *
                *                                                                  *
                ********************************************************************
DDC8 00                 NOP
                ********************************************************************
                *                                                                  *
                * THE FOLLOWING EQUATES SET OUTPUT DEVICE TO OUTPUT TO THE         *
                * SWITCHBOARD SERIAL PORT 1.                                       *
                *                                                                  *
                ********************************************************************

DDC9 =          COPTP   EQU     $               ;OUTPUT FROM PAPER TAPE PUNCH
DDC9 =          COUP1   EQU     $               ;OUTPUT FROM USER PUNCH 1
DDC9 =          COUP2   EQU     $               ;OUTPUT FROM USER PUNCH 2
DDC9 DB02       COLPT   IN      2               ;OUTPUT FROM LINE PRINTER,GET STATUS
DDCB E680               ANI     80H             ;WAIT UNTIL OK TO SEND
DDCD CAC9DD             JZ      COLPT
DDD0 79                 MOV     A,C             ;OUTPUT THE CHARACTER
```

```
DDD1 D301              OUT     1
DDD3 C9                RET

                ********************************************************************
                *                                                                  *
                * CUSTOM I/O PRINTER DRIVER FOR DIABLO PRINTER WITH 1200 BAUD      *
                * ETX/ACK HANDSHAKE.                                               *
                *                                                                  *
                ********************************************************************

DDD4 CDC9DD    COUL1   CALL    COLPT           ;OUTPUT THE CHARACTER
DDD7 3AF2DD            LDA     COUNT
DDDA 3D                DCR     A
DDDB 32F2DD            STA     COUNT
DDDE C0                RNZ
DDDF 3E4E              MVI     A,78
DDE1 32F2DD            STA     COUNT
DDE4 0E03              MVI     C,AETX
DDE6 CDC9DD            CALL    COLPT
DDE9 CD08DE    PWAIT   CALL    CIPTR
DDEC FE06              CPI     AACK
DDEE C2E9DD            JNZ     PWAIT
DDF1 C9                RET

DDF2 32        COUNT   DB      50

                ********************************************************************
                *                                                                  *
                * THE FOLLOWING EQUATES SET THE INPUT TO COME FROM THE SWBD        *
                * PARALLEL PORT 4, WITH STATUS ON ATTENTION PORT BIT 0.            *
                *                                                                  *
                ********************************************************************

DDF3 DB03      CIUC1   IN      3               ;GET ATTENTION BYTE
DDF5 E601              ANI     1               ;GET BIT 0 ONLY
DDF7 CAF3DD            JZ      CIUC1           ;WAIT FOR CHARACTER
DDFA DB04              IN      4               ;GET CHARACTER
DDFC E67F              ANI     7FH             ;STRIP OFF THE PARITY
DDFE C9                RET

DDFF DB03      CSUC1   IN      3               ;GET ATTENTION BYTE
DE01 E601              ANI     1               ;GET BIT 0 ONLY
DE03 EE01              XRI     1               ;CHANGE POLARITY
DE05 C317DE            JMP     STAT            ;RETURN PROPER INDICATION

                ********************************************************************
                *                                                                  *
                * THE FOLLOWING EQUATES SET THE INPUT FROM THE DEVICES TO COME     *
                * FROM THE SWITCHBOARD SERIAL PORT 1.                              *
                *                                                                  *
                ********************************************************************

DE08 =         CICRT   EQU     $               ;INPUT FROM CRT
DE08 =         CIUR1   EQU     $               ;INPUT FROM USER READER 1
DE08 =         CIUR2   EQU     $               ;INPUT FROM USER READER 2
DE08 DB02      CIPTR   IN      2               ;INPUT FROM PAPER TAPE READER, GET STATUS
```

```
DE0A E640           ANI     40H             ;WAIT FOR CHARACTER
DE0C CA08DE         JZ      CIPTR
DE0F DB01           IN      1
DE11 E67F           ANI     7FH             ;STRIP OFF THE PARITY
DE13 C9             RET

                    ********************************************************************
                    *                                                                  *
                    * CONSOLE STATUS ROUTINES, TEST IF A CHARACTER HAS ARRIVED.        *
                    *                                                                  *
                    ********************************************************************

DE14 CD21F0 CSTTY   CALL    DJTSTAT         ;STATUS FROM DISK JOCKEY 2D
DE17 3E00   STAT    MVI     A,0             ;PREP FOR ZERO RETURN
DE19 C0             RNZ                     ;NOTHING FOUND
DE1A 3D             DCR     A               ;RETURN WITH 0FFH
DE1B C9             RET

                    ********************************************************************
                    *                                                                  *
                    * THE FOLLOWING EQUATES CAUSE THE DEVICES TO GET STATUS FROM       *
                    * THE SWITCHBOARD SERIAL PORT 1.                                   *
                    *                                                                  *
                    ********************************************************************

DE1C =      CSUR1   EQU     $               ;STATUS OF USER READER 1
DE1C =      CSUR2   EQU     $               ;STATUS OF USER READER 2
DE1C =      CSPTR   EQU     $               ;STATUS OF PAPER TAPE READER
DE1C DB02   CSCRT   IN      2               ;STATUS FROM CRT, GET STATUS
DE1E E640           ANI     40H             ;STRIP OF DATA READY BIT
DE20 EE40           XRI     40H             ;MAKE CORRECT POLARITY
DE22 C317DE         JMP     STAT            ;RETURN PROPER INDICATION

                    ********************************************************************
                    *                                                                  *
                    * LIST DEVICE STATUS ROUTINES.                                     *
                    *                                                                  *
                    ********************************************************************

DE25 DB02   LSLPT   IN      2               ;ALL OTHER DEVICES WAIT
DE27 E680           ANI     80H
DE29 C8             RZ
DE2A 3EFF   READY   MVI     A,0FFH
DE2C C9             RET

                    ********************************************************************
                    *                                                                  *
                    * THIS INITIALLIZING ROUTINE SAMPLES BIT 0 OF SWBD PORT 7 TO       *
                    * DETERMINE IF THE KEYBOARD IS PLUGGED IN.  IF THE KEYBOARD IS     *
                    * PLUGGED IN, THE LSB RETURNS A 0. OTHERWISE, IT IS A 1.           *
                    * THIS 1 IS ADDED TO IOBYTE TO CHANGE THE CONSOLE INPUT FROM       *
                    * THE SWBD PARALLEL PORT 4 (THE KEYBOARD) TO THE SWBD SERIAL       *
                    * PORT THAT RECEIVES RS232 DATA FROM THE RS232 TERMINAL.           *
                    *                                                                  *
                    ********************************************************************
```

```
DE2D ØE1A       TINIT   MVI     C,CLEAR         ;INITIALIZE THE TERMINAL ROUTINE
DE2F DBØ7               IN      7               ;GET KEYBOARD INTERLOCK BYTE
DE31 E6Ø1               ANI     1               ;GET BIT 1 ONLY
DE33 C6CØ               ADI     INTIOBY         ;ADD INTIOBY TO KEYBOARD BIT
DE35 32Ø3ØØ             STA     IOBYTE          ;INITIALIZE IOBYTE
DE38 C3ØCDD             JMP     COUT

                ********************************************************************
                *                                                                  *
                * VIO-X VIDEO DRIVER                                               *
                *                                                                  *
                ********************************************************************

DE3B DBØ9       COCRT   IN      9               ;READ STATUS PORT
DE3D E6Ø1               ANI     1               ;MASK TXRDY BIT
DE3F CA3BDE             JZ      COCRT           ;WAIT FOR READY
DE42 79                 MOV     A,C             ;GET CHAR
DE43 D3Ø8               OUT     8               ;OUTPUT IT
DE45 C9                 RET                     ;ALL DONE

                ********************************************************************
                *                                                                  *
                * ROUTINE FOR OKIDATA PRINTER                                      *
                * PRINTER IS ON PORT Ø WITH PRINTER READY ON PORT 5 BIT 1          *
                *                                                                  *
                ********************************************************************

DE46 DBØ2       COPTR   IN      2               ;INPUT FROM PORT 2
DE48 E6Ø8               ANI     8               ;WAIT UNTIL OK TO SEND
DE4A CA46DE             JZ      COPTR
DE4D DBØ5       COPTR1  IN      5               ;BUFFER FULL?
DE4F E6Ø1               ANI     1
DE51 CA4DDE             JZ      COPTR1          ;WAIT UNTIL PRINTER READY
DE54 79                 MOV     A,C             ;OUTPUT THE CHARACTER
DE55 D3ØØ               OUT     Ø
DE57 C9                 RET

                ********************************************************************
                *                                                                  *
                * GOCPM IS THE ENTRY POINT FROM COLD BOOTS, AND WARM BOOTS. IT     *
                * INITIALIZES SOME OF THE LOCATIONS IN PAGE Ø, AND SETS UP THE     *
                * INITIAL DMA ADDRESS (80H).                                       *
                *                                                                  *
                ********************************************************************

DE58 218ØØØ     GOCPM   LXI     H,BUFF          ;SET UP INITIAL DMA ADDRESS
DE5B CD4BDF             CALL    SETDMA
DE5E 3EC3               MVI     A,(JMP)         ;INITIALIZE JUMP TO WARM BOOT
DE6Ø 32ØØØØ             STA     WBOT
DE63 32Ø5ØØ             STA     ENTRY           ;INITIALIZE JUMP TO BDOS
DE66 21Ø3DD             LXI     H,WBOOTE        ;ADDRESS IN WARM BOOT JUMP
DE69 22Ø1ØØ             SHLD    WBOT+1
DE6C 21Ø6CF             LXI     H,BDOS+6        ;ADDRESS IN BDOS JUMP
DE6F 22Ø6ØØ             SHLD    ENTRY+1
DE72 AF                 XRA     A               ;A <- Ø
DE73 32Ø5E5             STA     BUFSEC          ;DISK JOCKEY BUFFER EMPTY
```

```
DE76 320DE1             STA     BUFWRTN         ;SET BUFFER NOT DIRTY FLAG
DE79 3A0400             LDA     CDISK           ;JUMP TO CP/M WITH CURRENTLY SELECTED DISK IN C
DE7C 4F                 MOV     C,A
DE7D 3AAADE             LDA     CWFLG
DE80 A7                 ANA     A
DE81 11ACDE             LXI     D,COLDBEG       ;BEGINNING OF INITIAL COMMAND
DE84 3E0F               MVI     A,COLDEND-COLDBEG+1 ;LENGTH OF COMMAND
DE86 CA8EDE             JZ      CLDCMND
DE89 11BBDE             LXI     D,WARMBEG
DE8C 3E01               MVI     A,WARMEND-WARMBEG+1
DE8E 2108C7     CLDCMND LXI     H,CCP+8         ;COMMAND BUFFER
DE91 3207C7             STA     CCP+7
DE94 47                 MOV     B,A
DE95 CDD4E1             CALL    MOVLOP
DE98 3AAADE             LDA     CWFLG
DE9B A7                 ANA     A
DE9C 3AABDE             LDA     AUTOFLG
DE9F CAA3DE             JZ      CLDBOT
DEA2 1F                 RAR
DEA3 1F         CLDBOT  RAR
DEA4 DA00C7             JC      CCP
DEA7 C303C7             JMP     CCP+3           ;ENTER CP/M

DEAA 00         CWFLG   DB      0               ;COLD/WARM BOOT FLAG

                ;************************************************************
                ;*                                                          *
                ;* THE FOLLOWING BYTE DETERMINES IF AN INITIAL COMMAND IS TO BE *
                ;* GIVEN TO CP/M ON WARM OR COLD BOOTS. THE VALUE OF THE BYTE IS *
                ;* USED TO GIVE THE COMMAND TO CP/M:                        *
                ;*                                                          *
                ;* 0 = NEVER GIVE COMMAND.                                  *
                ;* 1 = GIVE COMMAND ON COLD BOOTS ONLY.                     *
                ;* 2 = GIVE THE COMMAND ON WARM BOOTS ONLY.                 *
                ;* 3 = GIVE THE COMMAND ON WARM AND COLD BOOTS.             *
                ;*                                                          *
                ;************************************************************

DEAB 01         AUTOFLG DB      1               ;AUTO COMMAND FEATURE

                ;************************************************************
                ;*                                                          *
                ;* IF THERE IS A COMMAND INSERTED HERE, IT WILL BE GIVEN IF THE *
                ;* AUTO FEATURE IS ENABLED.                                 *
                ;*       FOR EXAMPLE:                                       *
                ;*                                                          *
                ;*       COLDBEG DB      'MBASIC MYPROG'                    *
                ;*       COLDEND DB      0                                  *
                ;*                                                          *
                ;* WILL EXECUTE MICROSOFT BASIC, AND MBASIC WILL EXECUTE THE *
                ;* "MYPROG" BASIC PROGRAM.                                  *
                ;*                                                          *
                ;************************************************************

DEAC 5355424D49COLDBEG DB       'SUBMIT STARTUP';COLD BOOT COMMAND
DEBA 00         COLDEND DB      0
```

```
                WARMBEG DB      ''              ;WARM BOOT COMMAND GOES HERE
DEBB 00         WARMEND DB      0

                ;*****************************************************************
                ;*                                                               *
                ;* WBOOT LOADS IN ALL OF CP/M EXCEPT THE CBIOS, THEN INITIALIZES *
                ;* SYSTEM PARAMETERS AS IN COLD BOOT. SEE THE COLD BOOT LOADER   *
                ;* LISTING FOR EXACTLY WHAT HAPPENS DURING WARM AND COLD BOOTS.  *
                ;*                                                               *
                ;*****************************************************************

DEBC 310001     WBOOT   LXI     SP,TPA          ;SET UP STACK POINTER
DEBF 3E01               MVI     A,1
DEC0 =          WFLG    EQU     $-1             ;TEST IF BEGINNING OR
DEC1 A7                 ANA     A               ;       ENDING A WARM BOOT
DEC2 3E01               MVI     A,1
DEC4 32C0DE             STA     WFLG
DEC7 32AADE             STA     CWFLG           ;SET COLD/WARM BOOT FLAG
DECA CA58DE             JZ      GOCPM
DECD AF                 XRA     A
DECE 32C0DE             STA     WFLG
DED1 4F                 MOV     C,A

                        IF      (MAXHD NE 0) AND FIRST  ;SUPPLY WARM BOOT FROM HARD DISK ?
                        LXI     H,CCP-200H      ;INITIAL DMA ADDRESS
                        PUSH    H
                        STA     HEAD
                        MVI     A,4
                        PUSH    PSW             ;SAVE FIRST SECTOR
                        CALL    HDDRV           ;SELECT DRIVE A
                        MVI     C,0
                        CALL    HDTRK           ;HOME THE DRIVE
                WARMLOD POP     PSW             ;RESTORE SECTOR
                        POP     H               ;RESTORE DMA ADDRESS
                        INR     A
                        STA     HDSECTR
                        CPI     16              ;PAST BDOS ?
                        JZ      WBOOT           ;YES, ALL DONE
                        INR     H               ;UPDATE DMA ADDRESS
                        INR     H
                        SHLD    HDADD
                        PUSH    H
                        PUSH    PSW
                WARMRD  LXI     B,RETRIES*100H+0 ;RETRY COUNTER
                WRMREAD PUSH    B               ;SAVE THE RETRY COUNT
                        CALL    HDREAD          ;READ THE SECTOR
                        POP     B
                        JNC     WARMLOD         ;TEST FOR ERROR
                        DCR     B               ;UPDATE THE ERROR COUNT
                        JNZ     WRMREAD         ;KEEP TRYING IF NOT TO MANY ERRORS
                        HLT                     ;CAN'T WARM BOOT
                        ENDIF

                        IF      (MAXFLOP NE 0) AND NOT FIRST ;SUPPLY WARM BOOT FROM 2D ?
DED2 CD33DD             CALL    DJDRV           ;SELECT DRIVE A
DED5 0E00               MVI     C,0             ;SELECT SINGLE DENSITY
```

```
DED7 CD2DF4             CALL    DJDEN
DEDA 0E00               MVI     C,0             ;SELECT SIDE 0
DEDC CD30F4             CALL    DJSIDE
DEDF 3E0F               MVI     A,15            ;INITIALIZE THE SECTOR TO READ
DEE1 32FFDE             STA     NEWSEC
DEE4 2100C6             LXI     H,CCP-100H      ;AND THE DMA ADDRESS
DEE7 221EDF             SHLD    NEWDMA
DEEA CDFEDE             CALL    WARMLOD         ;READ IN CP/M
DEED 0100CC             LXI     B,CCP+500H      ;LOAD ADDRESS FOR REST OF WARM BOOT
DEF0 CD12F4             CALL    DJDMA
DEF3 0E08               MVI     C,8
DEF5 CD0FF4             CALL    DJSEC
DEF8 CD32DF             CALL    WARMRD
DEFB C303CC             JMP     CCP+503H

DEFE 3E0F       WARMLOD MVI     A,15            ;PREVIOUS SECTOR
DEFF =          NEWSEC  EQU     $-1
DF00 3C                 INR     A               ;UPDATE THE PREVIOUS SECTOR
DF01 3C                 INR     A
DF02 FE1B               CPI     27              ;WAS IT THE LAST ?
DF04 DA16DF             JC      NOWRAP
DF07 D609               SUI     9               ;YES
DF09 FE13               CPI     19
DF0B C8                 RZ
DF0C 2A1EDF             LHLD    NEWDMA
DF0F 1180FB             LXI     D,-480H
DF12 19                 DAD     D
DF13 221EDF             SHLD    NEWDMA
DF16 32FFDE     NOWRAP  STA     NEWSEC          ;SAVE THE NEW SECTOR TO READ
DF19 4F                 MOV     C,A
DF1A CD0FF4             CALL    DJSEC
DF1D 2100C6             LXI     H,CCP-100H      ;GET THE PREVIOUS DMA ADDRESS
DF1E =          NEWDMA  EQU     $-2
DF20 110001             LXI     D,100H          ;UPDATE THE DMA ADDRESS
DF23 19                 DAD     D
DF24 221EDF             SHLD    NEWDMA          ;SAVE THE DMA ADDRESS
DF27 44                 MOV     B,H
DF28 4D                 MOV     C,L
DF29 CD12F4             CALL    DJDMA           ;SET THE DMA ADDRESS
DF2C CD32DF             CALL    WARMRD
DF2F C3FEDE             JMP     WARMLOD

DF32 01000A     WARMRD  LXI     B,RETRIES*100H+0;MAXIMUM # OF ERRORS
DF35 C5         WRMREAD PUSH    B
DF36 CD0CF4             CALL    DJTRK           ;SET THE TRACK
DF39 CD15F4             CALL    DJREAD          ;READ THE SECTOR
DF3C C1                 POP     B
DF3D D0                 RNC                     ;CONTINUE IF SUCCESSFUL
DF3E 05                 DCR     B
DF3F C235DF             JNZ     WRMREAD         ;KEEP TRYING
DF42 C32AF4             JMP     DJERR
                        ENDIF

                ********************************************************************
                *                                                                  *
                * SETSEC JUST SAVES THE DESIRED SECTOR TO SEEK TO UNTIL AN          *
```

```
                ********************************************************************
                *  ACTUAL READ OR WRITE IS ATTEMPTED.                              *
                *                                                                  *
                ********************************************************************

DF45 60         SETSEC  MOV     H,B
DF46 69                 MOV     L,C
DF47 22FDE4             SHLD    CPMSEC
DF4A C9         DONOP   RET

                ********************************************************************
                *                                                                  *
                * SETDMA SAVES THE DMA ADDRESS FOR THE DATA TRANSFER.              *
                *                                                                  *
                ********************************************************************

DF4B 60         SETDMA  MOV     H,B             ;HL <- BC
DF4C 69                 MOV     L,C
DF4D 22EDE0             SHLD    CPMDMA          ;CP/M DMA ADDRESS
DF50 C9                 RET

                ********************************************************************
                *                                                                  *
                * HOME IS TRANSLATED INTO A SEEK TO TRACK ZERO.                    *
                *                                                                  *
                ********************************************************************

DF51 0E00       HOME    MVI     C,0             ;TRACK TO SEEK TO

                ********************************************************************
                *                                                                  *
                * SETTRK SAVES THE TRACK # TO SEEK TO. NOTHING IS DONE AT THIS     *
                * POINT, EVERYTHING IS DEFFERED UNTIL A READ OR WRITE.             *
                *                                                                  *
                ********************************************************************

DF53 79         SETTRK  MOV     A,C             ;A <- TRACK #
DF54 3200E5             STA     CPMTRK          ;CP/M TRACK #
DF57 C9                 RET

                ********************************************************************
                *                                                                  *
                * SECTRAN TRANSLATES A LOGICAL SECTOR # INTO A PHYSICAL SECTOR     *
                * #.                                                               *
                *                                                                  *
                ********************************************************************

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0) ;BOTH TYPES ?
DF58 3AFFE4     SECTRAN LDA     CPMDRV          ;GET THE DRIVE NUMBER

                        IF      FIRST
                        CPI     MAXHD*LOGDSK    ;OVER THE # OF HARD DISKS ?
                        JC      TRANHD
                        ELSE
DF5B FE02               CPI     MAXFLOP         ;OVER THE # OF FLOPPIES ?
DF5D D28FDF             JNC     TRANHD
                        ENDIF
```

```
                        ENDIF

                        IF      (MAXHD EQ Ø) OR (MAXFLOP EQ Ø) ;JUST ONE TYPE ?

                SECTRAN EQU     $
                        ENDIF

                        IF      MAXFLOP NE Ø    ;FLOPPY TRANSLATION
DF6Ø Ø3         TRANFP  INX     B
DF61 D5                 PUSH    D               ;SAVE TABLE ADDRESS
DF62 C5                 PUSH    B               ;SAVE SECTOR #
DF63 CD71EØ             CALL    GETDPB          ;GET DPB ADDRESS INTO HL
DF66 7E                 MOV     A,M             ;GET # OF CP/M SECTORS/TRACK
DF67 B7                 ORA     A               ;CLEAR CARY
DF68 1F                 RAR                     ;DIVIDE BY TWO
DF69 91                 SUB     C
DF6A F5                 PUSH    PSW             ;SAVE ADJUSTED SECTOR
DF6B FA77DF             JM      SIDETWO
DF6E F1         SIDEA   POP     PSW             ;DISCARD ADJUSTED SECTOR
DF6F C1                 POP     B               ;RESTORE SECTOR REQUESTED
DF7Ø D1                 POP     D               ;RESTOR ADDRESS OF XLT TABLE
DF71 EB         SIDEONE XCHG                    ;HL <- &(TRANSLATION TABLE)
DF72 Ø9                 DAD     B               ;BC = OFFSET INTO TABLE
DF73 6E                 MOV     L,M             ;HL <- PHYSICAL SECTOR
DF74 26ØØ               MVI     H,Ø
DF76 C9                 RET

DF77 Ø1ØFØØ     SIDETWO LXI     B,15            ;OFFSET TO SIDE BIT
DF7A Ø9                 DAD     B
DF7B 7E                 MOV     A,M
DF7C E6Ø8               ANI     8               ;TEST FOR DOUBLE SIDED
DF7E CA6EDF             JZ      SIDEA           ;MEDIA IS ONLY SINGLE SIDED
DF81 F1                 POP     PSW             ;RETRIEVE ADJUSTED SECTOR
DF82 C1                 POP     B
DF83 2F                 CMA                     ;MAKE SECTOR REQUEST POSITIVE
DF84 3C                 INR     A
DF85 4F                 MOV     C,A             ;MAKE NEW SECTOR THE REQUESTED SECTOR
DF86 D1                 POP     D
DF87 CD71DF             CALL    SIDEONE
DF8A 3E8Ø               MVI     A,8ØH           ;SIDE TWO BIT
DF8C B4                 ORA     H               ;       AND SECTOR
DF8D 67                 MOV     H,A
DF8E C9                 RET
                        ENDIF

                        IF      MAXHD NE Ø      ;HARD DISK TRANSLATION ROUTINE
DF8F 6Ø         TRANHD  MOV     H,B
DF9Ø 69                 MOV     L,C
DF91 23                 INX     H
DF92 C9                 RET
                        ENDIF

                ;***************************************************************
                ;                                                              *
                ; SETDRV SELECTS THE NEXT DRIVE TO BE USED IN READ/WRITE       *
                ; OPERATIONS. IF THE DRIVE HAS NEVER BEEN SELECTED BEFORE, A   *
```

```
                ********************************************************************
                * PARAMETER TABLE IS CREATED WHICH CORRECTLY DESCRIBES THE         *
                * DISKETTE CURRENTLY IN THE DRIVE. DISKETTES CAN BE OF FOUR        *
                * DIFFERENT SECTOR SIZES:                                          *
                *       1) 128 BYTES SINGLE DENSITY.                               *
                *       2) 256 BYTES DOUBLE DENSITY.                               *
                *       3) 512 BYTES DOUBLE DENSITY.                               *
                *       4) 1Ø24 BYTES DOUBLE DENSITY.                              *
                *                                                                  *
                ********************************************************************

DF93 79         SETDRV  MOV     A,C             ;SAVE THE DRIVE #
DF94 32FFE4             STA     CPMDRV
DF97 FEØ5               CPI     MAXFLOP+(MAXHD*LOGDSK) ;CHECK FOR A VALID DRIVE #
DF99 D262EØ             JNC     ZRET            ;ILLEGAL DRIVE #
DF9C 7B                 MOV     A,E             ;TEST IF DRIVE EVER LOGGED IN BEFORE
DF9D E6Ø1               ANI     1
DF9F C249EØ             JNZ     SETDRV1         ;BIT Ø OF E = Ø -> NEVER SELECTED BEFORE

                        IF      (MAXHD NE Ø) AND (MAXFLOP NE Ø) ;BOTH TYPES ?
DFA2 3AFFE4             LDA     CPMDRV          ;GET THE DRIVE NUMBER

                        IF      FIRST
                        CPI     MAXHD*LOGDSK    ;OVER THE # OF HARD DISKS ?
                        JC      DRVHD
                        SUI     MAXHD*LOGDSK
                        ELSE
DFA5 FEØ2               CPI     MAXFLOP         ;OVER THE # OF FLOPPIES ?
DFA7 D2FFDF             JNC     SUBFP
                        ENDIF
                        ENDIF

                        IF      (MAXFLOP NE Ø) AND FIRST
                        MOV     C,A             ;SAVE DRIVE #
                        MVI     A,Ø             ;HAVE THE FLOPPIES BEEN ACCESSED YET ?
                FLOPFLG EQU     $-1
                        ANA     A
                        JNZ     FLOPOK
                        MVI     B,17            ;FLOPPIES HAVN'T BEEN ACCESSED
                        LXI     H,DJBOOT        ;CHECK IF 2D CONTROLLER IS INSTALLED
                        MVI     A,(JMP)
                CLOPP   CMP     M
                        JNZ     ZRET
                        DCR     B
                        JNZ     CLOPP
                        CALL    DJBOOT          ;INITIALIZE THE CONTROLLER
                        MVI     A,1             ;SAVE 2D INITIALIZED FLAG
                        STA     FLOPFLG
                        ENDIF
                        IF      MAXFLOP NE Ø
DFAA 210100     FLOPOK  LXI     H,1             ;SELECT SECTOR 1 OF TRACK 1
DFAD 2201E5             SHLD    TRUESEC
DFBØ 3E01               MVI     A,1
DFB2 3200E5             STA     CPMTRK
DFB5 CD9EE1             CALL    FILL            ;FLUSH BUFFER AND REFILL
DFB8 DA62EØ             JC      ZRET            ;TEST FOR ERROR RETURN
DFBB CD27F4             CALL    DJSTAT          ;GET STATUS ON CURRENT DRIVE
```

```
DFBE E60C               ANI     0CH             ;STRIP OFF UNWANTED BITS
DFC0 F5                 PUSH    PSW             ;USED TO SELECT A DPB
DFC1 1F                 RAR
DFC2 218AE0             LXI     H,XLTS          ;TABLE OF XLT ADDRESSES
DFC5 5F                 MOV     E,A
DFC6 1600               MVI     D,0
DFC8 19                 DAD     D
DFC9 E5                 PUSH    H               ;SAVE POINTER TO PROPER XLT
DFCA CD71E0             CALL    GETDPB          ;GET DPH POINTER INTO DE
DFCD EB                 XCHG                    ;
DFCE D1                 POP     D
DFCF 0602               MVI     B,2             ;NUMBER OF BYTES TO MOVE
DFD1 CDD4E1             CALL    MOVLOP          ;MOVE THE ADDRESS OF XLT
DFD4 110800             LXI     D,8             ;OFFSET TO DPB POINTER
DFD7 19                 DAD     D               ;HL <- &DPH.DPB
DFD8 E5                 PUSH    H
DFD9 2A07F0             LHLD    ORIGIN+7        ;GET ADDRESS OF DJ TERMINAL OUT ROUTINE
DFDC 23                 INX     H               ;BUMP TO LOOK AT ADDRESS OF
                                                ;       UART STATUS LOCATION
DFDD 7E                 MOV     A,M
DFDE EE03               XRI     3               ;ADJUST FOR PROPER REV DJ
DFE0 6F                 MOV     L,A
DFE1 26F3               MVI     H,(ORIGIN+300H)/100H
DFE3 7E                 MOV     A,M
DFE4 E608               ANI     DBLSID          ;CHECK DOUBLE SIDED BIT
DFE6 11FDE3             LXI     D,DPB128S       ;BASE FOR SINGLE SIDED DPB'S
DFE9 C2EFDF             JNZ     SIDEOK
DFEC 113DE4             LXI     D,DPB128D       ;BASE OF DOUBLE SIDED DPB'S
DFEF EB         SIDEOK  XCHG                    ;HL <- DBP BASE, DE <- &DPH.DPB
DFF0 D1                 POP     D               ;RESTORE DE (POINTER INTO DPH)
DFF1 F1                 POP     PSW             ;OFFSET TO CORRECT DPB
DFF2 17                 RAL
DFF3 17                 RAL
DFF4 4F                 MOV     C,A
DFF5 0600               MVI     B,0
DFF7 09                 DAD     B
DFF8 EB                 XCHG                    ;PUT DPB ADDRESS IN DPH
DFF9 73                 MOV     M,E
DFFA 23                 INX     H
DFFB 72                 MOV     M,D
                        ENDIF

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
DFFC C349E0             JMP     SETDRV1         ;SKIP OVER THE HARD DISK SELECT
                        IF      NOT FIRST
DFFF D602       SUBFP   SUI     MAXFLOP         ;ADJUST THE DRIVE #
                        ENDIF
                        ENDIF

                        IF      MAXHD NE 0
E001 CD68E0     DRVHD   CALL    DIVLOG          ;DIVIDE BY LOGICAL DISKS PER DRIVE
E004 79                 MOV     A,C
E005 322AE3             STA     HDDISK
E008 CD18E3             CALL    DRVPTR
E00B 7E                 MOV     A,M
E00C 3C                 INR     A
```

```
E00D C249E0             JNZ     SETDRV1
E010 F6FC               ORI     NULL            ;SELECT DRIVE
E012 D352               OUT     HDFUNC
E014 3E05               MVI     A,SCENBL        ;ENABLE THE CONTROLLER
E016 D350               OUT     HDCNTL
E018 0EEF               MVI     C,239           ;WAIT APPROX 2 MINUTES FOR DISK TO READY
E01A 210000             LXI     H,0
E01D 2B         TDELAY  DCX     H
E01E 7C                 MOV     A,H
E01F B5                 ORA     L
E020 CC66E0             CZ      DCRC
E023 C8                 RZ
E024 DB50               IN      HDSTAT          ;TEST IF READY YET
E026 E620               ANI     DRVRDY
E028 C21DE0             JNZ     TDELAY

                        IF      SDELAY
E02B 210000             LXI     H,0             ;TIME ONE REVOLUTION OF THE DRIVE
E02E 0E40               MVI     C,INDEX
E030 DB50               IN      HDSTAT
E032 A1                 ANA     C
E033 47                 MOV     B,A             ;SAVE CURRENT INDEX LEVEL IN B
E034 DB50       INDX1   IN      HDSTAT
E036 A1                 ANA     C
E037 B8                 CMP     B               ;LOOP UTIL INDEX LEVEL CHANGES
E038 CA34E0             JZ      INDX1
E03B 23         INDX2   INX     H
E03C DB50               IN      HDSTAT          ;START COUNTING UNTIL INDEX RETURNS TO
E03E A1                 ANA     C               ;       PREVIOUS STATE
E03F B8                 CMP     B
E040 C23BE0             JNZ     INDX2
                        IF      M10
                        DAD     H
                        ENDIF
E043 2210E2             SHLD    SETTLE          ;SAVE THE COUNT FOR TIMEOUT DELAY
                        ENDIF
E046 CDFAE1             CALL    HDHOME
                        ENDIF

E049 CD71E0     SETDRV1 CALL    GETDPB          ;GET ADDRESS OF DPB IN HL
E04C 010F00             LXI     B,15            ;OFFSET TO SECTOR SIZE
E04F 09                 DAD     B
E050 7E                 MOV     A,M             ;GET SECTOR SIZE
E051 E607               ANI     7H
E053 329EE0             STA     SECSIZ
E056 7E                 MOV     A,M
E057 1F                 RAR
E058 1F                 RAR
E059 1F                 RAR
E05A 1F                 RAR
E05B E60F               ANI     0FH
E05D 32DCE0             STA     SECPSEC
E060 EB                 XCHG                    ;HL <- DPH
E061 C9                 RET

E062 210000     ZRET    LXI     H,0             ;SELDRV ERROR EXIT
```

```
E065 C9                 RET

                        IF      MAXHD NE 0
E066 0D         DCRC    DCR     C               ;CONDITIONAL DECREMENT C ROUTINE
E067 C9                 RET

E068 0E00       DIVLOG  MVI     C,0
E06A D603       DIVLOGX SUI     LOGDSK
E06C D8                 RC
E06D 0C                 INR     C
E06E C36AE0             JMP     DIVLOGX
                        ENDIF

                ;*****************************************************************
                ;*                                                               *
                ; * GETDPB RETURNS HL POINTING TO THE DPB OF THE CURRENTLY        *
                ; * SELECTED DRIVE, DE POINTING TO DPH.                           *
                ;*                                                               *
                ;*****************************************************************

E071 3AFFE4     GETDPB  LDA     CPMDRV
E074 6F                 MOV     L,A             ;FORM OFFSET
E075 2600               MVI     H,0
E077 29                 DAD     H
E078 29                 DAD     H
E079 29                 DAD     H
E07A 29                 DAD     H
E07B 11ADE4             LXI     D,DPBASE        ;BASE OF DPH'S
E07E 19                 DAD     D
E07F E5                 PUSH    H               ;SAVE ADDRESS OF DPH
E080 110A00             LXI     D,10            ;OFFSET TO DPB
E083 19                 DAD     D
E084 7E                 MOV     A,M             ;GET LOW BYTE OF DPB ADDRESS
E085 23                 INX     H
E086 66                 MOV     H,M             ;GET LOW BYTE OF DPB
E087 6F                 MOV     L,A
E088 D1                 POP     D
E089 C9                 RET

                ;*****************************************************************
                ;*                                                               *
                ; * XLTS IS A TABLE OF ADDRESS THAT POINT TO EACH OF THE XLT      *
                ; * TABLES FOR EACH SECTOR SIZE.                                  *
                ;*                                                               *
                ;*****************************************************************

                        IF      MAXFLOP NE 0
E08A 2FE3       XLTS    DW      XLT128          ;XLT FOR 128 BYTE SECTORS
E08C 4AE3               DW      XLT256          ;XLT FOR 256 BYTE SECTORS
E08E 7FE3               DW      XLT512          ;XLT FOR 512 BYTE SECTORS
E090 BCE3               DW      XLT124          ;XLT FOR 1024 BYTE SECTORS
                        ENDIF

                ;*****************************************************************
                ;*                                                               *
                ; * WRITE ROUTINE MOVES DATA FROM MEMORY INTO THE BUFFER. IF THE  *
```

```
                ********************************************************************
                * DESIRED CP/M SECTOR IS NOT CONTAINED IN THE DISK BUFFER, THE     *
                * BUFFER IS FIRST FLUSHED TO THE DISK IF IT HAS EVER BEEN          *
                * WRITTEN INTO, THEN A READ IS PERFORMED INTO THE BUFFER TO GET    *
                * THE DESIRED SECTOR. ONCE THE CORRECT SECTOR IS IN MEMORY, THE    *
                * BUFFER WRITTEN INDICATOR IS SET, SO THE BUFFER WILL BE           *
                * FLUSHED, THEN THE DATA IS TRANSFERRED INTO THE BUFFER.           *
                *                                                                  *
                ********************************************************************

E092 79         WRITE   MOV     A,C             ;SAVE WRITE COMMAND TYPE
E093 3204E1             STA     WRITTYP
E096 3E01               MVI     A,1             ;SET WRITE COMMAND
E098 06                 DB      (MVI) OR (B*8)  ;THIS "MVI B" INSTRUCTION  CAUSES
                                                ;       THE FOLLOWING "XRA A" TO
                                                ;       BE SKIPPED OVER.

                ********************************************************************
                *                                                                  *
                * READ ROUTINE TO BUFFER DATA FROM THE DISK. IF THE SECTOR         *
                * REQUESTED FROM CP/M IS IN THE BUFFER, THEN THE DATA IS SIMPLY    *
                * TRANSFERRED FROM THE BUFFER TO THE DESIRED DMA ADDRESS. IF       *
                * THE BUFFER DOES NOT CONTAIN THE DESIRED SECTOR, THE BUFFER IS    *
                * FLUSHED TO THE DISK IF IT HAS EVER BEEN WRITTEN INTO, THEN       *
                * FILLED WITH THE SECTOR FROM THE DISK THAT CONTAINS THE           *
                * DESIRED CP/M SECTOR.                                             *
                *                                                                  *
                ********************************************************************

E099 AF         READ    XRA     A               ;SET THE COMMAND TYPE TO READ
E09A 32F0E0             STA     RDWR            ;SAVE COMMAND TYPE

                ********************************************************************
                *                                                                  *
                * REDWRT CALCULATES THE PHYSICAL SECTOR ON THE DISK THAT           *
                * CONTAINS THE DESIRED CP/M SECTOR, THEN CHECKS IF IT IS THE       *
                * SECTOR CURRENTLY IN THE BUFFER. IF NO MATCH IS MADE, THE         *
                * BUFFER IS FLUSHED IF NECESSARY AND THE CORRECT SECTOR READ       *
                * FROM THE DISK.                                                   *
                *                                                                  *
                ********************************************************************

E09D 0600       REDWRT  MVI     B,0             ;THE 0 IS MODIFIED TO CONTAIN THE LOG2
E09E =          SECSIZ  EQU     $-1             ;       OF THE PHYSICAL SECTOR SIZE/128
                                                ;       ON THE CURRENTLY SELECTED DISK.
E09F 2AFDE4             LHLD    CPMSEC          ;GET THE DESIRED CP/M SECTOR #
E0A2 7C                 MOV     A,H
E0A3 E680               ANI     80H             ;SAVE ONLY THE SIDE BIT
E0A5 4F                 MOV     C,A             ;REMEMBER THE SIDE
E0A6 7C                 MOV     A,H
E0A7 E67F               ANI     7FH             ;FORGET THE SIDE BIT
E0A9 67                 MOV     H,A
E0AA 2B                 DCX     H               ;TEMPORARY ADJUSTMENT
E0AB 05         DIVLOOP DCR     B               ;UPDATE REPEAT COUNT
E0AC CAB9E0             JZ      DIVDONE
E0AF B7                 ORA     A
E0B0 7C                 MOV     A,H
```

```
E0B1 1F                 RAR
E0B2 67                 MOV     H,A
E0B3 7D                 MOV     A,L
E0B4 1F                 RAR                     ;DIVIDE THE CP/M SECTOR # BY THE SIZE
                                                ;       OF THE PHYSICAL SECTORS
E0B5 6F                 MOV     L,A
E0B6 C3ABE0             JMP     DIVLOOP         ;
E0B9 23         DIVDONE INX     H
E0BA 7C                 MOV     A,H
E0BB B1                 ORA     C               ;RESTORE THE SIDE BIT
E0BC 67                 MOV     H,A
E0BD 2201E5             SHLD    TRUESEC         ;SAVE THE PHYSICAL SECTOR NUMBER
E0C0 21FFE4             LXI     H,CPMDRV        ;POINTER TO DESIRED DRIVE,TRACK, AND SECTOR
E0C3 1103E5             LXI     D,BUFDRV        ;POINTER TO BUFFER DRIVE,TRACK, AND SECTOR
E0C6 0605               MVI     B,5             ;COUNT LOOP
E0C8 05         DTSLOP  DCR     B               ;TEST IF DONE WITH COMPARE
E0C9 CAD7E0             JZ      MOVE            ;YES, MATCH. GO MOVE THE DATA
E0CC 1A                 LDAX    D               ;GET A BYTE TO COMPARE
E0CD BE                 CMP     M               ;TEST FOR MATCH
E0CE 23                 INX     H               ;BUMP POINTERS TO NEXT DATA ITEM
E0CF 13                 INX     D
E0D0 CAC8E0             JZ      DTSLOP          ;MATCH, CONTINUE TESTING

                ********************************************************************
                *                                                                  *
                * DRIVE, TRACK, AND SECTOR DON'T MATCH, FLUSH THE BUFFER IF        *
                * NECESSARY AND THEN REFILL.                                       *
                *                                                                  *
                ********************************************************************

E0D3 CD9EE1             CALL    FILL            ;FILL THE BUFFER WITH CORRECT PHYSICAL SECTOR
E0D6 D8                 RC                      ;NO GOOD, RETURN WITH ERROR INDICATION

                ********************************************************************
                *                                                                  *
                * MOVE HAS BEEN MODIFIED TO CAUSE EITHER A TRANSFER INTO OR OUT    *
                * THE BUFFER.                                                      *
                *                                                                  *
                ********************************************************************

E0D7 3AFDE4     MOVE    LDA     CPMSEC          ;GET THE CP/M SECTOR TO TRANSFER
E0DA 3D                 DCR     A               ;ADJUST TO PROPER SECTOR IN BUFFER
E0DB E600               ANI     0               ;STRIP OFF HIGH ORDERED BITS
E0DC =          SECPSEC EQU     $-1             ;THE 0 IS MODIFIED TO REPRESENT THE # OF
                                                ;       CP/M SECTORS PER PHYSICAL SECTORS
E0DD 6F                 MOV     L,A             ;PUT INTO HL
E0DE 2600               MVI     H,0
E0E0 29                 DAD     H               ;FORM OFFSET INTO BUFFER
E0E1 29                 DAD     H
E0E2 29                 DAD     H
E0E3 29                 DAD     H
E0E4 29                 DAD     H
E0E5 29                 DAD     H
E0E6 29                 DAD     H
E0E7 1107E5             LXI     D,BUFFER        ;BEGINNING ADDRESS OF BUFFER
E0EA 19                 DAD     D               ;FORM BEGINNING ADDRESS OF SECTOR TO TRANSFER
```

```
E0EB EB              XCHG                    ;DE = ADDRESS IN BUFFER
E0EC 210000          LXI     H,0             ;GET DMA ADDRESS, THE 0 IS MODIFIED TO
                                             ;       CONTAIN THE DMA ADDRESS
E0ED =       CPMDMA  EQU     $-2
E0EF 3E00            MVI     A,0             ;THE ZERO GETS MODIFIED TO CONTAIN
                                             ;       A ZERO IF A READ, OR A 1 IF WRITE
E0F0 =       RDWR    EQU     $-1
E0F1 A7              ANA     A               ;TEST WHICH KIND OF OPERATION
E0F2 C2FAE0          JNZ     INTO            ;TRANSFER DATA INTO THE BUFFER
E0F5 CDD2E1  OUTOF   CALL    MOVER
E0F8 AF              XRA     A
E0F9 C9              RET

E0FA EB      INTO    XCHG                    ;
E0FB CDD2E1          CALL    MOVER           ;MOVE THE DATA, HL = DESTINATION
                                             ;       DE = SOURCE
E0FE 3E01            MVI     A,1
E100 320DE1          STA     BUFWRTN         ;SET BUFFER WRITTEN INTO FLAG
E103 3E00            MVI     A,0             ;CHECK FOR DIRECTORY WRITE
E104 =       WRITTYP EQU     $-1
E105 3D              DCR     A
E106 3E00            MVI     A,0
E108 3204E1          STA     WRITTYP         ;SET NO DIRECTORY WRITE
E10B C0              RNZ                     ;NO ERROR EXIT

                     ************************************************************
                     *                                                          *
                     * FLUSH WRITES THE CONTENTS OF THE BUFFER OUT TO THE DISK IF    *
                     * IT HAS EVER BEEN WRITTEN INTO.                           *
                     *                                                          *
                     ************************************************************

E10C 3E00    FLUSH   MVI     A,0             ;THE 0 IS MODIFIED TO REFLECT IF
                                             ;       THE BUFFER HAS BEEN WRITTEN INTO
E10D =       BUFWRTN EQU     $-1
E10E A7              ANA     A               ;TEST IF WRITTEN INTO
E10F C8              RZ                      ;NOT WRITTEN, ALL DONE

                     IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E110 2118F4          LXI     H,DJWRITE       ;WRITE OPERATION FOR DISK JOCKEY
E113 119AE2          LXI     D,HDWRITE       ;WRITE OPERATION FOR HARD DISK
E116 CDE1E1          CALL    DECIDE
                     ELSE
                     IF      MAXHD NE 0
                     LXI     H,HDWRITE
                     ENDIF
                     IF      MAXFLOP NE 0
                     LXI     H,DJWRITE
                     ENDIF
                     ENDIF

                     ************************************************************
                     *                                                          *
                     * PREP PREPARES TO READ/WRITE THE DISK. RETRIES ARE ATTEMPTED.  *
                     * UPON ENTRY, H&L MUST CONTAIN THE READ OR WRITE OPERATION      *
                     * ADDRESS.                                                 *
```

```
                *                                                               *
                *****************************************************************

E119 AF         PREP    XRA     A               ;RESET BUFFER WRITTEN FLAG
E11A 320DE1             STA     BUFWRTN
E11D 227FE1             SHLD    RETRYOP         ;SET UP THE READ/WRITE OPERATION
E120 060A               MVI     B,RETRIES       ;MAXIMUM NUMBER OF RETRIES TO ATTEMPT
E122 C5         RETRYLP PUSH    B               ;SAVE THE RETRY COUNT
E123 3A03E5             LDA     BUFDRV          ;GET DRIVE NUMBER INVOLVED IN THE OPERATION

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
                        IF      FIRST
                        CPI     MAXHD*LOGDSK
                        JC      NOADJST
                        SUI     MAXHD*LOGDSK
                        ELSE
E126 FE02               CPI     MAXFLOP
E128 DA2DE1             JC      NOADJST
E12B D602               SUI     MAXFLOP
                        ENDIF

E12D 4F         NOADJST MOV     C,A
E12E 2133DD             LXI     H,DJDRV         ;SELECT DRIVE
E131 11E9E1             LXI     D,HDDRV
E134 CDDDE1             CALL    DECIDGO
                        ELSE
                        MOV     C,A
                        IF      MAXHD NE 0
                        CALL    HDDRV
                        ENDIF
                        IF      MAXFLOP NE 0
                        CALL    DJDRV           ;SELECT THE DRIVE
                        ENDIF
                        ENDIF

E137 3A04E5             LDA     BUFTRK
E13A A7                 ANA     A               ;TEST FOR TRACK ZERO
E13B 4F                 MOV     C,A
E13C C5                 PUSH    B

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E13D 2109F4             LXI     H,DJHOME
E140 11FAE1             LXI     D,HDHOME
E143 CCDDE1             CZ      DECIDGO
                        ELSE
                        IF      MAXHD NE 0
                        CZ      HDHOME
                        ENDIF
                        IF      MAXFLOP NE 0
                        CZ      DJHOME          ;HOME THE DRIVE IF TRACK 0
                        ENDIF
                        ENDIF

E146 C1                 POP     B               ;RESTORE TRACK #

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
```

```
E147 210CF4             LXI     H,DJTRK
E14A 111BE2             LXI     D,HDTRK
E14D CDDDE1             CALL    DECIDGO
                        ELSE
                        IF      MAXHD NE 0
                        CALL    HDTRK
                        ENDIF
                        IF      MAXFLOP NE 0
                        CALL    DJTRK           ;SEEK TO PROPER TRACK
                        ENDIF
                        ENDIF

E150 2A05E5             LHLD    BUFSEC
E153 7C                 MOV     A,H             ;GET SECTOR INVOLVED IN OPERATION
E154 07                 RLC                     ;BIT 0 OF A EQUALS SIDE #
E155 E601               ANI     1               ;STRIP OFF UNNECESSARY BITS
E157 4F                 MOV     C,A             ;C <- SIDE #

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E158 2130F4             LXI     H,DJSIDE
E15B 1147E2             LXI     D,HDSIDE
E15E CDDDE1             CALL    DECIDGO
                        ELSE
                        IF      MAXHD NE 0
                        CALL    HDSIDE
                        ENDIF
                        IF      MAXFLOP NE 0
                        CALL    DJSIDE          ;SELECT THE SIDE
                        ENDIF
                        ENDIF

E161 2A05E5             LHLD    BUFSEC
E164 7C                 MOV     A,H
E165 E67F               ANI     7FH             ;STRIP OFF SIDE BIT
E167 47                 MOV     B,A             ;C <- SECTOR #
E168 4D                 MOV     C,L

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E169 210FF4             LXI     H,DJSEC
E16C 1150E2             LXI     D,HDSEC
E16F CDDDE1             CALL    DECIDGO
                        ELSE
                        IF      MAXHD NE 0
                        CALL    HDSEC
                        ENDIF
                        IF      MAXFLOP NE 0
                        CALL    DJSEC           ;SELECT THE SIDE
                        ENDIF
                        ENDIF

E172 0107E5             LXI     B,BUFFER        ;SET THE DMA ADDRESS

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E175 2112F4             LXI     H,DJDMA
E178 1142E2             LXI     D,HDDMA
E17B CDDDE1             CALL    DECIDGO
```

```
                        ELSE
                        IF      MAXHD NE 0
                        CALL    HDDMA
                        ENDIF
                        IF      MAXFLOP NE 0
                        CALL    DJDMA           ;SELECT THE SIDE
                        ENDIF
                        ENDIF

E17E CD0000             CALL    0               ;GET OPERATION ADDRESS
E17F =          RETRYOP EQU     $-2
E181 C1                 POP     B               ;RESTORE THE RETRY COUNTER
E182 3E00               MVI     A,0             ;NO ERROR EXIT STATUS
E184 D0                 RNC                     ;RETURN NO ERROR
E185 05                 DCR     B               ;UPDATE THE RETRY COUNTER
E186 37                 STC                     ;ASSUME RETRY COUNT EXPIRED
E187 3EFF               MVI     A,0FFH          ;ERROR RETURN
E189 C8                 RZ
E18A 78                 MOV     A,B
E18B FE05               CPI     RETRIES/2
E18D C222E1             JNZ     RETRYLP         ;TRY AGAIN

E190 C5                 PUSH    B
                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E191 2109F4             LXI     H,DJHOME
E194 11FAE1             LXI     D,HDHOME
E197 CDDDE1             CALL    DECIDGO
                        ELSE
                        IF      MAXHD NE 0
                        CALL    HDHOME
                        ENDIF
                        IF      MAXFLOP NE 0
                        CALL    DJHOME          ;HOME THE DRIVE IF TRACK 0
                        ENDIF
                        ENDIF

E19A C1                 POP     B
E19B C322E1             JMP     RETRYLP

                ;*****************************************************************
                ;*                                                               *
                ;* FILL FILLS THE BUFFER WITH A NEW SECTOR FROM THE DISK.        *
                ;*                                                               *
                ;*****************************************************************

E19E CD0CE1     FILL    CALL    FLUSH           ;FLUSH BUFFER FIRST
E1A1 D8                 RC                      ;CHECK FOR ERROR
E1A2 11FFE4             LXI     D,CPMDRV        ;UPDATE THE DRIVE, TRACK, AND SECTOR
E1A5 2103E5             LXI     H,BUFDRV
E1A8 0604               MVI     B,4             ;NUMBER OF BYTES TO MOVE
E1AA CDD4E1             CALL    MOVLOP          ;COPY THE DATA

E1AD 3AF0E0             LDA     RDWR
E1B0 A7                 ANA     A
E1B1 CAC6E1             JZ      FREAD
E1B4 3A04E1             LDA     WRITTYP
```

```
E1B7 3D                 DCR     A
E1B8 3D                 DCR     A
E1B9 C8                 RZ
E1BA CD71E0             CALL    GETDPB
E1BD 110F00             LXI     D,15
E1C0 19                 DAD     D
E1C1 7E                 MOV     A,M
E1C2 E603               ANI     3
E1C4 3D                 DCR     A
E1C5 C8                 RZ

E1C6 =          FREAD   EQU     $
                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E1C6 2115F4             LXI     H,DJREAD
E1C9 1165E2             LXI     D,HDREAD
E1CC CDE1E1             CALL    DECIDE
                        ELSE
                        IF      MAXHD NE 0
                        LXI     H,HDREAD
                        ENDIF
                        IF      MAXFLOP NE 0
                        LXI     H,DJREAD        ;SELECT THE SIDE
                        ENDIF
                        ENDIF
E1CF C319E1             JMP     PREP            ;SELECT DRIVE, TRACK, AND SECTOR.
                                                ;       THEN READ THE BUFFER

                ****************************************************************
                *                                                              *
                * MOVER MOVES 128 BYTES OF DATA. SOURCE POINTER IN DE, DEST    *
                * POINTER IN HL.                                               *
                *                                                              *
                ****************************************************************

E1D2 0680       MOVER   MVI     B,128           ;LENGTH OF TRANSFER
E1D4 1A         MOVLOP  LDAX    D               ;GET A BTE OF SOURCE
E1D5 77                 MOV     M,A             ;MOVE IT
E1D6 13                 INX     D               ;BUMP POINTERS
E1D7 23                 INX     H
E1D8 05                 DCR     B               ;UPDATE COUNTER
E1D9 C2D4E1             JNZ     MOVLOP          ;CONTINUE MOVING UNTIL DONE
E1DC C9                 RET

                ****************************************************************
                *                                                              *
                * ROUTINES TO DECIDE WHICH CONTROLLER TO USE.                  *
                *                                                              *
                ****************************************************************

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E1DD CDE1E1     DECIDGO CALL    DECIDE  ;WHICH CONTROLLER ?
E1E0 E9                 PCHL
                        ENDIF

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
E1E1 3A03E5     DECIDE  LDA     BUFDRV          ;GET PROPER ROUTINE INTO H&L, BASED
```

```
                        IF      FIRST           ;   ON CURRENTLY SELECTED DRIVE
                        CPI     MAXHD*LOGDSK
                        RNC
                        ELSE
E1E4 FE02               CPI     MAXFLOP
E1E6 D8                 RC
                        ENDIF
E1E7 EB                 XCHG
E1E8 C9                 RET
                        ENDIF

                ;*****************************************************************
                ;*                                                               *
                ; * THE FOLLOWING IS THE EQUIVALENT OF THE LOWEST LEVEL DRIVERS   *
                ; * FOR THE HARD DISK.                                            *
                ;*                                                               *
                ;*****************************************************************

                        IF      MAXHD NE 0
E1E9 79         HDDRV   MOV     A,C             ;SELECT HARD DISK DRIVE
E1EA CD68E0             CALL    DIVLOG          ;GET THE PHYSICAL DRIVE #
E1ED 79                 MOV     A,C
E1EE 322AE3             STA     HDDISK          ;SELECT THE DRIVE
E1F1 F6FC               ORI     NULL
E1F3 D352               OUT     HDFUNC
E1F5 3E0F               MVI     A,WENABL
E1F7 D350               OUT     HDCNTL
E1F9 C9                 RET

E1FA CD18E3     HDHOME  CALL    DRVPTR
E1FD 3600               MVI     M,0             ;SET TRACK TO ZERO

                        IF      SDELAY
E1FF DB50       STEPO   IN      HDSTAT          ;TEST STATUS
E201 E601               ANI     TKZERO          ;AT TRACK ZERO ?
E203 CA0FE2             JZ      DELAY
E206 3E01               MVI     A,1
E208 37                 STC
E209 CD2FE2             CALL    ACCOK           ;TAKE ONE STEP OUT
E20C C3FFE1             JMP     STEPO

                        ELSE

                        IN      HDSTAT
                        ANI     TKZERO
                        RZ
                        XRA     A
                        JMP     ACCOK
                        ENDIF

                        IF      SDELAY
E20F 210000     DELAY   LXI     H,0             ;GET DELAY
E210 =          SETTLE  EQU     $-2
E212 2B         DELOOP  DCX     H               ;WAIT 20MS
E213 7C                 MOV     A,H
E214 B5                 ORA     L
```

```
E215 23                 INX     H
E216 2B                 DCX     H
E217 C212E2             JNZ     DELOOP
E21A C9                 RET
                        ENDIF

E21B CD18E3     HDTRK   CALL    DRVPTR          ;GET POINTER TO CURRENT TRACK
E21E 5E                 MOV     E,M             ;GET CURRENT TRACK
E21F 71                 MOV     M,C             ;UPDATE THE TRACK
E220 7B                 MOV     A,E             ;NEED TO SEEK AT ALL ?
E221 91                 SUB     C
E222 C8                 RZ
E223 3F                 CMC                     ;GET CARRY INTO DIRECTION
E224 DA29E2             JC      HDTRK2
E227 2F                 CMA
E228 3C                 INR     A
                        IF      NOT SDELAY
                HDTRK2  JMP     ACCOK
                        ELSE
E229 CD2FE2     HDTRK2  CALL    ACCOK
E22C C30FE2             JMP     DELAY
                        ENDIF

E22F 47         ACCOK   MOV     B,A             ;PREP FOR BUILD
E230 CD23E3             CALL    BUILD
E233 E6FB       SLOOP   ANI     NSTEP           ;GET STEP PULSE LOW
E235 D352               OUT     HDFUNC          ;OUTPUT LOW STEP LINE
E237 F604               ORI     PSTEP           ;SET STEP LINE HIGH
E239 D352               OUT     HDFUNC          ;OUTPUT HIGH STEP LINE
E23B 05                 DCR     B               ;UPDATE REPEAT COUNT
E23C C233E2             JNZ     SLOOP           ;KEEP GOING THE REQUIRED # OF TRACKS
E23F C348E2             JMP     WSDONE

E242 60         HDDMA   MOV     H,B             ;SAVE THE DMA ADDRESS
E243 69                 MOV     L,C
E244 227FE2             SHLD    HDADD
E247 =          HDSIDE  EQU     $
E247 C9                 RET

E248 DB50       WSDONE  IN      HDSTAT          ;WAIT FOR SEEK COMPLETE TO FINISH
E24A E604               ANI     COMPLT
E24C CA48E2             JZ      WSDONE
E24F C9                 RET

                        IF      M26
E250 3E1F       HDSEC   MVI     A,01FH          ;FOR COMPATIBILITY WITH CBIOS REV 2.3, 2.4
E252 A1                 ANA     C
E253 CC62E2             CZ      GETSPT
E256 3208E3             STA     HDSECTR
E259 3EE0               MVI     A,0E0H
E25B A1                 ANA     C
E25C 07                 RLC
E25D 07                 RLC
E25E 07                 RLC
E25F 3224E3             STA     HEAD
E262 3E20       GETSPT  MVI     A,HDSPT
```

```
E264 C9                 RET

                        ELSE

                HDSEC   MOV     A,C
                        CALL    DIVSPT
                        ADI     HDSPT
                        ANA     A
                        CZ      GETSPT
                        STA     HDSECTR
                        MOV     A,C
                        STA     HEAD
                GETSPT  MVI     A,HDSPT
                        DCR     C
                        RET

                DIVSPT  MVI     C,0
                DIVSPTX SUI     HDSPT
                        RC
                        INR     C
                        JMP     DIVSPTX
                        ENDIF

E265 CDE3E2     HDREAD  CALL    HDPREP
E268 D8                 RC
E269 AF                 XRA     A
E26A D351               OUT     HDCMND
E26C 2F                 CMA
E26D D353               OUT     HDDATA
E26F D353               OUT     HDDATA
E271 3E01               MVI     A,RSECT         ;READ SECTOR COMMAND
E273 D351               OUT     HDCMND
E275 CDC9E2             CALL    PROCESS
E278 D8                 RC
E279 AF                 XRA     A
E27A D351               OUT     HDCMND
E27C 0680               MVI     B,SECLEN/4
E27E 210000             LXI     H,0
E27F =          HDADD   EQU     $-2
E281 DB53               IN      HDDATA
E283 DB53               IN      HDDATA
E285 DB53       RTLOOP  IN      HDDATA          ;MOVE FOUR BYTES
E287 77                 MOV     M,A
E288 23                 INX     H
E289 DB53               IN      HDDATA
E28B 77                 MOV     M,A
E28C 23                 INX     H
E28D DB53               IN      HDDATA
E28F 77                 MOV     M,A
E290 23                 INX     H
E291 DB53               IN      HDDATA
E293 77                 MOV     M,A
E294 23                 INX     H
E295 05                 DCR     B
E296 C285E2             JNZ     RTLOOP
E299 C9                 RET
```

```
E29A CDE3E2    HDWRITE CALL    HDPREP          ;PREPARE HEADER
E29D D8                RC
E29E AF                XRA     A
E29F D351              OUT     HDCMND
E2A1 2A7FE2            LHLD    HDADD
E2A4 0680              MVI     B,SECLEN/4
E2A6 7E        WTLOOP  MOV     A,M             ;MOVE 4 BYTES
E2A7 D353              OUT     HDDATA
E2A9 23                INX     H
E2AA 7E                MOV     A,M
E2AB D353              OUT     HDDATA
E2AD 23                INX     H
E2AE 7E                MOV     A,M
E2AF D353              OUT     HDDATA
E2B1 23                INX     H
E2B2 7E                MOV     A,M
E2B3 D353              OUT     HDDATA
E2B5 23                INX     H
E2B6 05                DCR     B
E2B7 C2A6E2            JNZ     WTLOOP
E2BA 3E05              MVI     A,WSECT         ;ISSUE WRITE SECTOR COMMAND
E2BC D351              OUT     HDCMND
E2BE CDC9E2            CALL    PROCESS
E2C1 D8                RC
E2C2 3E10              MVI     A,WFAULT
E2C4 A0                ANA     B
E2C5 37                STC
E2C6 C8                RZ
E2C7 AF                XRA     A
E2C8 C9                RET

E2C9 DB50      PROCESS IN      HDSTAT          ;WAIT FOR COMMAND TO FINISH
E2CB 47                MOV     B,A
E2CC E602              ANI     OPDONE
E2CE CAC9E2            JZ      PROCESS
E2D1 3E07              MVI     A,DSKCLK
E2D3 D350              OUT     HDCNTL
E2D5 DB50              IN      HDSTAT
E2D7 E608              ANI     TMOUT           ;TIMED OUT ?
E2D9 37                STC
E2DA C0                RNZ
E2DB DB51              IN      HDRESLT
E2DD E602              ANI     RETRY           ;ANY RETRIES ?
E2DF 37                STC
E2E0 C0                RNZ
E2E1 AF                XRA     A
E2E2 C9                RET

E2E3 DB50      HDPREP  IN      HDSTAT
E2E5 E620              ANI     DRVRDY
E2E7 37                STC
E2E8 C0                RNZ
E2E9 3E08              MVI     A,ISBUFF        ;INITIALIZE POINTER
E2EB D351              OUT     HDCMND
E2ED CD23E3            CALL    BUILD
```

```
E2F0 F60C              ORI     0CH
E2F2 D352              OUT     HDFUNC
E2F4 3A24E3            LDA     HEAD
E2F7 D353              OUT     HDDATA          ;FORM HEAD BYTE
E2F9 CD18E3            CALL    DRVPTR
E2FC 7E                MOV     A,M             ;FORM TRACK BYTE
E2FD D353              OUT     HDDATA
E2FF A7                ANA     A
E300 0680              MVI     B,80H
E302 CA07E3            JZ      ZKEY
E305 0600              MVI     B,0
E307 3E00      ZKEY    MVI     A,0             ;FORM SECTOR BYTE
E308 =         HDSECTR EQU     $-1
E309 D353              OUT     HDDATA
E30B 78                MOV     A,B
E30C D353              OUT     HDDATA
E30E 3E07              MVI     A,DSKCLK
E310 D350              OUT     HDCNTL
E312 3E0F              MVI     A,WENABL
E314 D350              OUT     HDCNTL
E316 AF                XRA     A
E317 C9                RET

E318 2A2AE3    DRVPTR  LHLD    HDDISK
E31B EB                XCHG
E31C 1600              MVI     D,0
E31E 212EE3            LXI     H,DRIVES
E321 19                DAD     D
E322 C9                RET

E323 3E00      BUILD   MVI     A,0
E324 =         HEAD    EQU     $-1
E325 17                RAL
E326 17                RAL
E327 17                RAL
E328 17                RAL
E329 F600              ORI     0
E32A =         HDDISK  EQU     $-1
E32B EEF0              XRI     0F0H
E32D C9                RET

E32E =         DRIVES  EQU     $
                       REPT    MAXHD
                       DB      0FFH
                       ENDM
E32E+FF                DB      0FFH
                       ENDIF

                ********************************************************************
                *                                                                  *
                * XLT TABLES (SECTOR SKEW TABLES) FOR CP/M 2.0. THESE TABLES       *
                * DEFINE THE SECTOR TRANSLATION THAT OCCURS WHEN MAPPING CP/M      *
                * SECTORS TO PHYSICAL SECTORS ON THE DISK. THERE IS ONE SKEW       *
                * TABLE FOR EACH OF THE POSSIBLE SECTOR SIZES. CURRENTLY THE       *
                * TABLES ARE LOCATED ON TRACK 0 SECTORS 6 AND 8. THEY ARE          *
                * LOADED INTO MEMORY IN THE CBIOS RAM BY THE COLD BOOT ROUTINE.    *
```

```
                ;*****************************************************************
                ;*                                                               *
                ;*****************************************************************

                        IF      MAXFLOP NE 0
E32F 00         XLT128  DB      0
E330 01070D1319         DB      1,7,13,19,25
E335 050B1117           DB      5,11,17,23
E339 03090F15           DB      3,9,15,21
E33D 02080E141A         DB      2,8,14,20,26
E342 060C1218           DB      6,12,18,24
E346 040A1016           DB      4,10,16,22

E34A 00         XLT256  DB      0
E34B 0102131425         DB      1,2,19,20,37,38
E351 0304151627         DB      3,4,21,22,39,40
E357 0506171829         DB      5,6,23,24,41,42
E35D 0708191A2B         DB      7,8,25,26,43,44
E363 090A1B1C2D         DB      9,10,27,28,45,46
E369 0B0C1D1E2F         DB      11,12,29,30,47,48
E36F 0D0E1F2031         DB      13,14,31,32,49,50
E375 0F10212233         DB      15,16,33,34,51,52
E37B 11122324           DB      17,18,35,36

E37F 00         XLT512  DB      0
E380 0102030411         DB      1,2,3,4,17,18,19,20
E388 2122232431         DB      33,34,35,36,49,50,51,52
E390 0506070815         DB      5,6,7,8,21,22,23,24
E398 2526272835         DB      37,38,39,40,53,54,55,56
E3A0 090A0B0C19         DB      9,10,11,12,25,26,27,28
E3A8 292A2B2C39         DB      41,42,43,44,57,58,59,60
E3B0 0D0E0F101D         DB      13,14,15,16,29,30,31,32
E3B8 2D2E2F30           DB      45,46,47,48

E3BC 00         XLT124  DB      0
E3BD 0102030405         DB      1,2,3,4,5,6,7,8
E3C5 191A1B1C1D         DB      25,26,27,28,29,30,31,32
E3CD 3132333435         DB      49,50,51,52,53,54,55,56
E3D5 090A0B0C0D         DB      9,10,11,12,13,14,15,16
E3DD 2122232425         DB      33,34,35,36,37,38,39,40
E3E5 393A3B3C3D         DB      57,58,59,60,61,62,63,64
E3ED 1112131415         DB      17,18,19,20,21,22,23,24
E3F5 292A2B2C2D         DB      41,42,43,44,45,46,47,48

                ;*****************************************************************
                ;*                                                               *
                ;* EACH OF THE FOLLOWING TABLES DESCRIBES A DISKETTE WITH THE    *
                ;* SPECIFIED CHARACTERISTICS.                                    *
                ;*                                                               *
                ;*****************************************************************


                ;*****************************************************************
                ;*                                                               *
                ;* THE FOLLOWING DPB DEFINES A  DISKETTE FOR 128 BYTE SECTORS,   *
                ;* SINGLE DENSITY, AND SINGLE SIDED.                             *
                ;*                                                               *
```

```
                ;*****************************************************************

E3FD 1A00       DPB128S DW      26              ;CP/M SECTORS/TRACK
E3FF 03                 DB      3               ;BSH
E400 07                 DB      7               ;BLM
E401 00                 DB      0               ;EXM
E402 F200               DW      242             ;DSM
E404 3F00               DW      63              ;DRM
E406 C0                 DB      0C0H            ;AL0
E407 00                 DB      0               ;AL1
E408 1000               DW      16              ;CKS
E40A 0200               DW      2               ;OFF
E40C 01                 DB      1H              ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.

                ;*****************************************************************
                ;                                                               *
                ; THE FOLLOWING DPB DEFINES A DISKETTE FOR 256 BYTE SECTORS,    *
                ; DOUBLE DENSITY, AND SINGLE SIDED.                             *
                ;                                                               *
                ;*****************************************************************

E40D 3400       DPB256S DW      52              ;CP/M SECTORS/TRACK
E40F 04                 DB      4               ;BSH
E410 0F                 DB      15              ;BLM
E411 00                 DB      0               ;EXM
E412 F200               DW      242             ;DSM
E414 7F00               DW      127             ;DRM
E416 C0                 DB      0C0H            ;AL0
E417 00                 DB      0               ;AL1
E418 2000               DW      32              ;CKS
E41A 0200               DW      2               ;OFF
E41C 12                 DB      12H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.

                ;*****************************************************************
                ;                                                               *
                ; THE FOLLOWING DPB DEFINES A DISKETTE AS 512 BYTE SECTORS,     *
                ; DOUBLE DENSITY, AND SINGLE SIDED.                             *
                ;                                                               *
                ;*****************************************************************

E41D 3C00       DPB512S DW      60              ;CP/M SECTORS/TRACK
E41F 04                 DB      4               ;BSH
E420 0F                 DB      15              ;BLM
E421 00                 DB      0               ;EXM
E422 1801               DW      280             ;DSM
E424 7F00               DW      127             ;DRM
E426 C0                 DB      0C0H            ;AL0
E427 00                 DB      0               ;AL1
E428 2000               DW      32              ;CKS
E42A 0200               DW      2               ;OFF
E42C 33                 DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
```

```
                                        ;8 IF DOUBLE SIDED.

                ********************************************************************
                *                                                                  *
                * THE FOLLOWING DPB DEFINES A DISKETTE AS 1Ø24 BYTE SECTORS,       *
                * DOUBLE DENSITY, AND SINGLE SIDED.                                *
                *                                                                  *
                ********************************************************************

E42D 4ØØØ       DP1Ø24S DW      64              ;CP/M SECTORS/TRACK
E42F Ø4                 DB      4               ;BSH
E43Ø ØF                 DB      15              ;BLM
E431 ØØ                 DB      Ø               ;EXM
E432 2BØ1               DW      299             ;DSM
E434 7FØØ               DW      127             ;DRM
E436 CØ                 DB      ØCØH            ;ALØ
E437 ØØ                 DB      Ø               ;AL1
E438 2ØØØ               DW      32              ;CKS
E43A Ø2ØØ               DW      2               ;OFF
E43C 74                 DB      74H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.

                ********************************************************************
                *                                                                  *
                * THE FOLLOWING DPB DEFINES A DISKETTE FOR 128 BYTE SECTORS,       *
                * SINGLE DENSITY, AND DOUBLE SIDED.                                *
                *                                                                  *
                ********************************************************************

E43D 34ØØ       DPB128D DW      52              ;CP/M SECTORS/TRACK
E43F Ø4                 DB      4               ;BSH
E44Ø ØF                 DB      15              ;BLM
E441 Ø1                 DB      1               ;EXM
E442 F2ØØ               DW      242             ;DSM
E444 7FØØ               DW      127             ;DRM
E446 CØ                 DB      ØCØH            ;ALØ
E447 ØØ                 DB      Ø               ;AL1
E448 2ØØØ               DW      32              ;CKS
E44A Ø2ØØ               DW      2               ;OFF
E44C Ø9                 DB      9H

                ********************************************************************
                *                                                                  *
                * THE FOLLOWING DPB DEFINES A DISKETTE AS 256 BYTE SECTORS,        *
                * DOUBLE DENSITY, AND DOUBLE SIDED.                                *
                *                                                                  *
                ********************************************************************

E44D 68ØØ       DPB256D DW      1Ø4             ;CP/M SECTORS/TRACK
E44F Ø4                 DB      4               ;BSH
E45Ø ØF                 DB      15              ;BLM
E451 ØØ                 DB      Ø               ;EXM
E452 E6Ø1               DW      486             ;DSM
E454 FFØØ               DW      255             ;DRM
E456 FØ                 DB      ØFØH            ;ALØ
```

```
E457 00                 DB      0               ;ALl
E458 4000               DW      64              ;CKS
E45A 0200               DW      2               ;OFF
E45C 1A                 DB      1AH

                ;**********************************************************************
                ;*                                                                    *
                ;* THE FOLLOWING DPB DEFINES A DISKETTE AS 512 BYTE SECTORS,          *
                ;* DOUBLE DENSITY, AND DOUBLE SIDED.                                  *
                ;*                                                                    *
                ;**********************************************************************

E45D 7800       DPB512D DW      120             ;CP/M SECTORS/TRACK
E45F 04                 DB      4               ;BSH
E460 0F                 DB      15              ;BLM
E461 00                 DB      0               ;EXM
E462 3102               DW      561             ;DSM
E464 FF00               DW      255             ;DRM
E466 F0                 DB      0F0H            ;AL0
E467 00                 DB      0               ;AL1
E468 4000               DW      64              ;CKS
E46A 0200               DW      2               ;OFF
E46C 3B                 DB      3BH

                ;**********************************************************************
                ;*                                                                    *
                ;* THE FOLLOWING DPB DEFINES A DISKETTE AS 1024 BYTE SECTORS,         *
                ;* DOUBLE DENSITY, AND DOUBLE SIDED.                                  *
                ;*                                                                    *
                ;**********************************************************************

E46D 8000       DP1024D DW      128             ;CP/M SECTORS/TRACK
E46F 04                 DB      4               ;BSH
E470 0F                 DB      15              ;BLM
E471 00                 DB      0               ;EXM
E472 5702               DW      599             ;DSM
E474 FF00               DW      255             ;DRM
E476 F0                 DB      0F0H            ;AL0
E477 00                 DB      0               ;AL1
E478 4000               DW      64              ;CKS
E47A 0200               DW      2               ;OFF
E47C 7C                 DB      7CH
                        ENDIF

                ;**********************************************************************
                ;*                                                                    *
                ;* THE FOLLOWING DPB DEFINES A 10 MEGABYTE HARD DISK, WITH 512        *
                ;* BYTE SECTORS.                                                      *
                ;*                                                                    *
                ;**********************************************************************

                        IF      MAXHD NE 0
                        IF      M26 NE 0
E47D 0004       DPBHD1  DW      1024            ;CP/M SECTORS/TRACK
E47F 05                 DB      5               ;BSH
E480 1F                 DB      31              ;BLM
```

```
E481 01                 DB      1               ;EXM
E482 B507               DW      1973            ;DSM
E484 FF01               DW      511             ;DRM
E486 FF                 DB      0FFH            ;AL0
E487 FF                 DB      0FFH            ;AL1
E488 0000               DW      0               ;CKS
E48A 0100               DW      1               ;OFF
E48C 33                 DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.
E48D 0004       DPBHD2  DW      1024            ;CP/M SECTORS/TRACK
E48F 05                 DB      5               ;BSH
E490 1F                 DB      31              ;BLM
E491 01                 DB      1               ;EXM
E492 B507               DW      1973            ;DSM
E494 FF01               DW      511             ;DRM
E496 FF                 DB      0FFH            ;AL0
E497 FF                 DB      0FFH            ;AL1
E498 0000               DW      0               ;CKS
E49A 4000               DW      64              ;OFF
E49C 33                 DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.

E49D 0004       DPBHD3  DW      1024            ;CP/M SECTORS/TRACK
E49F 05                 DB      5               ;BSH
E4A0 1F                 DB      31              ;BLM
E4A1 01                 DB      1               ;EXM
E4A2 B507               DW      1973            ;DSM
E4A4 FF01               DW      511             ;DRM
E4A6 FF                 DB      0FFH            ;AL0
E4A7 FF                 DB      0FFH            ;AL1
E4A8 0000               DW      0               ;CKS
E4AA 7F00               DW      127             ;OFF
E4AC 33                 DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.
                        ENDIF
                        IF      M10 NE 0
                DPBHD1  DW      336             ;CP/M SECTORS/TRACK
                        DB      5               ;BSH
                        DB      31              ;BLM
                        DB      1               ;EXM
                        DW      1269            ;DSM
                        DW      511             ;DRM
                        DB      0FFH            ;AL0
                        DB      0FFH            ;AL1
                        DW      0               ;CKS
                        DW      1               ;OFF
                        DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.
                DPBHD2  DW      336             ;CP/M SECTORS/TRACK
                        DB      5               ;BSH
                        DB      31              ;BLM
                        DB      1               ;EXM
```

```
                        DW      1280            ;DSM
                        DW      511             ;DRM
                        DB      0FFH            ;AL0
                        DB      0FFH            ;AL1
                        DW      0               ;CKS
                        DW      122             ;OFF
                        DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.
                        ENDIF
                        IF      M20 NE 0
                DPBHD1  DW      672             ;CP/M SECTORS/TRACK
                        DB      5               ;BSH
                        DB      31              ;BLM
                        DB      1               ;EXM
                        DW      2015            ;DSM
                        DW      511             ;DRM
                        DB      0FFH            ;AL0
                        DB      0FFH            ;AL1
                        DW      0               ;CKS
                        DW      1               ;OFF
                        DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.
                DPBHD2  DW      672             ;CP/M SECTORS/TRACK
                        DB      5               ;BSH
                        DB      31              ;BLM
                        DB      1               ;EXM
                        DW      2015            ;DSM
                        DW      511             ;DRM
                        DB      0FFH            ;AL0
                        DB      0FFH            ;AL1
                        DW      0               ;CKS
                        DW      98              ;OFF
                        DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                                ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                                ;8 IF DOUBLE SIDED.

        DPBHD3  DW      672             ;CP/M SECTORS/TRACK
                DB      5               ;BSH
                DB      31              ;BLM
                DB      1               ;EXM
                DW      1028            ;DSM
                DW      511             ;DRM
                DB      0FFH            ;AL0
                DB      0FFH            ;AL1
                DW      0               ;CKS
                DW      195             ;OFF
                DB      33H             ;16*((#CPM SECTORS/PHYSICAL SECTOR) -1) +
                                        ;LOG2(#BYTES PER SECTOR/128) + 1 +
                                        ;8 IF DOUBLE SIDED.
                ENDIF
                ENDIF

*****************************************************************
*                                                               *
```

```
                ;*****************************************************************
                ;*  CP/M DISK PARAMETER HEADERS, UNITIALIZED.                    *
                ;*                                                               *
                ;*****************************************************************

                HEADER  MACRO   ND,DPB
                        DW      0               ;TRANSLATION TABLE FILLED IN LATER
                        DW      0,0,0           ;SCRATCH
                        DW      DIRBUF          ;DIRECTORY BUFFER
                        DW      DPB             ;DPB FILLED IN LATER
                        DW      CSV&ND          ;DIRECTORY CHECK VECTOR
                        DW      ALV&ND          ;ALLOCATION VECTOR
                        ENDM

E4AD =          DPBASE  EQU     $
0000 #          DN      SET     0
                        IF      FIRST
                        REPT    MAXHD           ;GENERATE HARD DISK DPH'S FOLLOWED
                        HEADER  %DN,DPBHD1      ;       BY FLOPPY DPH'S
                DN      SET     DN+1
                        HEADER  %DN,DPBHD2
                DN      SET     DN+1
                        IF      (M26 NE 0) OR (M20 NE 0)
                        HEADER  %DN,DPBHD3
                DN      SET     DN+1
                        ENDIF
                        ENDM
                        REPT    MAXFLOP
                        HEADER  %DN,0
                DN      SET     DN+1
                        ENDM
                        ELSE
                        REPT    MAXFLOP         ;GENERATE FLOPPY DPH'S FOLLOWED BY
                        HEADER  %DN,0           ;       HARD DISK DPH'S
                DN      SET     DN+1
                        ENDM
E4AD+0000               DW      0               ;TRANSLATION TABLE FILLED IN LATER
E4AF+0000000000         DW      0,0,0           ;SCRATCH
E4B5+07E9               DW      DIRBUF          ;DIRECTORY BUFFER
E4B7+0000               DW      0               ;DPB FILLED IN LATER
E4B9+D2E9               DW      CSV0            ;DIRECTORY CHECK VECTOR
E4BB+87E9               DW      ALV0            ;ALLOCATION VECTOR
E4BD+0000               DW      0               ;TRANSLATION TABLE FILLED IN LATER
E4BF+0000000000         DW      0,0,0           ;SCRATCH
E4C5+07E9               DW      DIRBUF          ;DIRECTORY BUFFER
E4C7+0000               DW      0               ;DPB FILLED IN LATER
E4C9+5DEA               DW      CSV1            ;DIRECTORY CHECK VECTOR
E4CB+12EA               DW      ALV1            ;ALLOCATION VECTOR
                        REPT    MAXHD
                        HEADER  %DN,DPBHD1
                DN      SET     DN+1
                        HEADER  %DN,DPBHD2
                DN      SET     DN+1
                        IF      (M26 NE 0) OR (M20 NE 0)
                        HEADER  %DN,DPBHD3
                DN      SET     DN+1
                        ENDIF
```

```
                        ENDM
E4CD+0000               DW      0               ;TRANSLATION TABLE FILLED IN LATER
E4CF+0000000000         DW      0,0,0           ;SCRATCH
E4D5+07E9               DW      DIRBUF          ;DIRECTORY BUFFER
E4D7+7DE4               DW      DPBHD1          ;DPB FILLED IN LATER
E4D9+94EB               DW      CSV2            ;DIRECTORY CHECK VECTOR
E4DB+9DEA               DW      ALV2            ;ALLOCATION VECTOR
E4DD+0000               DW      0               ;TRANSLATION TABLE FILLED IN LATER
E4DF+0000000000         DW      0,0,0           ;SCRATCH
E4E5+07E9               DW      DIRBUF          ;DIRECTORY BUFFER
E4E7+8DE4               DW      DPBHD2          ;DPB FILLED IN LATER
E4E9+8BEC               DW      CSV3            ;DIRECTORY CHECK VECTOR
E4EB+94EB               DW      ALV3            ;ALLOCATION VECTOR
E4ED+0000               DW      0               ;TRANSLATION TABLE FILLED IN LATER
E4EF+0000000000         DW      0,0,0           ;SCRATCH
E4F5+07E9               DW      DIRBUF          ;DIRECTORY BUFFER
E4F7+9DE4               DW      DPBHD3          ;DPB FILLED IN LATER
E4F9+82ED               DW      CSV4            ;DIRECTORY CHECK VECTOR
E4FB+8BEC               DW      ALV4            ;ALLOCATION VECTOR
                        ENDIF

                ;*****************************************************************
                ;*                                                               *
                ;* CBIOS RAM LOCATIONS THAT DON'T NEED INITIALIZATION.           *
                ;*                                                               *
                ;*****************************************************************

E4FD 0000       CPMSEC  DW      0               ;CP/M SECTOR #
E4FF 00         CPMDRV  DB      0               ;CP/M DRIVE #
E500 00         CPMTRK  DB      0               ;CP/M TRACK #
E501 0000       TRUESEC DW      0               ;DISK JOCKEY SECTOR THAT CONTAINS CP/M SECTOR
E503 00         BUFDRV  DB      0               ;DRIVE THAT BUFFER BELONGS TO
E504 00         BUFTRK  DB      0               ;TRACK THAT BUFFER BELONGS TO
E505 0000       BUFSEC  DW      0               ;SECTOR THAT BUFFER BELONGS TO
E507 =          BUFFER  EQU     $

                ;*****************************************************************
                ;*                                                               *
                ;* SIGNON MESSAGE OUTPUT DURING COLD BOOT.                       *
                ;*                                                               *
                ;*****************************************************************

                HEXNUM  MACRO   NUM
                        IF      (NUM/16) > 9
                        DB      (NUM/16 AND 0FH) + 'A' - 10
                        ELSE
                        DB      (NUM/16 AND 0FH) + '0'
                        ENDIF
                        IF      (NUM AND 0FH) > 9
                        DB      (NUM AND 0FH) + 'A' - 10
                        ELSE
                        DB      (NUM AND 0FH) + '0'
                        ENDIF
                        ENDM

E507 0D0A0A     PROMPT  DB      ACR,ALF,ALF
```

```
CP/M MACRO ASSEM 2.0    #042    *** Cbios For CP/M Ver. 2.2 ***

 E50A 4D6F72726F        DB      'Morrow Designs '
 E519 36                DB      '0'+MSIZE/10            ;CP/M MEMORY SIZE
 E51A 30                DB      '0'+(MSIZE MOD 10)
 E51B 4B2043502F        DB      'K CP/M '               ;CP/M VERSION NUMBER
 E522 32                DB      CPMREV/10+'0'
 E523 2E                DB      '.'
 E524 32                DB      (CPMREV MOD 10)+'0'
 E525 2C20436269        DB      ', Cbios rev '
 E531 322E              DB      REVNUM/10+'0','.'       ;CBIOS REVISION NUMBER
 E533 38                DB      REVNUM MOD 10+'0'
                        IF      MAXHD NE 0
 E534 2E                DB      '.'
 E535 32                DB      MREV/10+'0'
 E536 36                DB      MREV MOD 10+'0'
                        IF      (M10 OR M20) AND SDELAY
                        DB      'M'
                        ENDIF
                        IF      (M10 OR M20) AND NOT SDELAY
                        DB      'F'
                        ENDIF
                        ENDIF
 E537 0D0A              DB      ACR,ALF
 E539 466F7220          DB      'For '

                        IF      MAXFLOP NE 0
 E53D 6120446973        DB      'a Disk Jockey 2D @ '
                        HEXNUM  %(ORIGIN/256)
 E550+46                DB      (240/16 AND 0FH) + 'A' - 10
 E551+30                DB      (240 AND 0FH) + '0'
 E552 30304820          DB      '00H '
                        ENDIF

                        IF      (MAXHD NE 0) AND (MAXFLOP NE 0)
 E556 616E6420          DB      'and '
                        ENDIF

                        IF      MAXHD NE 0
                        IF      MAXHD EQ 1
 E55A 616E20            DB      'an '
                        ENDIF
                        IF      MAXHD EQ 2
                        DB      'two '
                        ENDIF
                        IF      MAXHD EQ 3
                        DB      'three '
                        ENDIF
                        IF      MAXHD EQ 4
                        DB      'four '
                        ENDIF
                        IF      MREV EQ 10
                        DB      'M10 '
                        ENDIF
                        IF      MREV EQ 20
                        DB      'M20 '
                        ENDIF
                        IF      MREV EQ 26
```

```
E55D 4D323620          DB      'M26 '
                       ENDIF
E561 6861726420        DB      'hard disk'
                       IF      MAXHD NE 1
                       DB      's'
                       ENDIF
E56A 204020            DB      ' @ '
                       HEXNUM  %HDORG
E56D+35                DB      (80/16 AND 0FH) + '0'
E56E+30                DB      (80 AND 0FH) + '0'
E56F 482E              DB      'H.'
                       ENDIF
E571 0D0A              DB      ACR,ALF
E573 0D0A              DB      ACR,ALF
E575 2020202020        DB      '       THE W6GO/K6HHD LIST'
E58F 0D0A              DB      ACR,ALF
E591 2020202020        DB      '     Electronics Enterprises'
E5AD 0D0A              DB      ACR,ALF
E5AF 2020202020        DB      '      Rio Linda, California'
E5CA 0D0A              DB      ACR,ALF
E5CC 00                DB      0

                ;*****************************************************************
                ;*                                                               *
                ;* UTILITY ROUTINE TO OUTPUT THE MESSAGE POINTED AT BY H&L,      *
                ;* TERMINATED WITH A NULL.                                       *
                ;*                                                               *
                ;*****************************************************************

E5CD 7E         MESSAGE MOV     A,M             ;GET A CHARACTER OF THE MESSAGE
E5CE 23                 INX     H               ;BUMP TEXT POINTER
E5CF A7                 ANA     A               ;TEST FOR END
E5D0 C8                 RZ                      ;RETURN IF DONE
E5D1 E5                 PUSH    H               ;SAVE POINTER TO TEXT
E5D2 4F                 MOV     C,A             ;OUTPUT CHARACTER IN C
E5D3 CD0CDD             CALL    COUT            ;OUTPUT THE CHARACTER
E5D6 E1                 POP     H               ;RESTORE THE POINTER
E5D7 C3CDE5             JMP     MESSAGE         ;CONTINUE UNTIL NULL REACHED

                ;*****************************************************************
                ;*                                                               *
                ;* CBOOT IS THE COLD BOOT LOADER. ALL OF CP/M HAS BEEN LOADED IN *
                ;* WHEN CONTROL IS PASSED HERE.                                  *
                ;*                                                               *
                ;*****************************************************************

E5DA 310001     CBOOT   LXI     SP,TPA          ;SET UP STACK

E5DD 3EC0               MVI     A,INTIOBY
E5DF 320300             STA     IOBYTE
E5E2 CD2DDE             CALL    TINIT           ;INITIALIZE THE TERMINAL

E5E5 2107E5             LXI     H,PROMPT        ;PREP FOR SENDING SIGNON MESSAGE
E5E8 CDCDE5             CALL    MESSAGE         ;SEND THE PROMPT
E5EB AF                 XRA     A               ;SELECT DISK A
E5EC 32FFE4             STA     CPMDRV
```

```
E5EF 320400             STA     CDISK

                        IF      (MAXFLOP NE 0) AND FIRST
                        STA     FLOPFLG
                        ENDIF
E5F2 2103DD             LXI     H,BIOS+3
E5F5 2201DD             SHLD    BIOS+1
E5F8 C358DE             JMP     GOCPM

E5FB                    DS      512-($-BUFFER)  ;MAXIMUM SIZE BUFFER FOR 512 BYTE SECTORS

                        IF      MAXFLOP NE 0
E707                    DS      512             ;ADDITIONAL SPACE FOR FLOPPIES 1K SECTORS
                        ENDIF

                        IF      (MAXFLOP NE 0) OR (MAXHD NE 0)
E907            DIRBUF  DS      128             ;DIRECTORY BUFFER
                        ENDIF

                ALLOC   MACRO   ND,AL,CS
                ALV&ND  DS      AL
                CSV&ND  DS      CS
                        ENDM

0000 #          DN      SET     0

                        IF      NOT FIRST
                        REPT    MAXFLOP
                        ALLOC   %DN,75,64
                DN      SET     DN+1
                        ENDM
E987+           ALV0    DS      75
E9D2+           CSV0    DS      64
EA12+           ALV1    DS      75
EA5D+           CSV1    DS      64
                        REPT    MAXHD
                        IF      M26 NE 0
                        ALLOC   %DN,247,0
                DN      SET     DN+1
                        ALLOC   %DN,247,0
                DN      SET     DN+1
                        ALLOC   %DN,247,0
                DN      SET     DN+1
                        ENDIF
                        IF      M10 NE 0
                        ALLOC   %DN,159,0
                DN      SET     DN+1
                        ALLOC   %DN,161,0
                DN      SET     DN+1
                        ENDIF
                        IF      M20 NE 0
                        ALLOC   %DN,252,0
                DN      SET     DN+1
                        ALLOC   %DN,252,0
                DN      SET     DN+1
                        ALLOC   %DN,129,0
```

```
                    DN      SET     DN+1
                            ENDIF
                            ENDM
 EA9D+              ALV2    DS      247
 EB94+              CSV2    DS      Ø
 EB94+              ALV3    DS      247
 EC8B+              CSV3    DS      Ø
 EC8B+              ALV4    DS      247
 ED82+              CSV4    DS      Ø

                            ELSE

                            REPT    MAXHD
                            IF      M26 NE Ø
                            ALLOC   %DN,247,Ø
                    DN      SET     DN+1
                            ALLOC   %DN,247,Ø
                    DN      SET     DN+1
                            ALLOC   %DN,247,Ø
                    DN      SET     DN+1
                            ENDIF
                            IF      M1Ø NE Ø
                            ALLOC   %DN,159,Ø
                    DN      SET     DN+1
                            ALLOC   %DN,161,Ø
                    DN      SET     DN+1
                            ENDIF
                            IF      M2Ø NE Ø
                            ALLOC   %DN,252,Ø
                    DN      SET     DN+1
                            ALLOC   %DN,252,Ø
                    DN      SET     DN+1
                            ALLOC   %DN,129,Ø
                    DN      SET     DN+1
                            ENDIF
                            ENDM
                            REPT    MAXFLOP
                            ALLOC   %DN,75,64
                    DN      SET     DN+1
                            ENDM
                            ENDIF
 ED82                       END
```

```
0006 AACK       E22F ACCOK      000D ACR        0003 AETX       000A ALF
E987 ALV0       EA12 ALV1       EA9D ALV2       EB94 ALV3       EC8B ALV4
DEAB AUTOFLG    CF00 BDOS       A000 BIAS       DD00 BIOS       E503 BUFDRV
0080 BUFF       E507 BUFFER     E505 BUFSEC     E504 BUFTRK     E10D BUFWRTN
E323 BUILD      E5DA CBOOT      C700 CCP        0004 CDISK      DE08 CICRT
DE08 CIPTR      DD88 CITBLE     F003 CITTY      DDF3 CIUC1      DE08 CIUR1
DE08 CIUR2      DEA3 CLDBOT     DE8E CLDCMND    001A CLEAR      DE3B COCRT
DEAC COLDBEG    DEBA COLDEND    DDC9 COLPT      0004 COMPLT     DD42 CONIN
DD48 CONIN1     DD57 CONOUT     DD36 CONST      DDC9 COPTP      DE46 COPTR
DE4D COPTR1     DD90 COTBLE     F006 COTTY      DDD4 COUL1      DDF2 COUNT
DDC9 COUP1      DDC9 COUP2      DD0C COUT       E0ED CPMDMA     E4FF CPMDRV
0016 CPMREV     E4FD CPMSEC     E500 CPMTRK     DE1C CSCRT      DE1C CSPTR
DD3C CSREADR    DDB8 CSRTBLE    DDB0 CSTBLE     DE14 CSTTY      DDFF CSUC1
DE1C CSUR1      DE1C CSUR2      E9D2 CSV0       EA5D CSV1       EB94 CSV2
EC8B CSV3       ED82 CSV4       DEAA CWFLG      0008 DBLSID     E066 DCRC
E1E1 DECIDE     E1DD DECIDGO    E20F DELAY      E212 DELOOP     E907 DIRBUF
E0B9 DIVDONE    E068 DIVLOG     E06A DIVLOGX    E0AB DIVLOOP    F400 DJBOOT
F003 DJCIN      F006 DJCOUT     F42D DJDEN      F412 DJDMA      DD33 DJDRV
F42A DJERR      F409 DJHOME     F400 DJRAM      F415 DJREAD     F40F DJSEC
F41B DJSEL      F430 DJSIDE     F427 DJSTAT     F40C DJTRK      F021 DJTSTAT
F418 DJWRITE    DF4A DONOP      E46D DP1024D    E42D DP1024S    E43D DPB128D
E3FD DPB128S    E44D DPB256D    E40D DPB256S    E45D DPB512D    E41D DPB512S
E4AD DPBASE     E47D DPBHD1     E48D DPBHD2     E49D DPBHD3     E32E DRIVES
E001 DRVHD      E318 DRVPTR     0020 DRVRDY     0007 DSKCLK     E0C8 DTSLOP
0005 ENTRY      E19E FILL       0000 FIRST      DFAA FLOPOK     E10C FLUSH
E1C6 FREAD      E071 GETDPB     E262 GETSPT     DE58 GOCPM      E27F HDADD
0051 HDCMND     0050 HDCNTL     0053 HDDATA     E32A HDDISK     E242 HDDMA
E1E9 HDDRV      0052 HDFUNC     E1FA HDHOME     0050 HDORG      E2E3 HDPREP
E265 HDREAD     0051 HDRESLT    0004 HDRLEN     E250 HDSEC      E308 HDSECTR
E247 HDSIDE     0020 HDSPT      0050 HDSTAT     E21B HDTRK      E229 HDTRK2
E29A HDWRITE    E324 HEAD       DF51 HOME       0000 IDBUFF     0040 INDEX
E034 INDX1      E03B INDX2      00C0 INTIOBY    E0FA INTO       0003 IOBYTE
0008 ISBUFF     DD77 LIST       DD7A LIST1      DD82 LISTST     0003 LOGDSK
DE25 LSLPT      DDC0 LSTBLE     DD98 LTBLE      0000 M10        0000 M20
0001 M26        0002 MAXFLOP    0001 MAXHD      00F7 MDIR       E5CD MESSAGE
E0D7 MOVE       E1D2 MOVER      E1D4 MOVLOP     001A MREV       003C MSIZE
DF1E NEWDMA     DEFF NEWSEC     E12D NOADJST    DF16 NOWRAP     00FB NSTEP
00FC NULL       4A00 OFFSETC    0002 OPDONE     F000 ORIGIN     E0F5 OUTOF
DD72 PNCH1      E119 PREP       E2C9 PROCESS    E507 PROMPT     0004 PSTEP
DDA0 PTBLE      DD6C PUNCH      DDE9 PWAIT      E0F0 RDWR       DD62 READER
E099 READ       DD65 READERA    DD68 READR1     DE2A READY      E09D REDWRT
000A RETRIES    0002 RETRY      E122 RETRYLP    E17F RETRYOP    001C REVNUM
0001 RSECT      DDA8 RTBLE      E285 RTLOOP     0005 SCENBL     0001 SDELAY
0200 SECLEN     E0DC SECPSEC    E09E SECSIZ     DF58 SECTRAN    DD4C SELDEV
DF4B SETDMA     DF93 SETDRV     E049 SETDRV1    DF45 SETSEC     E210 SETTLE
DF53 SETTRK     DF6E SIDEA      DFEF SIDEOK     DF71 SIDEONE    DF77 SIDETWO
E233 SLOOP      DE17 STAT       E1FF STEPO      DFFF SUBFP      E01D TDELAY
DE2D TINIT      0001 TKZERO     0008 TMOUT      0100 TPA        DF60 TRANFP
DF8F TRANHD     E501 TRUESEC    DEBB WARMBEG    DEBB WARMEND    DEFE WARMLOD
DF32 WARMRD     DD03 WBOOTE     DEBC WBOOT      0000 WBOT       000F WENABL
0010 WFAULT     DEC0 WFLG       000B WRESET     E092 WRITE      E104 WRITTYP
DF35 WRMREAD    E248 WSDONE     0005 WSECT      E2A6 WTLOOP     E3BC XLT124
E32F XLT128     E34A XLT256     E37F XLT512     E08A XLTS       E307 ZKEY
E062 ZRET
```