JADE COMPUTER PRODUCTS
CP/M 2.2 - DOUBLE D

THE FOLLOWING IS A LIST OF FILES PRESENT ON THE JADE DOUBLE D DISKETTE. A BRIEF DESCRIPTION IS ALSO INCLUDED.

	ASM.COM	CP/M ASSEMBLER - PROVIDED BY DIGITAL RESEARCH.
✗	BIM.ASM	BOOTSTRAP INJECTION MODULE - PART 2 OF A SYSTEM BOOTSTRAP PROM. IN TDL MACRO ASSEMBLER SOURCE.
✗	BIM.HEX	BOOTSTRAP INJECTION MODULE - THIS FILES IN INTEL HEX FORMAT.
	BIOS.ASM	BASIC I/O SYSTEM - PROVIDED BY DIGITAL RESEARCH. BIOS FOR MDS DEVELOPMENT SYSTEM.
✗	BIOSGEN.COM	BIOS GENERATOR UTILITY - USED TO READ AND WRITE AN IMAGE OF THE USERS CBIOS FROM AND TO SYSTEM TRACK 0. THE IMAGE OF CBIOS RESIDES AT 1000H TO 13FFH. USE DDT TO PUT THE CBIOS IMAGE AT THAT ADDRESS.
✗	BLT.ASM	BIOS LOADER TRANSIENT - SOURCE CODE FOR "COLD START LOADER" AS GENERATED BY MOVCPM.COM.
✗	BOOT.COM	BOOT - PRESENTED AS A COM FILE, IF EXECUTED BY A SINGLE DENSITY CP/M SYSTEM IN WHICH THE DOUBLE D ALSO IS PRESENT, THIS WILL BOOT THE DOUBLE D SYSTEM.
	CBIOS.ASM	BASIC I/O SYSTEM - SKELETAL BIOS PROVIDED BY DIGITAL RESEARCH.
	CPM20.COM	IMAGE OF COLD START LOADER, CCP AND BDOS IN THE SAME FORMAT AS GENERATED BY MOVCPM 20 * AND THEN SAVE 34 CPM20.COM.
✗	DCM.ASM	DISK CONTROLLER MODULE - SOURCE CODE (TDL Z80) FOR THE DOUBLE D ONBOARD Z80A.
✗	DCM.HEX	DISK CONTROLLER MODULE - INTEL HEX FORMAT OF DCM.
✗	DCMGEN.COM	DCM GENERATOR UTILITY - USED TO READ AND WRITE AN IMAGE OF THE USERS DCM FROM OR TO SYSTEM TRACK 0. THE IMAGE OF DCM RESIDES AT 1000H TO 13FFH. USE DDT TO PUT DCM IMAGE AT THIS ADDRESS AND TO MAKE PATCHES.
✗	DDBIOS.ASM	DOUBLE D BIOS - CP/M ASSEMBLER FORMAT SOURCE CODE FOR DOUBLE D BIOS. THIS ASSEMBLE IS LISTED IN THE SOFTWARE MANUAL.
✗	DDBIOS.HEX	DOUBLE D BIOS - INTEL HEX FORMAT DDBIOS FILE.
	DDT.COM	DYNAMIC DEBUG TOOL - DIGITAL RESEARCH.
	DEBLOCK.ASM	DEBLOCKING SOURCE CODE - DIGITAL RESEARCH.
	DISKDEF.LIB	DISK DEFINITION LIBRARY - DIGITAL RESEARCH.
	DUMP.ASM	FILE DUMP UTILITY - SOURCE BY DIGITAL RESEARCH.
	DUMP.COM	FILE DUMP UTILITY - COM BY DIGITAL RESEARCH.
	ED.COM	EDITOR UTILITY - DIGITAL RESEARCH.
✗	FORMAT.ASM	FORMAT UTILITY - DOUBLE D FORMAT PROGRAM SOURCE.
✗	FORMAT.COM	FORMAT UTILITY - DOUBLE D FORMAT PROGRAM. FORMATS ON ANY DRIVE A THROUGH D IN SINGLE AND DOUBLE DENSITY.
	LOAD.COM	LOAD UTILITY - DIGITAL RESEARCH.
✗	MOVCPM.COM	CP/M RELOACATION UTILITY - GENERATES CP/M SYSTEM WITH BLT FOR JADE DOUBLE D.

OLDSYS.COM	SYSGEN UTILITY - DIGITAL RESEARCH SYSGEN.COM AS DOCUMENTED IN CP/M MANUALS.
PIP.COM	FILE TRANSFER UTILITY - DIGITAL RESEARCH.
X SBD.ASM	SYSTEM BOOT DRIVER - PART 1 OF SYSTEM PROM BOOT. ASSEMBLED SOURCE LISTING IS IN SOFTWARE MANUAL.
STAT.COM	SYSTEM STATUS UTILITY - DIGITAL RESEARCH.
SUBMIT.COM	CP/M BATCH SUBSYSTEM - DIGITAL RESEARCH.
* SYSGEN.COM	CSL/CCP/BDOS GENERATOR UTILITY - DOUBLE D SYSTEM TRACKS COMPATABLE. SIMILAR TO SYSGEN.COM DESCRIBED IN CP/M MANUALS BUT DOES NOT READ OR WRITE BIOS. USE BIOSGEN FOR YOUR CBIOS.
XSUB.COM	EXTENDED BATCH SUBSYSTEM - DIGITAL RESEARCH.

THE SYSTEM TRACKS HAVE A DIFFERENT LAYOUT THAN THE DISKETTES DISTRIBUTED BY DIGITAL RESEARCH. THIS SECTION PRESENTS A DISCRIPTION OF THE SYSTEM TRACKS (0 AND 1) AS DISTRIBUTED FOR THE JADE DOUBLE D DISK CONTROLLER BOARD. THOSE MODULES RESIDING ON THE SYSTEM TRACKS WHICH OFTEN NEED TO BE MODIFIED FOR A SPECIFIC SYSTEM ARE ON TRACK 0, WHICH IS IN SINGLE DENSITY. CCP AND BDOS, WHICH ARE NOT MODIFIED BY THE USER ARE ON TRACK 1 IN DOUBLE DENSITY. ALL DATA TRACKS ARE IN SINGLE DENSITY SUCH THAT THE DOUBLE D DISTRIBUTION DISKETTE CAN BE READ AND MODIFIED ON MOST 8" SINGLE DENSITY CP/M SYSTEMS.

THE FOLLOWING TABLE SHOWS THE LAYOUT OF SYSTEM TRACK 0. THIS TRACK IS FORMATTED IN SINGLE DENSITY WITH 26 SEQUENTIALLY NUMBERED SECTORS.

SECTOR NUMBER	EXECUTION ADDRESS	FORMAT LD ADDR	MODULE NAME		SYS 2.2,3	SYS 3.0
01	N.A.	1000H	IDT		IDT	—
02	1380H (DD)	1080H	BLT		BLT	IDT
03		1100H			—	DIR
04	4A00H+B	1180H	BIOS		DCM	—
05	4A80H+B	1200H	BIOS			
06	4B00H+B	1280H	BIOS			
07	4B80H+B	1300H	BIOS	1K		
08	4C00H+B	1380H	BIOS			
09	4C80H+B	1400H	BIOS			
10	4D00H+B	1480H	BIOS			
11	4D80H+B	1500H	BIOS		DCM	
12		1580H	RSV		SPARE	—
13	1000H (DD)	1600H	DCM		BIOS	BIOS
14	1080H (DD)	1680H	DCM			
15	1100H (DD)	1700H	DCM			
16	1180H (DD)	1780H	DCM	1K		
17	1200H (DD)	1800H	DCM			
18	1280H (DD)	1880H	DCM			
19	1300H (DD)	1900H	DCM			
20	1380H (DD)	1980H	DCM		BIOS	BIOS
21	1400H (DD)	1A00H	RSV		SPARE	
22	1480H (DD)	1A80H	RSV			
23	1500H (DD)	1B00H	RSV			
24	1580H (DD)	1B80H	RSV			
25	1600H (DD)	1C00H	RSV			
26	1680H (DD)	1C80H	RSV			

THE FOLLOWING TABLE SHOWS THE LAYOUT OF SYSTEM TRACK 1. THIS TRACK IS FORMATTED IN DOUBLE DENSITY WITH 48 PHYSICALLY STAGGERED SECTORS.

SECTOR NUMBER	EXECUTION ADDRESS	FORMAT LD ADDR	MODULE NAME
01		1D00H	SPARE
02	3400H+B	1D80H	CCP
03	3480H+B	1E00H	CCP
04	3500H+B	1E80H	CCP
05	3580H+B	1F00H	CCP
06	3600H+B	1F80H	CCP
07	3680H+B	2000H	CCP
08	3700H+B	2080H	CCP
09	3780H+B	2100H	CCP
10	3800H+B	2180H	CCP
11	3880H+B	2200H	CCP
12	3900H+B	2280H	CCP
13	3980H+B	2300H	CCP
14	3A00H+B	2380H	CCP
15	3A80H+B	2400H	CCP
16	3B00H+B	2480H	CCP
17	3B80H+B	2500H	CCP
18	3C00H+B	2580H	BDOS
19	3C80H+B	2600H	BDOS
20	3D00H+B	2680H	BDOS
21	3D80H+B	2700H	BDOS
22	3E00H+B	2780H	BDOS
23	3E80H+B	2800H	BDOS
24	3F00H+B	2880H	BDOS
25	3F80H+B	2900H	BDOS
26	4000H+B	2980H	BDOS
27	4080H+B	2A00H	BDOS
28	4100H+B	2A80H	BDOS
29	4180H+B	2B00H	BDOS
30	4200H+B	2B80H	BDOS
31	4280H+B	2C00H	BDOS
32	4300H+B	2C80H	BDOS
33	4380H+B	2D00H	BDOS
34	4400H+B	2D80H	BDOS
35	4480H+B	2E00H	BDOS
36	4500H+B	2E80H	BDOS
37	4580H+B	2F00H	BDOS
38	4600H+B	2F80H	BDOS
39	4680H+B	3000H	BDOS
40	4700H+B	3080H	BDOS
41	4780H+B	3100H	BDOS
42	4800H+B	3180H	BDOS
43	4880H+B	3200H	BDOS
44	4900H+B	3280H	BDOS
45	4980H+B	3300H	BDOS
46		3380H	SPARE
47		3400H	SPARE
48		3480H	SPARE

SYSTEM TRACK GENERATOR UTILITIES:

THE THREE GENERATOR UTILITIES SYSGEN.COM, BIOSGEN.COM, AND DCMGEN.COM PROVIDE THE END USER THE ABILITY TO EXTRACT AND REWRITE VARIOUS SECTIONS OF THE SYSTEM TRACKS. THE FOLLOWING TABLE SHOWS WHICH SECTIONS OF MEMORY ARE USED BY EACH PROGRAM AND WHICH SYSTEM TRACK MODULES ARE READ OR REWRITTEN. SYSGEN.COM IS SIMILIAR TO THE SYSGEN.COM DESCRIBED IN THE CP/M 2.0 MANUAL SET. NOTICE THE DIFFERENCE IS THE BIOS MODULE. EACH OF THESE PROGRAMS PROVIDE A FILE LOAD FEATURE. AN EXAMPLE, IF YOU HAD A FILE CPM32.COM AND YOU WISHED TO WRITE THIS FILE TO THE SYSTEM TRACKS.

```
A>DDT CPM32.COM
(DDT DISPLAYS MESSAGE)
-G0
A>SYSGEN
(AND THEN WRITE YOUR FILE)
```

```
A>SYSGEN CPM32.COM
(YOU GET A FILE LOADED MESSAGE)
NOW WRITE YOUR FILE.
```

IN CHANGING THE CP/M SYSTEM SIZE, YOU MUST REWRITE BLT/CCP/BDOS USING SYSGEN.COM AND REWRITE BIOS USING BIOSGEN.COM. DCMGEN IS USED TO MODIFY DCM FOR SUCH PARAMETERS AND DISK DRIVE STEP TIMING. CONSULT YOUR DCM LISTING FOR THE TIMING PARAMETERS.

UTILITY	MODULE	TRACK	SECTORS	SYYSTEM ADDRESS
SYSGEN.COM	BLT	0	2	0900-097FH
	CCP	1	2-17	0980-117FH
	BDOS	1	18-45	1180-1F7FH
BIOSGEN.COM	BIOS	0	4-11	1000-13FFH
DCMGEN.ASM	DCM	0	13-20	1000-13FFH

NOTES FOR RELEASE #1 DISKETTES. THE DDBIOS IS ASSEMBLED FOR A REV B DOUBLE D CONTROLLER BOARD. DDBIOS SOURCE SHOULD BE MODIFIED, REASSEMBLED, AND WRITTEN TO SYSTEM TRACK 0 FOR REV C BOARDS.

THE FOLLOWING JUMPERS SHOUULD BE USED TO CONFIGURE A SHUGART 800 DISK DRIVE.

EACH DRIVE: A, B, C, Y, T2, DS, 800

DRIVE A:	DS1
DRIVE B:	DS2
DRIVE C:	DS3
DIRVE D:	DS4

LAST DRIVE: T1, T3, T4, T5, T6

THE L JUMPER IS SET DEPENDING ON THE -5V SUPPLY.
CONSULT YOU SA800 MANUAL.

USE ONLY THESE JUMPERS, NO OTHERS.

NEW CP/M 2.2

BDOS FUNCTIONS

```
***********************************
* FUNCTION 37:  RESET DRIVE       *
*                                 *
***********************************
* Entry Parameters:               *
*     Register   C:  25H          *
*     Register  DE:  Drive Vector *
*                                 *
* Returned Value  :               *
*     Register   A:  ØØH          *
***********************************
```

The RESET DRIVE function allows resetting of specified drive(s). The passed parameter is a 16 bit vector of drives to be reset, the least significant bit is drive A:.

In order to maintain compatibility with MP/M, CP/M returns a zero value.

```
**********************************
* FUNCTION 4Ø:  WRITE RANDOM WITH*
*                   ZERO FILL    *
**********************************
* Entry Parameters:              *
*     Register   C:  28H         *
*     Register  DE:  FCB Address *
* Returned Value:                *
*     Register   A:  Return Code *
**********************************
```

The WRITE RANDOM WITH ZERO FILL operation is similar to FUNCTION 34: with the exception that a previously unallocated block is filled with zeros before the data is written.

DIGITAL RESEARCH CP/M ^{R} 22 FIELD SOFTWARE CHANGE

ID# CPM22-0001 PROGRAM: BDOS ISSUE DATE: 02/19/80

Error Description: The following change affects only those CP/M systems which are using the optional blocking and deblocking algorithms listed in Appendix G of the CP/M Alteration Guide. If you are in doubt as to the applicability of this field change, please contact Digital Research or your CP/M distributor.

Patch Procedure: Ensure you have an archive copy of the distributed MOVCPM.COM file. Make changes to a version of MOVCPM.COM by carefully following the steps shown below: MOVCPM.COM is loaded into memory using DDT and the changes are made using the Assemble (A) and Set (S) commands. After making the changes, return to the console command processor using the Go (G) command, and SAVE the altered memory image on disk. The memory image on tracks 0 and 1 must also be updated. This can be accomplished by executing the new MOVCPM program, as described in the CP/M Alteration Guide, and integrating your customized I/O system.

```
ddt movcpm.com
DDT VERS 2.0
NEXT PC
2700  0100
-a1cd2
1CD2  nop
1CD3  nop
1CD4  lxi h,0
1CD7



-G0

save 38 movcpm.com
```

NOTE: This Field Software change is not installed in the CP/M version 2.2. It must be installed in all systems which use the deblocking algorithms listed in Appendix G of the CP/M Alteration Guide.

DD CONTROLLER

CONTROL PORT (OUT) 43H

```
DATA   BNKØRQ  EQU  0000 0001B   SHOW BANK Ø TO SYSTEM
       BNK1RQ  EQU  0000 0011B   SHOW BANK 1 TO SYSTEM
       CLEAR   EQU  1000 0000B   RESETS Z80 WHEN BNK RQ
                                                EXERTED
       START   EQU  0000 0010B   REMOVE WINDOW FROM SYSTEM
                                   + EXECUTE INSTRUCTION
```

STATUS PORT (IN) 43H

```
WNDOM   EQU  0000 0001B   WINDOW NOT PRESENT BIT
BUSY    EQU  0000 0010B   CONTROLLER EXECUTING PGM BIT
WNDO11  EQU  0000 0100B   WINDOW ADDR BIT (SWITCH)
WNDO12  EQU  0000 1000B     "      "     "
```

DD DISK CONTROLLER COMMANDS

COMMAND BLOCK @ 1370H

1370	CBCMD	DB	COMMAND # Ø-7
71	CBDRV	DB	DRIVE #
72	CBTRK	DB	TRACK #
73	CBSEC	DB	SECTOR #
74	CBFFG	DB	FORMAT FLAGS
75	CB SPR	DB	—
76	CB MOD	DB	MODE SELECTS
77	CB STS	DB	CONTROLLER STATUS
78	CWLAD	DW	LOAD ADDR
7A	CWLNG	DW	LOAD LENGTH

LOCATION 1006H MUST BE 1041H FOR COMMAND.

CMDS (LBCmd)

Ø	LOG-ON DRIVE
1	READ SECTOR
2	WRITE SECTOR
3	FORMAT TRACK
4	READ ADDRESS
5	—
6	—
7	IDLE/BACKGROUND

COMMAND Ø : LOG ON DRIVE

CMD BLOCK PASSED IN :

(CBDRV) = DRIVE # (Ø-3)

(CB

VALUES RETURNED :

(CBSTS) = BOARD STATUS.

(CBTRK) = TRACK Ø

(CBSEC) = SECTOR 1

COMMAND 1 : READ SECTOR

PARAMS PASSED IN :

(CBDRV) = DRIVE # (Ø-3)
(CBTRK) = TRACK # TO SEEK
(CBSEC) = SECTOR # TO READ.

PARAMS PASSED OUT :

SECTOR DATA @ 1380H
(CBSTS) = STATUS

COMMAND 2: WRITE SECTOR

PARAMS PASSED IN:

```
    (CBDRV)  = DRIVE # (Ø-3)
    (CBTRK)  = TRACK # OF SECTOR
    (CBSEC)  = SECTOR # TO WRITE
  @ 1380H    = START OF 128-BYTE SECTOR DATA TO WRITE
```

PARAMS PASSED BACK:

```
    (CBSTS)  = STATUS
```

DD DISK CONT.

COMMAND 3: FORMAT TRACK

PARAMS PASSED IN:

(CBDRV) = DRIVE # (Ø-3)
(CBSEC) = FORMAT FLAG
(CBTRK) = TRACK TO FORMAT
@ 17Ø8 = START OF FORMAT PGM.

PARAMS PASSED OUT:

(CBSTS) = STATUS
(CWLNG) = ?

COMMAND 4: READ ADDRESS

PARAMS PASSED IN:

NOT IMPLEMENTED

PARAMS PASSED OUT:

NONE

DD DISK CONT.

COMMAND 7 : IDLE

PARAMS PASSED IN :

NONE

PARAMS PASSED OUT :

NONE

DD BIOS

TITLE PAGE

```
                              ;*******************************************************
                              ;                                                      *
                              ;       PROGRAM ID:      BIOS - CPM 2.2                *
                              ;                                                      *
                              ;*******************************************************
                              ;                                                      *
                              ;       PROPERTY OF:     JADE COMPUTER PRODUCTS        *
                              ;                        4901 W. ROSECRANS BLVD.       *
                              ;                        HAWTHORNE, CALIFORNIA         *
                              ;                        90250,    U.S.A.              *
                              ;                                                      *
                              ;*******************************************************
                              ;                                                      *
                              ;       VERSION:         2.2                           *
                              ;                                                      *
                              ;*******************************************************
                              ; THIS  BIOS  CONTAINS  DISK  SUBROUTINES  WHICH  ARE *
                              ; COMPATABLE  WITH THE  DCM-2.2 MODULE  AND THE  JADE *
                              ; DOUBLE D  DISK CONTROLLER.  THIS  COMBINATION WILL *
                              ; INTERFACE UP TO FOUR 8" DRIVES IN SINGLE AND DOUBLE *
                              ; DENSITY.  THE  CONSOLE,  READER/PUNCH, AND PRINTER *
                              ; INTERFACES SHOULD BE ALTERED FOR SPECIFIC  END USER *
                              ; SYSTEMS AS NEEDED.                                  *
                              ;*********************************************** SK ***
```

SKEW -6/4

```
                        ;*****************************************************
                        ; DISK OPERATING SYSTEM ADDRESSES.                    *
                        ;*****************************************************

 0014                   NK.SYS  ==      20      ;SYSTEM SIZE IN K BYTES.
 0400                   K.BYTE  ==      1024    ;1K BYTE SIZE.
 5000                   CPM.SZ  ==      NK.SYS*K.BYTE   ;TOP SYSTEM ADDRESS.
 0000                   CPM.BS  ==      CPM.SZ-(20*K.BYTE) ;CP/M BIAS VALUE.
 3400                   CCP     ==      CPM.BS+3400H    ;ADDRESS OF CCP.
 3C00                   BDOS    ==      CPM.BS+3C00H    ;ADDRESS OF BDOS.
 4A00                   BIOS    ==      CPM.BS+4A00H    ;ADDRESS OF BIOS
 C600                   BIOS.R  ==      1000H-BIOS      ;DDT OFFSET 1000H LOAD.
 0100                   TPA     ==      0100H           ;ADDRESS OF TPA.
 00FF                   IOBYTE  ==      0FFH            ;INITIAL IOBYTE VALUE.
 0000                   DF.DRV  ==      0               ;INITIAL DEFAULT DRV.
 0080                   SEC.SZ  ==      0080H           ;BYTES PER SECTOR.
 0100                   FMT.SZ  ==      0100H           ;FORMAT BUFF SIZE.
 0002                   N.DRVS  ==      2               ;1-4 DRIVES.

                        ;*****************************************************
                        ; DOUBLE D HARDWARE PARAMETERS.  PLEASE NOTE THIS     *
                        ; SECTION CONTAINS CONDITIONAL STATEMENTS.            *
                        ;*****************************************************

 0043                   D.PORT  ==      043H    ;DOUBLE D PORT ADDRESS.
 0001                   TRUE    ==      1       ;TRUE IS A ONE.
 0000                   FALSE   ==      0       ;FALSE IS A ZERO.
 0001                   REV.B   ==      TRUE    ;SET TRUE FOR REV B BOARDS.
 0000                   REV.C   ==      FALSE   ;SET TRUE FOR REV C BOARDS.
                                .IFG    REV.B, [
 0002                   DS.HLT  ==      002H    ;STATUS PORT HALT INDICATOR]
                                .IFG    REV.C, [
                        DS.HLT  ==      001H    ;STATUS PORT HALT INDICATOR]

                        ;*****************************************************
                        ; DOUBLE D HARDWARE COMMANDS                          *
                        ;*****************************************************

 0001                   DC.SIN  ==  00000001B   ;SWITCH DD BANK 0 INTO SYSTEM.
 0001                   DC.MB0  ==  00000001B   ;SELECT DOUBLE D BANK 0.
 0003                   DC.MB1  ==  00000011B   ;SELECT DOUBLE D BANK 1.
 0000                   DC.SOT  ==  00000000B   ;SWITCH DD MEM OUT OF SYSTEM.
 0002                   DC.INT  ==  00000010B   ;ISSUE DD Z80A INTERRUPT.

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

```
                     ;******************************************************
                     ; DISK CONTROLLER MODULE LINKAGE (DCM - VER 2.2)     *
                     ;******************************************************

                     ;*******( COMMAND BLOCK DEFINED )**********************

0370                 DD.CBT  ==      0370H   ;COMMAND BYTE   (BANK 0).
0371                 DD.DRV  ==      0371H   ;DRIVE NUMBER   (BANK 0).
0372                 DD.TRK  ==      0372H   ;TRACK NUMBER   (BANK 0).
0373                 DD.SEC  ==      0373H   ;SECTOR NUMBER  (BANK 0).
0377                 DD.STS  ==      0377H   ;CMMD STATUS    (BANK 0).
0380                 DD.BUF  ==      0380H   ;SECTOR BUFFER  (BANK 0).
0300                 DD.FBF  ==      0300H   ;FORMAT BUFFER  (BANK 1).
03A0                 DD.DPB  ==      03A0H   ;ID SEC DPB     (BANK 0).
03B1                 DD.DDF  ==      03B1H   ;ID SEC FLAGS   (BANK 0).

                     ;*******( DCM COMMANDS )*******************************

0000                 DC.LOG  ==      000H    ;LOG ON DISKETTE.
0001                 DC.RDS  ==      001H    ;READ SECTOR.
0002                 DC.WRS  ==      002H    ;WRITE SECTOR.
0003                 DC.FMT  ==      003H    ;FORMAT TRACK.

                     ;******************************************************
                     ; CONSOLE DEFINITIONS                                *
                     ;******************************************************

0000                 CNI.SP  ==      000H    ;INPUT STATUS PORT
0002                 CNI.SB  ==      002H    ;INPUT STATUS BIT
0000                 CNI.SI  ==      000H    ;INPUT STATUS INVERT
0001                 CNI.DP  ==      001H    ;INPUT DATA PORT

0000                 CNO.SP  ==      000H    ;OUTPUT STATUS PORT
0004                 CNO.SB  ==      004H    ;OUTPUT STATUS BIT
0000                 CNO.SI  ==      000H    ;OUTPUT STATUS INVERT
0001                 CNO.DP  ==      001H    ;OUTPUT DATA PORT

                     ;******************************************************
                     ; ASSEMBLER DIRECTIVES                               *
                     ;******************************************************

                             .PABS
                             .PHEX
                             .XLINK
4A00                         .LOC    BIOS

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

```
                                 ;*****************************************************
                                 ; BIOS JUMP VECTOR TABLE                              *
                                 ;*****************************************************

 4A00    C3 4A83                         JMP     INIT            ;COLD START ENTRY
 4A03    C3 4CBC                         JMP     WARM            ;RELOAD CCP/BDOS
 4A06    C3 4C80                         JMP     CNS.CK          ;GET CONSOLE STATUS
 4A09    C3 4C8A                         JMP     CNS.IN          ;CONSOLE INPUT
 4A0C    C3 4C95                         JMP     CNS.OT          ;CONSOLE OUTPUT
 4A0F    C3 4CA8                         JMP     LIST            ;PRINTER OUTPUT
 4A12    C3 4CA7                         JMP     PUNCH           ;PUNCH OUTPUT
 4A15    C3 4CA4                         JMP     READER          ;READER INPUT
 4A18    C3 4C3C                         JMP     HOME            ;HOME SELECTED DRIVE
 4A1B    C3 4C41                         JMP     SELDSK          ;SELECT DISK DRIVE
 4A1E    C3 4C60                         JMP     SETTRK          ;SET TRACK NUMBER
 4A21    C3 4C65                         JMP     SETSEC          ;SET SECTOR NUMBER
 4A24    C3 4C6A                         JMP     SETDMA          ;SET TRANSFER ADDRESS
 4A27    C3 4B03                         JMP     DISKRD          ;PERFORM DISK READ
 4A2A    C3 4B23                         JMP     DISKWR          ;PERFORM DISK WRITE
 4A2D    C3 4CAB                         JMP     LISTST          ;RETURN LIST STAT
 4A30    C3 4C70                         JMP     SECTRN          ;TRANSLATE SECTOR
 4A33    C3 4B50                         JMP     FORMAT          ;FORMAT A TRACK

                                 ;*****************************************************
                                 ; RESERVE DRIVE PARAMETER BLOCKS                      *
                                 ;*****************************************************

 000F                            DPB.SZ  ==      15              ;SIZE IS 15 BYTES.
 4A36                            D0.DPB: .BLKB   DPB.SZ          ;RESERVES 15 BYTES.
 4A45                            D1.DPB: .BLKB   DPB.SZ          ;FOR EACH DISK DRIVE.
 4A54                            D2.DPB: .BLKB   DPB.SZ          ;DRIVE A THRU DRIVE D.
 4A63                            D3.DPB: .BLKB   DPB.SZ

                                 ;*****************************************************
                                 ; BIOS VARIABLE STORAGE                               *
                                 ;*****************************************************

 4A72    00                      BT.CMD: .BYTE   0               ;DCM COMMAND.
 4A73    00                      BT.DRV: .BYTE   0               ;DRIVE NUMBER.
 4A74    00                      BT.TRK: .BYTE   0               ;TRACK NUMBER.
 4A75    00                      BT.SEC: .BYTE   0               ;SECTOR NUMBER.
 4A76    00                      BT.SP0: .BYTE   0               ;SPARE BYTE 0.
 4A77    00                      BT.SP1: .BYTE   0               ;SPARE BYTE 1.
 4A78    00                      BT.MOD: .BYTE   00000000B       ;MODE CONTROLS.
 4A79    00                      BT.STS: .BYTE   0               ;COMMAND STATUS.
 4A7A    0000                    BT.LAD: .WORD   0               ;LOAD ADDRESS.
 4A7C    0000                    BT.LNG: .WORD   0               ;LOAD LENGTH.

 4A7E    0000                    BT.DMA: .WORD   0               ;SYSTEM TRANSFER ADDR.
 4A80    0000                    DT.PTR: .WORD   0               ;DRIVE TABLE POINTER.
 4A82    00                      LOG.RQ: .BYTE   0               ;LOG ON REQUEST REG.

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

```
                        ;*****************************************************
                        ; INIT - COLD START ENTRY ** DIRECTORY BUFFER OVERLAY *
                        ;*****************************************************

4A83                    DIR.BF  ==      .               ;BUFFER BEGINNING.

                        ;*******( GET SYSTEM K SIZE IN ASCII )****************

4A83    31 0080         INIT:   LXI     SP,0080H        ;SET UP STACK AREA.
4A86    21 5000                 LXI     H,CPM.SZ        ;GET CPM SYS SIZE.
4A89    7C                      MOV     A,H             ;GET NMBR OF PAGES.
4A8A    0F                      RRC                     ; (/2).
4A8B    0F                      RRC                     ;CPM SIZE IN K.
4A8C    0600                    MVI     B,0             ;ZERO TENS COUNTER.
4A8E    FE0A            C.TENS: CPI     10              ;COMPARE AGAINST 10.
4A90    DA 4A99                 JC      C.ONES          ;MUST BE LESS THAN 10.
4A93    D60A                    SUI     10              ;SUBTRACT 10.
4A95    04                      INR     B               ;INC TENS COUNTER.
4A96    C3 4A8E                 JMP     C.TENS          ;COUNT TENS.
4A99    C630            C.ONES: ADI     '0'             ;ADD ASCII 0 TO REM.
4A9B    32 4AED                 STA     SYS.OD          ;STORE ONES DIGIT.
4A9E    78                      MOV     A,B             ;GET TENS COUNTER.
4A9F    C630                    ADI     '0'             ;ADD ASCII 0 TO TENS.
4AA1    32 4AEC                 STA     SYS.TD          ;STORE TENS DIGIT.

                        ;*******( SYSTEM  INITIALIZATION )********************

4AA4    C3 4AC0                 JMP     C.LOGO          ;JUMP OVER AREA.
4AA7                            .BLKB   25              ;RESERVE INIT AREA.

                        ;*******( SEND SYSTEM SIGN ON )***********************

4AC0    21 4ACF         C.LOGO: LXI     H,MSG.SO        ;SIGN ON MSG ADDR.
4AC3    CD 4CAE                 CALL    MSG.OT          ;ISSUE MESSAGE.
4AC6    2A 4A04                 LHLD    BIOS+4          ;WARM START ADDRESS.
4AC9    22 4A01                 SHLD    BIOS+1          ;RESET COLD START.
4ACC    C3 4CBC                 JMP     WARM            ;PERFORM WARM BOOT.

4ACF    0D0A0D0A        MSG.SO: .ASCII  [CR][LF][CR][LF]
4AD3    4A4144452043            .ASCII  'JADE COMPUTER PRODUCTS '[CR][LF]
4AEC    30              SYS.TD: .BYTE   '0'                       ;TENS DIGIT.
4AED    30              SYS.OD: .BYTE   '0'                       ;ONES DIGIT.
4AEE    4B2043502F4D            .ASCIS  'K CP/M VERS 2.2 '[CR][LF][CR][LF]

                        ;*******( FILL OUT DIRECTORY BUFFER )*****************

                                .IFG    (DIR.BF+SEC.SZ-.), [
4B03                            .LOC    DIR.BF+SEC.SZ   ;FILL OUT SECTOR SIZE]

                        ;*****************************************************
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```
                             ;*******************************************************
                             ; READ A DISK SECTOR ROUTINE                            *
                             ;*******************************************************

 4B03     3E01               DISKRD: MVI     A,DC.SIN         ;SWITCH DD INTO SYSTEM.
 4B05     D343                       OUT     D.PORT           ;ISSUE DD COMMAND.
 4B07     3E01                       MVI     A,DC.RDS         ;READ SECTOR COMMAND.
 4B09     CD 4B78                    CALL    DSK.EX           ;PERFORM OPERATION.
 4B0C     C2 4B49                    JNZ     DSK.ER           ;ERROR EXIT.
 4B0F     2A 4A7E                    LHLD    BT.DMA           ;LOAD USER BUF ADDRESS
 4B12     EB                         XCHG                     ;MOVE HL TO DE.
 4B13     01 0380                    LXI     B,DD.BUF         ;LOAD BUFFER OFFSET.
 4B16     2A 0040                    LHLD    D.ADDR           ;LOAD DD WINDOW ADDR.
 4B19     09                         DAD     B                ;HL NOW SECTOR BUFFER.
 4B1A     01 0080                    LXI     B,SEC.SZ         ;LOAD SECTOR SIZE.
 4B1D     CD 4BA7                    CALL    BLOCK            ;BLOCK MOVE ROUTINE.
 4B20     C3 4B43                    JMP     DSK.OK           ;NORMAL RETURN.

                             ;*******************************************************
                             ; WRITE A DISK SECTOR ROUTINE                           *
                             ;*******************************************************

 4B23     3E01               DISKWR: MVI     A,DC.SIN         ;SWITCH DD INTO SYSTEM.
 4B25     D343                       OUT     D.PORT           ;ISSUE HARDWARE CMND.
 4B27     01 0080                    LXI     B,SEC.SZ         ;LOAD SECTOR SIZE.
 4B2A     2A 0040                    LHLD    D.ADDR           ;DD SYSTEM ADDRESS.
 4B2D     11 0380                    LXI     D,DD.BUF         ;DD BUFFER OFFSET.
 4B30     19                         DAD     D                ;HL NOW DD BUF ADDR.
 4B31     EB                         XCHG                     ;DE NOW DD BUF ADDR.
 4B32     2A 4A7E                    LHLD    BT.DMA           ;HL NOW USER BUF ADDR.
 4B35     CD 4BA7                    CALL    BLOCK            ;BLOCK MOVE ROUTINE.
 4B38     3E02                       MVI     A,DC.WRS         ;LOAD WRITE SEC CMND.
 4B3A     CD 4B78                    CALL    DSK.EX           ;CALL DISK EXECUTIVE.
 4B3D     CA 4B43                    JZ      DSK.OK           ;JUMP IF WRITE OK.
 4B40     C3 4B49                    JMP     DSK.ER           ;ERROR EXIT.

                             ;*******************************************************
                             ; DISK READ/WRITE/FORMAT EXITS                          *
                             ;*******************************************************

 4B43     3E00               DSK.OK: MVI     A,DC.SOT         ;SWITCH DD OUT OF SYS.
 4B45     D343                       OUT     D.PORT           ;ISSSUE HARDWARE CMND.
 4B47     AF                         XRA     A                ;ZERO A REGISTER.
 4B48     C9                         RET                      ;ERROR EXIT.

 4B49     3E00               DSK.ER: MVI     A,DC.SOT         ;SWITCH DD OUT OF SYS.
 4B4B     D343                       OUT     D.PORT           ;ISSSUE HARDWARE CMND.
 4B4D     3EFF                       MVI     A,0FFH           ;LOAD ERROR FLAGS.
 4B4F     C9                         RET                      ;ERROR EXIT.

                             ;*******************************************************
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                                ;*******************************************************
                                ; FORMAT A DISK TRACK ROUTINE                          *
                                ;*******************************************************

4B50    3E01                    FORMAT: MVI     A,DC.SIN        ;SWITCH DD INTO SYSTEM.
4B52    D343                            OUT     D.PORT          ;ISSUE HARDWARE CMND.
4B54    3E03                            MVI     A,DC.MB1        ;SELECT DD BANK 1.
4B56    D343                            OUT     D.PORT          ;ISSUE HARDWARE CMND.
4B58    01 0100                         LXI     B,FMT.SZ        ;FORMAT PROG SIZE.
4B5B    2A 0040                         LHLD    D.ADDR          ;DD SYSTEM ADDRESS.
4B5E    11 0300                         LXI     D,DD.FBF        ;DD FORMAT BUF OFFSET.
4B61    19                              DAD     D               ;HL NOW DD FBUF ADDR.
4B62    EB                              XCHG                    ;DE NOW DD FBUF ADDR.
4B63    2A 4A7E                         LHLD    BT.DMA          ;FORMAT PROGRAM ADDR.
4B66    CD 4BA7                         CALL    BLOCK           ;BLOCK MOVE ROUTINE.
4B69    3E01                            MVI     A,DC.MB0        ;RESELECT DD BANK 0.
4B6B    D343                            OUT     D.PORT          ;ISSUE TO DD HARDWARE.
4B6D    3E03                            MVI     A,DC.FMT        ;LOAD FORMAT TRK CMND.
4B6F    CD 4B78                         CALL    DSK.EX          ;CALL DISK EXECUTIVE.
4B72    CA 4B43                         JZ      DSK.OK          ;JUMP IF WRITE OK.
4B75    C3 4B49                         JMP     DSK.ER          ;ERROR EXIT.

                                ;*******************************************************
                                ; DOUBLE D EXECUTION SUBROUTINE                        *
                                ;*******************************************************

4B78    32 4A72                 DSK.EX: STA     BT.CMD          ;STORE DCM COMMAND.
4B7B    01 0007                         LXI     B,7             ;NMBR BYTE TO MOVE.
4B7E    11 0370                         LXI     D,DD.CBT        ;COMMAND BYTE OFFSET.
4B81    2A 0040                         LHLD    D.ADDR          ;DD SYS ADDRESS.
4B84    19                              DAD     D               ;HL NOW PTS CMND BLK.
4B85    EB                              XCHG                    ;NOW ADDR IN DE.
4B86    21 4A72                         LXI     H,BT.CMD        ;BIOS CMND BLOCK.
4B89    CD 4BA7                         CALL    BLOCK           ;PERFORM BLOCK MOVE.
4B8C    3E02                            MVI     A,DC.INT        ;LOAD DD INTERRUPT.
4B8E    D343                            OUT     D.PORT          ;ISSUE DD INTERRUPT.
4B90    EB                              XCHG                    ;EXCHANGE SRC/DSTN.
4B91    01 0005                         LXI     B,5             ;5 RETURN BYTES.
4B94    DB43                    DSK.WT: IN      D.PORT          ;READ DD STATUS.
4B96    E602                            ANI     DS.HLT          ;TEST HALT* FLAG.
4B98    C2 4B94                         JNZ     DSK.WT          ;TEST UNTIL HALTED.
4B9B    3E01                            MVI     A,DC.SIN        ;SWITCH DD INTO SYS.
4B9D    D343                            OUT     D.PORT          ;ISSUE HARDWARE CMND.
4B9F    CD 4BA7                         CALL    BLOCK           ;GET DD STATUS.
4BA2    3A 4A79                         LDA     BT.STS          ;LOAD STATUS BYTE.
4BA5    A7                              ANA     A               ;TEST FOR ERRORS.
4BA6    C9                              RET                     ;RETURN TO CALLER.

                                ;*******************************************************
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                        ;*****************************************************
                        ; BLOCK - BLOCK MOVE   (Z80 LDIR REGISTER USEAGE)     *
                        ;*****************************************************

 4BA7   7E              BLOCK:  MOV     A,M             ;GET BYTE.
 4BA8   12                      STAX    D               ;STORE BYTE.
 4BA9   23                      INX     H               ;INC SOURCE PNTR
 4BAA   13                      INX     D               ;INC DESTINATION PNTR.
 4BAB   0B                      DCX     B               ;DECREMENT COUNT.
 4BAC   78                      MOV     A,B             ;GET HIGH COUNT.
 4BAD   B1                      ORA     C               ;OR IN LO COUNT.
 4BAE   C2 4BA7                 JNZ     BLOCK           ;ANOTHER BYTE.
 4BB1   C9                      RET                     ;RETURN TO USER.

                        ;*****************************************************
                        ; LOG-ON  -   SET DISK PARAMETER BLOCK                *
                        ;*****************************************************

                        ;*******( CHECK IF LOG-ON REQUESTED )*****************

 4BB2   3A 4A82         LOG.ON: LDA     LOG.RQ          ;CHECK LOG REQUEST.
 4BB5   E601                    ANI     001H            ;LOG ON BIT TEST.
 4BB7   C2 4B43                 JNZ     DSK.OK          ;RETURN, NO LOG-ON.

                        ;*******( READ IDENTITY SECTOR )**********************

 4BBA   22 4A80                 SHLD    DT.PTR          ;STORE DRV TBL PNTR.
 4BBD   3E01                    MVI     A,DC.SIN        ;SWITCH DD INTO SYS.
 4BBF   D343                    OUT     D.PORT          ;ISSUE HARDWARE CMND.
 4BC1   3E00                    MVI     A,DC.LOG        ;LOAD DCM LOG-ON CMND.
 4BC3   CD 4B78                 CALL    DSK.EX          ;PERFORM DISK OP.
 4BC6   CA 4BCF                 JZ      LOG.CK          ;GO TO LOGON ERROR.
 4BC9   21 0000                 LXI     H,0             ;ERROR, BAD LOG ON.
 4BCC   C3 4B49                 JMP     DSK.ER          ;BIOS EXIT.

                        ;*******( CHECK FOR JADE ID )*************************

 4BCF   11 0380         LOG.CK: LXI     D,DD.BUF        ;DD BUFFER OFFSET.
 4BD2   2A 0040                 LHLD    D.ADDR          ;DD SYS ADDRESS.
 4BD5   19                      DAD     D               ;HL NOW PNTS BUFFER.
 4BD6   11 4D4F                 LXI     D,JADEID        ;DE PNTS BIOS ID.
 4BD9   0608                    MVI     B,ID.SZE        ;SET LABEL SIZE.
 4BDB   1A              LOG.ID: LDAX    D               ;GET LABEL CHARACTER.
 4BDC   BE                      CMP     M               ;DOES ID SECTOR MATCH.
 4BDD   C2 4C0A                 JNZ     LG3740          ;ASSUME DISKETTE 3740.
 4BE0   05                      DCR     B               ;DECREMENT COUNT.
 4BE1   C2 4BDB                 JNZ     LOG.ID          ;CHECK IF ANOTHER CHR.

                        ;*******( DISKETTE CONTAINS ID )**********************

 4BE4   CD 4C29                 CALL    TRNONE          ;ASSUME DDENS.
 4BE7   CD 4C31                 CALL    DPB.AD          ;GET DPB ADDR IN DE.
 4BEA   01 03A0                 LXI     B,DD.DPB        ;DPB ADDR OFFSET.
 4BED   2A 0040                 LHLD    D.ADDR          ;DD SYSTEM ADDRESS.
 4BF0   09                      DAD     B               ;HL NOW AT ID DPB.
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4BF1    01 000F                 LXI     B,DPB.SZ        ;DPB SIZE IN BYTES.
4BF4    CD 4BA7                 CALL    BLOCK           ;MOVE INTO DPB.
4BF7    11 03B1                 LXI     D,DD.DDF        ;ID DTA DNS OFFSET.
4BFA    2A 0040                 LHLD    D.ADDR          ;DD SYSTEM ADDR.
4BFD    19                      DAD     D               ;HL POINTS FLAGS.
4BFE    7E                      MOV     A,M             ;LOAD FLAGS.
4BFF    E604                    ANI     04H             ;TEST DATA DENSITY.
4C01    CC 4C1F                 CZ      TR3740          ;IF 0 USE 3740 TRN.
4C04    2A 4A80                 LHLD    DT.PTR          ;RELOAD POINTER.
4C07    C3 4B43                 JMP     DSK.OK          ;EXIT BIOS JUMP.

                        ;*******( ASSUME 3740 DISKETTE )************************

4C0A    CD 4C1F         LG3740: CALL    TR3740          ;SET SECTOR TRANSLATE.
4C0D    CD 4C31                 CALL    DPB.AD          ;SET REGISTER DE.
4C10    01 000F                 LXI     B,DPB.SZ        ;DPB SIZE IN BYTES.
4C13    21 4D2C                 LXI     H,SD.PBK        ;ADDRESS OF BLK IMAGE.
4C16    CD 4BA7                 CALL    BLOCK           ;MOVE INTO DPB.
4C19    2A 4A80                 LHLD    DT.PTR          ;RELOAD POINTER.
4C1C    C3 4B43                 JMP     DSK.OK          ;EXIT BIOS JUMP.

                        ;*******( SET 3740 SECTOR TRANSLATION )****************

4C1F    11 4D12         TR3740: LXI     D,SDTRAN        ;SECTOR TRAN TBL ADDR.
4C22    2A 4A80                 LHLD    DT.PTR          ;ADDR DISK PARA HDER.
4C25    73                      MOV     M,E             ;LOW ORDER ADDR.
4C26    23                      INX     H               ;POINT NEXT BYTE.
4C27    72                      MOV     M,D             ;HIGH ORDER ADDR.
4C28    C9                      RET                     ;RETURN TO LOG USER.

                        ;*******( SET NO SECTOR TRANSLATION )******************

4C29    AF              TRNONE: XRA     A               ;ZERO A REGISTER.
4C2A    2A 4A80                 LHLD    DT.PTR          ;ADDR OF PARA HDER.
4C2D    77                      MOV     M,A             ;ZERO LOW ORDER ADDR.
4C2E    23                      INX     H               ;NEXT BYTE.
4C2F    77                      MOV     M,A             ;ZERO HIGH BYTE.
4C30    C9                      RET                     ;RETURN TO LOG USER.

                        ;*******( GET DRIVE PARA BLK ADDR )********************

4C31    2A 4A80         DPB.AD: LHLD    DT.PTR          ;ADDR DISK PARA HDER.
4C34    11 000A                 LXI     D,10            ;DPB TBL PNTR OFFSET.
4C37    19                      DAD     D               ;NOW AT DPB PNTR.
4C38    5E                      MOV     E,M             ;LOW ORDER ADDR.
4C39    23                      INX     H               ;NEXT BYTE.
4C3A    56                      MOV     D,M             ;HIGH ORDER ADDR.
4C3B    C9                      RET                     ;RETURN TO LOG USER.

                        ;******************************************************
                        ;*******( HOME DRIVE )***********************************

  4C3C    0E00          HOME:   MVI     C,0                 ;C REGISTER TO ZERO.
  4C3E    C3 4C60               JMP     SETTRK              ;PERFORM SET TRACK.

                        ;*******( SELECT DRIVE - LOGON )**************************

  4C41    21 0000       SELDSK: LXI     H,0                 ;ERROR RETURN CODE.
  4C44    79                    MOV     A,C                 ;PUT DRIVE NMBR IN A.
  4C45    32 4A73               STA     BT.DRV              ;STORE DRIVE NUMBER.
  4C48    FE02                  CPI     N.DRVS              ;CHECK IF LEGAL DRIVE.
  4C4A    D0                    RNC                         ;NO CARRY IF ILLEGAL.
  4C4B    7B                    MOV     A,E                 ;CHECK IF LOG-ON REQ.
  4C4C    32 4A82               STA     LOG.RQ              ;STORE LOGON REGISTER.
  4C4F    3A 4A73       RETDSK: LDA     BT.DRV              ;GET DRIVE NUMBER.
  4C52    6F                    MOV     L,A                 ;L = DISK NUMBER.
  4C53    2600                  MVI     H,0                 ;ZERO H REGISTER.
  4C55    29                    DAD     H                   ;*2.
  4C56    29                    DAD     H                   ;*4.
  4C57    29                    DAD     H                   ;*8.
  4C58    29                    DAD     H                   ;*16 (SIZE OF HEADER).
  4C59    11 4D57               LXI     D,D0.DPH            ;DRIVE 0 D.P.H.
  4C5C    19                    DAD     D                   ;HL= DRIVE N DPH.
  4C5D    C3 4BB2               JMP     LOG.ON              ;GO CHECK LOG-ON.

                        ;*******( SET TRACK )************************************

  4C60    79            SETTRK: MOV     A,C                 ;MOVE TRACK NUMBER.
  4C61    32 4A74               STA     BT.TRK              ;SAVE TRACK NUMBER.
  4C64    C9                    RET                         ;RETURN TO CALLER.

                        ;*******( SET SECTOR )***********************************

  4C65    79            SETSEC: MOV     A,C                 ;MOVE SECTOR NUMBER.
  4C66    32 4A75               STA     BT.SEC              ;SAVE SECTOR NUMBER.
  4C69    C9                    RET                         ;RETURN TO CALLER.

                        ;*******( SET TRANSFER ADDRESS )*************************

  4C6A    60            SETDMA: MOV     H,B                 ;HIGH ORDER MOVE.
  4C6B    69                    MOV     L,C                 ;LOW ORDER MOVE.
  4C6C    22 4A7E               SHLD    BT.DMA              ;SAVE TRANSFER ADDRESS.
  4C6F    C9                    RET                         ;RETURN TO CALLER.
```

```
                        ;*******( SECTOR TRANSLATION )**************************

   4C70    7A           SECTRN: MOV     A,D             ;TESTING TBL ADDR.
   4C71    B3                   ORA     E               ;ADDR IN REG DE.
   4C72    CA 4C7B              JZ      NOTRAN          ;IF ZERO, NO TRANS.
   4C75    EB                   XCHG                    ;(HL) NOW TRANS TBL.
   4C76    09                   DAD     B               ;(HL) NOW TRANS SECTOR.
   4C77    6E                   MOV     L,M             ;L IS TRANSLATED SEC.
   4C78    2600                 MVI     H,0             ;HIGH ORDER BYTE ZERO.
   4C7A    C9                   RET                     ;RETURN TO CALLER.
   4C7B    21 0001      NOTRAN: LXI     H,1             ;SET HL TO ONE.
   4C7E    09                   DAD     B               ;ADD SEC NMBR TO HL.
   4C7F    C9                   RET                     ;RETURN TO CALLER.

                        ;*******************************************************

                        ;*******************************************************
                        ; CONSOLE INPUT STATUS                                 *
                        ;*******************************************************

   4C80    DB00         CNS.CK: IN      CNI.SP          ;INPUT STATUS
   4C82    EE00                 XRI     CNI.SI          ;POLARITY ADJUST
   4C84    E602                 ANI     CNI.SB          ;MASK STATUS BIT
   4C86    C8                   RZ                      ;RETURN NOT RDY
   4C87    3EFF                 MVI     A,0FFH          ;SET READY FLAG
   4C89    C9                   RET                     ;RETURN RDY

                        ;*******************************************************
                        ; CONSOLE INPUT CHARACTER                              *
                        ;*******************************************************

   4C8A    CD 4C80      CNS.IN: CALL    CNS.CK          ;CALL STATUS CHECK.
   4C8D    CA 4C8A              JZ      CNS.IN          ;REPEAT TILL READY.
   4C90    DB01                 IN      CNI.DP          ;INPUT CHARACTER.
   4C92    E67F                 ANI     07FH            ;7 BIT ASCII+SIGN.
   4C94    C9                   RET                     ;RETURN TO CALLER.

                        ;*******************************************************
                        ; CONSOLE OUTPUT                                       *
                        ;*******************************************************

   4C95    DB00         CNS.OT: IN      CNO.SP          ;INPUT STATUS
   4C97    EE00                 XRI     CNO.SI          ;ADJUST POLARITY
   4C99    E604                 ANI     CNO.SB          ;MASK STATUS BIT
   4C9B    CA 4C95              JZ      CNS.OT          ;TRY AGAIN
   4C9E    79                   MOV     A,C             ;GET CHARACTER
   4C9F    E67F                 ANI     07FH            ;7 BIT ASCII
   4CA1    D301                 OUT     CNO.DP          ;SEND CHARACTER
   4CA3    C9                   RET

                        ;*******************************************************
                        ;*******************************************************
                        ; READER AND PUNCH DRIVERS - USER DEFINED              *
                        ;*******************************************************

  4CA4    3E1A          READER: MVI     A,CNTL.Z        ;RETURN END OD FILE.
  4CA6    C9                    RET                     ;NOT IMPLEMENTED.

  4CA7    C9            PUNCH:  RET                     ;NOT IMPLEMENTED.

                        ;*******************************************************
                        ; PRINTER DRIVER AREA                                  *
                        ;*******************************************************

  4CA8    C3 4C95       LIST:   JMP     CNS.OT          ;SEND TO CONSOLE

  4CAB    3EFF          LISTST: MVI     A,0FFH          ;READY
  4CAD    C9                    RET

                        ;*******************************************************
                        ; SEND MESSAGE SUBROUTINE                              *
                        ;*******************************************************

  4CAE    F5            MSG.OT: PUSH    PSW             ;SAVE CALLER FLAGS.
  4CAF    4E            ..REPT: MOV     C,M             ;LOAD CHARACTER.
  4CB0    CD 4C95               CALL    CNS.OT          ;CONSOLE OUTPUT.
  4CB3    7E                    MOV     A,M             ;SAME CAHRACTER.
  4CB4    23                    INX     H               ;INCREMENT POINTER.
  4CB5    E680                  ANI     080H            ;TEST SIGN BIT.
  4CB7    CA 4CAF               JZ      ..REPT          ;ANOTHER CHARACTER.
  4CBA    F1                    POP     PSW             ;RESTORE FLAGS.
  4CBB    C9                    RET                     ;RETURN TO CALLER.

                        ;*******************************************************

  000A                  LF      ==      00AH            ;ASCII LINE FEED.
  000D                  CR      ==      00DH            ;CARRAIGE RETURN.
  001A                  CNTL.Z  ==      01AH            ;CONTROL-Z (EOF).

                        ;*******************************************************
                        ;********************************************************
                        ; WARM REBOOT ENTRY - LOADS CCP/BDOS - INITIALIZES      *
                        ;********************************************************

                        ;*******( SET UP FOR SYSTEM BOOT )**********************

   4CBC     31 0080     WARM:   LXI     SP,0080H         ;SET UP STACK.
   4CBF     3E00                MVI     A,0              ;DRIVE 0 VALUE.
   4CC1     32 4A73             STA     BT.DRV           ;SELECT DISK.
   4CC4     01 3400             LXI     B,CCP            ;CP/M CCP ADDRESS.
   4CC7     CD 4C6A             CALL    SETDMA           ;SET DMA ADDR.
   4CCA     0E02                MVI     C,2              ;CCP 1ST SECTOR.
   4CCC     CD 4C65             CALL    SETSEC           ;SET SECTOR NMBR.
   4CCF     0E01                MVI     C,1              ;CCP/BDOS TRACK.
   4CD1     CD 4C60             CALL    SETTRK           ;SET TRACK NUMBER.

                        ;*******( READ CCP/BDOS )*******************************

   4CD4     CD 4B03     W.READ: CALL    DISKRD           ;READ ONE SECTOR.
   4CD7     A7                  ANA     A                ;SET FLAGS.
   4CD8     C2 4CF4             JNZ     W.EROR           ;EXIT IF ERROR.
   4CDB     3A 4A75             LDA     BT.SEC           ;GET SECTOR NMBR.
   4CDE     FE2D                CPI     45               ;LAST SECTOR CHECK.
   4CE0     CA 4CFB             JZ      W.ZRPG           ;GOTO ZERO PAGE SET.
   4CE3     3C                  INR     A                ;INCREMENT SECTOR.
   4CE4     32 4A75             STA     BT.SEC           ;STORE NEXT SECTOR.
   4CE7     11 0080             LXI     D,SEC.SZ         ;GET SECTOR SIZE.
   4CEA     2A 4A7E             LHLD    BT.DMA           ;GET TRANSFER ADDR.
   4CED     19                  DAD     D                ;CALCULATE NEW ADDR.
   4CEE     22 4A7E             SHLD    BT.DMA           ;SET NEW ADDRESS.
   4CF1     C3 4CD4             JMP     W.READ           ;DO ANOTHER WARM READ.

                        ;*******( READ ERROR DETECTED )*************************

   4CF4     21 4D43     W.EROR: LXI     H,MSG.LE         ;GET ERROR MESAAGE.
   4CF7     CD 4CAE             CALL    MSG.OT           ;ISSUE MESSAGE.
   4CFA     76                  HLT                      ;OR GOTO MONITOR

                        ;*******( INITIALIZE SYSTEM PARAMETERS )****************

   4CFB     01 0008     W.ZRPG: LXI     B,8              ;BASE IMAGE SIZE.
   4CFE     11 0000             LXI     D,0              ;BASE ADDRESS SET.
   4D01     21 4D3B             LXI     H,BS.IMG         ;BASE IMAGE ADDR.
   4D04     CD 4BA7             CALL    BLOCK            ;BLOCK MOVE ROUTINE.

                        ;*******( JUMP TO CCP )*********************************

   4D07     21 0080             LXI     H,0080H          ;DEFAULT SECTOR BUFF.
   4D0A     22 4A7E             SHLD    BT.DMA           ;SET TRANSFER ADDRESS.
   4D0D     0E00                MVI     C,0              ;DISK NMBR: OLD DISK?
   4D0F     C3 3400             JMP     CCP              ;JUMP INTO CCP CP/M.

                        ;********************************************************
                        ;*****************************************************
                        ; (DISK REQUEST PARAMETERS)
                        ;*****************************************************

 0040                   D.ADDR  ==      0040H   ;DD SYSTEM MEM ADDRESS.

                        ;*****************************************************
                        ; 3740 FORMAT PARAMETERS ******** CP/M SINGLE DENSITY *
                        ;*****************************************************

                        ;*******( SINGLE DENSITY CP/M SECTORING )**************

 4D12   01070D131905 SDTRAN: .BYTE   01H,07H,0DH,13H,19H,05H
 4D18   0B111703090F         .BYTE   0BH,11H,17H,03H,09H,0FH
 4D1E   1502080E141A         .BYTE   15H,02H,08H,0EH,14H,1AH
 4D24   060C1218040A         .BYTE   06H,0CH,12H,18H,04H,0AH
 4D2A   1016                 .BYTE   10H,16H

                        ;*******( DEFAULT DISK PARAMETER BLOCK )***************

 4D2C   001A            SD.PBK: .WORD   26      ;SECTORS PER TRACK.
 4D2E   03                      .BYTE   3       ;BLOCK SHIFT FACTOR.
 4D2F   07                      .BYTE   7       ;BLOCK MASK.
 4D30   00                      .BYTE   0       ;NULL MASK.
 4D31   00F2                    .WORD   242     ;DISK SIZE - 1.
 4D33   003F                    .WORD   63      ;DIRECTORY MAX.
 4D35   C0                      .BYTE   11000000B ;ALLOC 0.
 4D36   00                      .BYTE   0       ;ALLOC 1.
 4D37   0010                    .WORD   16      ;CHECK SIZE.
 4D39   0002                    .WORD   2       ;TRACK OFFSET.

                        ;*****************************************************
                        ; ZERO PAGE IMAGE                                     *
                        ;*****************************************************

 4D3B   C3 4A03         BS.IMG: JMP     BIOS+03H        ;WARM BOOT VECTOR.
 4D3E   FF00                    .BYTE   IOBYTE,DF.DRV   ;I/O BYTE AND DFLT DRV.
 4D40   C3 3C06                 JMP     BDOS+06H        ;BDOS CALL VECTOR.

                        ;*****************************************************
                        ; MESSAGES                                            *
                        ;*****************************************************

 4D43   0D0A4C4F4144 MSG.LE: .ASCIS  [CR][LF]'LOAD ERROR'

                        ;*****************************************************
                        ; ID LABEL DEFINITIONS                                *
                        ;*****************************************************

 4D4F   4A6164652044 JADEID: .ASCII  'JADE DD '       ;ID LABEL.
 0008                   ID.SZE  ==  .-JADEID          ;LABEL SIZE.

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

```
                     ;******************************************************
                     ; DRIVE PARAMETER HEADER AREA                         *
                     ;******************************************************

4D57    0000         D0.DPH: .WORD   0               ;SECTOR TRAN TBL.
4D59    0000                 .WORD   0               ;SCRATCH AREA.
4D5B    0000                 .WORD   0               ;SCRATCH AREA.
4D5D    0000                 .WORD   0               ;SCRATCH AREA.
4D5F    4A83                 .WORD   DIR.BF          ;DIRECTORY BUFFER.
4D61    4A36                 .WORD   D0.DPB          ;DRIVE PARAM BLK.
4D63    4E1B                 .WORD   D0.CHK          ;DRIVE CHANGE BLK.
4D65    4D97                 .WORD   D0.ALL          ;DRIVE ALLOCATION.

                     ;******************************************************

4D67    0000         D1.DPH: .WORD   0
4D69    0000                 .WORD   0
4D6B    0000                 .WORD   0
4D6D    0000                 .WORD   0
4D6F    4A83                 .WORD   DIR.BF
4D71    4A45                 .WORD   D1.DPB
4D73    4E2B                 .WORD   D1.CHK
4D75    4DB8                 .WORD   D1.ALL

                     ;******************************************************

4D77    0000         D2.DPH: .WORD   0
4D79    0000                 .WORD   0
4D7B    0000                 .WORD   0
4D7D    0000                 .WORD   0
4D7F    4A83                 .WORD   DIR.BF
4D81    4A54                 .WORD   D2.DPB
4D83    4E3B                 .WORD   D2.CHK
4D85    4DD9                 .WORD   D2.ALL

                     ;******************************************************

4D87    0000         D3.DPH: .WORD   0
4D89    0000                 .WORD   0
4D8B    0000                 .WORD   0
4D8D    0000                 .WORD   0
4D8F    4A83                 .WORD   DIR.BF
4D91    4A63                 .WORD   D3.DPB
4D93    4E4B                 .WORD   D3.CHK
4D95    4DFA                 .WORD   D3.ALL

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

```
                         ;*******************************************************
                         ; DRIVE ALLOCATION AREAS DECLARED                      *
                         ;*******************************************************

  4D97                   ADDR     =        .       ;AT CURRENT LOCATION.
  0021                   ALL.SZ   ==       33      ;ALLOCATION BLOCK SIZE.

  4D97                   D0.ALL   ==       ADDR    ;ALLOCATION FOR DRIVE 0.
  4DB8                   ADDR     =        ADDR+ALL.SZ
  4DB8                   D1.ALL   ==       ADDR    ;ALLOCATION FOR DRIVE 1.
  4DD9                   ADDR     =        ADDR+ALL.SZ
  4DD9                   D2.ALL   ==       ADDR    ;ALLOCATION FOR DRIVE 2.
  4DFA                   ADDR     =        ADDR+ALL.SZ
  4DFA                   D3.ALL   ==       ADDR    ;ALLOCATION FOR DRIVE 3.
  4E1B                   ADDR     =        ADDR+ALL.SZ

                         ;*******************************************************
                         ; CHANGED DISK CHECK AREAS DECLARED                    *
                         ;*******************************************************

  0010                   CHK.SZ   ==       16      ;CHECK AREA SIZE.
  4E1B                   D0.CHK   ==       ADDR    ;CHECK AREA FOR DRIVE 0.
  4E2B                   ADDR     =        ADDR+CHK.SZ
  4E2B                   D1.CHK   ==       ADDR    ;CHECK AREA FOR DRIVE 1.
  4E3B                   ADDR     =        ADDR+CHK.SZ
  4E3B                   D2.CHK   ==       ADDR    ;CHECK AREA FOR DRIVE 2.
  4E4B                   ADDR     =        ADDR+CHK.SZ
  4E4B                   D3.CHK   ==       ADDR    ;CHECK AREA FOR DRIVE 3.
  4E5B                   ADDR     =        ADDR+CHK.SZ

                         ;*******************************************************
                                  .END
```

```
+++++ SYMBOL TABLE +++++

ADDR    4E5B        ALL.SZ  0021        BDOS    3C00        BIOS    4A00
BIOS.R  C600        BLOCK   4BA7        BS.IMG  4D3B        BT.CMD  4A72
BT.DMA  4A7E        BT.DRV  4A73        BT.LAD  4A7A        BT.LNG  4A7C
BT.MOD  4A78        BT.SEC  4A75        BT.SP0  4A76        BT.SP1  4A77
BT.STS  4A79        BT.TRK  4A74        CCP     3400        CHK.SZ  0010
CNI.DP  0001        CNI.SB  0002        CNI.SI  0000        CNI.SP  0000
CNO.DP  0001        CNO.SB  0004        CNO.SI  0000        CNO.SP  0000
CNS.CK  4C80        CNS.IN  4C8A        CNS.OT  4C95        CNTL.Z  001A
CPM.BS  0000        CPM.SZ  5000        CR      000D        C.LOGO  4AC0
C.ONES  4A99        C.TENS  4A8E        D0.ALL  4D97        D0.CHK  4E1B
D0.DPB  4A36        D0.DPH  4D57        D1.ALL  4DB8        D1.CHK  4E2B
D1.DPB  4A45        D1.DPH  4D67        D2.ALL  4DD9        D2.CHK  4E3B
D2.DPB  4A54        D2.DPH  4D77        D3.ALL  4DFA        D3.CHK  4E4B
D3.DPB  4A63        D3.DPH  4D87        DC.FMT  0003        DC.INT  0002
DC.LOG  0000        DC.MB0  0001        DC.MB1  0003        DC.RDS  0001
DC.SIN  0001        DC.SOT  0000        DC.WRS  0002        DD.BUF  0380
DD.CBT  0370        DD.DDF  03B1        DD.DPB  03A0        DD.DRV  0371
DD.FBF  0300        DD.SEC  0373        DD.STS  0377        DD.TRK  0372
DF.DRV  0000        DIR.BF  4A83        DISKRD  4B03        DISKWR  4B23
DPB.AD  4C31        DPB.SZ  000F        DSK.ER  4B49        DSK.EX  4B78
DSK.OK  4B43        DSK.WT  4B94        DS.HLT  0002        DT.PTR  4A80
D.ADDR  0040        D.PORT  0043        FALSE   0000        FMT.SZ  0100
FORMAT  4B50        HOME    4C3C        ID.SZE  0008        INIT    4A83
IOBYTE  00FF        JADEID  4D4F        K.BYTE  0400        LF      000A
LG3740  4C0A        LIST    4CA8        LISTST  4CAB        LOG.CK  4BCF
LOG.ID  4BDB        LOG.ON  4BB2        LOG.RQ  4A82        MSG.LE  4D43
MSG.OT  4CAE        MSG.SO  4ACF        NK.SYS  0014        NOTRAN  4C7B
N.DRVS  0002        PUNCH   4CA7        READER  4CA4        RETDSK  4C4F
REV.B   0001        REV.C   0000        SDTRAN  4D12        SD.PBK  4D2C
SECTRN  4C70        SEC.SZ  0080        SELDSK  4C41        SETDMA  4C6A
SETSEC  4C65        SETTRK  4C60        SYS.OD  4AED        SYS.TD  4AEC
TPA     0100        TR3740  4C1F        TRNONE  4C29        TRUE    0001
WARM    4CBC        W.EROR  4CF4        W.READ  4CD4        W.ZRPG  4CFB
```

DCM

```
;*****************************************************
;                                                    *
;       DISK CONTROLLER MODULE  (DCM)                *
;                                                    *
;*****************************************************
;                                                    *
;       PROPERTY OF:    JADE COMPUTER PRODUCTS INC.  *
;                       4901 W. ROSECRANS BLVD.      *
;                       HAWTHORNE, CALIFORNIA        *
;                       90250,   U.S.A.              *
;                                                    *
;*****************************************************
;                                                    *
;       VERSION:        2.20 - 8" DRIVES             *
;                                                    *
;*****************************************************
;                                                    *
;       WRITTEN BY:     STAN KRUMME                  *
;                                                    *
;*****************************************************
; THE DISK CONTROLLER MODULE (DCM)  RESIDES INTERNAL *
; TO THE  JADE DOUBLE D DISK CONTROLLER BOARD.  THIS *
; PROGRAM PROVIDES A FACILITY TO READ/WRITE DISKETTE *
; SECTORS AND FORMAT DISKETTE TRACKS  (IN SINGLE AND *
; DOUBLE DENSITY).  THIS DCM SETS THE PARAMETERS FOR *
; EACH  DRIVE  DURING THE  "LOG-ON" OPERATION.   THE *
; FORMAT.COM PROGRAM WRITES AN IDENTIFICATION SECTOR *
; WHICH PROVIDES  THE NEEDED INFORMATION.   IF  THIS *
; IDENTITY  SECTOR  IS NOT PRESENT  ON THE DISKETTE, *
; IT IS  ASSUMED TO BE A  STANDARD  8"  3740 FORMAT. *
; THIS PROGRAM CONTAINS A 6 WORD  TIMING BLOCK WHICH *
; SHOULD BE PATCHED TO MATCH THE  USERS DISK DRIVES. *
; THIS HAS NORMALLY BEEN SET FOR  SHUGART SA800/801. *
;*****************************************************
```

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

                        ; THE FOLLOWING IS A LIST OF THE INTERNAL I/O
                        ; ADDRESS  ASSIGNMENTS.  THESE  PORTS  AND
                        ; CONTROLS CAN ONLY BE USED BY THE ONBOARD Z80A.
                        ; THESE PORTS AND CONTROLS ARE NOT IN THE S100
                        ; BUS ADDRESS SPACE.

                        ; (CONTROLLER PORT ASSIGNMENTS)

 0000                   BL.STS  ==      000H    ;BOARD STATUS PORT.
 0000                   BL.CTL  ==      000H    ;BOARD CONTROL PORT.
 0004                   WD.CMD  ==      004H    ;1791 COMMAND REGISTER.
 0004                   WD.STS  ==      004H    ;1791 STATUS REGISTER.
 0005                   WD.TRK  ==      005H    ;1791 TRACK REGISTER.
 0006                   WD.SEC  ==      006H    ;1791 SECTOR REGISTOR.
 0007                   WD.DTA  ==      007H    ;1791 DATA REGISTER.

                        ; (CONTROLLER FUNCTION ASSIGNMENTS)

 0008                   XP.STP  ==      008H    ;ISSUE STEP PULSE.
 0010                   XP.MTO  ==      010H    ;MOTOR TURN OFF.
 0020                   XP.IRR  ==      020H    ;S100 INT-REQ RESET.
 0040                   XP.MTX  ==      040H    ;MOTOR TIME EXTEND.
 0080                   XP.DSH  ==      080H    ;DATA SYNC HOLD.

                        ;*******************************************

                        ; THE FOLLOWING LIST ASSIGNS EACH BIT POSITION
                        ; AND FUNCTION OF THE BOARD CONTROL PORT (BL.CTL).

                        ; (BIT ASSIGNMENTS)

 0001                   BC.DSA  ==  00000001B   ;DRIVE SELECT A (2*0).
 0002                   BC.DSB  ==  00000010B   ;DRIVE SELECT B (2*1).
 0004                   BC.DSE  ==  00000100B   ;DRIVE SELECT ENABLE.
 0008                   BC.EIA  ==  00001000B   ;EIA SIGNAL LEVEL OUT.
 0010                   BC.DDE  ==  00010000B   ;DOUBLE DENSITY ENABLE.
 0020                   BC.DAS  ==  00100000B   ;DIRECTION AND SIDE
 0040                   BC.PCA  ==  01000000B   ;PRECOMP SELECT A.
 0080                   BC.PCB  ==  10000000B   ;PRECOMP SELECT B.

                        ; (FUNCTON ASSIGNMENTS)

 0003                   BC.DSN  ==  BC.DSA!BC.DSB       ;DRIVE NMBR MASK.
 0000                   BC.SDS  ==  0                   ;SINGLE DENSITY.
 0010                   BC.DDS  ==  BC.DDE              ;DOUBLE DENSITY.
 0040                   BC.PCH  ==  BC.PCA              ;PRECOMP - HEAVY.
 0080                   BC.PCM  ==  BC.PCB              ;PRECOMP - MEDIUM.
 00C0                   BC.PCL  ==  BC.PCA!BC.PCB       ;PRECOMP - LIGHT.
 0000                   BC.PCZ  ==  0                   ;PRECOMP - OFF.

                        ;*******************************************
                        ;*************************************************

                        ; THE FOLLOWING LIST DEFINES EACH BIT AND
                        ; FUNCTION OF THE BOARD STATUS PORT (BL.STS).

0001                    BS.US0  ==  00000001B   ;USER SWITCH 0.
0002                    BS.US1  ==  00000010B   ;USER SWITCH 1.
0004                    BS.TST  ==  00000100B   ;TEST MODE SWITCH.
0008                    BS.INT  ==  00001000B   ;HOST INT REQUEST.
0010                    BS.EIA  ==  00010000B   ;EIA SIGNAL LEVEL IN.
0020                    BS.MOF  ==  00100000B   ;MOTOR OFF INIDCATOR.
0040                    BS.TSD  ==  01000000B   ;TWO SIDED DRIVE FLAG.
0080                    BS.DCN  ==  10000000B   ;DISK CHANGE INDICATOR.

                        ;***********************************************

                        ; THE FOLLOWING IS A LIST OF COMMAND CODES
                        ; ISSUED TO THE 1791-01 DISK CONTROLLER.
                                         1
0010                    DC.HDL  ==  00010000B   ;SEEK/LOAD RW HEAD.
0018                    DC.HDU  ==  00011000B   ;SEEK/UNLD RW HEAD.
0080                    DC.RDS  ==  10000000B   ;READ SECTOR.
00A0                    DC.WRS  ==  10100000B   ;WRITE SECTOR.
00F0                    DC.WRT  ==  11110000B   ;WRITE TRACK FORMAT.
00C0                    DC.RDA  ==  11000000B   ;READ TRACK ADDRESS.
00D0                    DC.STS  ==  11010000B   ;SET TYPE 1 STATUS
00D8                    DC.IFI  ==  11011000B   ;FORCED INTERRUPT.

                        ;**********************************************

                        ; THE FOLLOWING LIST CONTAINS ALL THE
                        ; MASKS USED TO TEST THE 1791-01 STATUS
                        ; CODES (PORT WD.STS).

009D                    DM.RER  ==  10011101B   ;READ ERROR TEST.
00FD                    DM.WER  ==  11111101B   ;WRITE ERROR TEST.
00E4                    DM.FER  ==  11100100B   ;FORMAT ERROR TEST.
0004                    DM.TK0  ==  00000100B   ;TRACK 0 TEST.
0020                    DM.HDL  ==  00100000B   ;HEAD LOAD TEST.
0080                    DM.DNR  ==  10000000B   ;DRIVE NOT READY.
0004                    DM.LDE  ==  00000100B   ;LOST DATA ERROR.

                        ;*************************************************
                        ;*********** (BASE ADDRESS FOR DCM) *************

  1000                  BASE     ==      1000H          ;BASE ADDRESS.

                        ;*********** (MEMORY BANKS) *********************

  1000                  BANK.0   ==  BASE+0000H         ;BANK 0 DEFINED.
  0400                  BANK.L   ==  0400H              ;BANK LENGTH.
  1400                  BANK.1   ==  BANK.0+BANK.L      ;BANK 1 DEFINED.

                        ;************ (RESTART VECTORS) *****************

  1000                  RST.0    ==   BANK.0+0000H      ;RESTART 0.
  1008                  RST.1    ==   BANK.0+0008H      ;RESTART 1.
  1010                  RST.2    ==   BANK.0+0010H      ;RESTART 2.
  1018                  RST.3    ==   BANK.0+0018H      ;RESTART 3.
  1020                  RST.4    ==   BANK.0+0020H      ;RESTART 4.
  1028                  RST.5    ==   BANK.0+0028H      ;RESTART 5.
  1030                  RST.6    ==   BANK.0+0030H      ;RESTART 6.
  1038                  RST.7    ==   BANK.0+0038H      ;RESTART 7.

                        ; ********* (INTERRUPT VECTORS) ****************

  1038                  HR.INT   ==  RST.7              ;MASKABLE.
  1066                  NM.INT   ==  BANK.0+0066H       ;NON MASKABLE.

                        ;*********** (I/O COMMUNICATION ) ***************

  1370                  IO.BLK   ==  BANK.0+0370H       ;I/O BLOCK BEGIN.
  1370                  TP.STK   ==  IO.BLK+0000H       ;TOP OF STACK.
  1370                  CMD.BK   ==  IO.BLK+0000H       ;COMMAND BLOCK.
  1380                  BUF.BG   ==  IO.BLK+0010H       ;SECTOR BUFFER.
  1700                  FMT.BG   ==  BANK.1+0300H       ;FORMAT BUFFER.
  1708                  FMT.PS   ==  FMT.BG+0008H       ;FORMAT PROGRAM.

                        ;***********************************************
                        ;****************************************************
                        ; PAUSE IS USED AFTER THE 179X-01 IS ISSUED A COMMAND
                        ; AND BEFORE THE 179X-01 STATUS REGISTER IS READ.    *
                        ; THIS ALLOWS THE 179X-01 TO 'DIGEST' THE COMMAND!   *
                        ;****************************************************

                                .DEFINE PAUSE = [
                                XTHL
                                XTHL
                                XTHL
                                XTHL]

                        ;****************************************************
                        ; WAIT IS A RESTART CALL TO THE TIMER SUBROUTINE     *
                        ; ENTRY.  THIS SUBROUTINE PROVIDES MOST OF THE       *
                        ; TIMING USED BY THE DOUBLE D CONTROLLER.            *
                        ;****************************************************

                                .DEFINE WAIT = [
                                 RST    1]

                        ;******* (ASSEMBLER DIRECTIVES) *********************

                                .PABS
                                .PHEX
                                .XLINK

                        ;******* (TIMING CONSTANTS) *************************

0019                    TMR.FC  ==      0019H   ;TIMING CONSTANT, FIRST PASS.
001C                    TMR.NC  ==      001CH   ;TIMING CONSTANT, NORMAL PASS.

                        ;******* (RETRY VALUES) *****************************

0005                    RTY.SK  ==      5       ;REPOSITION R/W HEAD ON RETRY.
0009                    RTY.LS  ==      9       ;LAST REPEATED RETRY.

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

```
                            ;*********************************************************
                            ; THE FOLLOWING AREA IS THE INITIAL START JUMP TABLE.    *
                            ; THE FIRST JUMP IS EXECUTED WHEN THE ONBOARD Z80A IS     *
                            ; RESET.   THE  SECOND JUMP IS THE  DCM ENTRY  FROM A     *
                            ; BOOTSTRAP LOADER.  THIS ENTRY ASSUMES  DCM HAS BEEN     *
                            ; LOADED INTO DOUBLE D BANK 1  BY THE LOADER ROUTINE.     *
                            ; THE LAST  TWO BYTES  HOLD THE  JUMP ADDRESS USED BY     *
                            ; RESTART INTERRUPT ROUTINE AT BANK 0 + 0380H.            *
                            ;*********************************************************

1000                                 .LOC     RST.0             ;BEGINNING.
1000     C3 0000                     JMP      ~~0~~ CLEAR       ;NOT IMPLEMENTED YET.
1003     C3 1780                     JMP      INIT.B+BANK.L     ;INIT - BOOTSTRAPED.
1006     1041               HR.VEC:  .WORD    X.CUTE            ;BUS INTERRUPT VECTOR.

                            ;*********************************************************
                            ; THE FOLLOWING SUBROUTINE IS THE ENTRY POINT FOR THE    *
                            ; DISK CONTROLLER TIMING MODULE. THIS MODULE PROVIDES    *
                            ; DELAYS WHICH ARE MULTIPLES OF 100 MICROSECONDS. THE    *
                            ; CONTENTS OF REGISTER PAIR  DE  DETERMINES THE TOTAL    *
                            ; PERIOD.   (DELAY = (DE) * 100 MICROSECONDS).   THIS    *
                            ; SUBROUTINE IS ENTERED BY THE MACRO "WAIT".             *
                            ;*********************************************************

1008                                 .LOC     RST.1             ;TIMING ENTRY POINT.
1008     0619                        MVI      B,TMR.FC          ;FIRST TICK CONSTANT.
100A     10FE                        DJNZ     .                 ;AUTO DEC UNTIL ZERO.
100C     C3 1074                     JMP      TICK.E            ;JUMP TO TICK ENTRY.

                            ;*********************************************************
                            ; THE FOLLOWING RESTART LOCATIONS ARE SPARES AT THIS     *
                            ; TIME.  THEY MAY BE USED IN FUTURE UPGRADES.            *
                            ;*********************************************************
                                                      CLEAR   USE "DOWN" RTN
1018                                 .LOC     RST.3
1020                                 .LOC     RST.4            LD IX, DT&D
1028                                 .LOC     RST.5            EI
1030                                 .LOC     RST.6            HALT

                            ;*********************************************************
                            ; THE  FOLLOWING SECTION IS THE  MASKABLE  INTERRUPT     *
                            ; ROUTINE.  THIS ROUTINE IS EXECUTED WHEN RESTARTING     *
                            ; THE Z80 FROM A HALT.   THE FUNCTIONS ARE RESET THE     *
                            ; DOUBLE D INT REQ FLIP-FLOP,  PUT  THE  INTERRUPTED     *
                            ; ADDR IN REG DE, AND JUMP ADDRESS AT "HR.VEC".          *
                            ;*********************************************************

1038                                 .LOC     HR.INT            ;HOST INTERRUPT ADDR.
1038     DB20                        IN       XP.IRR            ;RESET INTERRUPT REQ FF
103A     D1                          POP      D                 ;PURGE INTERRUPTED ADDR
103B     2A 1006                     LHLD     HR.VEC            ;LOAD RETURN ADDRESS
103E     E9                          PCHL                       ;JUMP RETURN ADDRESS

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

```
                        ;**************************************************
                        ; THE FOLLOWING SECTION HALTS EXECUTION OF THE     *
                        ; ONBOARD Z80A PROCESSOR.  DURING THIS TIME THE HOST *
                        ; SYSTEM CAN SWITCH THE CONTROLLER MEMORY INTO THE  *
                        ; S100 BUS FOR STATUS CHECK, SETTING COMMAND BLOCK, *
                        ; AND SECTOR DATA TRANSFERS.                        *
                        ;**************************************************

103F    FB              FETCH:  EI                      ;ENABLE INTERRUPT START
1040    76                      HLT                     ;HALT ON-BOARD PROCESSOR

                        ;**************************************************
                        ; THE FOLLOWING SECTION GAINS CONTROL AFTER THE DISK *
                        ; CONTROLLER IS INTERRUPTED FROM THE HALT CONDITION. *
                        ; THIS SECTION BRACNCHES TO THE INDIVIDUAL COMMAND   *
                        ; ROUTINES.  THE COMMAND TABLE CONTAINS THE ADDRESSES*
                        ; FOR THIS DISTRIBUTION.                             *
                        ;**************************************************
                                CALL    [illegible]         GET 179x's [illegible]
1041    3A 1370         X.CUTE: LDA     CB.CMD          ;LOAD HOST COMMAND.
1044    E607                    ANI     ..MASK          ;MASK ANY OPTIONS.
1046    87                      ADD     A               ;GET 2*A VALUE.
1047    1600                    MVI     D,0             ;ZERO D REGISTER.
1049    5F                      MOV     E,A             ;DE NOW TABLE OFFSET.
104A    21 1053                 LXI     H,..CMDT        ;LOAD TABLE ADDRESS.
104D    19                      DAD     D               ;NOW POINTS TO ENTRY.
104E    5E                      MOV     E,M             ;LOW ORDER ADDR LOAD.
104F    23                      INX     H               ;POINT TO NEXT BYTE.
1050    56                      MOV     D,M             ;HI ORDER ADDRESS.
1051    EB                      XCHG                    ;BRANCH ADDR IN HL.
1052    E9                      PCHL                    ;BRANCH TO COMMAND.

                        ;**************************************************

1053                    ..CMDT  ==      .               ;COMMAND TABLE.
1053    10AF            ..CM0A: .WORD   $.LGON          ;LOG-ON DRIVE.
1055    107C            ..CM1A: .WORD   $.READ          ;READ SECTOR.
1057    108B            ..CM2A: .WORD   $.WRIT          ;WRITE SECTOR.
1059    109A            ..CM3A: .WORD   $.FORM          ;FORMAT TRACK.
105B    10CC            ..CM4A: .WORD   $.ADDR          ;READ ADDRESS.
105D    10CF            ..CM5A: .WORD   $.SPAR          ;SPARE.
105F    10CF            ..CM6A: .WORD   $.SPAR          ;SPARE.
1061    10D2            ..CM7A: .WORD   $.IDLE          ;BACKGROUND.
0007                    ..MASK  ==      007H            ;COMMAND MASK.

                        ;**************************************************
                        ;*****************************************************
                        ; THE FOLLOWING SECTION IS THE NON-MASKABLE INTERRUPT*
                        ; ROUTINE.  UPON 1791-01 COMMAND TERMINATION THE Z80 *
                        ; RECIEVES A NON-MASKABLE INTERRUPT.  THE STATUS PORT*
                        ; IS INTERROGATED AND SAVED (SV.STS).  REGISTER IY   *
                        ; CONTAINS THE RETURN ADDRESS.                       *
                        ;*****************************************************

1066                            .LOC    NM.INT          ;NON-MASKABLE INT.

1066    DB04            WD.INT: IN      WD.STS          ;GET 1791 STATUS.
1068    A9                      XRA     C               ;INVERT (1791).
1069    32 130D                 STA     SV.STS          ;SAVE STATUS.
106C    FDE3                    XTIY                    ;EXCHANGE (SP)<>IY.
106E    ED45                    RETN                    ;RETURN AT OLD IY.

                        ;****************************************************
                        ; THIS SECTION IS THE REMAINDER OF THE TIMING       *
                        ; SECTION ENTERED BY A RESTART 1.  SEE THAT SECTION *
                        ; FOR THE DESCRIPTION.                              *
                        ;****************************************************

1070    061C            TICK.R: MVI     B,TMR.NC        ;NORMAL TICK CONSTANT.
1072    10FE                    DJNZ    .               ;AUTO DEC UNTIL ZERO.
1074    1B              TICK.E: DCX     D               ;DECREMENT AMOUNT.
1075    7A                      MOV     A,D             ;GET HIGH ORDER.
1076    B3                      ORA     E               ;AND LOW ORDER.
1077    00                      NOP                     ;TIMING ADJUST.
1078    00                      NOP                     ;TIMING ADJUST.
1079    20F5                    JRNZ    TICK.R          ;REPEAT UNTIL ZERO.
107B    C9                      RET                     ;RETURN TO USER.

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

```
                              ;*****************************************************
                              ;  $.READ IS THE READ-SECTOR COMMAND CONTROLLER.     *
                              ;*****************************************************

   107C     CD 10DD           $.READ: CALL     SELECT            ;SELECT DRIVE ROUTINE.
   107F     C2 103F                   JNZ      FETCH             ;DRIVE NOT READY EXIT.
   1082     CD 1180                   CALL     SEEK              ;SEEK TRACK, SET CTLS.
   1085     CD 1265                   CALL     RD.SEC            ;READ DISK SECTOR.
   1088     C3 103F                   JMP      FETCH             ;GET NEXT COMMAND.

                              ;*****************************************************
                              ;  $.WRIT IS THE WRITE-SECTOR COMMAND CONTROLLER.    *
                              ;*****************************************************

   108B     CD 10DD           $.WRIT: CALL     SELECT            ;SELECT DRIVE ROUTINE.
   108E     C2 103F                   JNZ      FETCH             ;DRIVE NOT READY EXIT.
   1091     CD 1180                   CALL     SEEK              ;SEEK TRACK, SET CTLS.
   1094     CD 1294                   CALL     WR.SEC            ;WRITE DISK SECTOR.
   1097     C3 103F                   JMP      FETCH             ;GET NEXT COMMAND.

                              ;*****************************************************
                              ;  $.FORM IS THE FORMAT-TRACK COMMAND CONTROLLER.    *
                              ;*****************************************************

   109A     CD 10DD           $.FORM: CALL     SELECT            ;SELECT DRIVE NUMBER.
   109D     C2 103F                   JNZ      FETCH             ;DRIVE NOT READY EXIT.
   10A0     3A 1373                   LDA      CB.SEC            ;LOAD FORMAT FLAGS.
   10A3     DD7705                    MOV      DV.FLG(X),A       ;RESET DRIVE FLAGS.
   10A6     CD 1180                   CALL     SEEK              ;SEEK TRACK, SET CTLS.
   10A9     CD 12C3                   CALL     WR.TRK            ;WRITE DISK TRACK.
   10AC     C3 103F                   JMP      FETCH             ;GET NEXT COMMAND.

                              ;*****************************************************
                              ;  $.LGON IS THE DRIVE LOG-ON COMMAND CONTROLLER     *
                              ;*****************************************************

   10AF     CD 10DD           $.LGON: CALL     SELECT            ;SELECT DRIVE NUMBER.
   10B2     C2 103F                   JNZ      FETCH             ;DRIVE NOT READY EXIT.
   10B5     AF                        XRA      A                 ;ZERO REGISTER A.
   10B6     32 1372                   STA      CB.TRK            ;SET TRACK AT 0.
   10B9     3C                        INR      A                 ;NOW A REG IS 1.
   10BA     32 1373                   STA      CB.SEC            ;SET SECTOR TO ID.
   10BD     CD 1180                   CALL     SEEK              ;SEEK TRACK, SET CTLS.
   10C0     C2 103F                   JNZ      FETCH             ;POSSIBLE ERROR EXIT.
   10C3     CD 1265                   CALL     RD.SEC            ;READ ID SECTOR.
   10C6     CD 114B                   CALL     LOG.ON            ;LOG ON DISK DRIVE.
   10C9     C3 103F                   JMP      FETCH             ;GET NEXT COMMAND.

                              ;*****************************************************
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                        ;*****************************************************
                        ;  $.ADDR IS THE READ-ADDRESS COMMAND CONTROLLER.    *
                        ;*****************************************************

   10CC    C3 103F      $.ADDR: JMP     FETCH           ;NOT IMPLEMENTED.

                        ;*****************************************************
                        ;  $.SPAR IS A SPARE COMMAND CONTROLLER.             *
                        ;*****************************************************

   10CF    C3 103F      $.SPAR: JMP     FETCH           ;GET NEXT COMMAND.

                        ;*****************************************************
                        ;  $.IDLE IS THE IDLE COMMAND CONTROLLER.            *
                        ;*****************************************************

   10D2    DB00         $.IDLE: IN      BL.STS          ;INPUT BOARD STATUS.
   10D4    E608                 ANI     BS.INT          ;CHECK HOST INTERRUPT.
   10D6    28FA                 JRZ     $.IDLE          ;REPEAT IDLE CHECK.
   10D8    DB20                 IN      XP.IRR          ;RESET INTERRUPT REQ.
   10DA    C3 103F              JMP     FETCH           ;GET NEXT COMMAND.

                        ;*****************************************************
                        ;****************************************************
                        ; THE FOLLOWING SUBROUTINE IS RESPONSIBLE FOR       *
                        ; SELECTING THE COMMAND REQUESTED DRIVE NMBR.       *
                        ; BEFORE DRIVE SELECTION, THE DRIVE MOTOR STATE     *
                        ; IS TESTED, AND IF NEEDED THEY ARE TURNED ON.      *
                        ; INDEX REGISTER X IS SET TO POINT TO THE NEW       *
                        ; SELECTED DRIVE IN THE DRIVE TABLE.                *
                        ;****************************************************

                        ;******* (MOTOR CHECK ROUTINE) **********************

   10DD    DB00         SELECT: IN      BL.STS          ;BOARD LEVEL STATUS.
   10DF    E620                 ANI     BS.MOF          ;CHECK MOTOR STATE.
   10E1    2807                 JRZ     ..CKDV          ;IF ON, CHECK DRIVE.
   10E3    DB40                 IN      XP.MTX          ;ISSUE MOTOR START.
   10E5    ED5B 1314            LDED    TM.MTO          ;MOTOR STARTUP DELAY.
   10E9    CF                   WAIT                    ;PROGRAMMABLE DELAY.

                        ;******* (SELECT DRIVE ROUTINE) *********************

   10EA    DB40         ..CKDV: IN      XP.MTX          ;EXTEND MOTOR TIMER.
   10EC    3A 1371              LDA     CB.DRV          ;LOAD DRIVE NUMBER.
   10EF    DDBE00               CMP     DV.NBR(X)       ;CURRENTLY SELECTED?
   10F2    2831                 JRZ     ..DVOK          ;GO IF DRIVE SELECTED.
   10F4    CD 124B              CALL    EX.HDU          ;UNLOAD R/W HEAD.
   10F7    3A 130C              LDA     SV.DRV          ;LOAD PORT IMAGE.
   10FA    E6FB                 ANI     #BC.DSE         ;DRIVE SELECT DSBLD.
   10FC    D300                 OUT     BL.CTL          ;ISSUE DESELECT.
   10FE    3A 1371              LDA     CB.DRV          ;LOAD DESIRED DRIVE.
   1101    E603                 ANI     BC.DSN          ;MASK DRIVE NUMBER.
   1103    D300                 OUT     BL.CTL          ;OUTPUT DRIVE NMBR.
   1105    F604                 ORI     BC.DSE          ;SET DRV ENABLE BIT.
   1107    D300                 OUT     BL.CTL          ;ENABLE NEW DRIVE.
   1109    32 130C              STA     SV.DRV          ;SAVE DRIVE SELECT.

                        ;******* (SET TABLE POINTER) ************************

   110C    E603                 ANI     BC.DSN          ;GET DRIVE NUMBER.
   110E    DD21 1322            LXI     X,DV.TBL        ;DRIVE TABLE ADDR.
   1112    11 0007              LXI     D,DV.DES        ;DRIVE ENTRY SIZE.
   1115    3D           ..NEXT: DCR     A               ;DECREMENT DRV NO.
   1116    FA 111D              JM      ..SLED          ;IF S=1 EXIT.
   1119    DD19                 DADX    D               ;POINT NEXT DRIVE.
   111B    18F8                 JMPR    ..NEXT          ;TRY THIS DRIVE.

                        ;******* (EXIT) *************************************

   111D    CD 1258      ..SLED: CALL    EX.STS          ;CHECK DRIVE STATUS.
   1120    E680                 ANI     DM.DNR          ;CHECK DRIVE NOT RDY.
   1122    32 1377              STA     CB.STS          ;SET COMMAND STATUS.
   1125    C9           ..DVOK: RET                     ;RETURN TO CALLER.

                        ;****************************************************
                        ;****************************************************
                        ; HOME.D IS THE SUBROUTINE THAT STEPS THE DISK DRIVE*
                        ; R/W HEAD OUTWARD UNTIL THE TRACK 0 FLAG BECOMES   *
                        ; ACTIVE OR 255 STEPS HAVE BEEN ISSUED.             *
                        ;****************************************************

                        ;******* (RESTORE R/W HEAD) *************************

 1126    2EFF           HOME.D: MVI     L,255           ;SET STEP COUNTER.
 1128    CD 1258        ..STEP: CALL    EX.STS          ;CHECK DISK STATUS.
 112B    E604                   ANI     DM.TKO          ;INSPECT TRACK 0 FLG.
 112D    200C                   JRNZ    ..EXIT          ;IF SET, GO ..EXIT.
 112F    2D                     DCR     L               ;DECREMENT STEP COUNT.
 1130    2815                   JRZ     ..EROR          ;ERROR IF 255 STEPS.
 1132    DB08                   IN      XP.STP          ;ISSUE STEP PULSE.
 1134    ED5B 1310              LDED    TM.STP          ;LOAD STEP DELAY.
 1138    CF                     WAIT                    ;PROGRAMMABLE DELAY.
 1139    18ED                   JMPR    ..STEP          ;TRY STEPPING AGAIN.

                        ;******* (DRIVE IS RESTORED) ************************

 113B    ED5B 1312      ..EXIT: LDED    TM.ALS          ;TIME AFTER LAST STEP.
 113F    CF                     WAIT                    ;PROGRAMMABLE DELAY.
 1140    3E00                   MVI     A,000H          ;SET COMPLETE FLAG.
 1142    DD7701                 MOV     DV.TRK(X),A     ;SET TRACK VALUE.
 1145    A7                     ANA     A               ;SET RETURN FLAGS.
 1146    C9                     RET                     ;RETURN TO CALLER.

                        ;******* (TRACK 0 NOT FOUND) ************************

 1147    3EFF           ..EROR: MVI     A,0FFH          ;SET FAILURE FLAG.
 1149    A7                     ANA     A               ;SET RETURN FLAGS.
 114A    C9                     RET                     ;RETURN TO CALLER.

                        ;****************************************************
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                          ;*****************************************************
                          ; LOG.ON IS THE SUBROUTINE THAT READS THE IDENTITY  *
                          ; SECTOR FROM THE DISKETTE AND MAKES THE NEEDED     *
                          ; ENTRYS INTO THE DRIVE TABLE.  THE SECTOR DATA IS  *
                          ; ALSO LEFT IN THE SECTOR BUFFER FOR BIOS TO FINISH *
                          ; THE LOG-ON OPERATION.                             *
                          ;*****************************************************

                          ;******* (CHECK JADE IDENTITY) **********************

  114B    11 131A         LOG.ON: LXI     D,JADEID        ;ID ADDRESS LOADED.
  114E    21 1380                 LXI     H,ID.LBL        ;SECTOR ID ADDRESS.
  1151    0608                    MVI     B,ID.SZE        ;ID LABEL SIZE.
  1153    1A              ..CKJI: LDAX    D               ;GET CHARACTER.
  1154    BE                      CMP     M               ;CHECK AGAINST DISK.
  1155    2017            INX H  >JRNZ    ..3740          ;IF DIFFERENT: 3740.
  1157    10FA            INX D   DJNZ    ..CKJI          ;REPEAT OPERATION.

                          ;******* (LOG-ON JADE FORMAT) ***********************

  1159    3A 13A0                 LDA     ID.SPT          ;SECTORS PER TRACK.
  115C    DD7703                  MOV     DV.SPT(X),A     ;STORE IN DRIVE TBL.
  115F    3A 13B0                 LDA     ID.STG STG      ;STAGGER NUMBER.
  1162    DD7703                  MOV     DV.SPT(X),A     ;STORE IN DRIVE TBL.
  1165    3A 13B1                 LDA     ID.FLG          ;SIDE AND DENSITIES.
  1168    DD7705                  MOV     DV.FLG(X),A     ;STORE IN DRIVE TBL.
  116B    C3 103F                 ~~JMP~~     ~~FETCH~~           ;GET NEXT COMMAND.
                                  RET

                          ;******* (ASSUME 3740 FORMAT) ***********************

  116E    3E1A            ..3740: MVI     A,26            ;SECTORS PER TRACK.
  1170    DD7703                  MOV     DV.SPT(X),A     ;STORE IN DRIVE TBL.
  1173    3E01                    MVI     A,1 STG         ;STAGGER NUMBER.
  1175    DD7703                  MOV     DV.SPT(X),A     ;STORE IN DRIVE TBL.
  1178    3E00                    MVI     A,ID.FLD        ;SIDE AND DENSITIES.
  117A    DD7705                  MOV     DV.FLG(X),A     ;STORE IN DRIVE TBL.
  117D    C3 103F                 ~~JMP~~     ~~FETCH~~           ;GET NEXT COMMAND.
                                  RET
                          ;*****************************************************
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                        ;****************************************************
                        ; THE FOLLOWING SUBROUTINE PERFORMS THE TRACK SEEK  *
                        ; OPERATION.  AFTER THE SEEK OPERATION, THE DENSITY *
                        ; AND PRE-COMPENSATION CONTROLS ARE SET.            *
                        ;****************************************************

                        ;******* (HEAD LOADING) *****************************

  1180    CD 1258       SEEK:   CALL    EX.STS          ;GET DRIVE STATUS.
  1183    E620                  ANI     DM.HDL          ;CHECK HEAD LOAD.
  1185    2008                  JRNZ    ..HLDD          ;BYPASS IF LOADED.
  1187    CD 123E               CALL    EX.HDL          ;LOAD R/W HEAD.
  118A    ED5B 130E             LDED    TM.HLD          ;HEAD LOAD DELAY.
  118E    CF                    WAIT                    ;PROGRAMMABLE DELAY.

                        ;******* (CHECK TRACK NUMBER) ***********************

  118F    3A 1372       ..HLDD: LDA     CB.TRK          ;REQUESTED TRACK NO.
  1192    DD9601                SUB     DV.TRK(X)       ;TRACK OFFSET REQ.
  1195    2006                  JRNZ    ..DSET          ;IF OFFSET, SET DIRC.
  1197    DD7E06                MOV     A,DV.CTL(X)     ;GET PREVIOUS CTLS.
  119A    C3 122B               JMP     ..EXIT          ;GOTO SET CONTROLS.

                        ;******* (SET DIRECTION AND STEP COUNTER) ***********

  119D    F5            ..DSET: PUSH    PSW             ;SAVE REG A AND FLGS.
  119E    ED5B 1318             LDED    TM.SAW          ;STEP AFTER WRITE.
  11A2    CF                    WAIT                    ;PROGRAMMABLE DELAY.
  11A3    F1                    POP     PSW             ;RESTORE A AND FLGS.
  11A4    380A                  JRC     ..SOUT          ;IF CARRY STEP OUT.
  11A6    6F            ..SIN:  MOV     L,A             ;MOVE OFFSET TO L.
  11A7    3A 130C               LDA     SV.DRV          ;DRIVE SELECT BITS.
  11AA    F620                  ORI     BC.DAS          ;SET DIRECTION IN.
  11AC    D300                  OUT     BL.CTL          ;OUTPUT CONTROL.
  11AE    180B                  JMPR    ..STEP          ;GOTO STEP ROUTINE.
  11B0    ED44          ..SOUT: NEG                     ;COMPLEMENT OFFSET.
  11B2    FA 1238               JM      ..HOME          ;BETTER HOME DRV.
  11B5    6F                    MOV     L,A             ;MOVE OFFSET TO L.
  11B6    3A 130C               LDA     SV.DRV          ;DRIVE SELECT BITS.
  11B9    D300                  OUT     BL.CTL          ;SET DIRECTION OUT.

                        ;******* (ISSUE STEPS) ******************************

  11BB    DB08          ..STEP: IN      XP.STP          ;ISSUE STEP PULSE.
  11BD    ED5B 1310             LDED    TM.STP          ;STEP DELAY TIME.
  11C1    CF                    WAIT                    ;PROGRAMMABLE DELAY.
  11C2    2D                    DCR     L               ;DECREMENT STEPS.
  11C3    20F6                  JRNZ    ..STEP          ;REPEAT OPERATION.
  11C5    ED5B 1312             LDED    TM.ALS          ;MORE AFTER LAST STP.
  11C9    CF                    WAIT                    ;PROGRAMMABLE DELAY.
```

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                                ;******* (TRACK SECTION DISTRIBUTE) ****************

    11CA    3A 1372                     LDA     CB.TRK              ;CURRENT TRACK NMBR.
    11CD    FE01                        CPI     1                   ;COMPARE AGAINST 1.
    11CF    380C                        JRC     ..TRK0              ;IF CARRY, TRACK 0.
    11D1    2811                        JRZ     ..TRK1              ;IF ZERO,  TRACK 1.
    11D3    FE1A                        CPI     26                  ;CHECK OUTER THIRD.
    11D5    381E                        JRC     ..OUTS              ;GOTO OUTS SETTING.
    11D7    FE34                        CPI     52                  ;CHECK MIDDLE THIRD.
    11D9    382B                        JRC     ..MIDS              ;GOTO MIDS SETTING.
    11DB    303A                        JRNC    ..INSD              ;GOTO INSD SETTING.

                                ;******* (TRACK ZERO) *******************************

    11DD    3A 130C             ..TRK0: LDA     SV.DRV              ;GET DRIVE NUMBER.
    11E0    F6C0                        ORI     BC.SDS!BC.PCL       ;SDEN AND PC-LOW.
    11E2    1844                        JMPR    ..CTLS              ;JUMP CONTROLS SET.

                                ;******* (TRACK ONE) ********************************

    11E4    DDCB054E            ..TRK1: BIT     DF.T1D,DV.FLG(X) ;TRK 1 DENSITY FLG.
    11E8    3A 130C                     LDA     SV.DRV              ;GET DRIVE NUMBER.
    11EB    2004                        JRNZ    ..T1DD              ;GO TO SET DDEN.
    11ED    F6C0                        ORI     BC.SDS!BC.PCL       ;SDEN AND PC-LOW.
    11EF    1837                        JMPR    ..CTLS              ;JUMP CONTROLS SET.
    11F1    F6D0                ..T1DD: ORI     BC.DDS!BC.PCL       ;DDEN AND PC-LOW.
    11F3    1833                        JMPR    ..CTLS              ;JUMP CONTROLS SET.

                                ;******* (OUTSIDE TRACKS) ***************************

    11F5    DDCB0556            ..OUTS: BIT     DF.DTD,DV.FLG(X) ;DATA DENSITY FLG.
    11F9    3A 130C                     LDA     SV.DRV              ;GET DRIVE NUMBER.
    11FC    2004                        JRNZ    ..OTDD              ;GO TO SET DDEN.
    11FE    F6C0                        ORI     BC.SDS!BC.PCL       ;SDEN AND PC-LOW.
    1200    1826                        JMPR    ..CTLS              ;JUMP CONTROLS SET.
    1202    F6D0                ..OTDD: ORI     BC.DDS!BC.PCL       ;DDEN AND PC-LOW.
    1204    1822                        JMPR    ..CTLS              ;JUMP CONTROLS SET.

                                ;******* (MIDDLE TRACKS) ****************************

    1206    DDCB0556            ..MIDS: BIT     DF.DTD,DV.FLG(X) ;DATA DENSITY FLG.
    120A    3A 130C                     LDA     SV.DRV              ;GET DRIVE NUMBER.
    120D    2004                        JRNZ    ..MDDD              ;GO TO SET DDEN.
    120F    F6C0                        ORI     BC.SDS!BC.PCL       ;SDEN AND PC-LOW.
    1211    1815                        JMPR    ..CTLS              ;JUMP CONTROLS SET.
    1213    F690                ..MDDD: ORI     BC.DDS!BC.PCM       ;DDEN AND PC-MED.
    1215    1811                        JMPR    ..CTLS              ;JUMP CONTROLS SET.
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                               ;******* (INSIDE TRACKS) *****************************

 1217    DDCB0556              ..INSD: BIT     DF.DTD,DV.FLG(X) ;DATA DENSITY FLG.
 121B    3A 130C                       LDA     SV.DRV           ;GET DRIVE NUMBER.
 121E    2004                          JRNZ    ..INDD           ;GO TO SET DDEN.
 1220    F6C0                          ORI     BC.SDS!BC.PCL    ;SDEN AND PC-LOW.
 1222    1804                          JMPR    ..CTLS           ;JUMP CONTROLS SET.
 1224    F650                  ..INDD: ORI     BC.DDS!BC.PCH    ;DDEN AND PC-HI.
 1226    1800                          JMPR    ..CTLS           ;JUMP CONTROLS SET.

                               ;******* (SET CONTROLS )******************************

 1228    DD7706                ..CTLS: MOV     DV.CTL(X),A      ;SAVE CONTROLS.
 122B    D300                  ..EXIT: OUT     BL.CTL           ;OUTPUT CONTROLS.

                               ;*******( SET TRACK VALUES AND EXIT )****************

 122D    3A 1372               ..TKVL: LDA     CB.TRK           ;REQUESTED TRACK NO.
 1230    DD7701                        MOV     DV.TRK(X),A      ;SET DRIVE TABLE.
 1233    A9                            XRA     C                ;INVERT (1791-01).
 1234    D305                          OUT     WD.TRK           ;SET TRACK REGISTER.
 1236    AF                            XRA     A                ;SET ZERO FLAG.
 1237    C9                            RET                      ;RETURN TO CALLER.

                               ;*******( CALIBRATE TRACK NUMBER )*******************

 1238    CD 1126               ..HOME: CALL    HOME.D           ;HOME SELECTED DRIVE.
 123B    C3 118F                       JMP     ..HLDD           ;NOW SEEK TRACK.

                               ;****************************************************
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                                ;*****************************************************
                                ; THE FOLLOWING TWO SUBROUTINES PROVIDE THE R/W HEAD *
                                ; LOAD AND UNLOAD FUNCTIONS.  AS THE 179X-01 DOES NOT*
                                ; OFFER THIS EXPLICIT COMMAND,  THE  SEEK COMMAND    *
                                ; (TYPE-1) IS USED WITH THE LOAD BIT SET  TO EITHER  *
                                ; LOAD OR UNLOAD.  THE DESTINATION TRACK IS SET EQUAL*
                                ; TO THE CONTENTS OF THE TRACK REGISTER TO BYPASS THE*
                                ; 179X-01 STEP FUNCTION.  REFER TO THE FLOW-CHART FOR*
                                ; 179X-01 TYPE 1 COMMANDS.                           *
                                ;*****************************************************

                                ;******* (LOAD R/W HEAD) *****************************

   123E     FDE1                EX.HDL: POP     Y                   ;RETURN ADDR IN REG Y.
   1240     DB05                        IN      WD.TRK              ;READ PRESENT TRACK.
   1242     D307                        OUT     WD.DTA              ;SET DESTINATION TRK.
   1244     3E10                        MVI     A,DC.HDL            ;LOAD HEAD LOAD CMND.
   1246     A9                          XRA     C                   ;INVERT (1791-01).
   1247     D304                        OUT     WD.CMD              ;ISSUE COMMAND.
   1249     18FE                        JMPR    .                   ;WAIT FOR INTERRUPT.

                                ;******* (UNLOAD R/W HEAD)  *************************

   124B     FDE1                EX.HDU: POP     Y                   ;RETURN ADDR IN REG Y.
   124D     DB05                        IN      WD.TRK              ;READ PRESENT TRACK.
   124F     D307                        OUT     WD.DTA              ;SET DESTINATION TRK.
   1251     3E18                        MVI     A,DC.HDU            ;LOAD UNLD HEAD CMND.
   1253     A9                          XRA     C                   ;INVERT (1791-01).
   1254     D304                        OUT     WD.CMD              ;ISSUE COMMAND.
   1256     18FE                        JMPR    .                   ;WAIT FOR INTERRUPT.

                                ;****************************************************
                                ; THE FOLLOWING SUBROUTINE IS USED TO UPDATE THE    *
                                ; 179X-01 STATUS PORT TO REFLECT CURRENT TYPE-1     *
                                ; STATUS CODES.  NOTE THIS IS A TYPE-4 COMMAND      *
                                ; WITH NO INTERRUPT CONDITIONS SET.                 *
                                ;****************************************************

   1258     3ED0                EX.STS: MVI     A,DC.STS            ;LOAD SET-STATUS CMND.
   125A     A9                          XRA     C                   ;INVERT (1791-01).
   125B     D304                        OUT     WD.CMD              ;ISSUE COMMAND.
   125D     E3                          PAUSE                       ;PAUSE FOR 179X-01.
   1261     DB04                        IN      WD.STS              ;INPUT STATUS PORT.
   1263     A9                          XRA     C                   ;INVERT (1791-01).
   1264     C9                          RET                         ;RETURN TO USER.

                                ;****************************************************
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                              ;*******************************************************
                              ; RD.SEC IS THE SUBROUTINE THAT INTERACTS WITH THE    *
                              ; 179X-01 DURING READ SECTOR OPERATIONS. THIS SECTION *
                              ; INITIATES THE DISK TRANSFER, SERVICES THE CONTROLLER*
                              ; CHIP DURING DATA TRANSFER, AND TERMINATES OPERATION *
                              ; WHEN FINISHED.  ERROR DETECTION IS IMPLEMENTED AND  *
                              ; RETRIES ARE EXRCUTED IF DATA ERRORS ARE DETECTED.   *
                              ;*******************************************************

                              ;******* (INITIALIZE READ OPERATION) ****************

 1265    AF                   RD.SEC: XRA     A                       ;ZERO A REGISTER.
 1266    32 130B                      STA     ERR.CT                  ;ZERO ERROR COUNT.
 1269    3A 1373                      LDA     CB.SEC                  ;LOAD SECTOR NMBR.
 126C    A9                           XRA     C                       ;INVERT (1791-01).
 126D    D306                         OUT     WD.SEC                  ;SET SECTOR REGISTER.
 126F    FD21 1288            ..RTRY: LXI     Y,..NMI                 ;LOAD NMI VECTOR.
 1273    2A 1309                      LHLD    BUF.ST                  ;BUFFER START.
 1276    3E80                         MVI     A,DC.RDS                ;READ SECTOR COMMAND.
 1278    A9                           XRA     C                       ;INVERT (1791-01).
 1279    D304                         OUT     WD.CMD                  ;ISSUE READ COMMAND
 127B    E3                           PAUSE                           ;ALLOW 1791 TO SETTLE

                              ;******* (DATA TRANSFER LOOP) **********************

 127F    DB80                 ..REPT: IN      XP.DSH                  ;HOLD FOR DATA
 1281    DB07                         IN      WD.DTA                  ;INPUT DATA.
 1283    A9                           XRA     C                       ;INVERT (1791-01).
 1284    77                           MOV     M,A                     ;PUT INTO BUFFER
 1285    23                           INX     H                       ;BUMP BUFF POINTER
 1286    18F7                         JMPR    ..REPT                  ;GO FOR ANOTHER

                              ;******* (CHECK STATUS) ****************************

 1288    E69D                 ..NMI:  ANI     DM.RER                  ;TEST FOR ERRORS.
 128A    32 1377                      STA     CB.STS                  ;SAVE READ STATUS.
 128D    C8                           RZ                              ;RETURN COMPLETE.
 128E    CD 12DC                      CALL    CHK.RT                  ;CHECK ABOUT RETRYS.
 1291    28DC                         JRZ     ..RTRY                  ;PERFORM RETRY.
 1293    C9                           RET                             ;ERROR RETURN.

                              ;******************************************************
                              ;*******************************************************
                              ; WR.SEC IS THE SUBROUTINE THAT INTERACTS WITH THE    *
                              ; 179X-01 DURING WRITE SETOR OPERATIONS. THIS SECTION*
                              ; INITIATES THE DISK TRANSFER, SERVICES THE CONTROLLER
                              ; CHIP, AND TERMINATES THE OPERATION. ERROR DETECTION*
                              ; IS IMPLEMENTED.                                     *
                              ;*******************************************************

                              ;******* (INITIALIZE WRITE OPERATION) ***************

 1294     AF                  WR.SEC: XRA      A                  ;ZERO REGISTER.
 1295     32 130B                     STA      ERR.CT             ;SET ERROR COUNTER.
 1298     3A 1373                     LDA      CB.SEC             ;LOAD SECTOR NMBR.
 129B     A9                          XRA      C                  ;INVERT (1791-01).
 129C     D306                        OUT      WD.SEC             ;SET SECTOR REGISTER.
 129E     FD21 12B7           ..RTRY: LXI      Y,..NMI            ;SET NMI RETURN.
 12A2     2A 1309                     LHLD     BUF.ST             ;BUFFER START.
 12A5     3EA0                        MVI      A,DC.WRS           ;LOAD WRITE SECTOR CMD.
 12A7     A9                          XRA      C                  ;INVERT (1791-01).
 12A8     D304                        OUT      WD.CMD             ;ISSUE COMMAND.
 12AA     E3                          PAUSE                       ;ALLOW 1791 TO SETTLE

                              ;******* (DATA TRANSFER LOOP) ***********************

 12AE     DB80                ..REPT: IN       XP.DSH             ;HOLD FOR DATA REQ.
 12B0     7E                          MOV      A,M                ;GET DATA BYTE.
 12B1     A9                          XRA      C                  ;INVERT (1791-01).
 12B2     D307                        OUT      WD.DTA             ;OUTPUT DATA BYTE.
 12B4     23                          INX      H                  ;INCREMENT BUFF POINTER
 12B5     18F7                        JMPR     ..REPT             ;REPEAT SEQUECE

                              ;******* (CHECK STATUS) *****************************

 12B7     E6FD                ..NMI:  ANI      DM.WER             ;TEST FOR WRITE ERRORS.
 12B9     32 1377                     STA      CB.STS             ;STORE WRITE STATUS.
 12BC     C8                          RZ                          ;RETURN COMPLETE.
 12BD     CD 12DC                     CALL     CHK.RT             ;CHECK ABOUT RETRYS.
 12C0     28DC                        JRZ      ..RTRY             ;PERFORM RETRY.
 12C2     C9                          RET                         ;ERROR RETURN.

                              ;*****************************************************
                              ;*****************************************************
                              ; WR.TRK IS THE SUBROUTINE WHICH INITIATES A FORMAT *
                              ; TRACK COMMAND (WRITE-TRACK 179X-01 TYPE 3).  THE  *
                              ; FORMATTING BYTE STREAM IS PROVIDED BY A PROGRAM   *
                              ; WHICH MUST BE PRESENT IN THE FORMAT BUFFER.       *
                              ;*****************************************************

                              ;******* (INITIALIZE WRITE TRACK) *******************

  12C3     FD21 12D3          WR.TRK: LXI     Y,..NMI         ;LOAD NMI VECTOR.
  12C7     3EF0                       MVI     A,DC.WRT        ;WRITE TRACK CMND.
  12C9     A9                         XRA     C               ;INVERT (1791-01).
  12CA     D304                       OUT     WD.CMD          ;ISSUE COMMAND.
  12CC     E3                         PAUSE                   ;ALLOW 179X TO SETTLE.
  12D0     C3 1708                    JMP     FMT.PS          ;FORMAT PROG START.

                              ;******* (CHECK COMPLETION STATUS) ******************

  12D3     E6E4               ..NMI:  ANI     DM.FER          ;TEST FOR ERRORS.
  12D5     32 1377                    STA     CB.STS          ;STORE FORMAT STATUS.
  12D8     22 137A                    SHLD    CW.LNG          ;DISPLAY TRAIL BYTES.
  12DB     C9                         RET                     ;RETURN TO USER.

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

```
                        ;*****************************************************
                        ; CHK.RT IS THE SUBROUTINE USED BY RD.SEC AND       *
                        ; WR.SEC TO COUNT RETRY OPERATIONS AND PERFORM A    *
                        ; RE-SEEK OPERATION WHEN NEEDED.                    *
                        ;*****************************************************

                        ;******* (CHECK IF RECOVERABLE) *********************

   12DC     E680        CHK.RT: ANI     DM.DNR          ;TEST NOT READY BIT.
   12DE     2028                JRNZ    ..EXIT          ;CAN NOT RECOVER.
   12E0     3A 1376             LDA     CB.MOD          ;GET COMMAND MODE.
   12E3     E680                ANI     CM.NRT          ;NO RETRYS CHECK.
   12E5     2021                JRNZ    ..EXIT          ;SHOULD NOT RECOVER.
   12E7     DB40                IN      XP.MTX          ;MOTOR TIME EXTEND.

                        ;******* (RECORD RETRY) *****************************

   12E9     3A 130B             LDA     ERR.CT          ;GET ERROR COUNT.
   12EC     3C                  INR     A               ;INCREMENT.
   12ED     32 130B             STA     ERR.CT          ;STORE NEW COUNT.
   12F0     FE05                CPI     RTY.SK          ;SHOULD TRY SEEK?
   12F2     2008                JRNZ    ..CKLS          ;IF NOT, CHECK LAST.

                        ;******* (REPOSITION R/W HEAD) **********************

   12F4     CD 1126             CALL    HOME.D          ;HOME SELECTED DRIVE.
   12F7     200F                JRNZ    ..EXIT          ;ERROR EXIT.
   12F9     CD 1180             CALL    SEEK            ;SEEK DESIRED TRACK.

                        ;******* (HOLD READ GATE FOR 3/4 REVOLUTION) ********

   12FC     FE09        ..CKLS: CPI     RTY.LS          ;WAS THIS THE LAST.
   12FE     2807                JRZ     ..STNZ          ;ERROR LAST RETRY.
   1300     ED5B 1316           LDED    TM.PLD          ;PHASE LOCK DELAY.
   1304     CF                  WAIT                    ;PROGRAMMABLE DELAY.
   1305     AF                  XRA     A               ;CLEAR FOR RETRY.
   1306     C9                  RET                     ;TRY AGAIN EXIT.

                        ;******* (ERROR EXIT) *******************************

   1307     3C          ..STNZ: INR     A               ;SET NOT ZERO.
   1308     C9          ..EXIT: RET                     ;ERROR EXIT.

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

```
                                ;******* (BUFFER POINTERS) ********************

  1309     1380                 BUF.ST: .WORD   BUF.BG  ;BUFFER START ADDRESS

                                ;*********************************************

  130B     00                   ERR.CT: .BYTE   0        ;RETRY ERROR COUNTER.

                                ;******* (HOLDING AREAS) **********************

  130C     00                   SV.DRV: .BYTE   0        ;BL.CTL DRIVE BITS.
  130D     00                   SV.STS: .BYTE   000H     ;1791 STATUS SAVE

                                ;******* (TIMING VALUES, 0.1 MS) *********

  130E     015E                 TM.HLD: .WORD   350      ;HEAD ENGAGE TIME.
  1310     0050                 TM.STP: .WORD   80       ;STEPPER INTERVAL.
  1312     0050                 TM.ALS: .WORD   80       ;AFTER LAST STEP.
  1314     0001                 TM.MTO: .WORD   1        ;MOTOR START UP.
  1316     04B0                 TM.PLD: .WORD   1200     ;PHASE LOCK RECOVERY.
  1318     000A                 TM.SAW: .WORD   10       ;STEP AFTER WRITING.

                                ; * ENTRY *     SA 800  FDD100  SA 850
                                ;                        8-C
                                ; TM.HLD: .WORD 350     250     350
                                ; TM.STP: .WORD 80      60      30
                                ; TM.ALS: .WORD 80      80      120
                                ; TM.MTO: .WORD 1       1       1
                                ; TM.PLD: .WORD 1200    1200    1200
                                ; TM.SAW: .WORD 10      10      10

                                ;******* (DISKETTE FORMAT LABEL) *******************
                                                      ic
  131A     4A6164652044 JADEID: .ASCII  "JADE DD "       ;DISKETTE ID LABEL.
  0008                  ID.SZE  ==      (. - JADEID)     ;ID LABEL SIZE.

  1380                  ID.LBL  ==   BUF.BG+0000H        ;ID SECTOR LABEL.
  13A0                  ID.BLK  ==   ID.LBL+0020H        ;ID BLOCK AREA.
  13A0                  ID.SPT  ==   ID.BLK+0000H        ;SECTORS/TRACK.
  13B0                  ID.STG  ==   ID.BLK+0010H        ;SECTOR STAGGER.
  13B1                  ID.FLG  ==   ID.BLK+0011H        ;DISKETTE FLAGS.
  0000                  ID.FLD  ==   00000000B           ;3740 FLAGS.

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

```
                               ;******* (DRIVE TABLE ENTRIES) ******************

  0000                         DV.NBR   ==       0        ;CURRENT DRIVE NUMBER.
  0001                         DV.TRK   ==       1        ;CURRENT TRACK NUMBER.
  0002                         DV.SEC   ==       2        ;CURRENT SECTOR NUMBER
  0003                         DV.SPT   ==       3        ;SECTORS PER TRACK.
  0004                         DV.STG   ==       4        ;SECTOR STAGGER NUMBER.
  0005                         DV.FLG   ==       5        ;SIDE AND DENSITY FLAGS
  0006                         DV.CTL   ==       6        ;LAST CONTROLS USED.

                               ;******* (DRIVE TABLE AREA) *********************

  1322                         DV.TBL   ==       .        ;DRIVE TABLE ADDRESS.

  1322      00FF00000002 DT.DE0: .BYTE    0,255,0,0,0,DF.DFL,0C4H ;DRIVE 0.
  1329      01FF00000002 DT.DE1: .BYTE    1,255,0,0,0,DF.DFL,0C5H ;DRIVE 1.
  1330      02FF00000002         .BYTE    2,255,0,0,0,DF.DFL,0C6H ;DRIVE 2.
  1337      03FF00000002         .BYTE    3,255,0,0,0,DF.DFL,0C7H ;DRIVE 3.
  133E      04FF00000000 DT.DED: .BYTE    4,255,0,0,0,0,0         ;DUMMY.

  0007                         DV.DES   ==       DT.DE1-DT.DE0    ;ENTRY SIZE.

                               ;******* (FLAG BIT DEFINITIONS) ****************

  0001                         DF.T1D   ==   1    ;TRACK 1 DENSITY (1 = DOUBLE).
  0002                         DF.DTD   ==   2    ;DATA TRACKS DENSITY (1 = DD).
  0003                         DF.TSD   ==   3    ;TWO SIDED ( 1 = TWO SIDES).
  0002                         DF.DFL   ==   1<DF.T1D      ;DEFAULT FLAGS.

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

```
                                ;*******************************************************
                                ; THE FOLLOWING AREA IS DEFINED AS THE COMMAND BLOCK. *
                                ; THIS AREA IS RESERVED FOR SPECIFICATION BY THE HOST *
                                ; SYSTEM FOR ALL DISK OPERATIONS.   CONTROLLER STATUS *
                                ; AT COMPLETION OF OPERATION IS PRESENT IN THIS AREA. *
                                ;*******************************************************

 1370                                   .LOC    CMD.BK  ;COMMAND BLOCK.

 1370     00                    CB.CMD: .BYTE   0       ;CONTROL COMMAND.
 1371     00                    CB.DRV: .BYTE   0       ;DRIVE NUMBER.
 1372     00                    CB.TRK: .BYTE   0       ;TRACK NUMBER.
 1373     00                    CB.SEC: .BYTE   0       ;SECTOR NUMBER.
 1374     00                    CB.FFG: .BYTE   0       ;FORMAT FLAGS.
 1375     00                    CB.SPR: .BYTE   0       ;UNASSIGNED.
 1376     00                    CB.MOD: .BYTE   0       ;MODE SELECTS.
 1377     00                    CB.STS: .BYTE   0       ;CONTROLLER STATUS.

 1378     0000                  CW.LAD: .WORD   0       ;LOAD ADDRESS.
 137A     0000                  CW.LNG: .WORD   0       ;LOAD LENGTH

                                ;******* (MODE BIT DEFINITIONS) ***********************

 0080                           CM.NRT  ==  10000000B   ;NO RETRYS ( = 1 ).

                                ;******* (STATUS BIT DEFINITIONS) *********************

 0080                           CS.DNR  ==  10000000B   ;DRIVE NOT READY.
 0040                           CS.WRP  ==  01000000B   ;WRITE PROTECTED.
 0020                           CS.BT5  ==  00100000B   ;NOT ASSIGNED.
 0010                           CS.RNF  ==  00010000B   ;RECORD NOT FOUND.
 0008                           CS.CRC  ==  00001000B   ;CRC ERROR.
 0004                           CS.LDE  ==  00000100B   ;LOST DATA ERROR.
 0002                           CS.BT1  ==  00000010B   ;NOT ASSIGNED.
 0001                           CS.BT0  ==  00000001B   ;NOT ASSIGNED.

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

```
                              ;*********************************************************
                              ; THIS SECTION RESIDES IN THE DCM SECTOR BUFFER. THIS *
                              ; SECTION MOVES DCM FROM BANK 1 DOWN TO BANK 0.   THE *
                              ; C REGISTER IS SET FOR 1791-01 OR 1793-01.  THE LAST *
                              ; OPERATION IS TO  READ THE  BIOS  LOADER  SECTOR  TO *
                              ; OVERLAY THIS INITIALIZATION SEQUENCE.   BIOS LOADER *
                              ; THEN READ BIOS INTO BANK 1 AND HALTS.               *
                              ;*********************************************************

                              ;*******( EXECUTES IN BANK 1 )***************************

  1380                                .LOC     BUF.BG          ;RESIDES IN BUFFER.
  1380    01 0400             INIT.B: LXI      B,BANK.L        ;SET BANK LENGTH.
  1383    11 1000                     LXI      D,BANK.0        ;SET DESTINATION.
  1386    21 1400                     LXI      H,BANK.1        ;SET SOURCE ADDR.
  1389    EDB0                        LDIR                     ;MOVE BLOCK.
  138B    C3 138E                     JMP      ..DOWN          ;JUMP TO NEW IMAGE.

                              ;*******( NOW IN BANK 0, SET INT MODE )*****************

  138E    31 1370             ..DOWN: LXI      SP,TP.STK       ;SET STACK PNTR.
  1391    ED56                        IM1                      ;INTERRUPT MODE 1.

                              ;*******( SET 1791-01/1793-01 )*************************

  1393    0E00                        MVI      C,0             ;LOAD C REG ZERO.
  1395    DB00                        IN       BL.STS          ;BOARD STATUS.
  1397    E601                        ANI      BS.US0          ;TEST USER SW #1.
  1399    2002                        JRNZ     LD.BLT          ;SW OPEN - 1793.
  139B    0EFF                        MVI      C,0FFH          ;SW CLOSED - 1791.

                              ;*******( OVERLAY WITH BIOS LOADER TRANSIENT )**********

  139D    DD21 133E           LD.BLT: LXI      X,DT.DED        ;INIT DRIVE TBL.
  13A1    3E02                        MVI      A,2             ;BIOS LOADER SECTOR.
  13A3    32 1373                     STA      CB.SEC          ;SET SECTOR VALUE.
  13A6    DB40                        IN       XP.MTX          ;MOTOR TIME EXTEND.
  13A8    21 1380                     LXI      H,BUF.BG        ;SET RETURN ADDR.
  13AB    E5                          PUSH     H               ;PUSH INTO STACK.
  13AC    C3 1265                     JMP      RD.SEC          ;GET BIOS LOADER.

                              ;*********************************************************
                                      .END
```

```
+++++ SYMBOL TABLE +++++

BANK.0 1000         BANK.1 1400         BANK.L 0400         BASE   1000
BC.DAS 0020         BC.DDE 0010         BC.DDS 0010         BC.DSA 0001
BC.DSB 0002         BC.DSE 0004         BC.DSN 0003         BC.EIA 0008
BC.PCA 0040         BC.PCB 0080         BC.PCH 0040         BC.PCL 00C0
BC.PCM 0080         BC.PCZ 0000         BC.SDS 0000         BL.CTL 0000
BL.STS 0000         BS.DCN 0080         BS.EIA 0010         BS.INT 0008
BS.MOF 0020         BS.TSD 0040         BS.TST 0004         BS.US0 0001
BS.US1 0002         BUF.BG 1380         BUF.ST 1309         CB.CMD 1370
CB.DRV 1371         CB.FFG 1374         CB.MOD 1376         CB.SEC 1373
CB.SPR 1375         CB.STS 1377         CB.TRK 1372         CHK.RT 12DC
CMD.BK 1370         CM.NRT 0080         CS.BT0 0001         CS.BT1 0002
CS.BT5 0020         CS.CRC 0008         CS.DNR 0080         CS.LDE 0004
CS.RNF 0010         CS.WRP 0040         CW.LAD 1378         CW.LNG 137A
DC.HDL 0010         DC.HDU 0018         DC.IFI 00D8         DC.RDA 00C0
DC.RDS 0080         DC.STS 00D0         DC.WRS 00A0         DC.WRT 00F0
DF.DFL 0002         DF.DTD 0002         DF.T1D 0001         DF.TSD 0003
DM.DNR 0080         DM.FER 00E4         DM.HDL 0020         DM.LDE 0004
DM.RER 009D         DM.TKO 0004         DM.WER 00FD         DT.DE0 1322
DT.DE1 1329         DT.DED 133E         DV.CTL 0006         DV.DES 0007
DV.FLG 0005         DV.NBR 0000         DV.SEC 0002         DV.SPT 0003
DV.STG 0004         DV.TBL 1322         DV.TRK 0001         ERR.CT 130B
EX.HDL 123E         EX.HDU 124B         EX.STS 1258         FETCH  103F
FMT.BG 1700         FMT.PS 1708         HOME.D 1126         HR.INT 1038
HR.VEC 1006         ID.BLK 13A0         ID.FLD 0000         ID.FLG 13B1
ID.LBL 1380         ID.SPT 13A0         ID.STG 13B0         ID.SZE 0008
INIT.B 1380         IO.BLK 1370         JADEID 131A         LD.BLT 139D
LOG.ON 114B         NM.INT 1066         RD.SEC 1265         RST.0  1000
RST.1  1008         RST.2  1010         RST.3  1018         RST.4  1020
RST.5  1028         RST.6  1030         RST.7  1038         RTY.LS 0009
RTY.SK 0005         SEEK   1180         SELECT 10DD         SV.DRV 130C
SV.STS 130D         TICK.E 1074         TICK.R 1070         TMR.FC 0019
TMR.NC 001C         TM.ALS 1312         TM.HLD 130E         TM.MTO 1314
TM.PLD 1316         TM.SAW 1318         TM.STP 1310         TP.STK 1370
WD.CMD 0004         WD.DTA 0007         WD.INT 1066         WD.SEC 0006
WD.STS 0004         WD.TRK 0005         WR.SEC 1294         WR.TRK 12C3
XP.DSH 0080         XP.IRR 0020         XP.MTO 0010         XP.MTX 0040
XP.STP 0008         X.CUTE 1041         $.ADDR 10CC         $.FORM 109A
$.IDLE 10D2         $.LGON 10AF         $.READ 107C         $.SPAR 10CF
$.WRIT 108B
```

SBD

```
                ;**************************************************
                ;                                                *
                ;       PROGRAM ID:     SYSTEM BOOTSTRAP DRIVER  *
                ;                                                *
                ;**************************************************
                ;                                                *
                ;       PROPERTY OF:    JADE COMPUTER PRODUCTS   *
                ;                       4901 W. ROSECRANS BLVD.  *
                ;                       HAWTHORNE, CALIFORNIA    *
                ;                       90250,   U.S.A.          *
                ;                                                *
                ;**************************************************
                ;                                                *
                ;       VERSION:        2.2                      *
                ;                                                *
                ;**************************************************
                ; THE SYSTEM BOOTSTRAP DRIVER IS ONE OF TWO MODULES   *
                ; THAT MAKE UP THE  SYSTEM RESIDENT BOOTSTRAP. THIS   *
                ; MODULE IS TO BE EXECUTED BY THE SYSTEM PROCESSOR.   *
                ; DURING EXECUTION, THIS MODULE PERFORMS A BLOCK MOVE *
                ; OF THE SECOND MODULE (BOOT INJECTION MODULE) INTO   *
                ; THE DOUBLE D CONTROLLER MEMORY.  A SUCCESSFUL BOOT  *
                ; OPERATION BY THE DOUBLE D WILL LEAVE DCM IN BANK 0  *
                ; AND BIOS IN  BANK 1.  THE REMAINDER OF THIS MODULE  *
                ; THEN  MOVES  THE  BIOS IMAGE TO THE  PROPER SYSTEM  *
                ; ADDRESS AND JUMPS TO THE BIOS COLD START ENTRY.     *
                ;********************************************* SK ***
                ;
                ;**************************************************
                ; DOUBLE D HARDWARE PARAMETERS.  PLEASE NOTE THIS    *
                ; SECTION CONTAINS CONDITIONAL STATEMENTS.           *
                ;**************************************************
                ;
0043 =          D$PORT  EQU     043H    ;DOUBLE D PORT ADDRESS.
0001 =          TRUE    EQU     1       ;TRUE IS A ONE.
0000 =          FALSE   EQU     0       ;FALSE IS A ZERO.
0001 =          REV$B   EQU     TRUE    ;SET TRUE FOR REV B BOARDS.
0000 =          REV$C   EQU     FALSE   ;SET TRUE FOR REV C BOARDS.
0000 =          MA10    EQU     FALSE   ;TRUE IF MA10 JUMPED (REV-B).
                ;
                        IF      REV$B
0002 =          DS$HLT  EQU     002H    ;STATUS PORT HALT INDICATOR.
000C =          DS$ASW  EQU     00CH    ;STATUS PORT ADDR SW MASK.
                D$BASE  SET     0E400H  ;SYSTEM WINDOW BASE ADDRESS
                        ENDIF
                ;
                        IF      MA10
                D$BASE  EQU     0E000H  ;SYSTEM WINDOW BASE ADDRESS
                        ENDIFF
                ;
                        IF      REV$C
                DS$HLT  EQU     001H    ;STATUS PORT HALT INDICATOR.
                DS$ASW  EQU     00EH    ;STATUS PORT ADDR SW MASK.
                D$BASE  EQU     0E000H  ;SYSTEM WINDOW BASE ADDRESS
                        ENDIF
                ;
                ;**************************************************
                ; BOOTSTRAP INJECTION MODULE PARAMETERS              *
                ;**************************************************
                ;
1000 =          IM$ADR  EQU     1000H   ;BOOT INJECTION MODULE ADDRESS.
00C0 =          IM$SZE  EQU     00C0H   ;BOOT INJECTION MODULE SIZE.
                ;
```

```
               ; BOOTSTRAP LINKAGE ADDRESS.                          *
               ;******************************************************
               ;
0080 =         BSTACK  EQU     0080H   ;BOOTSTRAP TOP OF STACK.
0040 =         D$ADDR  EQU     0040H   ;DOUBLE D ADDRESS POINTER.
0377 =         BL$DCS  EQU     0377H   ;DCM DISK CONTROLLER STATUS.
0378 =         BL$ADR  EQU     0378H   ;DCM LOAD AND JUMP ADDRESS.
037A =         BL$BSZ  EQU     037AH   ;DCM BLOCK LOAD SIZE.
               ;
               ;******************************************************
               ; DOUBLE D HARDWARE COMMANDS                          *
               ;******************************************************
               ;
0080 =         DC$BGN  EQU     080H    ;RESET Z80A AND EXECUTE.
0001 =         DC$MRQ  EQU     001H    ;REQUEST MEMORY WINDOW.
0000 =         DC$MRT  EQU     000H    ;RELEASE MEMORY WINDOW$
0001 =         DC$MB0  EQU     001H    ;SELECT MEMORY BANK 0.
0003 =         DC$MB1  EQU     003H    ;SELECT MEMORY BANK 1.
0002 =         DC$EXC  EQU     002H    ;ISSUE DOUBLE D INTERRUPT.
               ;
               ;******************************************************
               ; ASSEMBLER DIRECTIVES                                *
               ;******************************************************
               ;
0100                   ORG     0100H   ;MODULE ADDRESS (ALTERABLE).
               ;
               ;******************************************************
               ; SET STACK AND CONTROLLER ADDRESS                    *
               ;******************************************************
               ;
0100 318000    BEGIN:  LXI     SP,BSTACK       ;SET STACK POINTER.
0103 DB43              IN      D$PORT          ;INPUT STATUS PORT.
0105 E60C              ANI     DS$ASW          ;MASK FOR ADDR SWS.
0107 07                RLC                     ;POSITION BITS.
0108 F6E4              ORI     D$BASE SHR 8    ;OR IN BASE ADDR.
010A 67                MOV     H,A             ;HIGH BYTE VALUE.
010B 2E00              MVI     L,0             ;LOW BYTE VALUE.
010D 224000            SHLD    D$ADDR          ;STORE THE ADDRESS
               ;
               ;******************************************************
               ; INJECT BOOT MODULE INTO CONTROLLER                  *
               ;******************************************************
               ;
0110 3E01      INJECT: MVI     A,DC$MB0        ;REQUEST DD MEM BANK 0.
0112 D343              OUT     D$PORT          ;ISSUE COMMAND.
0114 01C000            LXI     B,IM$SZE        ;INJECTION SIZE.
0117 EB                XCHG                    ;D$ADDR HL TO DE.
0118 210010            LXI     H,IM$ADR        ;INJECTION MODULE.
011B CD5901            CALL    BLOCK           ;BLOCK MOVE.
               ;
               ;******************************************************
               ; RESET AND START THE DISK PROCESSOR                  *
               ;******************************************************
               ;
011E 3E80              MVI     A,DC$BGN        ;BEGIN DD PROCESSOR.
0120 D343              OUT     D$PORT          ;ISSUE  COMMAND.
0122 E3                XTHL                    ;ALLOW DOUBLE D TIME
0123 E3                XTHL                    ;TO START UP.
               ;
               ;******************************************************
               ; WAIT FOR TASK COMPLETION                            *
               ;******************************************************
               ;
0124 DB43      WAIT:   IN      D$PORT          ;INPUT DD STATUS.
0126 E602              ANI     DS$HLT          ;TEST HALT* STATUS.
```

```
               ;******************************************************
               ; SWITCH CONTROLLER MEMORY INTO SYSTEM BUS            *
               ;******************************************************
               ;
012B 3E01              MVI     A,DC$MRQ        ;REQUEST MEM (BANK 0).
012D D343              OUT     D$PORT          ;ISSUE COMMAND.
               ;
               ;******************************************************
               ; CHECK FOR BOOTSTRAP MALFUNCTION                     *
               ;******************************************************
               ;
012F 2A4000            LHLD    D$ADDR          ;CONTROLLER ADDRESS.
0132 117703            LXI     D,BL$DCS        ;ERROR CODE OFFSET.
0135 19                DAD     D               ;SET HL POINTER.
0136 7E                MOV     A,M             ;GET ERROR CODE.
0137 A7                ANA     A               ;TEST REGISTER.
0138 C26601            JNZ     BAD$LD          ;BAD LOAD.
               ;
               ;******************************************************
               ; PERFORM BLOCK TRANSFER FROM DISK MEMORY             *
               ;******************************************************
               ;
013B 2A4000            LHLD    D$ADDR          ;CONTROLLER ADDRESS.
013E 117803            LXI     D,BL$ADR        ;LOAD ADDRESS PNTR.
0141 19                DAD     D               ;SET HL POINTER.
0142 5E                MOV     E,M             ;LOW ORDER ADDR.
0143 23                INX     H               ;INCREMENT HL.
0144 56                MOV     D,M             ;HIGH ORDER ADDR.
0145 23                INX     H               ;REQUIRES BL.BSZ NEXT.
0146 4E                MOV     C,M             ;LOW ORDER LENGTH.
0147 23                INX     H               ;INCREMENT HL.
0148 46                MOV     B,M             ;HIGH ORDER LENGTH.
0149 D5                PUSH    D               ;USE AS JUMP ADDR.
014A 3E03              MVI     A,DC$MB1        ;SWITCH TO MEM BANK 1.
014C D343              OUT     D$PORT          ;ISSUE COMMAND.
014E 2A4000            LHLD    D$ADDR          ;DOUBLE D MEM ADDRESS.
0151 CD5901            CALL    BLOCK           ;MOVE BIOS MODULE.
               ;
               ;******************************************************
               ; TRANSFER CONTROL TO OPERATING SYSTEM                *
               ;******************************************************
               ;
0154 3E01              MVI     A,DC$MBO        ;SWITCH TO BANK.0
0156 D343              OUT     D$PORT          ;ISSUE COMMAND.
0158 C9                RET                     ;GOTO BIOS COLD ENTRY.
               ;
               ;******************************************************
               ; BLOCK MOVE SUBROUTINE (Z80 BLOCK MOVE REGISTERS)    *
               ;******************************************************
               ;
0159 7E        BLOCK:  MOV     A,M             ;GET BYTE.
015A 23                INX     H               ;INC POINTER
015B EB                XCHG                    ;GET DESTINATION.
015C 77                MOV     M,A             ;PUT BYTE.
015D 23                INX     H               ;INC POINTER
015E EB                XCHG                    ;GET SOURCE.
015F 0B                DCX     B               ;ONE LESS TO DO.
0160 78                MOV     A,B             ;GET HI COUNT.
0161 B1                ORA     C               ;GET LO COUNT.
0162 C25901            JNZ     BLOCK           ;FINISH LOADING.
0165 C9                RET
               ;
               ;******************************************************
               ; ERROR HAS BEEN DETECTED                             *
               ;******************************************************
```

SBD

TITLE PAGE

```
;******************************************************
;                                                     *
;       PROGRAM ID:     SYSTEM BOOTSTRAP DRIVER       *
;                                                     *
;******************************************************
;                                                     *
;       PROPERTY OF:    JADE COMPUTER PRODUCTS        *
;                       4901 W. ROSECRANS BLVD.       *
;                       HAWTHORNE, CALIFORNIA         *
;                       90250,   U.S.A.               *
;                                                     *
;******************************************************
;                                                     *
;       VERSION:        2.2                           *
;                                                     *
;******************************************************
; THE  SYSTEM BOOTSTRAP DRIVER IS ONE OF TWO MODULES  *
; THAT MAKE UP THE  SYSTEM  RESIDENT BOOTSTRAP. THIS  *
; MODULE IS TO BE EXECUTED BY  THE SYSTEM PROCESSOR.  *
; DURING EXECUTION, THIS MODULE PERFORMS A BLOCK MOVE *
; OF THE SECOND MODULE  (BOOT INJECTION MODULE) INTO  *
; THE DOUBLE D CONTROLLER MEMORY.  A SUCCESSFUL BOOT  *
; OPERATION BY THE DOUBLE D WILL LEAVE DCM IN BANK 0  *
; AND BIOS IN  BANK 1.  THE REMAINDER OF THIS MODULE  *
; THEN MOVES THE  BIOS  IMAGE TO  THE  PROPER SYSTEM  *
; ADDRESS AND  JUMPS TO THE  BIOS COLD START ENTRY.   *
;*********************************************** SK ***
```

```
                         ;******************************************************
                         ; DOUBLE D HARDWARE PARAMETERS.  PLEASE NOTE THIS     *
                         ; SECTION CONTAINS CONDITIONAL STATEMENTS.            *
                         ;******************************************************

    0043                 D.PORT  ==      043H   ;DOUBLE D PORT ADDRESS.
    0001                 TRUE    ==      1      ;TRUE IS A ONE.
    0000                 FALSE   ==      0      ;FALSE IS A ZERO.
    0001                 REV.B   ==      TRUE   ;SET TRUE FOR REV B BOARDS.
    0000                 REV.C   ==      FALSE  ;SET TRUE FOR REV C BOARDS.
    0000                 MA10    ==      FALSE  ;TRUE IF MA10 JUMPED (REV-B).

                                 .IFG    REV.B, [
    0002                 DS.HLT  ==      002H   ;STATUS PORT HALT INDICATOR.
    000C                 DS.ASW  ==      00CH   ;STATUS PORT ADDR SW MASK.
    E400                 D.BASE  =       0E400H ;SYSTEM WINDOW BASE ADDRESS]

                                 .IFG    MA10, [
                         D.BASE  ==      0E000H ;SYSTEM WINDOW BASE ADDRESS]

                                 .IFG    REV.C, [
                         DS.HLT  ==      001H   ;STATUS PORT HALT INDICATOR.
                         DS.ASW  ==      00EH   ;STATUS PORT ADDR SW MASK.
                         D.BASE  ==      0E000H ;SYSTEM WINDOW BASE ADDRESS]

                         ;******************************************************
                         ; BOOTSTRAP INJECTION MODULE PARAMETERS (ALTERABLE)   *
                         ;******************************************************

    0200                 IM.ADR  ==      0200H  ;BOOT INJECTION MODULE ADDRESS.
    00C0                 IM.SZE  ==      00C0H  ;BOOT INJECTION MODULE SIZE.

                         ;******************************************************
                         ; BOOTSTRAP LINKAGE ADDRESS.                          *
                         ;******************************************************

    0080                 BSTACK  ==      0080H  ;BOOTSTRAP TOP OF STACK.
    0040                 D.ADDR  ==      0040H  ;DOUBLE D ADDRESS POINTER.
    0377                 BL.DCS  ==      0377H  ;DCM DISK CONTROLLER STATUS.
    0378                 BL.ADR  ==      0378H  ;DCM LOAD AND JUMP ADDRESS.
    037A                 BL.BSZ  ==      037AH  ;DCM BLOCK LOAD SIZE.

                         ;******************************************************
                         ; DOUBLE D HARDWARE COMMANDS                          *
                         ;******************************************************

    0080                 DC.BGN  ==      080H   ;RESET Z80A AND EXECUTE.
    0001                 DC.MRQ  ==      001H   ;REQUEST MEMORY WINDOW.
    0000                 DC.MRT  ==      000H   ;RELEASE MEMORY WINDOW.
    0001                 DC.MB0  ==      001H   ;SELECT MEMORY BANK 0.
    0003                 DC.MB1  ==      003H   ;SELECT MEMORY BANK 1.
    0002                 DC.EXC  ==      002H   ;ISSUE DOUBLE D INTERRUPT.

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

```
                                ;*******************************************************
                                ; ASSEMBLER DIRECTIVES                                 *
                                ;*******************************************************

                                        .I8080          ;USE 8080 INSTRUCTION SUBSET.
                                        .PABS           ;ASSEMBLE ABSOLUTE ADDRESS.
                                        .PHEX           ;GENERATE INTEL HEX FORMAT.
                                        .XLINK          ;SUPRESS LINKAGE OUTPUT.
 0100                                   .LOC    0100H   ;MODULE ADDRESS (ALTERABLE).

                                ;*******************************************************
                                ; SET STACK AND CONTROLLER ADDRESS                     *
                                ;*******************************************************

 0100     31 0080               BEGIN:  LXI     SP,BSTACK       ;SET STACK POINTER.
 0103     DB43                          IN      D.PORT          ;INPUT STATUS PORT.
 0105     E60C                          ANI     DS.ASW          ;MASK FOR ADDR SWS.
 0107     07                            RLC                     ;POSITION BITS.
 0108     F6E4                          ORI     D.BASE>8        ;OR IN BASE ADDR.
 010A     67                            MOV     H,A             ;HIGH BYTE VALUE.
 010B     2E00                          MVI     L,0             ;LOW BYTE VALUE.
 010D     22 0040                       SHLD    D.ADDR          ;STORE THE ADDRESS

                                ;*******************************************************
                                ; INJECT BOOT MODULE INTO CONTROLLER                   *
                                ;*******************************************************

 0110     3E01                  INJECT: MVI     A,DC.MBO        ;REQUEST DD MEM BANK O.
 0112     D343                          OUT     D.PORT          ;ISSUE COMMAND.
 0114     01 00C0                       LXI     B,IM.SZE        ;INJECTION SIZE.
 0117     EB                            XCHG                    ;D.ADDR HL TO DE.

 0118     21 0200                       LXI     H,IM.ADR        ;INJECTION MODULE.
 011B     CD 0159                       CALL    BLOCK           ;BLOCK MOVE.

                                ;*******************************************************
                                ; RESET AND START THE DISK PROCESSOR                   *
                                ;*******************************************************

 011E     3E80                          MVI     A,DC.BGN        ;BEGIN DD PROCESSOR.
 0120     D343                          OUT     D.PORT          ;ISSUE  COMMAND.
 0122     E3                            XTHL                    ;ALLOW DOUBLE D TIME
 0123     E3                            XTHL                    ;TO START UP.

                                ;*******************************************************
                                ; WAIT FOR TASK COMPLETION                             *
                                ;*******************************************************

 0124     DB43                  WAIT:   IN      D.PORT          ;INPUT DD STATUS.
 0126     E602                          ANI     DS.HLT          ;TEST HALT* STATUS.
 0128     C2 0124                       JNZ     WAIT            ;WAIT TILL HALTED.
```

SHR 8

```
                                  ;*****************************************************
                                  ; SWITCH CONTROLLER MEMORY INTO SYSTEM BUS           *
                                  ;*****************************************************

 012B   3E01                                MVI     A,DC.MRQ        ;REQUEST MEM (BANK 0).
 012D   D343                                OUT     D.PORT          ;ISSUE COMMAND.

                                  ;*****************************************************
                                  ; CHECK FOR BOOTSTRAP MALFUNCTION                    *
                                  ;*****************************************************

 012F   2A 0040                             LHLD    D.ADDR          ;CONTROLLER ADDRESS.
 0132   11 0377                             LXI     D,BL.DCS        ;ERROR CODE OFFSET.
 0135   19                                  DAD     D               ;SET HL POINTER.
 0136   7E                                  MOV     A,M             ;GET ERROR CODE.
 0137   A7                                  ANA     A               ;TEST REGISTER.
 0138   C2 0166                             JNZ     BAD.LD          ;BAD LOAD.

                                  ;*****************************************************
                                  ; PERFORM BLOCK TRANSFER FROM DISK MEMORY            *
                                  ;*****************************************************

 013B   2A 0040                             LHLD    D.ADDR          ;CONTROLLER ADDRESS.
 013E   11 0378                             LXI     D,BL.ADR        ;LOAD ADDRESS PNTR.
 0141   19                                  DAD     D               ;SET HL POINTER.
 0142   5E                                  MOV     E,M             ;LOW ORDER ADDR.
 0143   23                                  INX     H               ;INCREMENT HL.
 0144   56                                  MOV     D,M             ;HIGH ORDER ADDR.
 0145   23                                  INX     H               ;REQUIRES BL.BSZ NEXT.
 0146   4E                                  MOV     C,M             ;LOW ORDER LENGTH.
 0147   23                                  INX     H               ;INCREMENT HL.
 0148   46                                  MOV     B,M             ;HIGH ORDER LENGTH.
 0149   D5                                  PUSH    D               ;USE AS JUMP ADDR.
 014A   3E03                                MVI     A,DC.MB1        ;SWITCH TO MEM BANK 1.
 014C   D343                                OUT     D.PORT          ;ISSUE COMMAND.
 014E   2A 0040                             LHLD    D.ADDR          ;DOUBLE D MEM ADDRESS.
 0151   CD 0159                             CALL    BLOCK           ;MOVE BIOS MODULE.

                                  ;*****************************************************
                                  ; TRANSFER CONTROL TO OPERATING SYSTEM               *
                                  ;*****************************************************

 0154   3E01                                MVI     A,DC.MB0        ;SWITCH TO BANK.0
 0156   D343                                OUT     D.PORT          ;ISSUE COMMAND.
 0158   C9                                  RET                     ;GOTO BIOS COLD ENTRY.
```

```
                              ;*****************************************************
                              ; BLOCK MOVE SUBROUTINE (Z80 BLOCK MOVE REGISTERS)    *
                              ;*****************************************************

  0159     7E                 BLOCK:   MOV     A,M                 ;GET BYTE.
  015A     23                          INX     H                   ;INC POINTER
  015B     EB                          XCHG                        ;GET DESTINATION.
  015C     77                          MOV     M,A                 ;PUT BYTE.
  015D     23                          INX     H                   ;INC POINTER
  015E     EB                          XCHG                        ;GET SOURCE.
  015F     0B                          DCX     B                   ;ONE LESS TO DO.
  0160     78                          MOV     A,B                 ;GET HI COUNT.
  0161     B1                          ORA     C                   ;GET LO COUNT.
  0162     C2 0159                     JNZ     BLOCK               ;FINISH LOADING.
  0165     C9                          RET

                              ;*****************************************************
                              ; ERROR HAS BEEN DETECTED                             *
                              ;*****************************************************

  0166     21 016D            BAD.LD:  LXI     H,ER.MSG            ;ERROR MESSAGE
  0169     CD 0196                     CALL    MSG.OT              ;DISPLAY IT.
  016C     76                          HLT                         ;HALT OR GOTO MONITOR.

  016D     0D0A0A535953 ER.MSG:  .ASCIS  [CR][LF][LF]"SYSTEM BOOT LOAD ERROR"

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

```
                        ;*****************************************************
                        ; CONSOLE LINKAGE DEFINITIONS                          *
                        ;*****************************************************

0000                    CNO.SP  ==      000H    ;OUTPUT STATUS PORT.
0004                    CNO.SB  ==      004H    ;OUTPUT STATUS BIT.
0000                    CNO.SI  ==      000H    ;OUTPUT STATUS INVERT.
0001                    CNO.DP  ==      001H    ;OUTPUT DATA PORT.

000A                    LF      ==      00AH    ;ASCII LINE FEED
000D                    CR      ==      00DH    ;CARRAIGE RETURN

                        ;*****************************************************
                        ; CONSOLE OUTPUT                                       *
                        ;*****************************************************

0186    F5              CNS.OT: PUSH    PSW             ;SAVE CHARACTER
0187    DB00            ..WAIT: IN      CNO.SP          ;INPUT STATUS
0189    EE00                    XRI     CNO.SI          ;ADJUST POLARITY
018B    E604                    ANI     CNO.SB          ;MASK STATUS BIT
018D    CA 0187                 JZ      ..WAIT          ;TRY AGAIN
0190    F1                      POP     PSW             ;RESTORE CHARACTER
0191    E67F                    ANI     07FH            ;7 BIT ASCII
0193    D301                    OUT     CNO.DP          ;SEND CHARACTER
0195    C9                      RET

                        ;*****************************************************
                        ; DISPLAY MESSAGE SUBROUTINE                           *
                        ;*****************************************************

0196    F5              MSG.OT: PUSH    PSW             ;SAVE CALLER FLAGS.
0197    7E              ..REPT: MOV     A,M             ;LOAD CHARACTER.
0198    CD 0186                 CALL    CNS.OT          ;CONSOLE OUTPUT.
019B    7E                      MOV     A,M             ;SAME CAHRACTER.
019C    23                      INX     H               ;INCREMENT POINTER.
019D    E680                    ANI     080H            ;TEST SIGN BIT.
019F    CA 0197                 JZ      ..REPT          ;ANOTHER CHARACTER.
01A2    F1                      POP     PSW             ;RESTORE FLAGS.
01A3    C9                      RET                     ;RETURN TO CALLER.

                        ;*****************************************************

0100                            .END    BEGIN
```

```
+++++ SYMBOL TABLE +++++

BAD.LD 0166           BEGIN  0100           BLOCK  0159           BL.ADR 0378
BL.BSZ 037A           BL.DCS 0377           BSTACK 0080           CNO.DP 0001
CNO.SB 0004           CNO.SI 0000           CNO.SP 0000           CNS.OT 0186
CR     000D           DC.BGN 0080           DC.EXC 0002           DC.MBO 0001
DC.MB1 0003           DC.MRQ 0001           DC.MRT 0000           DS.ASW 000C
DS.HLT 0002           D.ADDR 0040           D.BASE E400           D.PORT 0043
ER.MSG 016D           FALSE  0000           IM.ADR 0200           IM.SZE 00C0
INJECT 0110           LF     000A           MA10   0000           MSG.OT 0196
REV.B  0001           REV.C  0000           TRUE   0001           WAIT   0124
```

BIM

```
;******************************************************
;                                                     *
;       PROGRAM ID:     BOOTSTRAP INJECTION MODULE    *
;                                                     *
;******************************************************
;                                                     *
;       PROPERTY OF:    JADE COMPUTER PRODUCTS        *
;                       4901 W. ROSECRANS BLVD.       *
;                       HAWTHORNE, CALIFORNIA         *
;                       90250,   U.S.A.               *
;                                                     *
;******************************************************
;                                                     *
;       VERSION:        2.2                           *
;                                                     *
;******************************************************
; THE  BOOTSTRAP  INJECTION  MODULE  IS  ONE  OF TWO  *
; MODULES THAT TOGETHER MAKE UP THE  SYSTEM RESIDENT  *
; BOOT.  THIS MODULE IS DOWNLOADED INTO THE DOUBLE D  *
; MEMORY BY THE SYSTEM BOOTSTRAP DRIVER.  THE MODULE  *
; THEN READS IN THE DISK CONTROLLER MODULE (DCM) FROM *
; TRACK 0.  THE ORIGIN OF THIS PROGRAM IS FIXED AS IT *
; IS ASSEMBLED TO EXECUTE INSIDE THE DOUBLE D.   THE  *
; BOOT INJECTION MODULE  CAN  THEREFORE  RESIDE  IN   *
; THE BOOTSTRAP PROM WITHOUT THE NEED TO REASSEMBLE.  *
; NOTE:  STEP TIMING AND  MOTOR TURN-ON DELAYS  ARE   *
; DEFINED IN THIS MODULE.  PATCHING MAY BE REQUIRED.  *
;********************************************** SK ***
```

```
                        ;******************************************************
                        ; CONTROLLER PORT ASSIGNMENTS                         *
                        ;******************************************************

   0000                 BL.STS  ==      000H    ;BOARD STATUS
   0000                 BL.CTL  ==      000H    ;BOARD CONTROLS
   0004                 WD.CMD  ==      004H    ;1791 COMMAND REGISTER
   0004                 WD.STS  ==      004H    ;1791 STATUS REGISTER
   0005                 WD.TRK  ==      005H    ;1791 TRACK REGISTER
   0006                 WD.SEC  ==      006H    ;1791 SECTOR REGISTOR
   0007                 WD.DTA  ==      007H    ;1791 DATA REGISTER
   0008                 XP.STP  ==      008H    ;STEPPER PULSE
   0010                 XP.MTO  ==      010H    ;MOTOR TIME OUT
   0040                 XP.MTX  ==      040H    ;MOTOR TIME EXTEND
   0080                 XP.DSH  ==      080H    ;DATA SYNC HOLD

                        ;******************************************************
                        ; 1791-01 COMMAND CODES                               *
                        ;******************************************************

   0018                 DC.HDL  ==      018H    ;LOAD R/W HEAD.
   0090                 DC.RMS  ==      090H    ;READ MULTI-SECTOR.
   00D0                 DC.STS  ==      0D0H    ;SET TYPE 1 STATUS.

                        ;******************************************************
                        ; BOARD STATUS AND CONTROL PORTS                      *
                        ;******************************************************

   0001                 BS.USO  ==      001H    ;1791-01 INDICATOR (CLOSED).
   0000                 BC.DRO  ==      000H    ;DRIVE 0 SELECT.
   0004                 BC.DSE  ==      004H    ;DRIVE SELECT ENABLE

                        ;******************************************************
                        ; DISK STATUS MASKS                                   *
                        ;******************************************************

   009C                 DM.RER  ==      10011100B       ;READ ERROR TEST MASK
   0004                 DM.TKO  ==      00000100B       ;TRACK 0 TEST

                        ;******************************************************
                        ; DISK DRIVE PARAMETERS                               *
                        ;******************************************************

   0008                 TM.STP  ==      8               ;STEPPER INTERVAL - MS.
   0001                 TM.DBR  ==      1               ;DELAY BEFORE READ- MS.
   0050                 NB.TRK  ==      80              ;MAXIMUN NMBR OF STEPS.

                        ;******************************************************
                        ;*****************************************************
                        ; INTERNAL MEMORY ASSIGNMENTS                        *
                        ;*****************************************************

 0000                   BANK.0  ==      0000H           ;LOWER BANK ADDRESS.
 0400                   BANK.L  ==      0400H           ;1K BANK LENGTH.
 0400                   BANK.1  ==      BANK.0+BANK.L   ;UPPER BANK ADDRESS.
 0066                   INT.NM  ==      BANK.0+0066H    ;NON-MASKABLE INT ADDR.
 0376                   BL.ERC  ==      BANK.0+0376H    ;ERROR CODE LOCATION.
 0377                   BL.DCS  ==      BANK.0+0377H    ;DISK CONTROLLER STAT.

                        ;*****************************************************
                        ; BOOTSTRAP COMMUNICATION                            *
                        ;*****************************************************

 0001                   BE.HOM  ==      001H            ;HOME ERROR.
 0002                   BE.RDA  ==      002H            ;READ ERROR A.
 0004                   BE.RDB  ==      004H            ;READ ERROR B.

                        ;*****************************************************
                        ; DISK CONTROLLER MODULE (DCM) LINKAGE               *
                        ;*****************************************************

 000D                   DCM.SS  ==      13              ;FIRST DCM SECTOR = 13.
 0403                   DCM.BG  ==      BANK.1+3        ;DCM COLD START ENTRY.
 0400                   DCM.LN  ==      0400H           ;DCM LENGTH

                        ;*****************************************************
                        ; ASSEMBLER DIRECTIVES                               *
                        ;*****************************************************

                                .PABS                   ;ABSOLUTE ADDRESSING.
                                .PHEX                   ;INTEL HEX FILE FORM.
                                .XLINK                  ;NO LINKAGE OUTPUT.
 0000                           .LOC    BANK.0          ;PROGRAM START POINT

                        ;*****************************************************
                        ; DELAY MACRO.  ALLOWS 1791 TO DIGEST INSTRUCTIONS   *
                        ;*****************************************************

                        .DEFINE DELAY = [
                                XTHL
                                XTHL
                                XTHL
                                XTHL]

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

```
                           ;*********************************************************
                           ; SET STACK, START DRIVE MOTOR, AND SET INVERT SW (C) *
                           ;*********************************************************

 0000    31 0400           BEGIN:  LXI     SP,BANK.1           ;SET UP STACK.
 0003    DB40                      IN      XP.MTX              ;TURN ON MOTOR.
 0005    0E00                      MVI     C,0                 ;ASSUME 1793.
 0007    DB00                      IN      BL.STS              ;INPUT STATUS.
 0009    E601                      ANI     BS.US0              ;TEST USER SW 0.
 000B    2002                      JRNZ    SELECT              ;GOTO SELECT DRV.
 000D    0EFF                      MVI     C,0FFH              ;1791-01 INVERTS.

                           ;*********************************************************
                           ; CLEAR 1791-01 INTERRUPT AND SELECT DRIVE 0            *
                           ;*********************************************************

 000F    CD 009C           SELECT: CALL    STATUS              ;179X-01 FORCED CLEAR.
 0012    3E04                      MVI     A,BC.DSE!BC.DR0     ;DRIVE 0, ENABLED.
 0014    D300                      OUT     BL.CTL              ;OUTPUT CONTROLS.

                           ;*********************************************************
                           ; POSITION R/W HEAD AT TRACK ZERO                       *
                           ;*********************************************************

 0016    2E50              HOME:   MVI     L,NB.TRK            ;SET MAX TRACKS.
 0018    CD 009C           STEP:   CALL    STATUS              ;GET 179X STATUS.
 001B    E604                      ANI     DM.TK0              ;TEST TRACK 0 BIT.
 001D    200E                      JRNZ    TRACK0              ;TRACK 0 EXIT.
 001F    2D                        DCR     L                   ;DEC ATTEMPTS.
 0020    CA 0091                   JZ      ER.HOM              ;CANT FIND TRK 0?
 0023    DB08                      IN      XP.STP              ;ISSUE STEP PULSE.
 0025    11 0008                   LXI     D,TM.STP            ;STEP INTERVAL TIME.
 0028    CD 00A9                   CALL    TIMER               ;PAUSE FOR PERIOD.
 002B    18EB                      JMPR    STEP                ;TRY ANOTHER TIME.

                           ;*********************************************************
                           ; LOAD R/W HEAD ON SELECTED DRIVE                       *
                           ;*********************************************************

 002D    79                TRACK0: MOV     A,C                 ;GET TRACK 0 VALUE.
 002E    D305                      OUT     WD.TRK              ;SET TRACK REGISTER.
 0030    D307                      OUT     WD.DTA              ;SEEK SAME TRACK.
 0032    FD21 003D                 LXI     Y,RD.SET            ;SET NMI RETURN ADDR.
 0036    3E18                      MVI     A,DC.HDL            ;HEAD LOAD COMMAND.
 0038    A9                        XRA     C                   ;INVERT (1791-01).
 0039    D304                      OUT     WD.CMD              ;ISSUE COMMAND.
 003B    18FE                      JMPR    .                   ;WAIT FOR INTERRUPT.

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

```
                     ;******************************************************
                     ; SET-UP FOR DCM READ OPERATION                       *
                     ;******************************************************

003D    11 0001      RD.SET: LXI     D,TM.DBR       ;DELAY BEFORE READ.
0040    CD 00A9              CALL    TIMER          ;CALL MS. TIMER.
0043    11 0400              LXI     D,BANK.L       ;SET BANK LENGTH
0046    21 0400              LXI     H,BANK.1       ;DCM LOAD ADDRESS
0049    FD21 0089            LXI     Y,ER.RDA       ;READ ERROR TRAP.
004D    3E0D                 MVI     A,DCM.SS       ;FIRST SEC OF DCM.
004F    A9                   XRA     C              ;INVERT (1791-01)
0050    D306                 OUT     WD.SEC         ;SET 179X SEC REG.
0052    3E90                 MVI     A,DC.RMS       ;READ MULTI-SECTOR.
0054    A9                   XRA     C              ;INVERT (1791-01).
0055    D304                 OUT     WD.CMD         ;ISSUE 179X COMMAND.
0057    E3                   DELAY                  ;ALLOW 179X TO SETTLE.
005B    1813                 JMPR    R.BYTE         ;GOTO READ ROUTINE.

                     ;******************************************************
                     ; DISK INTERRUPT "NMI" ROUTINE                        *
                     ;******************************************************

0066                         .LOC    INT.NM

0066    DB04         WD.INT: IN      WD.STS         ;GET 1791 STATUS.
0068    A9                   XRA     C              ;INVERT (1791-01).
0069    32 0377              STA     BL.DCS         ;MAKE STATUS VISIBLE.
006C    FDE3                 XTIY                   ;EXCHANGE (SP)<>IY!
006E    ED45                 RETN                   ;BRANCH VECTOR ADDR.

                     ;******************************************************
                     ; ACCEPT EACH BYTE AND STORE IN MEMORY                *
                     ;******************************************************

0070    DB80         R.BYTE: IN      XP.DSH         ;WAIT FOR DATA.
0072    DB07                 IN      WD.DTA         ;INPUT INV DATA.
0074    A9                   XRA     C              ;INVERT (1791-01).
0075    77                   MOV     M,A            ;STORE DCM BYTE.
0076    23                   INX     H              ;INCREMENT POINTER.
0077    1B                   DCX     D              ;DECREMENT LENGTH.
0078    7A                   MOV     A,D            ;GET HIGH REG.
0079    B3                   ORA     E              ;THEN OR-IN LOW REG.
007A    20F4                 JRNZ    R.BYTE         ;READ ANOTHER BYTE.

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

```
                                ;*****************************************************
                                ; TEST READ STATUS, TERMINATE OPERATION, GO DCM      *
                                ;*****************************************************

  007C     DB04                 R.TEST: IN       WD.STS               ;INPUT READ STATUS.
  007E     A9                           XRA      C                    ;INVERT (1791-01).
  007F     E69C                         ANI      DM.RER               ;TEST FOR ERRORS.
  0081     200A                         JRNZ     ER.RDB               ;READ ERROR TRAP.
  0083     CD 009C                      CALL     STATUS               ;TERMINATE READ.
  0086     C3 0403                      JMP      DCM.BG               ;TRANSFER TO DCM.

                                ;*****************************************************
                                ; READ ERROR HAS BEEN DETECTED                       *
                                ;*****************************************************

  0089     3E02                 ER.RDA: MVI      A,BE.RDA             ;LOAD READ ERROR CODE.
  008B     1806                         JMPR     ER.HLT               ;GO TO ERROR HALT.
  008D     3E04                 ER.RDB: MVI      A,BE.RDB             ;LOAD READ ERROR CODE.
  008F     1802                         JMPR     ER.HLT               ;GO TO ERROR HALT.
  0091     3E01                 ER.HOM: MVI      A,BE.HOM             ;HOME ERROR CODE.
  0093     32 0376              ER.HLT: STA      BL.ERC               ;DISPLAY ERROR CODE.
  0096     AF                           XRA      A                    ;ZERO A REG.
  0097     D300                         OUT      BL.STS               ;DESELECT DRIVE.
  0099     DB10                         IN       XP.MTO               ;MOTOR OFF!
  009B     76                           HLT                           ;TERMINATE.

                                ;*****************************************************
                                ; GET UPDATED 1791-01 STATUS                         *
                                ;*****************************************************

  009C     3ED0                 STATUS: MVI      A,DC.STS             ;TYPE 4 - STATUS.
  009E     A9                           XRA      C                    ;INVERT (1791-01).
  009F     D304                         OUT      WD.CMD               ;ISSUE COMMAND.
  00A1     E3                           DELAY                         ;ALLOW 1791 TIME.
  00A5     DB04                         IN       WD.STS               ;GET STATUS
  00A7     A9                           XRA      C                    ;INVERT (1791-01).
  00A8     C9                           RET                           ;RETURN TO CALLER.

                                ;*****************************************************
                                ; TIMER - WAIT FOR (BC * 1.0) MILLISECONDS           *
                                ;*****************************************************

  00A9     3EF7                 TIMER:  MVI      A,247                ;LOAD INT MS VALUE.
  00AB     3D                   MS.INT: DCR      A                    ;DEC FOR 1 MS.
  00AC     20FD                         JRNZ     MS.INT               ;REPEAT FOR 1 MS.
  00AE     1B                           DCX      D                    ;TEST FOR ANOTHER MS.
  00AF     7A                           MOV      A,D                  ;CHECK REG D.
  00B0     B3                           ORA      E                    ;AND REGISTER E.
  00B1     20F6                         JRNZ     TIMER                ;DO ANOTHER 1 MS.
  00B3     C9                           RET                           ;TIME PERIOD EXPIRED!

                                ;*****************************************************

                                        .END
```

```
+++++ SYMBOL TABLE +++++

BANK.0 0000       BANK.1 0400       BANK.L 0400       BC.DRO 0000
BC.DSE 0004       BEGIN  0000       BE.HOM 0001       BE.RDA 0002
BE.RDB 0004       BL.CTL 0000       BL.DCS 0377       BL.ERC 0376
BL.STS 0000       BS.USC 0001       DCM.BG 0403       DCM.LN 0400
DCM.SS 000D       DC.HDL 0018       DC.RMS 0090       DC.STS 00D0
DM.RER 009C       DM.TKO 0004       ER.HLT 0093       ER.HOM 0091
ER.RDA 0089       ER.RDB 008D       HOME   0016       INT.NM 0066
MS.INT 00AB       NB.TRK 0050       RD.SET 003D       R.BYTE 0070
R.TEST 007C       SELECT 000F       STATUS 009C       STEP   0018
TIMER  00A9       TM.DBR 0001       TM.STP 0008       TRACK0 002D
WD.CMD 0004       WD.DTA 0007       WD.INT 0066       WD.SEC 0006
WD.STS 0004       WD.TRK 0005       XP.DSH 0080       XP.MTO 0010
XP.MTX 0040       XP.STP 0008
```

BLT

```
;******************************************************
;                                                     *
;       PROGRAM ID:     BIOS LOADER TRANSIENT         *
;                                                     *
;******************************************************
;                                                     *
;       PROPERTY OF:    JADE COMPUTER PRODUCTS        *
;                       4901 W. ROSECRANS BLVD.       *
;                       HAWTHORNE, CALIFORNIA         *
;                       90250,   U.S.A.               *
;                                                     *
;******************************************************
;                                                     *
;       VERSION:        2.2                           *
;                                                     *
;******************************************************
; THE BIOS LOADER IS READ INTO THE DCM SECTOR BUFFER *
; AFTER THE DCM PROGRAM HAS INITIALIZE. THIS PROGRAM *
; THEN READS THE  BIOS MODULE (1K) INTO BANK 1.  THE *
; COMMAND BLOCK IN  DCM IS SET TO INDICATE THE  BIOS *
; MODULE SIZE AND ITS LOAD ADDRESS.  THE BIOS LOADER *
; PROGRAM IS  GENERATED BY  MOVCPM.COM  AS THE  COLD *
; START LOADER (900-97F HEX).                        *
;*********************************************** SK ***
```

```
                        ;*****************************************************
                        ; CONTROLLER PORT ASSIGNMENTS                        *
                        ;*****************************************************

   0000                 BL.STS  ==      000H    ;BOARD STATUS
   0000                 BL.CTL  ==      000H    ;BOARD CONTROLS
   0004                 WD.CMD  ==      004H    ;1791 COMMAND REGISTER
   0004                 WD.STS  ==      004H    ;1791 STATUS REGISTER
   0006                 WD.SEC  ==      006H    ;1791 SECTOR REGISTOR
   0007                 WD.DTA  ==      007H    ;1791 DATA REGISTER
   0010                 XP.MTO  ==      010H    ;MOTOR TIME OUT
   0040                 XP.MTX  ==      040H    ;MOTOR TIME EXTEND
   0080                 XP.DSH  ==      080H    ;DATA SYNC HOLD

                        ;*****************************************************
                        ; 1791-01 COMMAND AND MASK.                          *
                        ;*****************************************************

   0080                 DC.RDS  ==  10000000B   ;READ SECTOR.
   009C                 DM.RER  ==  10011100B   ;READ ERROR MASK.

                        ;*****************************************************
                        ; SYSTEM ASSIGNMENTS                                 *
                        ;*****************************************************

   0014                 NMBR.K  ==      20              ;SYSTEM SIZE IN K.
   0400                 LNG.1K  ==      1024            ;TOTAL BYTES IN 1K.
   5000                 CPM.SZ  ==      NMBR.K*LNG.1K   ;TOTAL SYSTEM BYTES.
   0600                 BIOS.S  ==      LNG.1K*3/2      ;BIOS ALLOCATED SIZE.
   4A00                 BIOS.A  ==      CPM.SZ-BIOS.S   ;BIOS LOAD ADDRESS.

                        ;*****************************************************
                        ; INTERNAL MEMORY ASSIGNMENTS                        *
                        ;*****************************************************

   1000                 BANK.0  ==      1000H           ;LOWER BANK ADDRESS.
   0400                 BANK.L  ==      0400H           ;1K BANK LENGTH.
   1400                 BANK.1  ==      BANK.0+BANK.L   ;UPPER BANK ADDRESS.
   1370                 IO.BLK  ==      BANK.0+0370H    ;I/O BLOCK ADDRESS.
   1377                 CB.STS  ==      IO.BLK+0007H    ;COMMAND STATUS BYTE.
   1378                 CW.LAD  ==      IO.BLK+0008H    ;BIOS LOAD ADDR LOC.
   137A                 CW.LNG  ==      IO.BLK+000AH    ;BIOS LOAD LENGTH LOC.
   1380                 SEC.BF  ==      BANK.0+0380H    ;SECTOR BUFFER AREA.

                        ;*****************************************************
                        ; BIOS PROGRAM LINKAGE.                              *
                        ;*****************************************************

   0004                 SEC.BG  ==      4               ;FIRST BIOS SECTOR.
   0008                 SEC.NM  ==      8               ;NUMBER OF SECTORS.
   000B                 SEC.EX  ==      SEC.BG+SEC.NM-1 ;LAST BIOS SECTOR.

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

```
                         ;*****************************************************
                         ; ASSEMBLER DIRECTIVES                               *
                         ;*****************************************************

                                 .PABS
                                 .PHEX
                                 .XLINK
 1380                            .LOC     SEC.BF          ;PROGRAM START POINT

                         ;*****************************************************
                         ; PAUSE MACRO.  ALLOWS 1791 TO DIGEST INSTRUCTIONS!  *
                         ;*****************************************************

                         .DEFINE PAUSE = [
                                 XTHL
                                 XTHL
                                 XTHL
                                 XTHL]

                         ;*****************************************************
                         ; INITIALIZE BIOS READ OPERATION                     *
                         ;*****************************************************

 1380    21 0400         BEGIN:  LXI      H,LNG.1K        ;BIOS LOAD LENGTH.
 1383    22 137A                 SHLD     CW.LNG          ;LOAD LENGTH SET.
 1386    21 4A00                 LXI      H,BIOS.A        ;BIOS SYSTEM ADDR.
 1389    22 1378                 SHLD     CW.LAD          ;LOAD ADDRESS SET.
 138C    21 1400                 LXI      H,BANK.1        ;BIOS LOAD POINT.

                         ;*****************************************************
                         ; SET-UP FOR EACH READ SECTOR COMMAND                *
                         ;*****************************************************

 138F    FD21 13AB       RD.SEC: LXI      Y,RD.TST        ;SET NMI VECTOR.
 1393    3A 13C7                 LDA      SECTOR          ;FIRST BIOS SECTOR.
 1396    A9                      XRA      C               ;INVERT (1791-01).
 1397    D306                    OUT      WD.SEC          ;SET 1791 SEC REG.
 1399    3E80                    MVI      A,DC.RDS        ;READ SECTOR CMND.
 139B    A9                      XRA      C               ;INVERT (1791-01).
 139C    D304                    OUT      WD.CMD          ;ISSUE 1791 COMMAND.
 139E    E3                      PAUSE                    ;ALLOW 1791 TO SETTLE.

                         ;*****************************************************
                         ; READ SECTOR OPERATION                              *
                         ;*****************************************************

 13A2    DB80            RD.BYT: IN       XP.DSH          ;WAIT FOR DATA.
 13A4    DB07                    IN       WD.DTA          ;INPUT INV DATA.
 13A6    A9                      XRA      C               ;INVERT (1791-01).
 13A7    77                      MOV      M,A             ;STORE DCM BYTE.
 13A8    23                      INX      H               ;INCREMENT POINTER.
 13A9    18F7                    JMPR     RD.BYT          ;REPEAT OPERATION.

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

```
                              ;*****************************************************
                              ; CHECK READ SECTOR STATUS, REPEAT UNTIL BIOS LOADED *
                              ;*****************************************************

 13AB     E69C                RD.TST: ANI      DM.RER            ;TEST FOR ERRORS.
 13AD     200D                        JRNZ     ERRORS            ;ERROR DETECTED.
 13AF     3A 13C7                     LDA      SECTOR            ;GET SECTOR NMBR.
 13B2     FE0B                        CPI      SEC.EX            ;CHECK IF LAST SEC.
 13B4     280F                        JRZ      FINISH            ;GO IF FINISHED.
 13B6     3C                          INR      A                 ;INCREMENT.
 13B7     32 13C7                     STA      SECTOR            ;STORE AWAY.
 13BA     18D3                        JMPR     RD.SEC            ;READ NEXT SECTOR.

                              ;*****************************************************
                              ; READ ERROR HAS BEEN DETECTED                       *
                              ;*****************************************************

 13BC     32 1377             ERRORS: STA      CB.STS            ;DISPLAY ERROR STATUS.
 13BF     AF                          XRA      A                 ;ZERO  A REGISTER.
 13C0     D300                        OUT      BL.CTL            ;DESELECT DRIVE.
 13C2     DB10                        IN       XP.MTO            ;MOTOR OFF!
 13C4     76                          HLT                        ;TERMINATE.

                              ;*****************************************************
                              ; BIOS SECTOR HAVE BEEN LOADED                       *
                              ;*****************************************************

 13C5     FB                  FINISH: EI                         ;ENABLE INTERRUPTS.
 13C6     76                          HLT                        ;SHUTDOWN BOARD.

                              ;*****************************************************
                              ; SECTOR NUMBER STORAGE                              *
                              ;*****************************************************

 13C7     04                  SECTOR: .BYTE    SEC.BG            ;SECTOR COUNTER.

                              ;*****************************************************
                                      .END
```

```
+++++ SYMBOL TABLE +++++

BANK.0 1000       BANK.1 1400       BANK.L 0400       BEGIN  1380
BIOS.A 4A00       BIOS.S 0600       BL.CTL 0000       BL.STS 0000
CB.STS 1377       CPM.SZ 5000       CW.LAD 1378       CW.LNG 137A
DC.RDS 0080       DM.RER 009C       ERRORS 13BC       FINISH 13C5
IO.BLK 1370       LNG.1K 0400       NMBR.K 0014       RD.BYT 13A2
RD.SEC 138F       RD.TST 13AB       SECTOR 13C7       SEC.BF 1380
SEC.BG 0004       SEC.EX 000B       SEC.NM 0008       WD.CMD 0004
WD.DTA 0007       WD.SEC 0006       WD.STS 0004       XP.DSH 0080
XP.MTO 0010       XP.MTX 0040
```

FORMAT

```
;*******************************************************
;                                                     *
;       PROGRAM ID:     FORMAT                        *
;                                                     *
;*******************************************************
;                                                     *
;       PROPERTY OF:    JADE COMPUTER PRODUCTS        *
;                       4901 W. ROSECRANS BLVD.       *
;                       HAWTHORNE, CALIFORNIA         *
;                       90250,   U.S.A.               *
;                                                     *
;*******************************************************
;                                                     *
;       VERSION:        2.2                           *
;                                                     *
;*******************************************************
;                                                     *
;       WRITTEN BY:     STAN KRUMME                   *
;                                                     *
;*******************************************************
; FORMAT  IS A SYSTEM UTILITY  WHICH PROVIDES A MEANS *
; TO WRITE A  SINGLE OR  DOUBLE DENSITY FORMAT ON ANY *
; OF DRIVES  A THROUGH D.  THIS UTILITY ALSO PROVIDES *
; A  COPY-SYSTEM-TRACKS  FEATURE.  THIS  IS  A USEFUL *
; FUNCTION FOR  FORMAT AS THE  SYSTEM  TRACKS  CAN BE *
; WRITTEN WITH THE  OPERATING SYSTEM  WHEN FORMATTED. *
; THE USER CAN FORMAT ONLY THE SYSTEM TRACKS OF OLDER *
; SINGLE DENSITY DISKETTES SUCH THAT  THESE DISKETTES *
; CAN CARRY THE  OPERATING SYSTEM WITHOUT ERASING THE *
; DATA TRACKS. FORMAT.COM IS 8080/8085/Z80 COMPATABLE *
;*******************************************************
```

```
                        ;*******************************************************
                        ; DRIVER MODULE DEFINITIONS                             *
                        ;*******************************************************

   000A                 LF      ==      00AH            ;ASCII LINE FEED.
   000D                 CR      ==      00DH            ;CARRAIGE RETURN.
   0100                 TPA     ==      0100H           ;TRANSIENT PROGRAM.
   0003                 CNTL.C  ==      3               ;REQUEST REBOOT CPM.
   0000                 TRK.0   ==      0               ;TRACK 0.
   0001                 TRK.1   ==      1               ;TRACK 1.
   0002                 TRK.2   ==      2               ;TRACK 2.
   004C                 TRK.76  ==      76              ;TRACK 76.
   0080                 SEC.SZ  ==      128             ;128 BYTES PER SECTOR.
   0001                 ID.SEC  ==      1               ;ID SECTOR NUMBER.
   0000                 REBOOT  ==      0               ;REBOOT ADDRESS.

                        ;*******************************************************
                        ; SYSTEM TRACKS COPY DEFINITIONS                        *
                        ;*******************************************************

   1000                 TK0.LP  ==      1000H           ;TRACK 0 TPA LOAD ADDR.
   0001                 TK0.FS  ==      1               ;TRACK 0 FIRST SECTOR.
   001A                 TK0.LS  ==      26              ;TRACK 0 LAST SECTOR.
   001A                 TK0.NS  ==      TK0.LS-TK0.FS+1 ;TRACK 0 NMBR SECTORS.
   0F80                 TK0.LC  == TK0.LP-SEC.SZ*TK0.FS ;TRACK 0 LOAD CONSTANT.
   0D00                 TK0.SZ  ==      SEC.SZ*TK0.NS   ;TRACK 0 LOAD SIZE.
   1D00                 TK1.LP  ==      TK0.LP+TK0.SZ   ;TRACK 1 TPA LOAD ADDR.
   0001                 TK1.FS  ==      1               ;TRACK 1 FIRST SECTOR.
   0030                 TK1.LS  ==      48              ;TRACK 1 LAST SECTOR.

                        ;*******************************************************
                        ; INJECTION MODULE DEFINITIONS                          *
                        ;*******************************************************

   1700                 FMT.EA  ==      1700H           ;FORMAT EXEC ADDRESS.
   0005                 WD.TRK  ==      005H            ;DOUBLE D TRACK PORT.
   0007                 WD.DTA  ==      007H            ;DOUBLE D DATA PORT.
   0080                 XP.DSH  ==      80H             ;DATA SYNC HOLD PORT.
   0000                 ZEROS   ==      00000000B       ;ALL ZERO BYTE.
   00FF                 ONES    ==      11111111B       ;ALL ONES BYTE.

                        ;*******************************************************
                        ; BDOS CALL - VECTOR NUMBERS                            *
                        ;*******************************************************

   0005                 BDOS    ==      0005H           ;SYSTEM CALL ADDR.
   0001                 CNS.RD  ==      1               ;READ CONSOLE.
   0002                 CNS.WR  ==      2               ;WRITE CONSOLE.
```

```
                        ;*******************************************************
                        ; BIOS VECTOR DEFINITIONS                              *
                        ;*******************************************************

   001B                 BS.DSK  ==      01BH            ;SELECT DISK OFFSET.
   001E                 BS.TRK  ==      01EH            ;SET TRACK OFFSET.
   0021                 BS.SEC  ==      021H            ;SET SECTOR OFFSET.
   0024                 BS.DMA  ==      024H            ;SET ADDRESS OFFSET.
   0027                 BS.RDS  ==      027H            ;READ SECTOR OFFSET.
   002A                 BS.WRS  ==      02AH            ;WRITE SECTOR OFFSET.
   0033                 BS.FMT  ==      033H            ;FORMAT TRACK OFFSET.
   0002                 BS.PAG  ==      0002H           ;BIOS VECTOR POINTER.
   0001                 LOG.VC  ==      1               ;DRV SEL DONT LOGON.

                        ;*******************************************************
                        ; ASSEMBLER DIRECTIVES                                 *
                        ;*******************************************************

                                .I8080
                                .PABS
                                .PHEX
                                .XLINK
   0100                         .LOC    TPA
```

```
                        ;*******************************************************
                        ; PROGRAM BEGINS                                        *
                        ;*******************************************************

 0100    C3 0138        BEGIN:  JMP     INIT            ;GO TO INITIALIZE.

                        ;*******************************************************
                        ; ASCII IDENTIFICATION INSERT                           *
                        ;*******************************************************

 0103    4A4144452043           .ASCII  'JADE COMPUTER PRODUCTS '
 011A    444F55424C45           .ASCII  'DOUBLE D - FORMAT '
 012C    56455253494F           .ASCII  'VERSION 2.2 '

                        ;*******************************************************
                        ; SET STACK POINTER AND ISSUE LOG-ON                    *
                        ;*******************************************************

 0138    31 0100        INIT:   LXI     SP,TPA          ;SET STACK POINTER.
 013B    21 0521                LXI     H,MSG.BG        ;LOAD MESSAGE ADDR.
 013E    CD 0281                CALL    MSG.OT          ;ISSUE MESSAGE.

                        ;*******************************************************
                        ; FUNCTION SELECTION AND CONTROL DISTRIBUTOR            *
                        ;*******************************************************

 0141    21 056C        FUN.BG: LXI     H,MSG.FL        ;FUNCTION LIST ADDRESS.
 0144    CD 0281                CALL    MSG.OT          ;ISSUE MESAGE.
 0147    CD 028F                CALL    CNS.IN          ;GET CONSOLE CHARACTER.
 014A    FE31                   CPI     "1"
 014C    CA 017E                JZ      FUN.1           ;FMT DOUBLE DENSITY.
 014F    FE32                   CPI     "2"
 0151    CA 01E3                JZ      FUN.2           ;FMT SINGLE DENSITY.
 0154    FE33                   CPI     "3"
 0156    CA 01BB                JZ      FUN.3           ;FMT 3740.
 0159    FE34                   CPI     "4"
 015B    CA 022B                JZ      FUN.4           ;FMT SYSTEM TRACKS.
 015E    FE35                   CPI     "5"
 0160    CA 0259                JZ      FUN.5           ;READ SYSTEM TRACKS.
 0163    FE36                   CPI     "6"
 0165    CA 026D                JZ      FUN.6           ;WRITE SYSTEM TRACKS.
 0168    FE26                   CPI     "&"
 016A    CA 03FD                JZ      RST.6           ;DEBUG TDL TRAP.
 016D    FE27                   CPI     "'"
 016F    CA 03FE                JZ      RST.7           ;DDT TRAP.
 0172    21 066C                LXI     H,MSG.SE        ;SELECT ERROR MESSAGE.
 0175    32 0670                STA     LTR.SE          ;STORE BAD SYMBOL.
 0178    CD 0281                CALL    MSG.OT          ;ISSUE MESSAGE.
 017B    C3 0141                JMP     FUN.BG          ;TRY SELECTION AGAIN.

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

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                          ;*****************************************************
                          ; FUNCTION 1 - FORMAT IN DOUBLE DENSITY              *
                          ;*****************************************************

017E      3A 04D2         FUN.1:   LDA      DD.FLG          ;LOAD DDENS FLAGS.
0181      32 0406                  STA      F.FLAG          ;STORE FORMAT FLAGS.
0184      21 068B                  LXI      H,MSG.FD        ;FORMAT DRIVE MESSAGE.
0187      CD 03AA                  CALL     SEL.DR          ;SELECT DRIVE LETTER.
018A      DA 0141                  JC       FUN.BG          ;CARRY: RESELECT.
018D      3E00                     MVI      A,TRK.0         ;TRACK 0.
018F      32 0404                  STA      TRK.NO          ;SET TRACK NUMBER.
0192      CD 02E4                  CALL     FMT.SD          ;FORMAT TRACK SDENS.
0195      DA 017E                  JC       FUN.1           ;JUMP ERROR DETECTED.
0198      3E01                     MVI      A,TRK.1         ;TRACK 1 VALUE.
019A      32 0404                  STA      TRK.NO          ;SET TRACK NUMBER.
019D      CD 02EA         ..REPT:  CALL     FMT.DD          ;FORMAT TRACK DDENS.
01A0      DA 017E                  JC       FUN.1           ;JUMP ERROR DETECTED.
01A3      3A 0404                  LDA      TRK.NO          ;LOAD TRACK NUMBER.
01A6      FE4C                     CPI      TRK.76          ;WAS IT THE LAST TRK.
01A8      CA 01B2                  JZ       ..ID            ;AFTER LAST TRACK.
01AB      3C                       INR      A               ;INCREMENT TRACK NO.
01AC      32 0404                  STA      TRK.NO          ;STORE TRACK NUMBER.
01AF      C3 019D                  JMP      ..REPT          ;FORMAT NEXT TRACK.
01B2      21 04A1         ..ID:    LXI      H,IDS.DD        ;ID SECTOR: DDENS.
01B5      CD 02C1                  CALL     WRT.ID          ;WRITE ID SECTOR.
01B8      C3 017E                  JMP      FUN.1           ;ANOTHER DISK?

                          ;*****************************************************
                          ; FUNCTION 3 - FORMAT STANDARD 3740                  *
                          ;*****************************************************

01BB      3E00            FUN.3:   MVI      A,0             ;3740 SDENS FLAGS.
01BD      32 0406                  STA      F.FLAG          ;STORE FORMAT FLAGS.
01C0      21 068B                  LXI      H,MSG.FD        ;FORMAT DRIVE MESSAGE.
01C3      CD 03AA                  CALL     SEL.DR          ;SELECT DRIVE LETTER.
01C6      DA 0141                  JC       FUN.BG          ;CARRY: RESELECT.
01C9      3E00                     MVI      A,TRK.0         ;TRACK 0.
01CB      32 0404                  STA      TRK.NO          ;SET TRACK NUMBER.
01CE      CD 02E4         ..REPT:  CALL     FMT.SD          ;FORMAT TRACK SDENS.
01D1      DA 01BB                  JC       FUN.3           ;JUMP ERROR DETECTED.
01D4      3A 0404                  LDA      TRK.NO          ;LOAD TRACK NUMBER.
01D7      FE4C                     CPI      TRK.76          ;WAS IT THE LAST TRK.
01D9      CA 01BB                  JZ       FUN.3           ;AFTER LAST TRACK.
01DC      3C                       INR      A               ;INCREMENT TRACK NO.
01DD      32 0404                  STA      TRK.NO          ;STORE TRACK NUMBER.
01E0      C3 01CE                  JMP      ..REPT          ;FORMAT NEXT TRACK.

                          ;*****************************************************
                          ;***********************************************************
                          ; FUNCTION 2 - FORMAT IN SINGLE DENSITY                     *
                          ;***********************************************************

 01E3     3A 0452         FUN.2:   LDA     SD.FLG              ;LOAD SDENS FLAGS.
 01E6     32 0406                  STA     F.FLAG              ;STORE FORMAT FLAGS.
 01E9     21 068B                  LXI     H,MSG.FD            ;FORMAT DRIVE MESSAGE.
 01EC     CD 03AA                  CALL    SEL.DR              ;SELECT DRIVE LETTER.
 01EF     DA 0141                  JC      FUN.BG              ;CARRY: RESELECT.
 01F2     3E00                     MVI     A,TRK.0             ;TRACK 0.
 01F4     32 0404                  STA     TRK.NO              ;SET TRACK NUMBER.
 01F7     CD 02E4                  CALL    FMT.SD              ;FORMAT TRACK SDENS.
 01FA     DA 01E3                  JC      FUN.2               ;JUMP ERROR DETECTED.
 01FD     3E01                     MVI     A,TRK.1             ;TRACK 1
 01FF     32 0404                  STA     TRK.NO              ;SET TRACK NUMBER.
 0202     CD 02EA                  CALL    FMT.DD              ;FORMAT TRACK DDENS.
 0205     DA 01E3                  JC      FUN.2               ;JUMP ERROR DETECTED.
 0208     3E02                     MVI     A,TRK.2             ;TRACK 2.
 020A     32 0404                  STA     TRK.NO              ;SET TRACK NUMBER.
 020D     CD 02E4         ..REPT:  CALL    FMT.SD              ;FORMAT TRACK SDENS.
 0210     DA 01E3                  JC      FUN.2               ;JUMP ERROR DETECTED.
 0213     3A 0404                  LDA     TRK.NO              ;LOAD TRACK NUMBER.
 0216     FE4C                     CPI     TRK.76              ;WAS IT THE LAST TRK.
 0218     CA 0222                  JZ      ..ID                ;AFTER LAST TRACK.
 021B     3C                       INR     A                   ;INCREMENT TRACK NO.
 021C     32 0404                  STA     TRK.NO              ;STORE TRACK NUMBER.
 021F     C3 020D                  JMP     ..REPT              ;FORMAT NEXT TRACK.
 0222     21 0421         ..ID:    LXI     H,IDS.SD            ;ID SECTOR: SDENS.
 0225     CD 02C1                  CALL    WRT.ID              ;WRITE ID SECTOR.
 0228     C3 01E3                  JMP     FUN.2               ;ANOTHER DISK?

                          ;***********************************************************
                          ; FUNCTION 4 - FORMAT JADE SYSTEM TRACKS ONLY               *
                          ;***********************************************************

 022B     3A 0452         FUN.4:   LDA     SD.FLG              ;LOAD SDENS FLAGS.
 022E     32 0406                  STA     F.FLAG              ;STORE FORMAT FLAGS.
 0231     21 068B                  LXI     H,MSG.FD            ;FORMAT DRIVE MESSAGE.
 0234     CD 03AA                  CALL    SEL.DR              ;SELECT DRIVE LETTER.
 0237     DA 0141                  JC      FUN.BG              ;CARRY: RESELECT.
 023A     3E00                     MVI     A,TRK.0             ;TRACK 0.
 023C     32 0404                  STA     TRK.NO              ;SET TRACK NUMBER.
 023F     CD 02E4                  CALL    FMT.SD              ;FORMAT TRACK SDENS.
 0242     DA 022B                  JC      FUN.4               ;JUMP ERROR DETECTED.
 0245     3E01                     MVI     A,TRK.1             ;TRACK 1
 0247     32 0404                  STA     TRK.NO              ;SET TRACK NUMBER.
 024A     CD 02EA                  CALL    FMT.DD              ;FORMAT TRACK DDENS.
 024D     DA 022B                  JC      FUN.4               ;JUMP ERROR DETECTED.
 0250     21 0421                  LXI     H,IDS.SD            ;ID SECTOR: SDENS.
 0253     CD 02C1                  CALL    WRT.ID              ;WRITE ID SECTOR.
 0256     C3 022B                  JMP     FUN.4               ;ANOTHER DISK?

                          ;***********************************************************
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```
                                ;*******************************************************
                                ; FUNCTION 5 - READ SYSTEM TRACKS                      *
                                ;*******************************************************

   0259     21 06B7             FUN.5:  LXI     H,MSG.RS        ;READ SYSTEM MESSAGE.
   025C     CD 03AA                     CALL    SEL.DR          ;SELECT DRIVE LETTER.
   025F     DA 0141                     JC      FUN.BG          ;GOTO RESELECT.
   0262     3E27                        MVI     A,BS.RDS        ;READ SECTOR VECTOR.
   0264     32 0401                     STA     RW.OPV          ;TRANSFER IS READ.
   0267     CD 0314                     CALL    TRNSFR          ;READ SYSTEM TRACKS.
   026A     C3 0141                     JMP     FUN.BG          ;RESELECT FUNCTION.

                                ;*******************************************************
                                ; FUNCTION 6 - WRITE SYSTEM TRACKS                     *
                                ;*******************************************************

   026D     21 06D3             FUN.6:  LXI     H,MSG.WS        ;WRITE SYSTEM MESSAGE.
   0270     CD 03AA                     CALL    SEL.DR          ;SELECT REQUESTED DRV.
   0273     DA 0141                     JC      FUN.BG          ;GOTO RESELECT.
   0276     3E2A                        MVI     A,BS.WRS        ;WRITE SECTOR VECTOR.
   0278     32 0401                     STA     RW.OPV          ;TRANSFER IS WRITE
   027B     CD 0314                     CALL    TRNSFR          ;WRITE SYSTEM TRACKS.
   027E     C3 026D                     JMP     FUN.6           ;WRITE ANOTHER DISK.

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

```
                        ;******************************************************
                        ; MESSAGE DISPLAY ROUTINE                             *
                        ;******************************************************

    0281    F5          MSG.OT: PUSH    PSW             ;SAVE CALLER FLAGS.
    0282    7E          ..REPT: MOV     A,M             ;LOAD CHARACTER.
    0283    CD 029C             CALL    CNS.OT          ;CONSOLE OUTPUT.
    0286    7E                  MOV     A,M             ;SAME CAHRACTER.
    0287    23                  INX     H               ;INCREMENT POINTER.
    0288    E680                ANI     080H            ;TEST SIGN BIT.
    028A    CA 0282             JZ      ..REPT          ;ANOTHER CHARACTER.
    028D    F1                  POP     PSW             ;RESTORE FLAGS.
    028E    C9                  RET                     ;RETURN TO CALLER.

                        ;******************************************************
                        ; CONSOLE LINKAGE - BDOS CALLS                        *
                        ;******************************************************

    028F    0E01        CNS.IN: MVI     C,CNS.RD        ;BDOS CONSOLE READ.
    0291    CD 0005             CALL    BDOS            ;SYSTEM CALL.
    0294    E67F                ANI     07FH            ;7 BIT ASCII.
    0296    FE03                CPI     CNTL.C          ;CHECK CONTROL-C.
    0298    CA 0000             JZ      REBOOT          ;REBOOT SYSTEM.
    029B    C9                  RET                     ;RETURN CALLER.

    029C    E5          CNS.OT: PUSH    H               ;SAVE TEXT INDEX.
    029D    5F                  MOV     E,A             ;MOVE CHARACTER.
    029E    0E02                MVI     C,CNS.WR        ;BDOS CONSOLE WRITE.
    02A0    CD 0005             CALL    BDOS            ;SYSTEM CALL.
    02A3    E1                  POP     H               ;SAVE TEXT POINTER.
    02A4    C9                  RET                     ;RETURN CALLER.

                        ;******************************************************
                        ; DISPLAY HEXIDECIMAL VALUE                           *
                        ;******************************************************

    02A5    7C          HXW.OT: MOV     A,H             ;LOAD HIGH ORDER.
    02A6    CD 02AA             CALL    HXB.OT          ;DO HIGH BYTE.
    02A9    7D                  MOV     A,L             ;LOAD LOW ORDER.
    02AA    F5          HXB.OT: PUSH    PSW             ;SAVE CHARACTER.
    02AB    0F                  RRC                     ;SHIFT
    02AC    0F                  RRC
    02AD    0F                  RRC
    02AE    0F                  RRC
    02AF    CD 02B3             CALL    HXN.OT          ;DO UPPER NIBBLE.
    02B2    F1                  POP     PSW             ;GET LOWER NIBBLE.
    02B3    E60F        HXN.OT: ANI     00FH            ;MASK NIBBLE.
    02B5    FE0A                CPI     00AH            ;LESS THAN 10?
    02B7    DA 02BC             JC      ..NMBR          ;DO NUMBER THING.
    02BA    C607        ..LTTR: ADI     ´A´-´9´-1       ;ADD LETTER OFFSET.
    02BC    C630        ..NMBR: ADI     ´0´             ;START AT ZERO.
    02BE    C3 029C             JMP     CNS.OT          ;CONSOLE OUTPUT.

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

```
                     ;*****************************************************
                     ; WRITE ID SECTOR                                     *
                     ;*****************************************************

                     ;*******( SET TRANSFER ADDRESS )**********************

02C1    44           WRT.ID: MOV     B,H            ;MOV HL TO BC.
02C2    4D                   MOV     C,L            ;MOV HL TO BC.
02C3    2E24                 MVI     L,BS.DMA       ;BIOS DMA VECTOR.
02C5    CD 03F8              CALL    BIOS           ;SET TRANSFER ADDRESS.

                     ;*******( SET TRACK TO ZERO )*************************

02C8    0E00                 MVI     C,TRK.0        ;TRACK 0 SET.
02CA    2E1E                 MVI     L,BS.TRK       ;BIOS TRACK VECTOR.
02CC    CD 03F8              CALL    BIOS           ;SET TRACK NMBR.

                     ;*******( SET SECTOR TO ID.SEC )**********************

02CF    0E01                 MVI     C,ID.SEC       ;ID SECTOR VALUE.
02D1    2E21                 MVI     L,BS.SEC       ;BIOS SECTOR VECTOR.
02D3    CD 03F8              CALL    BIOS           ;BIOS TRANSFER CALL.

                     ;*******( PERFORM WRITE SECTOR )**********************

02D6    2E2A                 MVI     L,BS.WRS       ;BIOS WRITE VECTOR.
02D8    CD 03F8              CALL    BIOS           ;BIOS TRANSFER CALL.
02DB    B7                   ORA     A              ;SET CONDITION CODES.
02DC    C8                   RZ                     ;RETURN USER GOOD.
02DD    21 06FF              LXI     H,MSG.NC       ;TRANSFER INCOMPLETE.
02E0    CD 0281              CALL    MSG.OT         ;ISSUE MESSAGE.
02E3    C9                   RET

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

```
                        ;*****************************************************
                        ; FORMAT TRACK DRIVER                                 *
                        ;*****************************************************

                        ;*******( DENSITY ENTRIES )****************************

  02E4    21 0800       FMT.SD: LXI     H,FT3740        ;LOAD INJECTION ADDR.
  02E7    C3 02ED               JMP     ST.DMA          ;GO SET DMA ADDR.
  02EA    21 0900       FMT.DD: LXI     H,FTJ48D        ;LOAD INJECTION ADDR.

                        ;*******( SET INJECTION MODULE ADDRESS )***************

  02ED    44            ST.DMA: MOV     B,H             ;MOV HL TO BC.
  02EE    4D                    MOV     C,L             ;MOV HL TO BC.
  02EF    2E24                  MVI     L,BS.DMA        ;BIOS DMA VECTOR.
  02F1    CD 03F8               CALL    BIOS            ;SET TRANSFER ADDRESS.

                        ;*******( SET TRACK )**********************************

  02F4    3A 0404               LDA     TRK.NO          ;LOAD TRACK NMBR.
  02F7    4F                    MOV     C,A             ;PUT INTO C REGISTER.
  02F8    2E1E                  MVI     L,BS.TRK        ;BIOS TRACK VECTOR.
  02FA    CD 03F8               CALL    BIOS            ;SET TRACK NMBR.

                        ;*******( SET SECTOR TO FLAG )*************************

  02FD    3A 0406               LDA     F.FLAG          ;LOAD DCM FLAG.
  0300    4F                    MOV     C,A             ;DCM FLAGS.
  0301    2E21                  MVI     L,BS.SEC        ;BIOS SECTOR VECTOR.
  0303    CD 03F8               CALL    BIOS            ;BIOS TRANSFER CALL.

                        ;*******( PERFORM FORMAT TRACK )***********************

  0306    2E33                  MVI     L,BS.FMT        ;BIOS WRITE VECTOR.
  0308    CD 03F8               CALL    BIOS            ;BIOS TRANSFER CALL.
  030B    B7                    ORA     A               ;SET CONDITION CODES.
  030C    C8                    RZ                      ;RETURN USER GOOD.
  030D    21 06FF               LXI     H,MSG.NC        ;TRANSFER INCOMPLETE.
  0310    CD 0281               CALL    MSG.OT          ;ISSUE MESSAGE.
  0313    C9                    RET

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

```
                     ;*******************************************************
                     ; SYSTEM TRACKS TRANSFER FUNCTION - ENTRY POINT        *
                     ;*******************************************************

                     ;*******( TRANSFER TRACK 0 )****************************

0314    21 0407      TRNSFR: LXI     H,TKO.SL        ;ADDR OF SECTOR LIST.
0317    23                   INX     H               ;SKIP ID SECTOR.
0318    22 03FF              SHLD    SYS.WP          ;INIT WORK POINTER.
031B    0E00                 MVI     C,TRK.0         ;CBS TRACK NUMBER.
031D    2E1E                 MVI     L,BS.TRK        ;BIOS TRACK VECTOR.
031F    CD 03F8              CALL    BIOS            ;BIOS TRANSFER CALL.

                     ;*******( SET SECTOR IN BIOS )**************************

0322    2A 03FF      ..TKOS: LHLD    SYS.WP          ;LOAD SECTOR POINTER.
0325    4E                   MOV     C,M             ;SECTOR NMBR TO REG C.
0326    2E21                 MVI     L,BS.SEC        ;BIOS SETSEC VECTOR.
0328    CD 03F8              CALL    BIOS            ;BIOS TRANSFER CALL.

                     ;*******( SET ADDRESS IN BIOS )*************************

032B    2A 03FF              LHLD    SYS.WP          ;LOAD SECTER POINTER.
032E    A7                   ANA     A               ;CLEAR CARRY BIT.
032F    7E                   MOV     A,M             ;GET SECTOR NUMBER.
0330    1F                   RAR                     ;SECTOR NMBR / 2.
0331    57                   MOV     D,A             ;HIGH LOAD OFFSET.
0332    3E00                 MVI     A,0             ;ZERO A REGISTER.
0334    1F                   RAR                     ;CARRY TO BIT 7.
0335    5F                   MOV     E,A             ;LOW LOAD OFFSET.
0336    21 0F80              LXI     H,TKO.LC        ;TRK 0 LOAD CONSTANT.
0339    19                   DAD     D               ;HL = SEC LOAD ADDR.
033A    44                   MOV     B,H             ;HL TO BC HIGH ORDER.
033B    4D                   MOV     C,L             ;HL TO BC LOW ORDER.
033C    2E24                 MVI     L,BS.DMA        ;BIOS ADDR VECTOR.
033E    CD 03F8              CALL    BIOS            ;BIOS TRANSFER CALL.

                     ;*******( SECTOR TRANSFER OPERATION )*******************

0341    3A 0401              LDA     RW.OPV          ;LOAD OPERATION VECTOR.
0344    6F                   MOV     L,A             ;TRANSFER TO REG L.
0345    CD 03F8              CALL    BIOS            ;BIOS TRANSFER CALL.
0348    B7                   ORA     A               ;SET CONDITION CODES.
0349    C2 03A3              JNZ     ..BLOW          ;SOMETHING WRONG!

                     ;*******(INCREMENT NEXT SECTOR )************************

034C    2A 03FF              LHLD    SYS.WP          ;LOAD SECTOR POINTER.
034F    7E                   MOV     A,M             ;LOAD SECTOR NUMBER.
0350    FE16                 CPI     016H            ;CHECK LAST STAGGERED.
0352    CA 035C              JZ      ..TRK1          ;IF DONE, DO TRK 1.
0355    23                   INX     H               ;INCREMENT POINTER.
0356    22 03FF              SHLD    SYS.WP          ;STORE IT AWAY.
0359    C3 0322              JMP     ..TKOS          ;NEXT TRK 0 SECTOR.
```

```
                          ;*******( TRANSFER TRACK 1 )****************************

 035C    21 1D00          ..TRK1: LXI     H,TK1.LP          ;TRK 1 ADDR IN TPA.
 035F    22 03FF                  SHLD    SYS.WP            ;INIT WORK POINTER.
 0362    3E01                     MVI     A,TK1.FS          ;FIRST SECTOR NUMBER.
 0364    32 0405                  STA     SEC.NO            ;SET CURRENT SECTOR.
 0367    0E01                     MVI     C,TRK.1           ;SET TRACK AT 1.
 0369    2E1E                     MVI     L,BS.TRK          ;BIOS TRACK VECTOR.
 036B    CD 03F8                  CALL    BIOS              ;BIOS TRANSFER CALL.

                          ;*******( SET SECTOR AND DMA IN BIOS )****************

 036E    3A 0405          ..TK1S: LDA     SEC.NO            ;LOAD CURRENT SECTOR.
 0371    4F                       MOV     C,A               ;TRANSFER TO REG C.
 0372    2E21                     MVI     L,BS.SEC          ;BIOS SECTOR VECTOR.
 0374    CD 03F8                  CALL    BIOS              ;BIOS TRANSFER CALL.
 0377    2A 03FF                  LHLD    SYS.WP            ;LOAD WORK POINTER.
 037A    44                       MOV     B,H               ;MOVE HIGH ORDER.
 037B    4D                       MOV     C,L               ; AND LOW ORDER.
 037C    2E24                     MVI     L,BS.DMA          ;BIOS ADDR VECTOR.
 037E    CD 03F8                  CALL    BIOS              ;BIOS TRANSFER CALL.

                          ;*******( SECTOR TRANSFER OPERATION )*****************

 0381    3A 0401                  LDA     RW.OPV            ;LOAD OPERATION VECTOR.
 0384    6F                       MOV     L,A               ;TRANSFER TO REG L.
 0385    CD 03F8                  CALL    BIOS              ;BIOS TRANSFER CALL.
 0388    B7                       ORA     A                 ;SET CONDITION CODES.
 0389    C2 03A3                  JNZ     ..BLOW            ;SOMETHING WRONG!

                          ;*******(INCREMENT NEXT SECTOR )**********************

 038C    3A 0405                  LDA     SEC.NO            ;GET CURRENT SECTOR.
 038F    FE30                     CPI     TK1.LS            ;WAS THIS THE LAST?
 0391    C8                       RZ                        ;IF DONE, GO HOME.
 0392    3C                       INR     A                 ;INCREMENT COUNT.
 0393    32 0405                  STA     SEC.NO            ;STORE IT AWAY.
 0396    2A 03FF                  LHLD    SYS.WP            ;LOAD WORK ADDRESS.
 0399    11 0080                  LXI     D,SEC.SZ          ;GET SECTOR SIZE.
 039C    19                       DAD     D                 ;ADD TO ADDRESS.
 039D    22 03FF                  SHLD    SYS.WP            ;STORE NEW ADDRESS.
 03A0    C3 036E                  JMP     ..TK1S            ;ANOTHER TRK 1 SECTOR.

                          ;*******( ENCOUNTERED DIFFICULTY )********************

 03A3    21 06FF          ..BLOW: LXI     H,MSG.NC          ;MESSAGE ADDRESS.
 03A6    CD 0281                  CALL    MSG.OT            ;SEND MESSAGE.
 03A9    C9                       RET                       ;GO HOME.

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

```
                     ;******************************************************
                     ; SELECT DRIVE THRU BIOS                              *
                     ;******************************************************

                     ;*******( DISPLAY MESSAGE AND WAIT FOR DRIVE )*********

03AA    22 0402      SEL.DR: SHLD    MSG.SV          ;SAVE MESSAGE ADDRESS.
03AD    2A 0402      ..REPT: LHLD    MSG.SV          ;LOAD MESSAGE ADDRESS.
03B0    CD 0281              CALL    MSG.OT          ;ISSUE MESSAGE.
03B3    CD 028F              CALL    CNS.IN          ;GET DRIVE LETTER.
03B6    FE0D                 CPI     CR              ;CHECK FOR RESELECT.
03B8    CA 03DE              JZ      ..EXIT          ;IF CR GOTO EXIT AREA.

                     ;*******( SEE IF DRIVE LETTER GOOD )*******************

03BB    32 072D              STA     DR.LTR          ;DRIVE LETTER.
03BE    32 0670              STA     LTR.SE          ;ILLG DRV LTTR.
03C1    D641                 SUI     ´A´             ;GET NUMBER.
03C3    DA 03D5              JC      ..ILLG          ;ILLEGAL, REPEAT.
03C6    FE04                 CPI     04H             ;DRIVE A THRU D?
03C8    DA 03E0              JC      ..NMBR          ;GOOD NUMBER.
03CB    D620                 SUI     ´A´-´A´         ;CHECK LOWER CASE.
03CD    DA 03D5              JC      ..ILLG          ;ILLEGAL, REPEAT.
03D0    D604                 SUI     04H             ;LOWER A THRU D?
03D2    DA 03E0              JC      ..NMBR          ;LEGAL DRIVE.

                     ;*******( EXIT TO RESELECT FUNCTION )******************

03D5    21 066C      ..ILLG: LXI     H,MSG.SE        ;´SELECT ERROR´
03D8    CD 0281              CALL    MSG.OT          ;ISSUE MESSAGE.
03DB    C3 03AD              JMP     ..REPT          ;REPEAT SELECTION.

                     ;*******( EXIT TO RESELECT FUNCTION )******************

03DE    37           ..EXIT: STC                     ;SET CARRY.
03DF    C9                   RET                     ;RETURN.

                     ;*******( VALID DRIVE NUMBER )*************************

03E0    4F           ..NMBR: MOV     C,A             ;DRIVE NMBR TO C.
03E1    1E01                 MVI     E,LOG.VC        ;LOG ON VECTOR.
03E3    2E1B                 MVI     L,BS.DSK        ;BIOS SELCT DISK.
03E5    CD 03F8              CALL    BIOS            ;BIOS TRANSFER CALL.
03E8    21 0716              LXI     H,MSG.XX        ;´TYPE CR WHEN READY´
03EB    CD 0281              CALL    MSG.OT          ;SEND MESSAGE.
03EE    CD 028F              CALL    CNS.IN          ;GET CONSOLE CHAR.
03F1    FE0D                 CPI     CR              ;CHECK IF CR.
03F3    C2 03AD              JNZ     ..REPT          ;IF NOT, TRY AGAIN.
03F6    A7                   ANA     A               ;CLEAR CARRY.
03F7    C9                   RET                     ;RETURN CALLER.

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

```
                        ;*****************************************************
                        ; BIOS TRANSFER ROUTINE                              *
                        ;*****************************************************

   03F8    3A 0002      BIOS:   LDA     BS.PAG          ;GET HIGH ADDRESS.
   03FB    67                   MOV     H,A             ;SET IT IN H REG.
   03FC    E9                   PCHL                    ;JUMP TO BIOS.

                        ;*****************************************************
                        ; SOFTWARE TRAPS                                     *
                        ;*****************************************************

   03FD    F7           RST.6:  RST     6               ;EXIT FORMAT.
   03FE    FF           RST.7:  RST     7               ;EXIT FORMAT.

                        ;*****************************************************
                        ; WORKING VARIABLES                                  *
                        ;*****************************************************

   03FF    0000         SYS.WP: .WORD   0       ;ADDRESS POINTER.
   0401    00           RW.OPV: .BYTE   0       ;READ OR WRITE VECTOR.
   0402    0000         MSG.SV: .WORD   0       ;MESSAGE SAVE ADDRESS.

   0404    00           TRK.NO: .BYTE   0       ;TRACK NUMBER HOLD.
   0405    00           SEC.NO: .BYTE   0       ;SECTOR NUMBER HOLD.
   0406    00           F.FLAG: .BYTE   0       ;FORMAT FLAG (DCM).

                        ;*****************************************************
                        ; 3740 SECTOR TRANSLATION                            *
                        ;*****************************************************

   0407    01070D131905 TK0.SL: .BYTE   01H,07H,0DH,13H,19H,05H
   040D    0B1117030 90F        .BYTE   0BH,11H,17H,03H,09H,0FH
   0413    1502080E141A         .BYTE   15H,02H,08H,0EH,14H,1AH
   0419    060C1218040A         .BYTE   06H,0CH,12H,18H,04H,0AH
   041F    1016                 .BYTE   10H,16H

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

```
                     ;*****************************************************
                     ; JADE SINGLE DENSITY - IDENTITY SECTOR              *
                     ;*****************************************************

                     ;*******( JADE IDENTIFICATION )***********************

0421    4A6164652044 IDS.SD: .ASCII  "JADE DD SINGLE DENSITY FORMAT "

                     ;*******( DISK PARAMETER BLOCK - CP/M 2.2 )***********

0441                         .LOC    IDS.SD+20H      ;LOCATE CP/M BLOCK.
0441    001A                 .WORD   26              ;SECTORS PER TRACK.
0443    03                   .BYTE   3               ;BLOCK SHIFT FACTOR.
0444    07                   .BYTE   7               ;BLOCK MASK.
0445    00                   .BYTE   0               ;NULL MASK.
0446    00F2                 .WORD   242             ;DISK SIZE - 1.
0448    003F                 .WORD   63              ;DIRECTORY MAXIMUM.
044A    C0                   .BYTE   11000000B       ;ALLOC 0.
044B    00                   .BYTE   0               ;ALLOC 1.
044C    0010                 .WORD   16              ;CHECK SIZE.
044E    0002                 .WORD   2               ;TRACK OFFSET.

                     ;*******( DCM DISK PARAMETERS )***********************

0451                         .LOC    IDS.SD+30H      ;LOCATE DCM BLOCK.
0451    06                   .BYTE   6               ;SECTOR STAGGER (TRNS).
0452    02           SD.FLG: .BYTE   00000010B       ;DISKETTE FLAGS.

04A1                         .LOC    IDS.SD+SEC.SZ   ;EXTEND FULL SECTOR.

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

```
                                  ;*****************************************************
                                  ; JADE DOUBLE DENSITY - IDENTITY SECTOR              *
                                  ;*****************************************************

                                  ;*******( JADE IDENTIFICATION )************************

   04A1     4A6164652044 IDS.DD: .ASCII  "JADE DD DOUBLE DENSITY FORMAT "

                                  ;*******( DISK PARAMETER BLOCK - CP/M 2.2 )************

   04C1                                  .LOC    IDS.DD+20H       ;LOCATE CP/M BLOCK.
   04C1     0030                         .WORD   48               ;SECTORS PER TRACK.
   04C3     04                           .BYTE   4                ;BLOCK SHIFT FACTOR.
   04C4     0F                           .BYTE   00001111B        ;BLOCK MASK.
   04C5     01                           .BYTE   1                ;NULL MASK.
   04C6     00E0                         .WORD   224              ;DISK SIZE - 1.
   04C8     003F                         .WORD   63               ;DIRECTORY MAXIMUM.
   04CA     80                           .BYTE   10000000B        ;ALLOC 0.
   04CB     00                           .BYTE   0                ;ALLOC 1.
   04CC     0010                         .WORD   16               ;CHECK SIZE.
   04CE     0002                         .WORD   2                ;TRACK OFFSET.

                                  ;*******( DCM DISK PARAMETERS )************************

   04D1                                  .LOC    IDS.DD+30H       ;LOCATE DCM BLOCK.
   04D1     06                           .BYTE   6                ;SECTOR STAGGER (TRNS).
   04D2     06                  DD.FLG:  .BYTE   00000110B        ;DISKETTE FLAGS.

   0521                                  .LOC    IDS.DD+SEC.SZ    ;EXTEND TO FULL SIZE

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

```
                     ;******************************************************
0521                 MSG.BG:         ;CONSOLE SIGN ON                      *
                     ;******************************************************

0521    0D0A          .ASCII [CR][LF]
0523    0D0A444F5542  .ASCII [CR][LF]'DOUBLE D - FORMAT UTILITY'
053E    0D0A56455253  .ASCII [CR][LF]'VERSION 2.2 '
054C    0D0A          .ASCII [CR][LF]
054E    0D0A55736520  .ASCIS [CR][LF]'USE CTL-C FOR SYSTEM REBOOT.'

                     ;******************************************************
056C                 MSG.FL:         ;DISPLAY FUNCTION SELECTIONS          *
                     ;******************************************************

056C    0D0A          .ASCII [CR][LF]
056E    0D0A2A2A2A2A  .ASCII [CR][LF]'******  FUNCTIONS LIST  *******'
058F    0D0A          .ASCII [CR][LF]
0591    0D0A312E2046  .ASCII [CR][LF]'1. FORMAT  DOUBLE DENSITY 8" '
05B0    0D0A322E2046  .ASCII [CR][LF]'2. FORMAT  SINGLE DENSITY 8" '
05CF    0D0A332E2046  .ASCII [CR][LF]'3. FORMAT  STANDARD 3740  8" '
05EE    0D0A342E2046  .ASCII [CR][LF]'4. FORMAT  SYSTEM TRACKS ONLY'
060D    0D0A352E2052  .ASCII [CR][LF]'5. READ    SYSTEM TRACKS IMAGE  '
062F    0D0A362E2057  .ASCII [CR][LF]'6. WRITE   SYSTEM TRACKS IMAGE  '
0651    0D0A          .ASCII [CR][LF]
0653    0D0A454E5445  .ASCIS [CR][LF]'ENTER FUNCTION NUMBER: '

                     ;******************************************************
066C                 MSG.SE:         ;SELECTION ERROR                      *
                     ;******************************************************

066C    0D0A0D0A      .ASCII [CR][LF][CR][LF]
0670    20           LTR.SE: .BYTE   ' '
0671    206973204E4F  .ASCIS ' IS NOT A VALID SELECTION '

                     ;******************************************************
                     ;******************************************************
068B                 MSG.FD:         ;FORMAT ON DISK DRIVE                 *
                     ;******************************************************

068B    0D0A0D0A      .ASCII [CR][LF][CR][LF]
068F    577269746520  .ASCIS 'WRITE FORMAT ON DRIVE (CR TO RESELECT): '

                     ;******************************************************
06B7                 MSG.RS:         ;READ SYSTEM ON DRIVE                 *
                     ;******************************************************

06B7    0D0A0D0A      .ASCII [CR][LF][CR][LF]
06BB    524541442053  .ASCIS 'READ SYSTEM FROM DRIVE: '

                     ;******************************************************
06D3                 MSG.WS:         ;WRITE SYSTEM ON DRIVE                *
                     ;******************************************************

06D3    0D0A0D0A      .ASCII [CR][LF][CR][LF]
06D7    575249544520  .ASCIS 'WRITE SYSTEM TO DRIVE (CR TO RESELECT): '

                     ;******************************************************
06FF                 MSG.NC:         ;TRANSFER INCOMPLETE                  *
                     ;******************************************************

06FF    0D0A0D0A      .ASCII [CR][LF][CR][LF]
0703    5452414E5346  .ASCIS 'TRANSFER INCOMPLETE'

                     ;******************************************************
0716                 MSG.XX:         ;TYPE CR WHEN DRIVE READY             *
                     ;******************************************************

0716    0D0A0D0A      .ASCII [CR][LF][CR][LF]
071A    547970652043  .ASCII 'TYPE CR WHEN DRIVE '
072D    20           DR.LTR: .BYTE   ' '
072E    205245414459  .ASCIS ' READY. '

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

```
;*****************************************************
; FORMAT - TITLE BLOCK AND PAGE ALIGNMENT           *
;*****************************************************

        .DEFINE FORMAT [NAME] = [
NAME    ==      (.!OFFH)+1      ;SET NEXT PAGE BOUNDRY.
        .LOC    NAME            ;SET LOC TO NEXT PAGE.
OFFSET  =       FMT.EA-NAME     ;DETERMINE ADDR OFFSET.
        .Z80                    ;NOW USE Z80  CODE.
        .ASCII  'FORMAT!']      ;INCLUDE HEADER!

;*****************************************************
; DENSITY - DECLARE TYPE                            *
;*****************************************************

        .DEFINE DENSITY [TYPE] = [
        .IFIDN  [TYPE][SINGLE], [
        .ASCII  'S'
        .EXIT]
        .IFIDN  [TYPE][DOUBLE], [
        .ASCII  'D'
        .EXIT]
        .ERROR  'INVALID DENSITY']

;*****************************************************
; SECTORS - SPECIFY SEQUENCE AND NUMBER OF SECTORS  *
;*****************************************************

        .DEFINE SECTORS [LIST,NMBR] = [
        LXI     H,LIST+OFFSET   ;SECTOR SEQUENCE ADDR.
        MVI     E,NMBR]         ;NUMBER OF SECTORS.

;*****************************************************
; BLOCK - GENERATE A BLOCK OF CONSTANTS             *
;*****************************************************

        .DEFINE BLOCK [COUNT,BYTE,%REPT] = [
        NMBR = COUNT            ;SET EQUAL FOR NOW.
        MVI     B,NMBR          ;LOAD NMBR OF BYTES.
%REPT:  IN      XP.DSH          ;WAIT FOR DATA REQ.
        MVI     A,BYTE          ;LOAD BYTE VALUE.
        XRA     C               ;INVERT (1791-01).
        OUT     WD.DTA          ;WRITE DATA PORT.
        DJNZ    %REPT]          ;REPEAT FOR COUNT.

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

```
;*******************************************************
; REPEAT - REPEAT FORMAT SECTION FOR EACH SECTOR       *
;*******************************************************

        .DEFINE REPEAT [LOCATION] = [
        DCR     E               ;DEC NMBR SECTORS LEFT.
        JNZ     LOCATION+OFFSET]

;*******************************************************
; ENDING - RECORD NMBR OF TRAILING BYTES WRITTEN       *
;*******************************************************

        .DEFINE ENDING  [BYTE,%REPT] = [
        LXI     H,0             ;COUNT OF ZERO.
%REPT:  IN      XP.DSH          ;WAIT FOR REQ.
        MVI     A,BYTE          ;LOAD CONSTANT.
        XRA     C               ;INVERT (1791-01).
        OUT     WD.DTA          ;WRITE TO PORT.
        INX     H               ;INCREMENT COUNT.
        JMP     %REPT+OFFSET    ;CONTINUE.]

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

```
;******************************************************
; WRITE - WRITE SPECIFIC FORMAT BYTES                 *
;******************************************************

        .DEFINE WRITE [TYPE,VALU] = [

;*******( ID ADDRESS MARK )****************************

        .IFIDN  [TYPE][ID.MARK],    [
         IN     XP.DSH              ;WAIT FOR DATA REQ.
         MVI    A,0FEH              ;ID ADDR MARK.
         XRA    C                   ;INVERT (1791-01).
         OUT    WD.DTA              ;WRITE DATA PORT.
        .EXIT]                      ;TERMINATE MACRO

;*******( INDEX MARK )*********************************

        .IFIDN  [TYPE][INDEX.MARK], [
         IN     XP.DSH              ;WAIT FOR DATA REQ.
         MVI    A,0FCH              ;INDEX MARK.
         XRA    C                   ;INVERT (1791-01).
         OUT    WD.DTA              ;WRITE DATA PORT.
        .EXIT]                      ;TERMINATE MACRO

;*******( DATA ADDRESS MARK )**************************

        .IFIDN  [TYPE][DATA.MARK], [
         IN     XP.DSH              ;WAIT FOR DATA REQ.
         MVI    A,0FBH              ;DATA ADDR MARK.
         XRA    C                   ;INVERT (1791-01).
         OUT    WD.DTA              ;WRITE DATA PORT.
        .EXIT]                      ;TERMINATE MACRO

;*******( CRC )****************************************

        .IFIDN  [TYPE][CRC], [
         IN     XP.DSH              ;WAIT FOR DATA REQ.
         MVI    A,0F7H              ;GENERATE CRC.
         XRA    C                   ;INVERT (1791-01).
         OUT    WD.DTA              ;WRITE DATA PORT.
        .EXIT]                      ;TERMINATE MACRO

;*******( EXPLICIT BYTE VALUE )************************

        .IFIDN  [TYPE][BYTE], [
         IN     XP.DSH              ;WAIT FOR DATA REQ.
         MVI    A,VALU              ;EXPLICIT VALUE.
         XRA    C                   ;INVERT (1791-01).
         OUT    WD.DTA              ;WRITE DATA PORT.
        .EXIT]

;*******( TRACK NUMBER )*******************************

        .IFIDN  [TYPE][TRACK.NO], [
         IN     XP.DSH              ;WAIT FOR REQUEST.
         IN     WD.TRK          ;GET TRACK NMBR.
         OUT    WD.DTA          ;WRITE DATA PORT.
        .EXIT]

;*******( SECTOR NUMBER )******************************

        .IFIDN  [TYPE][SECTOR.NO], [
        IN      XP.DSH          ;WAIT FOR REQUEST.
        MOV     A,M             ;SET SECTOR NUMBR.
        XRA     C               ;INVERT (1791-01).
        OUT     WD.DTA          ;WRITE DATA PORT.
        INX     H               ;INC SEC-NMBR PNTR.
        .EXIT                   ;TERMINATE MACRO]

;*******( SIDE NUMBER )********************************

        .IFIDN  [TYPE][SIDE.NO], [
        IN      XP.DSH          ;WAIT FOR REQUEST.
        MVI     A,0             ;SET SIDE NUMBER.
        XRA     C               ;INVERT (1791-01).
        OUT     WD.DTA          ;WRITE DATA PORT.
        .EXIT                   ;TERMINATE MACRO]

;*******( SECTOR SIZE CODE )***************************

        .IFIDN  [TYPE][SECTOR.SIZE], [
        SEC.CD = 0FFH           ;DECLARE BLANK.
        .IFIDN [VALU][128],     [SEC.CD = 000H]
        .IFIDN [VALU][256],     [SEC.CD = 001H]
        .IFIDN [VALU][512],     [SEC.CD = 002H]
        .IFIDN [VALU][1024],    [SEC.CD = 003H]
        .IFE    (SEC.CD-0FFH),  [
        .ERROR  'INVALID SECTOR SIZE']
         IN     XP.DSH          ;WAIT FOR DATA REQ.
         MVI    A,SEC.CD        ;LOAD SIZE CODE.
         XRA    C               ;INVERT (1791-01).
         OUT    WD.DTA          ;WRITE DATA PORT.
        .EXIT                   ;TERMINATE MACRO]

;*******( ILLEGAL EXPANSION )**************************

        .ERROR  'ILLEGAL EXPANSION']

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

```
0800    464F524D4154           FORMAT   FT3740
0807    53                     DENSITY  SINGLE
0808    21  17B5               SECTORS  SS3740,26 ✓

080D    0628         BG3740:1  BLOCK    40,ONES
0818    0606               2   BLOCK    6,ZEROS
0823    DB80                   WRITE    INDEX.MARK
082A    061A               3   BLOCK    26,ONES
0835    0606         RP3740:4  BLOCK    6,ZEROS
0840    DB80                   WRITE    ID.MARK
0847    DB80                   WRITE    TRACK.NO
084D    DB80                   WRITE    SIDE.NO
0854    DB80                   WRITE    SECTOR.NO
085B    DB80                   WRITE    SECTOR.SIZE,128
0862    DB80                   WRITE    CRC
0869    060B               5   BLOCK    11,ONES
0874    0606               6   BLOCK    6,ZEROS
087F    DB80                   WRITE    DATA.MARK
0886    0680               7   BLOCK    128,0E5H
0891    DB80                   WRITE    CRC
0898    061B               8   BLOCK    27,ONES
08A3    1D                     REPEAT   RP3740

08A7    21  0000               ENDING   ONES

08B5    010203040506 SS3740:   .BYTE     1, 2, 3, 4, 5, 6, 7, 8, 9,10
08BF    0B0C0D0E0F10           .BYTE    11,12,13,14,15,16,17,18,19,20
08C9    15161718191A           .BYTE    21,22,23,24,25,26
```

```
 0900    464F524D4154          FORMAT   FTJ48D
 0907    44                    DENSITY  DOUBLE
 0908    21 17AE               SECTORS  SSJ48D,48

 090D    0650        BGJ48D: 1 BLOCK    80,04EH     <-  [ BLOCK ,   12, ZEROS
 0918    060C        RPJ48D: 2 BLOCK    12,ZEROS         BLOCK      3,0F6H
 0923    0603                3 BLOCK    3,0F5H           WRITE      INDEX.MARK
 092E    DB80                  WRITE    ID.MARK          BLOCK      50,4EH
 0935    DB80                  WRITE    TRACK.NO
 093B    DB80                  WRITE    SIDE.NO
 0942    DB80                  WRITE    SECTOR.NO
 0949    DB80                  WRITE    SECTOR.SIZE,128
 0950    DB80                  WRITE    CRC
 0957    0616                4 BLOCK    22,04EH
 0962    060C                5 BLOCK    12,ZEROS
 096D    0603                6 BLOCK    3,0F5H
 0978    DB80                  WRITE    DATA.MARK
 097F    0680                7 BLOCK    128,0E5H
 098A    DB80                  WRITE    CRC
 0991    0616                8 BLOCK    22,04EH
 099C    1D                    REPEAT   RPJ48D

 09A0    21 0000             9 ENDING   ONES

 09AE    0105090D1115 SSJ48D:  .BYTE     1, 5, 9,13,17,21
 09B4    191D2125292D          .BYTE    25,29,33,37,41,45
 09BA    02060A0E1216          .BYTE     2, 6,10,14,18,22
 09C0    1A1E22262A2E          .BYTE    26,30,34,38,42,46
 09C6    03070B0F1317          .BYTE     3, 7,11,15,19,23
 09CC    1B1F23272B2F          .BYTE    27,31,35,39,43,47
 09D2    04080C101418          .BYTE     4, 8,12,16,20,24
 09D8    1C2024282C30          .BYTE    28,32,36,40,44,48

                               .END
```

```
+++++ SYMBOL TABLE +++++

BDOS   0005         BEGIN  0100         BG3740 080D         BGJ48D 090D
BIOS   03F8         BS.DMA 0024         BS.DSK 001B         BS.FMT 0033
BS.PAG 0002         BS.RDS 0027         BS.SEC 0021         BS.TRK 001E
BS.WRS 002A         CNS.IN 028F         CNS.OT 029C         CNS.RD 0001
CNS.WR 0002         CNTL.C 0003         CR     000D         DD.FLG 04D2
DR.LTR 072D         FMT.DD 02EA         FMT.EA 1700         FMT.SD 02E4
FT3740 0800         FTJ48D 0900         FUN.1  017E         FUN.2  01E3
FUN.3  01BB         FUN.4  022B         FUN.5  0259         FUN.6  026D
FUN.BG 0141         F.FLAG 0406         HXB.OT 02AA         HXN.OT 02B3
HXW.OT 02A5         IDS.DD 04A1         IDS.SD 0421         ID.SEC 0001
INIT   0138         LF     000A         LOG.VC 0001         LTR.SE 0670
MSG.BG 0521         MSG.FD 068B         MSG.FL 056C         MSG.NC 06FF
MSG.OT 0281         MSG.RS 06B7         MSG.SE 066C         MSG.SV 0402
MSG.WS 06D3         MSG.XX 0716         NMBR   0016         OFFSET 0E00
ONES   00FF         REBOOT 0000         RP3740 0835         RPJ48D 0918
RST.6  03FD         RST.7  03FE         RW.OPV 0401         SD.FLG 0452
SEC.CD 0000         SEC.NO 0405         SEC.SZ 0080         SEL.DR 03AA
SS3740 08B5         SSJ48D 09AE         ST.DMA 02ED         SYS.WP 03FF
TK0.FS 0001         TK0.LC 0F80         TK0.LP 1000         TK0.LS 001A
TK0.NS 001A         TK0.SL 0407         TK0.SZ 0D00         TK1.FS 0001
TK1.LP 1D00         TK1.LS 0030         TPA    0100         TRK.0  0000
TRK.1  0001         TRK.2  0002         TRK.76 004C         TRK.NO 0404
TRNSFR 0314         WD.DTA 0007         WD.TRK 0005         WRT.ID 02C1
XP.DSH 0080         ZEROS  0000
```

The following is the hex code generated

by the FORMAT INJECTION MODULES.

```
^CB:
B>DDT
DDT VERS 1.4
-F100,1000,00
-IFORMAT.HEX
-R
NEXT  PC
09DE 0000
-D800,8FF
0800 46 4F 52 4D 41 54 21 53 21 B5 17 1E 1A 06 28 DB FORMAT!S!.....(.
0810 80 3E FF A9 D3 07 10 F7 06 06 DB 80 3E 00 A9 D3 .>..........>...
0820 07 10 F7 DB 80 3E FC A9 D3 07 06 1A DB 80 3E FF .....>........>.
0830 A9 D3 07 10 F7 06 06 DB 80 3E 00 A9 D3 07 10 F7 .........>......
0840 DB 80 3E FE A9 D3 07 DB 80 DB 05 D3 07 DB 80 3E ..>............>
0850 00 A9 D3 07 DB 80 7E A9 D3 07 23 DB 80 3E 00 A9 ......^...#..>..
0860 D3 07 DB 80 3E F7 A9 D3 07 06 0B DB 80 3E FF A9 ....>........>..
0870 D3 07 10 F7 06 06 DB 80 3E 00 A9 D3 07 10 F7 DB ........>.......
0880 80 3E FB A9 D3 07 06 80 DB 80 3E E5 A9 D3 07 10 .>........>.....
0890 F7 DB 80 3E F7 A9 D3 07 06 1B DB 80 3E FF A9 D3 ...>........>...
08A0 07 10 F7 1D C2 35 17 21 00 00 DB 80 3E FF A9 D3 .....5.!....>...
08B0 07 23 C3 AA 17 01 02 03 04 05 06 07 08 09 0A 0B .#..............
08C0 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19 1A 00 ................
08D0 00 00 00 `00 00 00 00 00 00 00 00 00 00 00 00 00 ................
08E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
08F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
-D900,9FF
0900 46 4F 52 4D 41 54 21 44 21 AE 17 1E 30 06 50 DB FORMAT!D!...0.P.
0910 80 3E 4E A9 D3 07 10 F7 06 0C DB 80 3E 00 A9 D3 .>N.........>...
0920 07 10 F7 06 03 DB 80 3E F5 A9 D3 07 10 F7 DB 80 .......>........
0930 3E FE A9 D3 07 DB 80 DB 05 D3 07 DB 80 3E 00 A9 >............>..
0940 D3 07 DB 80 7E A9 D3 07 23 DB 80 3E 00 A9 D3 07 ....^...#..>....
0950 DB 80 3E F7 A9 D3 07 06 16 DB 80 3E 4E A9 D3 07 ..>........>N...
0960 10 F7 06 0C DB 80 3E 00 A9 D3 07 10 F7 06 03 DB ......>.........
0970 80 3E F5 A9 D3 07 10 F7 DB 80 3E FB A9 D3 07 06 .>........>.....
0980 80 DB 80 3E E5 A9 D3 07 10 F7 DB 80 3E F7 A9 D3 ...>........>...
0990 07 06 16 DB 80 3E 4E A9 D3 07 10 F7 1D C2 18 17 .....>N.........
09A0 21 00 00 DB 80 3E FF A9 D3 07 23 C3 A3 17 01 05 !....>....#.....
09B0 09 0D 11 15 19 1D 21 25 29 2D 02 06 0A 0E 12 16 ......!%)-......
09C0 1A 1E 22 26 2A 2E 03 07 0B 0F 13 17 1B 1F 23 27 .."&*.........#'
09D0 2B 2F 04 08 0C 10 14 18 1C 20 24 28 2C 30 00 00 +/....... $(,0..
09E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
09F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
-
```

```
                 LIST    NOCOND
        ;***************************************************************************
        ;
        ;        The Disk Controller Module contains the firmware for the Jade
        ; Double D Disk controller board.
        ;
        ;***************************************************************************
        ;
        ;   The disk controller module (DCM) resides internal to the Jade Double D
        ; Disk Controller board. This program provides a facility to read/write
        ; diskette sectors & format diskette tracks (in single & double density).
        ; This module sets the parameters for each drive during the "LOG-ON"
        ; operation. The FORMAT program (not in this module) writes an ident-
        ; ification sector (0,0) which provides the needed information. If this
        ; identity sector`is not present on the diskette, it is assumed to be a
        ; standard 8" IBM 3740 format. This program contains a 6 word timing block
        ; which should be patched to match the user's disk drives. This has normally
        ; been set for Shugart SA800/801 drives.
        ;
        ;***************************************************************************
        ;
        ;        REVISION STATUS:
        ;
        ; 1.0 - 1 AUG 82   GRH
        ;        Initial release
        ;
        ; 1.1 - GRH
        ;        Fix bug causing code to crash after predictable number of warm boots.
        ;        A CALL was being made without a return in the login function.
        ;
        ; 1.2 - 1 AUG 82   GRH
        ;        ADDED RECAL FEATURE TO RECOVER FROM THE INSTANCE WHERE THE
        ;        HEAD IS OUTSIDE TRACK 0 BUT THE SENSOR IS STILL GIVING
        ;        THE TRACK 0 SIGNAL. IF TRK 0 SENSE IS TRUE ON ENTRY, THE
        ;        HEAD IS STEPPED IN SEVERAL TRACKS, THEN A TRK 0 SEEK IS
        ;        PERFORMED.
        ;
        ; 1.3 - 31 AUG 83   GRH
        ;        Add sector de-blocking algorithms for 256 byte sectors. Remove unused
        ;        code & vars. Optimize code.
        ;
(3133)  VERSN   EQU     '13'
        ;
        ;***************************************************************
(0000)  FALSE   EQU     0
(FFFF)  TRUE    EQU     NOT FALSE
(0000)  LSTINC  EQU     FALSE
```

```

 (0080)      CMNRT:  EQU     10000000B        ;NO RETRYS (=1)
 (0080)      SECSIZ  EQU     128              ;SIZE OF LOGICAL SECTORS

```

```
                  ;*********************************************************
                  ;
                  ;       REGISTER USAGE:
                  ;       A, B= SCRATCH
                  ;       C= 179X INVERSION CONSTANT
                  ;       DE= USED FOR FLAG, SECTOR BY R/W SECTOR SUBR
                  ;       HL= PTR TO DATA XFER BY R/W SECTOR SUBR
                  ;       IX= DISK PARAMETER BLOCK PTR
                  ;       IY= 179X NMI RETURN ADDRESS
                  ;       AF'= R/W FLAGS
                  ;       BC', DE', HL'= NOT USED
                  ;
                  ;*********************************************************

                  ;-------------------------------------------------------------------
                  ;
                  ;   THE FOLLOWING AREA IS THE INITIAL START JUMP TABLE.
                  ; THE 1ST JUMP IS EXECUTED WHEN THE ONBOARD Z80 IS RESET.
                  ; THE SECOND JUMP IS THE DCM ENTRY FROM A BOOTSTRAP LOADER.
                  ; THIS ENTRY ASSUMES DCM HAS BEEN LOADED INTO DD BANK 1 BY THE
                  ; LOADER ROUTINE.
                  ;
                  ;-------------------------------------------------------------------

      (0000)              ORG     0

0000  C31B00    R         JP      CLEAR           ;RESET & RE-INITIALIZE Z-80 REGS

0003  C38007              JP      INITB+BANKL     ;INIT - BOOTSTRAPPED
0006  (0002)              DS      2


                  ;*******************************************************************
                  ;
                  ;   THIS SUBROUTINE IS THE ENTRY POINT FOR THE DISK CONTROLLER
                  ; TIMING MODULE. THIS MODULE PROVIDES DELAYS WHICH ARE
                  ; MULTIPLES OF 100 us. THE CONTENTS OF DE DETERMINES THE TOTAL
                  ; PERIOD. (DELAY=(DE)*100 us).
                  ;
                  ;*******************************************************************
                  RST8:
0008  0619                LD      B,TMRFC         ;SET CONSTANT
000A  10FE                DJNZ    $
000C  C31300    R         JP      TICKE           ;GOTO TICK ENTRY

000F  061C        TICKR:  LD      B,TMRNC         ;SET NORMAL CONSTANT
0011  10FE                DJNZ    $

0013  1B          TICKE:  DEC     DE              ;COUNT -1
0014  7A                  LD      A,D
0015  B3                  OR      E               ;IF COUNT NOT 0 THEN REPEAT
0016  00                  NOP
0017  00                  NOP
0018  20F5                JR      NZ,TICKR
```

```
001A  C9            0296         RET                     ;ELSE RETURN
                    0297
                    0298
                    0299  ;------------------------------------------------
                    0300  ;
                    0301  ;       INITIALIZATION FROM RESET VECTOR
                    0302  ;
                    0303  ;------------------------------------------------
001B  312505        0304  CLEAR:  LD      SP,STACK
001E  CD1401        0305          CALL    INIT
0021  181D          0306          JR      SLEEP
                    0307
                    0308
                    0309  ;-------------------------------------
                    0310  ;
                    0311  ;       ENTRY VECTOR TO READ SECTOR
                    0312  ; USES RST 40 VECTOR
                    0313  ;
                    0314  ;-------------------------------------
0023  (0005)        0315          DS      28H - $
0028  C37002        0316  RST40:  JP      RDSEC
                    0317
                    0318
                    0319  ;*************************************
                    0320  ;
                    0321  ;       TEMPORARY INIT USED ONLY ONCE
                    0322  ;
                    0323  ;*************************************
002B  (0005)        0327          DS      (38H - 8) - $   ;POSITION CODE
                    0328
0030  CD1401        0329  RST38A: CALL    INIT
0033  3E70          0330          LD      A,XCUTE         ;MODIFY CALL VECTOR
0035  323E00        0331          LD      (HRVEC + 1),A
                    0332
                    0333  ;-----------------------------------------------------------------
                    0334  ;
                    0335  ;  MASKABLE INTERRUPT ROUTINE - EXECUTED WHEN RESTARTING THE
                    0336  ; Z80 FROM A HALT. THE FUNCTIONS ARE; RESET THE DD INT REQ
                    0337  ; FLOP, PUT THE INTERRUPTED ADDR IN DE & JUMP TO CMD HANDLER.
                    0338  ;
                    0339  ;-----------------------------------------------------------------
                    0340  TSTACK:
0038  DB20          0341  RST38:  IN      A,XPIRR         ;RESET INT REQ
003A  312505        0342          LD      SP,STACK        ;SET UP STACK
003D  CD3000        0343  HRVEC:  CALL    RST38A          ;MODIFIED BY RST38A TO CALL XCUTE
                    0344
                    0345  ;-----------------------------------------------------------------
                    0346  ;
                    0347  ;   END OF SEQUENCE HALT - DURING THIS TIME, THE HOST SYSTEM
                    0348  ; CAN SWITCH THE CONTROLLER MEMORY INTO THE S100 BUS FOR
                    0349  ; STATUS CHECK, SETTING COMMAND BLOCK, & SECTOR DATA XFERS.
                    0350  ;
                    0351  ;-----------------------------------------------------------------
0040  FB            0352  SLEEP:  EI              ;SET ALARM
```

```
0041  76                 HALT          ;GO TO SLEEP


                ;---------------------------
                ;
                ;  READ ADDRESS COMMAND
                ;
                ;---------------------------
                ADDR:                           ;NOT IMPLEMENTED


                ;-----------------
                ;
                ;   SPARE COMMAND
                ;
                ;-----------------
0042  217703    SPAR:    LD      HL,CBSTS       ;SET COMMAND ERROR
0045  36FF               LD      (HL),-1
0047  C9                 RET


                ;-----------------
                ;
                ;   IDLE COMMAND
                ;
                ;-----------------
0048  DB00      IDLE:    IN      A,BLSTS        ;IF NO HOST INTERRUPT THEN WAIT
004A  E608               AND     BSINT
004C  28FA               JR      Z,IDLE
004E  DB20               IN      A,XPIRR        ;ELSE RESET INTERRUPT REQUEST & EXIT
0050  C9                 RET


                ;*****************************************************************
                ;
                ;   THIS IS THE NON-MASKABLE INTERRUPT ROUTINE
                ; UPON 1791 COMMAND TERMINATION, THE Z80 RECEIVES A NMI. THE
                ; STATUS PORT IS INTERROGATED & SAVED (SVSTS). IY HAS RETURN
                ; ADDR.
                ;
                ;*****************************************************************
0051  (0015)             DS      66H - $        ;ADJUST FOR NMI VECTOR LOCATION

0066  DB04      WDINT:   IN      A,WDSTS        ;GET 1791 STATUS & RESET INT.
0068  A9                 XOR     C
0069  327C03             LD      (SVSTS),A
006C  FDE3               EX      (SP),IY        ;PUT RETURN ADDR ON STACK
006E  ED45               RETN


                ;*****************************************************************
                ;
                ;   COMMAND SELECTOR SUBR GETS CONTROL AFTER THE DISK CONTROLLER IS
                ; INTERRUPTED FROM THE HALT CONDITION. IT BRANCHES TO THE INDIVIDUAL
```

```
                 ; COMMAND ROUTINES.
                 ;
                 ;*****************************************************************
0070  CD6302     XCUTE:  CALL    EXSTS           ;GET 179X'S ATTENTION FOR CMDS

0073  3A7003             LD      A,(CBCMD)       ;GET HOST CMD

0076  E607               AND     MASK            ;LIMIT OPTIONS
0078  1600               LD      D,0
007A  5F                 LD      E,A             ;SET UP OFFSET
007B  218300             LD      HL,CMDT         ;SET TABLE PTR
007E  19                 ADD     HL,DE

007F  5E                 LD      L,(HL)          ;GET ADDRESS
0080  2600               LD      H,0

0082  E9                 JP      (HL)            ;GOTO COMMAND

                 ;   COMMAND TABLE

      (0083)     CMDT:   EQU     $               ;COMMAND TABLE
0083  B1                 DB      LGON            ;LOG-ON DRIVE
0084  E5                 DB      READ            ;READ SECTOR
0085  EA                 DB      WRIT            ;WRITE SECTOR
0086  8B                 DB      FORM            ;FORMAT TRACK
0087  42                 DB      ADDR            ;READ ADDRESS
0088  42                 DB      SPAR            ;SPARES
0089  42                 DB      SPAR
008A  48                 DB      IDLE            ;BACKGROUND
      (0007)     MASK:   EQU     7               ;COMMAND MASK (CHANGE IF # CMDS INCREASED)


                 ;----------------------------
                 ;
                 ;   FORMAT TRACK COMMAND
                 ;
                 ;----------------------------
008B  CD2B01     FORM:   CALL    SELECT
008E  C0                 RET     NZ

008F  3A7303             LD      A,(CBSEC)       ;GET FORMAT FLAGS
0092  DD7703             LD      (IX+DVFLG),A    ;RESET DRIVE FLAGS
0095  CDBC01             CALL    SEEK

0098  FD21A800           LD      IY,NMIWT        ;SET RETURN ADDR

009C  3EF0               LD      A,DCWRT         ;OUTPUT WRITE TRACK COMMAND TO 1791
009E  A9                 XOR     C
009F  D304               OUT     WDCMD,A
00A1  E3                 EX      (SP),HL         ;WAIT FOR 1791
00A2  E3                 EX      (SP),HL
00A3  E3                 EX      (SP),HL
00A4  E3                 EX      (SP),HL
00A5  C30807             JP      FMTPS
```

```
                 0464
00A8  E6E4       0465  NMIWT:  AND    DMFER          ;SET ANY ERRORS
00AA  327703     0466          LD     (CBSTS),A
                 0467
00AD  227A03     0468          LD     (CWLNG),HL     ;DISPLAY TRAIL BYTES
00B0  C9         0469          RET
                 0470
                 0471
                 0472  ;------------------------------------------------------------------
                 0473  ;
                 0474  ;   DRIVE LOG-ON COMMAND READS THE IDENTITY SECTOR FROM THE
                 0475  ; DISKETTE AND MAKES THE NEEDED ENTRYS INTO THE DRIVE TABLE.
                 0476  ; THE SECTOR DATA IS ALSO LEFT IN THE SECTOR BUFFER FOR BIOS
                 0477  ; TO FINISH THE LOG-ON OPERATION.
                 0478  ;
                 0479  ;------------------------------------------------------------------
00B1  CD2B01     0480  LGON:   CALL   SELECT
00B4  C0         0481          RET    NZ
                 0482
00B5  AF         0483          XOR    A              ;SET TRACK=0
00B6  327203     0484          LD     (CBTRK),A
                 0485
00B9  3C         0486          INC    A              ;SET SECTOR =1
00BA  327303     0487          LD     (CBSEC),A
00BD  CDBC01     0488          CALL   SEEK
                 0489
00C0  218003     0490          LD     HL,XBUF
00C3  1E01       0491          LD     E,1
00C5  CD7002     0492          CALL   RDSEC          ;READ ID SECTOR
                 0493
00C8  114403     0494          LD     DE,JADEID      ;SET STRING PTR
00CB  218003     0495          LD     HL,IDLBL       ;SET SECTOR BUFFER PTR TO COMPARE
00CE  0608       0496          LD     B,IDSZE        ;SET ID LENGTH
                 0497
00D0  1A         0498  CKJI:   LD     A,(DE)         ;IF ID NOT=JADE THEN 3740
00D1  BE         0499          CP     (HL)
00D2  200B       0500          JR     NZ,I3740
                 0501
00D4  23         0502          INC    HL             ;ELSE INC PTRS
00D5  13         0503          INC    DE
00D6  10F8       0504          DJNZ   CKJI           ;IF NOT DONE THEN REPEAT
                 0505
00D8  3A8103     0506          LD     A,(IDFLG)      ;SET SIDES & DENSITIES
00DB  DD7703     0507          LD     (IX+DVFLG),A
00DE  C9         0508          RET
                 0509
                 0510  ;      ASSUME 3740 FORMAT
                 0511
                 0512  I3740:
00DF  3E00       0513          LD     A,IDFLD        ;SIDE & DENSITIES FLAGS=0
00E1  DD7703     0514          LD     (IX+DVFLG),A
00E4  C9         0515          RET
                 0516
                 0517
```

```
                  ;-----------------------------
                  ;
                  ;   READ SECTOR COMMAND
                  ;
                  ;-----------------------------
00E5  3EFF        READ:   LD      A,-1            ;FLAG := READ
00E7  B7                  OR      A
00E8  1801                JR      OPCONT


                  ;-----------------------------
                  ;
                  ;   WRITE SECTOR COMMAND
                  ;
                  ;-----------------------------
00EA  AF          WRIT:   XOR     A               ;FLAG := WRITE
00EB  08          OPCONT: EX      AF,AF'          ;SAVE OP IN ALT REGS

00EC  CD2B01              CALL    SELECT          ;SELECT DRIVE
00EF  CCBC01              CALL    Z,SEEK          ;SEEK TRACK
00F2  C0                  RET     NZ

00F3  210003              LD      HL,XBUF         ;DEFAULT TO UNBLOCKED
00F6  3A7303              LD      A,(CBSEC)
00F9  5F                  LD      E,A

00FA  DD7E03              LD      A,(IX + DVFLG)  ;IF SECTOR SIZE == 128 THEN SKIP BLOCKING
00FD  E6C0                AND     11000000B
00FF  CA7402              JP      Z,RWSECP

0102  CDE902              CALL    DOBUFR          ;SET UP PHYSICAL SECTOR BUFFER
0105  C0                  RET     NZ

0106  08                  EX      AF,AF'          ;IF READ THEN ALREADY IN XBUF
0107  C0                  RET     NZ

0108  57                  LD      D,A
0109  08                  EX      AF,AF'
010A  210004              LD      HL,SBUFR        ;USE PHYSICAL SECTOR BUFFER
010D  3A0005              LD      A,(BSECT)
0110  5F                  LD      E,A
0111  C37702              JP      RWSECT


```

```
                ;************************************
                ;
                ;   INITIALIZE REGS & VARS SUBR
                ;
                ;************************************

0114  ED56      INIT:   IM      1
0116  0E00              LD      C,0             ;IF NOT INVERTED DATA SELECT THEN CONTINUE
0118  DB00              IN      A,BLSTS
011A  E601              AND     BSUS0
011C  2001              JR      NZ,STOP
011E  0D                DEC     C               ;ELSE SET UP INVERT MASK
011F  DD216003  STOP:   LD      IX,DTDED        ;SET DRIVE TABLE PTR
0123  AF                XOR     A               ;BLOCKED BUFFER := EMPTY
0124  320005            LD      (BSECT),A
0127  320305            LD      (SVDRV),A       ;BASE BLCTL BITS
012A  C9                RET


                ;*********************************************************************
                ;
                ;   THIS SUBROUTINE IS RESPONSIBLE FOR SELECTING THE COMMAND
                ; REQUESTED DRIVE #. BEFORE DRIVE SELECTION, THE DRIVE MOTOR
                ; STATE IS TESTED AND IF NEEDED, THEY ARE TURNED ON.
                ;       EXIT -  IX= NEW DRIVE TABLE
                ;               A= 0: OK, /0: ERR
                ;
                ;*********************************************************************
012B  DB00      SELECT: IN      A,BLSTS         ;GET BOARD LEVEL STATUS
012D  E620              AND     BSMOF           ;IF MOTOR ON THEN CHECK DRIVE
012F  2806              JR      Z,CKDV

0131  DB40              IN      A,XPMTX         ;ELSE ISSUE MOTOR START
0133  110100            LD      DE,TMMTO
0136  CF                RST     8

0137  DB40      CKDV:   IN      A,XPMTX         ;EXTEND MOTOR TIME

0139  3A0305            LD      A,(SVDRV)       ;INSURE 179X INTRQ ENABLED FOR LATER
013C  F604              OR      BCDSE           ;CMDS
013E  D300              OUT     BLCTL,A

0140  3A7103            LD      A,(CBDRV)       ;IF THIS DRIVE = OLD DRIVE THEN OK
0143  DD9600            SUB     (IX+DVNBR)
0146  C8                RET     Z

0147  1E10              LD      E,DCHDU         ;ELSE UNLOAD HEAD
0149  CD5702            CALL    EXHEAD

014C  3A0305            LD      A,(SVDRV)       ;DESELECT CURRENT DRIVE,
014F  E6FB              AND     [NOT BCDSE]
0151  D300              OUT     BLCTL,A

0153  3A7103            LD      A,(CBDRV)       ;SELECT DESIRED DRIVE,
0156  E603        0617          AND     BCDSN
0158  D300        0618          OUT     BLCTL,A
015A  F604        0619          OR      BCDSE
015C  D300        0620          OUT     BLCTL,A
015E  320305      0621          LD      (SVDRV),A
                  0622
0161  E603        0623          AND     BCDSN           ;SELECT DRIVE TABLE FOR DRIVE
0163  DD214C03    0624          LD      IX,DVTBL
0167  110500      0625          LD      DE,DVDES        ;DRIVE TABLE ARRAY SIZE
                  0626
016A  3D          0627  NEXT:   DEC     A               ;IF DRIVE = 0 THEN EXIT WITH POINTER SET
016B  FA7201      0628          JP      M,SLED
                  0629
016E  DD19        0630          ADD     IX,DE           ;ELSE POINT TO NEXT ARRAY & REPEAT
0170  18F8        0631          JR      NEXT
                  0632
0172  CD6302      0633  SLED:   CALL    EXSTS           ;SET FLAGS PER DRIVE READY
0175  E680        0634          AND     DMDNR
0177  327703      0635          LD      (CBSTS),A
                  0636
017A  C9          0637          RET
                  0638
                  0639
                  0640  ;*****************************************************************
                  0641  ;
                  0642  ;   HOMED SUBROUTINE STEPS THE DISK DRIVE HEAD OUTWARD UNTIL
                  0643  ; TRACK 0 FLAG IS TRUE OR 255 STEPS HAVE BEEN ISSUED
                  0644  ;       EXIT -  A= 0: OK, -1: TRK 0 NOT FOUND
                  0645  ;
                  0646  ;*****************************************************************
                  0647  HOMED:
017B  CD6302      0648          CALL    EXSTS           ;IF NOT TRK 0 THEN NO RECAL
017E  E604        0649          AND     DMTK0
0180  2817        0650          JR      Z,HOME1
                  0651
0182  2E0A        0652          LD      L,10            ;ELSE STEP IN BEYOND TRK 0
0184  3A0305      0653          LD      A,(SVDRV)       ;SELECT 'IN'
0187  F620        0654          OR      BCDAS
0189  D300        0655          OUT     BLCTL,A
                  0656
018B  DB08        0657  RECAL1: IN      A,XPSTP         ;STEP
018D  115000      0658          LD      DE,TMSTPC
0190  CF          0659          RST     8
                  0660
0191  2D          0661          DEC     L
0192  20F7        0662          JR      NZ,RECAL1
                  0663
0194  3A0305      0664          LD      A,(SVDRV)       ;RESTORE DIRECTION
0197  D300        0665          OUT     BLCTL,A
                  0666  HOME1:
0199  2EFF        0667          LD      L,255D          ;SET MAX COUNT
                  0668
019B  CD6302      0669  STEP:   CALL    EXSTS           ;IF ON TRACK 0 THEN EXIT
019E  E604        0670          AND     DMTK0
```

```
01A0  200B        0671         JR     NZ,EXIT
                  0672
01A2  2D          0673         DEC    L               ;IF STEPS = 255 THEN ERROR
01A3  2813        0674         JR     Z,EROR
                  0675
01A5  DB08        0676         IN     A,XPSTP         ;ISSUE STEP PULSE
                  0677
01A7  115000      0678         LD     DE,TMSTPC       ;SET DELAY
01AA  CF          0679         RST    8
01AB  18EE        0680         JR     STEP
                  0681
                  0682  ;      DRIVE IS RESTORED
                  0683
01AD  115000      0684  EXIT:  LD     DE,TMALS        ;WAIT A BIT AFTER LAST STEP
01B0  CF          0685         RST    8
                  0686
01B1  3E00        0687         LD     A,0             ;SET COMPLETE FLAG
01B3  DD7701      0688         LD     (IX+DVTRK),A    ;SET TRACK VALUE
                  0689
01B6  A7          0690         AND    A               ;SET RETURN FLAGS
01B7  C9          0691         RET
                  0692
                  0693  ;   TRACK 0 NOT FOUND
                  0694
01B8  3EFF        0695  EROR:  LD     A,0FFH          ;SET FAILURE FLAG
01BA  A7          0696         AND    A
01BB  C9          0697         RET
                  0698
                  0699
                  0700  ;*************************************************
                  0701  ;
                  0702  ;   TRACK SEEK SUBROUTINE
                  0703  ;   EXIT - DENSITY & PRE-COMP CONTROLS SET
                  0704  ;                 ZF= OK, NZ= ERROR
                  0705  ;
                  0706  ;*************************************************
01BC  CD6302      0707  SEEK:  CALL   EXSTS           ;IF HEAD ALREADY LOADED THE BYPASS
01BF  E620        0708         AND    DMHDL
01C1  2009        0709         JR     NZ,HLDD
                  0710
01C3  1E18        0711         LD     E,DCHDL         ;ELSE LOAD HEAD
01C5  CD5702      0712         CALL   EXHEAD
                  0713
01C8  115E01      0714         LD     DE,TMHLD
01CB  CF          0715         RST    8
                  0716
01CC  3A7203      0717  HLDD:  LD     A,(CBTRK)       ;IF CURRENT TRACK=REQUESTED TRACK THEN EXIT
01CF  DD9601      0718         SUB    (IX+DVTRK)
01D2  2006        0719         JR     NZ,DSET
                  0720
01D4  DD7E04      0721         LD     A,(IX+DVCTL)    ;ELSE GET PREVIOUS CTLS & RETURN
01D7  C34402    R 0722         JP     EXITS
                  0723
                  0724  ;      SET DIRECTION & STEP COUNT
```

```
                     0725
01DA  F5             0726  DSET:   PUSH    AF
01DB  110A00         0727          LD      DE,TMSAW          ;DELAY FOR STEP AFTER WRITE
01DE  CF             0728          RST     8
                     0729
01DF  F1             0730          POP     AF
01E0  380A           0731          JR      C,SOUT            ;CARRY=STEP OUT
                     0732
01E2  6F             0733  SIN:    LD      L,A
01E3  3A0305         0734          LD      A,(SVDRV)
01E6  F620           0735          OR      BCDAS
01E8  D300           0736          OUT     BLCTL,A
01EA  180B           0737          JR      STEPS
                     0738
01EC  ED44           0739  SOUT:   NEG                       ;COMPLEMENT OFFSET
01EE  FA5102         0740          JP      M,HOME
                     0741
01F1  6F             0742          LD      L,A
01F2  3A0305         0743          LD      A,(SVDRV)
01F5  D300           0744          OUT     BLCTL,A
                     0745
01F7  DB08           0746  STEPS:  IN      A,XPSTP           ;ISSUE STEP PULSE
01F9  115000         0747          LD      DE,TMSTPC
01FC  CF             0748          RST     8
                     0749
01FD  2D             0750          DEC     L                 ;IF STEPS-1 NOT 0 THEN STEP AGAIN
01FE  20F7           0751          JR      NZ,STEPS
                     0752
0200  115000         0753          LD      DE,TMALS          ;ELSE EXTEND LAST PULSE
0203  CF             0754          RST     8
                     0755
                     0756  ;       TRACK SECTION DISTRIBUTE
                     0757
0204  1EC0           0758          LD      E,BCSDS + BCPCL ;USE SD, PRECOMP LOW AS DEFAULTS
                     0759
0206  3A7203         0760          LD      A,(CBTRK)         ;IF TRACK 0 THEN USE DEFAULTS
0209  FE01           0761          CP      1
020B  3830           0762          JR      C,CTLS
                     0763
020D  280A           0764          JR      Z,TRK1            ;ELSE IF TRACK 1 THEN GOTO TRK1
                     0765
020F  FE1A           0766          CP      26D               ;ELSE IF < TRACK 26 THEN GOTO OUTS
0211  3810           0767          JR      C,OUTS
                     0768
0213  FE34           0769          CP      52D               ;ELSE IF < TRACK 52 THEN GOTO MIDS
0215  3814           0770          JR      C,MIDS
                     0771
0217  181C           0772          JR      INSD
                     0773
                     0774  ;       TRACK 1
                     0775
0219  DDCB034E       0776  TRK1:   BIT     DFT1D,(IX + DVFLG)       ;IF SD THEN USE DEFAULTS
021D  281E           0777          JR      Z,CTLS
                     0778
```

```
021F  1ED0          0779  T1DD:   LD      E,BCDDS + BCPCL         ;USE DD, LOW COMP
0221  181A          0780          JR      CTLS
                    0781
                    0782  ;       OUTSIDE TRACKS
                    0783
0223  DDCB0356      0784  OUTS:   BIT     DFDTD,(IX + DVFLG)      ;IF SD THEN USE DEFAULTS
0227  2814          0785          JR      Z,CTLS
                    0786
0229  18F4          0787          JR      T1DD            ;ELSE USE SAME AS TRACK 1
                    0788
                    0789  ;       MIDDLE TRACKS
                    0790
022B  DDCB0356      0791  MIDS:   BIT     DFDTD,(IX + DVFLG)      ;IF SD THEN USE DEFAULTS
022F  280C          0792          JR      Z,CTLS
                    0793
0231  1E90          0794          LD      E,BCDDS + BCPCM         ;USE DD, MEDIUM PRECOMP
0233  1808          0795          JR      CTLS
                    0796
                    0797  ;       INSIDE TRACKS
                    0798
0235  DDCB0356      0799  INSD:   BIT     DFDTD,(IX + DVFLG)      ;IF SD THEN USE DEFAULTS
0239  2802          0800          JR      Z,CTLS
                    0801
023B  1E50          0802          LD      E,BCDDS + BCPCH         ;SET DD, HIGH PRECOMP
                    0803
                    0804  ;       SET CONTROLS
                    0805
023D  3A0305        0806  CTLS:   LD      A,(SVDRV)       ;ADD DENSITY, PRECOMP BITS TO CONTROL BITS
0240  B3            0807          OR      E
0241  DD7704        0808          LD      (IX + DVCTL),A
                    0809
0244  D300          0810  EXITS:  OUT     BLCTL,A
                    0811
0246  3A7203        0812          LD      A,(CBTRK)       ;SET REQUESTED TRACK
0249  DD7701        0813          LD      (IX + DVTRK),A
024C  A9            0814          XOR     C
024D  D305          0815          OUT     WDTRK,A         ;SET TRACK REGISTER
024F  AF            0816          XOR     A               ;SET Z FLAG
0250  C9            0817          RET
                    0818
                    0819  ;       CALIBRATE TRACK #
                    0820
0251  CD7B01        0821  HOME:   CALL    HOMED           ;HOME SELECTED DRIVE
0254  C3CC01        0822          JP      HLDD            ;NOW SEEK TRACK
                    0823
                    0824
                    0825  ;***************************************
                    0826  ;
                    0827  ;    HEAD LOAD/UNLOAD SUBROUTINES
                    0828  ;        ENTRY - E= HEAD COMMAND
                    0829  ;
                    0830  ;***************************************
0257  FDE1          0831  EXHEAD: POP     IY              ;IY=RETURN ADDR
0259  DB05          0832          IN      A,WDTRK         ;PERFORM SEEK TO CURRENT TRACK WITH HEAD LOAD
```

```
025B  D307             OUT     WDDTA,A

025D  7B               LD      A,E             ;OUTPUT PASSED COMMAND
025E  A9               XOR     C
025F  D304             OUT     WDCMD,A

0261  18FE             JR      $               ;WAIT FOR INTERRUPT


                ;*************************************
                ;
                ;   GET STATUS SUBROUTINE
                ;       EXIT -  A= 1791 STATUS
                ;
                ;*************************************
0263  3ED0      EXSTS: LD      A,DCSTS         ;OUTPUT SET STATUS COMMAND TO 1791
0265  A9               XOR     C
0266  D304             OUT     WDCMD,A
0268  E3               EX      (SP),HL         ;PAUSE
0269  E3               EX      (SP),HL
026A  E3               EX      (SP),HL
026B  E3               EX      (SP),HL
026C  DB04             IN      A,WDSTS         ;GET LATEST STATUS
026E  A9               XOR     C
026F  C9               RET


                ;*********************************************
                ;
                ;       READ SECTOR SUBR PRESETS RWOP TO READ
                ;
                ;*********************************************
0270  16FF      RDSEC: LD      D,-1
0272  1803             JR      RWSECT


                ;*************************************
                ;
                ;       READ/WRITE SECTOR SUBR
                ;       ENTRY-  A'= 0: WRITE, /0: READ
                ;               HL= XFER PTR
                ;               E= SECTOR
                ;       EXIT -  NZ= ERROR
                ;               A,HL,B= ?
                ;
                ;*************************************
0274  08        RWSECA: EX     AF,AF'
0275  57               LD      D,A
0276  08               EX      AF,AF'


                ;*****************************************************************
                ;
                ;   READ/WRITE SECTOR SUBROUTINE INITIATES DISK XFER, SEVICES THE
```

```
                 0887  ; CONTROLLER CHIP DURING DATA XFER, & TERMINATES OPERATION
                 0888  ; WHEN FINISHED. ERROR DETECTION IS IMPLEMENTED & RETRIES ARE
                 0889  ; EXECUTED IF DATA ERRORS ARE DETECTED.
                 0890  ;       ENTRY - D= 0: WRITE, /0: READ
                 0891  ;               HL= XFER PTR
                 0892  ;               E= PHYSICAL SECTOR # (1..26)
                 0893  ;       EXIT  - NZ= ERROR
                 0894  ;               HL, A, B= ?
                 0895  ;
                 0896  ;*****************************************************************
                 0897
0277  AF         0898  RWSECT: XOR    A               ;0 ERROR COUNT
0278  320405     0899          LD     (ERRCT),A
                 0900          CALL   CHOSIDE         ;CHOOSE SIDE
027B  7B         0901          LD     A,E             ;SET 1791 SECTOR REGISTER
027C  A9         0902          XOR    C
027D  D306       0903          OUT    WDSEC,A
                 0904
027F  FD21A002   0905  RWRTRY: LD     IY,RWNMI        ;SET NMI VECTOR FOR RETURN
                 0906
0283  0688       0907          LD     B,DCRDS         ;DEFAULT TO READ
                 0908
0285  7A         0909          LD     A,D             ;SELECT OPERATION
0286  B7         0910          OR     A
0287  2002       0911          JR     NZ,OPOK
                 0912
0289  06A8       0913          LD     B,DCWRS         ;WRITE OP
                 0914
028B  78         0915  OPOK:   ~~LD     A,B~~             ;OUTPUT READ SECTOR COMMAND   LD   A,(SIDE)
                                                                                      OR   B
028C  A9         0916          XOR    C
028D  D304       0917          OUT    WDCMD,A
                 0918
028F  E3         0919          EX     (SP),HL
0290  E3         0920          EX     (SP),HL         ;WAIT FOR 1791
0291  E3         0921          EX     (SP),HL
0292  E3         0922          EX     (SP),HL
                 0923
0293  7A         0924          LD     A,D             ;IF WRITE OP THEN GO DO IT
0294  B7         0925          OR     A
0295  2820       0926          JR     Z,WROP
                 0927
0297  DB80       0928  RDREPT: IN     A,XPDSH         ;GENERATE "HOLD" UNTIL 179X READY
                 0929
0299  DB07       0930          IN     A,WDDTA         ;XFER DATA TO BUFFER
029B  A9         0931          XOR    C
029C  77         0932          LD     (HL),A
029D  23         0933          INC    HL              ;PTR +1
029E  18F7       0934          JR     RDREPT
                 0935
                 0936  ;   CHECK STATUS
                 0937
02A0  069D       0938  RWNMI:  LD     B,DMRER         ;IF NO ERRORS THEN RETURN
02A2  F5         0939          PUSH   AF              ;SAVE 179X STATUS
                 0940
```

```
02A3 7A                 LD      A,D             ;IF WRITE OP THEN
02A4 B7                 OR      A
02A5 2002               JR      NZ,RWMSK

02A7 06FD               LD      B,DMWER         ;USE WRITE ERR MASK

02A9 F1         RWMSK:  POP     AF              ;179X STATUS
02AA A0                 AND     B
02AB 327703             LD      (CBSTS),A
02AE C8                 RET     Z

02AF D5                 PUSH    DE              ;SAVE FLAG, SECTOR
02B0 CDC002             CALL    CHKRT           ;IF RETRYS NOT EXHAUSTED THEN RETRY
02B3 D1                 POP     DE
02B4 28C9               JR      Z,RWRTRY

02B6 C9                 RET


                WROP:
02B7 DB80       REPTW:  IN      A,XPDSH         ;HOLD FOR DATA REQ

02B9 7E                 LD      A,(HL)          ;OUTPUT DATA TO 1791
02BA A9                 XOR     C
02BB D307               OUT     WDDTA,A
02BD 23                 INC     HL
02BE 18F7               JR      REPTW


                ;*************************************
                ;
                ;   CHECK FOR RETRYS SUBROUTINE
                ;       EXIT -  A= 0: OK, /0: ERROR
                ;
                ;*************************************
02C0 E680       CHKRT:  AND     DMDNR           ;IF NOT READY THEN EXIT
02C2 C0                 RET     NZ

02C3 3A7603             LD      A,(CBMOD)       ;IF NO RETRYS CHECK THEN EXIT
02C6 E680               AND     CMNRT
02C8 C0                 RET     NZ

02C9 DB40               IN      A,XPMTX

02CB 3A0405             LD      A,(ERRCT)       ;ERROR COUNT +1
02CE 3C                 INC     A
02CF 320405             LD      (ERRCT),A
02D2 FE05               CP      RTYSK           ;IF NOT TRY SEEK THEN CHECK LAST
02D4 2007               JR      NZ,CKLS

02D6 CD7B01             CALL    HOMED           ;HOME SELECTED DRIVE
02D9 CCBC01             CALL    Z,SEEK          ;RE-SEEK DESIRED TRACK
02DC C0                 RET     NZ              ;IF ERROR THEN EXIT

02DD FE09       CKLS:   CP      RTYLS           ;IF LAST RETRY THEN RETURN WITH ERROR
```

```
02DF  2806        0995          JR      Z,STNZ
                  0996
02E1  11B004      0997          LD      DE,TMPLD        ;ELSE WAIT & RETURN WITH NO ERRORS
02E4  CF          0998          RST     8
                  0999
02E5  AF          1000          XOR     A
02E6  C9          1001          RET
                  1002  ;
02E7  3C          1003  STNZ:   INC     A       ;SET NO RETRY FLAG (NZ)
                  1004
02E8  C9          1005          RET
                  1006
                  1007
                  1008  ;*************************************************
                  1009  ;
                  1010  ;       DEBLOCKING BUFFER HANDLER
                  1011  ;       ENTRY-  AF'= ZF: WRITE OP, NZ: READ OP
                  1012  ;       EXIT -  NZ= ERROR
                  1013  ;               HL, DE= ?
                  1014  ;
                  1015  ;*************************************************
                  1016  DOBUFR:
02E9  CD0C03      1017          CALL    BUFOK           ;SET UP SECTOR BUFFER
02EC  C0          1018          RET     NZ
                  1019
02ED  C5          1020          PUSH    BC
02EE  018000      1021          LD      BC,SECSIZ       ;SET UP XFER
02F1  118003      1022          LD      DE,XBUF
02F4  210004      1023          LD      HL,SBUFR        ;DEFAULT TO LO HALF
                  1024
02F7  3A7303      1025          LD      A,(CBSEC)       ;COMPUTE LOGICAL HALF
02FA  3D          1026          DEC     A               ;0: LO, 1: HI
02FB  CB47        1027          BIT     0,A
02FD  2803        1028          JR      Z,XOK
                  1029
02FF  218004      1030          LD      HL,SBUFR + SECSIZ       ;XFER HI HALF
                  1031
0302  08          1032  XOK:    EX      AF,AF'          ;IF READ THEN OK
0303  2001        1033          JR      NZ,NOTWRT
                  1034
0305  EB          1035          EX      DE,HL           ;ELSE REVERSE DIRECTION
                  1036
0306  08          1037  NOTWRT: EX      AF,AF'          ;RESTORE FLAG
0307  EDB0        1038          LDIR
                  1039
0309  C1          1040          POP     BC
030A  AF          1041          XOR     A               ;RETURN OK
030B  C9          1042          RET
                  1043
                  1044
                  1045  ;*************************************
                  1046  ;
                  1047  ;       CHECK FOR BUFFER OK SUBR
                  1048  ;       EXIT -  NZ= ERROR
                  1049  ;               HL,DE,A= ?
                  1050  ;**************************************
                  1051  BUFOK:
0309C 3A7303      1052          LD      A,(CBSEC)               ;COMPUTE PHYSICAL SECTOR
030F  3D          1053          DEC     A               ;1..N -> 0..N-1
0310  CB2F        1054          SRA     A               ;N' = N / 2
0312  3C          1055          INC     A               ;0..N'-1 -> 1..N'
                  1056
0313  5F          1057          LD      E,A             ;SAVE FOR LATER
0314  3A0005      1058          LD      A,(BSECT)
0317  BB          1059          CP      E
0318  200F        1060          JR      NZ,NOTSAME
                  1061
031A  3A0205      1062          LD      A,(BDISK)               ;IF BUFFER NOT SAME THEN READ BUFR
031D  DDBE00      1063          CP      (IX + DVNBR)
0320  2007        1064          JR      NZ,NOTSAME
                  1065
0322  3A0105      1066          LD      A,(BTRACK)
0325  DDBE01      1067          CP      (IX + DVTRK)
0328  C8          1068          RET     Z               ;SAME, JUST RETURN
                  1069
                  1070  NOTSAME:
0329  210004      1071          LD      HL,SBUFR        ;SET PTR
032C  D5          1072          PUSH    DE              ;SAVE PHYSICAL SECTOR #
032D  CD7002      1073          CALL    RDSEC
0330  D1          1074          POP     DE
0331  2802        1075          JR      Z,BRDOK         ;IF ERROR THEN CLEAR BUFFER
                  1076
0333  1E00        1077          LD      E,0
                  1078
0335  210005      1079  BRDOK:  LD      HL,BSECT        ;UPDATE BUFFER PTRS
0338  73          1080          LD      (HL),E
0339  23          1081          INC     HL
033A  DD7E01      1082          LD      A,(IX + DVTRK)
033D  77          1083          LD      (HL),A
033E  23          1084          INC     HL
033F  DD7E00      1085          LD      A,(IX + DVNBR)
0342  77          1086          LD      (HL),A
0343  C9          1087          RET
                  1088
                  1089
```

```

                ;------------------------------
                ;
                ;   DISKETTE FORMAT LABEL
                ;
                ;------------------------------
0344  4A616465  JADEID: DB      'Jade DD '      ;DISKETTE ID LABLE
      20444420
      (0008)    IDSZE:  EQU     $-JADEID        ;LABEL LENGTH

      (0380)    IDLBL:  EQU     BUF80+0         ;ID SECTOR LABEL OFFSET

      (03A0)    IDBLK:  EQU     IDLBL+20H       ;ID DISK DESCRIPTOR BLOCK OFFSET
      (03A0)    IDSPT:  EQU     IDBLK+0         ;SECTORS PER TRACK OFFSET
      (03B0)    IDSTG:  EQU     IDBLK+10H       ;SECTOR STAGGER OFFSET
      (03B1)    IDFLG:  EQU     IDBLK+11H       ;DISKETTE FLAGS OFFSET

      (0000)    IDFLD:  EQU     00000000B       ;3740 FLAGS

                ;----------------------------------------
                ;
                ;       DRIVE TABLE OFFSETS
                ;
                ;----------------------------------------
      (0000)    DVNBR:  EQU     0               ;CURRENT DRIVE #
      (0001)    DVTRK:  EQU     1               ;CURRENT TRACK #
      (0002)    DVSEC:  EQU     2               ;CURRENT SECTOR #
                ;
                ;       DISK FORMAT FLAG BYTE
                ;
                ;BIT #: 76543210
                ;       ^^  ^^^^___ TRACK 0 DENSITY (0: SD, 1: DD) (ALLWAYS 0)
                ;       ||  |||____ TRACK 1 DENSITY
                ;       \|  ||_____ TRACK 2..76 DENSITY
                ;        |  |______ SIDES FLAG (0: 1 SIDE, 1: 2 SIDES)
                ;        |_________ BYTES PER SECTOR  (00: 128, 01: 256, 10: 512, 11: 1024)
                ;
      (0003)    DVFLG:  EQU     3               ;SIDE & DENSITY FLAGS

                ;       FLAG BIT DEFINITIONS

      (0001)    DFT1D:  EQU     1               ;TRK 1 DENSITY (1=DBL)
      (0002)    DFDTD:  EQU     2               ;DATA TRKS DENSITY (1=DBL)
      (0003)    DFTSD:  EQU     3               ;2 SIDED  (1=2 SIDES)
      (0002)    DFDFL:  EQU     DFT1D + DFT1D   ;DEFAULT FLAGS

      (0004)    DVCTL:  EQU     4               ;LAST CONTROLS USED OFFSET

                ;       DRIVE TABLES

      (034C)    DVTBL:  EQU     $
034C  00FF0002  DTDE0:  DB      0,255D,0,DFDFL,0C4H             ;DRIVE 0
      C4
0351  01FF0002  DTDE1:  DB      1,255D,0,DFDFL,0C5H             ;DRIVE 1
```

```
      C5
0356  02FF0002    1143          DB      2,255D,0,DFDFL,0C6H             ;DRIVE 2
      C6
035B  03FF0002    1144          DB      3,255D,0,DFDFL,0C7H             ;DRIVE 3
      C7
0360  04FF0000    1145  DTDED:  DB      4,255D,0,0,0                    ;DUMMY
      00
      (0005)      1146  DVDES:  EQU     DTDE1-DTDE0                     ;ENTRY SIZE
                  1147
                  1148
                  1149  ;----------------------------------------
                  1150  ;
                  1151  ;   COMMAND BLOCK
                  1152  ; THIS IS THE HOST COMMUNICATION AREA
                  1153  ;
                  1154  ;----------------------------------------
0365  (000B)      1158          DS      CMDBLK - $      ;POSITION BLOCK
                  1159  ;CMDBLK:                        COMMENTED OUT, DEFINED IN INCLUDE FILE
0370  00          1160          DB      0               ;CONTROL COMMAND
0371  00          1161          DB      0               ;DRIVE #
0372  00          1162          DB      0               ;TRACK #
0373  00          1163          DB      0               ;SECTOR #
0374  00          1164          DB      0               ;FORMAT FLAGS
0375  00          1165          DB      0               ;UNASSIGNED
0376  00          1166          DB      0               ;MODE SELECTS
0377  00          1167          DB      0               ;CONTROLLER STATUS
0378  0000        1168          DW      0               ;LOAD ADDR
037A  0000        1169          DW      0               ;LOAD LENGTH
037C  00          1170  SVSTS   DB      0               ;1791 RAW STATUS
                  1171
037D  (0003)      1175          DS      BUFBG-$
      (0380)      1176  XBUF    EQU     $               ;DATA XFER BUFFER START
                  1177
```

```
                    1179  ;-----------------------------------------------------------------------------
                    1180  ;
                    1181  ;   THIS CODE IS ENTERED BY THE BOOT INJECTION MODULE (BIM) FROM ENTRY
                    1182  ; VECTOR AT DCM ADDRESS 0003H (ACTUALLY AT 0403H WHEN EXECUTED).
                    1183  ; IT RELOCATES THE ENTIRE DCM CURRENTLY IN BANK 1 TO BANK 0, THEN TRANSFERS
                    1184  ; CONTROL TO IT'S BANK 0 IMAGE WHICH THEN PROCEEDS TO INITIALIZE THE FIRMWARE
                    1185  ; AND LOAD THE BIOS LOADER INTO THIS BUFFER.
                    1186  ;
                    1187  ;-----------------------------------------------------------------------------
0380  010004        1188  INITB:  LD      BC,BANKL          ;SET BYTE COUNT TO MOVE
0383  110000        1189          LD      DE,BANK0
0386  210004        1190          LD      HL,BANK1
0389  EDB0          1191          LDIR                      ;XFER DCM TO BANK 0 FROM LOAD
038B  C38E03      R 1192          JP      DOWN              ;TRANSFER TO FOLLOWING CODE NOW IN BANK 0 ALSO
                    1193  ;
038E  312505        1194  DOWN:   LD      SP,STACK
0391  CD1401        1195          CALL    INIT
                    1196
0394  1E02          1197          LD      E,2               ;LOAD IN BIOS LOADER SECTOR
0396  DB40          1198          IN      A,XPMTX
0398  210003        1199          LD      HL,BUFBG          ;SET RETURN TO EXECUTE BLT
039B  E5            1200          PUSH    HL
039C  C3700E        1201          JP      RDSEC
                    1202
                    1206
```

```
      (0400)             ORG     BANK1
                   ;
                   ;       PHYSICAL SECTOR LOCS FOR DEBLOCKING
                   ;
0400  (0100)       SBUFR   DS      256             ;PHYSICAL SECTOR BUFFER
                   ;
                   ;       NOTE: THE FOLLOWING 3 BYTES MUST APPEAR IN THIS ORDER, THEY ARE
                   ; INDEXED BY A POINTER IN BUFOK SUBR.
                   ;
0500  (0001)       BSECT   DS      1               ;CURRENT SECTOR #
0501  (0001)       BTRACK  DS      1               ;CURRENT SECTOR TRACK #
0502  (0001)       BDISK   DS      1               ;CURRENT SECTOR DISK #

0503  (0001)       SVDRV   DS      1               ;BLCTL DRIVE BITS
0504  (0001)       ERRCT   DS      1               ;RETRY COUNT

0505  (0020)               DS      32              ;STACK SIZE
      (0525)       STACK   EQU     $

0525  (0000)               END

Errors             0
Range Count        4
```

```
DISK CONTROLLER MODULE   (DCM)
Symbol      Value  Defn  References

ADDR        0042   0361  0435
BANK0       0000   0204  0205 0208 0220 1189
BANK1       0400   0205  0221 0233 1190 1203 1208 1227
BANKL       0400   0203  0205 0270 1188
BCDAS       0020   0098  0654 0735
BCDDE       0010   0097  0107
BCDDS       0010   0107  0779 0794 0802
BCDR0       0000   0101
BCDSA       0001   0093  0105
BCDSB       0002   0094  0105
BCDSE       0004   0095  0602 0613 0619
BCDSN       0003   0105  0617 0623
BCEIA       0008   0096
BCPCA       0040   0099  0108 0110
BCPCB       0080   0100  0109 0110
BCPCH       0040   0108  0802
BCPCL       00C0   0110  0758 0779
BCPCM       0080   0109  0794
BCPCZ       0000   0111
BCSDS       0000   0106  0758
BDISK       0502   1219  1062
BEHDM       0001   0226
BERDA       0002   0227
BERDB       0004   0228
BLCTL       0000   0078  0603 0614 0618 0620 0655 0665 0736 0744 0810
BLSTS       0000   0077  0379 0571 0591
BRDOK       0335   1079  1075
BSDCN       0080   0123
BSECT       0500   1217  0557 0577 1058 1079
BSEIA       0010   0120
BSINT       0008   0119  0380
BSMOF       0020   0121  0592
BSTSD       0040   0122
BSTST       0004   0118
BSUS0       0001   0116  0572
BSUS1       0002   0117
BTRACK      0501   1218  1066
BUFBG       0380   0220  1100 1172 1175 1199
BUFOK       030C   1051  1017
CBCMD       0370   0209  0415
CBDRV       0371   0210  0605 0616
CBFFG       0374   0213
CBMOD       0376   0215  0978
CBSEC       0373   0212  0450 0487 0541 1025 1052
CBSPR       0375   0214
CBSTS       0377   0216  0369 0466 0635 0949
CBTRK       0372   0211  0484 0717 0760 0812
CHKRT       02C0   0975  0953
CKDV        0137   0599  0593
CKJI        00D0   0498  0504
CKLS        02DD   0994  0988
CLEAR       001B   0304  0268
CMDBLK      0370   0208  0209 0210 0211 0212 0213 0214 0215 0216 0217 0218 1155 1158
CMDT        0083   0430  0420
```

```
Symbol      Value  Defn  References

CMNRT       0080   0238  0979
CSBSY       0001   0159
CSCRC       0008   0156
CSDNR       0080   0152
CSDRQ       0002   0167
CSHLD       0020   0154
CSINDX      0002   0158
CSLDE       0004   0166
CSRNF       0010   0165
CSSKE       0010   0155
CSTK0       0004   0157
CSTYPE      0020   0163
CSWFLT      0020   0164
CSWRP       0040   0153
CTLS        023D   0806  0762 0777 0780 0785 0792 0795 0800
CWLAD       0378   0217
CWLNG       037A   0218  0468
DCHDL       0018   0127  0711
DCHDU       0010   0128  0609
DCIFI       00D8   0146
DCMBG       0403   0233
DCMLN       0400   0234
DCMSS       0004   0232
DCRDA       00C0   0144
DCRDS       0088   0140  0907
DCRMS       0098   0141
DCSTS       00D0   0145  0848
DCWRS       00A8   0142  0913
DCWRT       00F0   0147  0456
DFDFL       0002   1134  1141 1142 1143 1144
DFDTD       0002   1132  0784 0791 0799
DFT1D       0001   1131  0776 1134 1134
DFTSD       0003   1133
DMDNR       0080   0176  0634 0975
DMFER       00E4   0173  0465
DMHDL       0020   0175  0708
DMLDE       0004   0177
DMRER       009D   0171  0938
DMTK0       0004   0174  0649 0670
DMWER       00FD   0172  0945
DOBUFR      02E9   1016  0548
DOWN        038E   1194  1192
DSET        01DA   0726  0719
DTDE0       034C   1141  1146
DTDE1       0351   1142  1146
DTDED       0360   1145  0575
DVCTL       0004   1136  0721 0808
DVDES       0005   1146  0625
DVFLG       0003   1127  0451 0507 0514 0544 0776 0784 0791 0799
DVNBR       0000   1114  0606 1063 1085
DVSEC       0002   1116
DVTBL       034C   1140  0624
DVTRK       0001   1115  0688 0718 0813 1067 1082
EROR        01B8   0695  0674
```

```
Symbol      Value  Defn  References

ERRCT       0504   1222  0899 0984 0986
EXHEAD      0257   0831  0610 0712
EXIT        01AD   0684  0671
EXITS       0244   0810  0722
EXSTS       0263   0848  0413 0633 0648 0669 0707
FALSE       0000   0046  0047 0048
FMTBG       0700   0221  0222
FMTPS       0708   0222  0463
FORM        008B   0447  0434
HLDD        01CC   0717  0709 0822
HOME        0251   0821  0740
HOME1       0199   0666  0650
HOMED       017B   0647  0821 0990
HRVEC       003D   0343  0331
I3740       00DF   0512  0500
IDBLK       03A0   1102  1103 1104 1105
IDFLD       0000   1107  0513
IDFLG       03B1   1105  0506
IDLBL       0380   1100  0495 1102
IDLE        0048   0379  0381 0438
IDSPT       03A0   1103
IDSTG       03B0   1104
IDSZE       0008   1098  0496
INIT        0114   0569  0305 0329 1195
INITB       0380   1188  0270
INSD        0235   0799  0772
JADEID      0344   1097  0494 1098
LGON        00B1   0480  0431
LSTINC      0000   0048  0071 0137
MASK        0007   0439  0417
MIDS        022B   0791  0770
NBTRK       0050   0184
NEXT        016A   0627  0631
NMINT       0066   0206
NMIWT       00A8   0465  0454
NOTSAME     0329   1070  1060 1064
NOTWRT      0306   1037  1033
OPCONT      00EB   0534  0525
OPOK        028B   0915  0911
OUTS        0223   0784  0767
RDREPT      0297   0928  0934
RDSEC       0270   0865  0316 0492 1073 1201
READ        00E5   0523  0432
RECAL1      018B   0657  0662
REPTW       02B7   0960  0966
RST38       0038   0341
RST38A      0030   0329  0343
RST40       0028   0316
RST8        0008   0282
RTYLS       0009   0199  0994
RTYSK       0005   0198  0987
RWMSK       02A9   0947  0943
RWNMI       02A0   0938  0905
RWRTRY      027F   0905  0955
```

```
Symbol      Value  Defn  References

RWSECA      0274   0879  0546
RWSECT      0277   0898  0559 0866
SBUFR       0400   1212  0556 1023 1030 1071
SECSIZ      0080   0239  1021 1030
SEEK        018C   0707  0452 0488 0537 0991
SELECT      012B   0591  0447 0480 0536
SIN         01E2   0733
SLED        0172   0633  0628
SLEEP       0040   0352  0306
SOUT        01EC   0739  0731
SPAR        0042   0369  0436 0437
STACK       0525   1225  0304 0342 1194
STEP        019B   0669  0680
STEPS       01F7   0745  0737 0751
STNZ        02E7   1003  0995
STOP        011F   0575  0573
SVDRV       0503   1221  0578 0601 0612 0621 0653 0664 0734 0743 0806
SVSTS       037C   1170  0401
T1DD        021F   0779  0787
TICKE       0013   0290  0285
TICKR       000F   0287  0295
TMALS       0050   0186  0684 0753
TMDBR       0001   0183
TMHLD       015E   0185  0714
TMMTO       0001   0187  0596
TMPLD       04B0   0188  0997
TMRFC       0019   0193  0283
TMRNC       001C   0194  0287
TMSAW       000A   0189  0727
TMSTP       0008   0181
TMSTPC      0050   0182  0658 0678 0747
TRK1        0219   0776  0764
TRUE        FFFF   0047
TSTACK      0038   0340
VERSN       3133   0043
WDCMD       0004   0079  0458 0837 0850 0917
WDDTA       0007   0083  0833 0930 0964
WDINT       0066   0399
WDSEC       0006   0082  0903
WDSTS       0004   0080  0399 0855
WDTRK       0005   0081  0815 0832
WRIT        00EA   0533  0433
WROP        02B7   0959  0926
XBUF        0380   1176  0490 0540 1022
XCUTE       0070   0413  0330
XCK         0302   1032  1028
XPDSH       0080   0088  0928 0960
XPIRR       0020   0086  0341 0382
XPMTO       0010   0085
XPMTX       0040   0087  0595 0599 0982 1198
XPSTP       0008   0084  0657 0676 0746
```

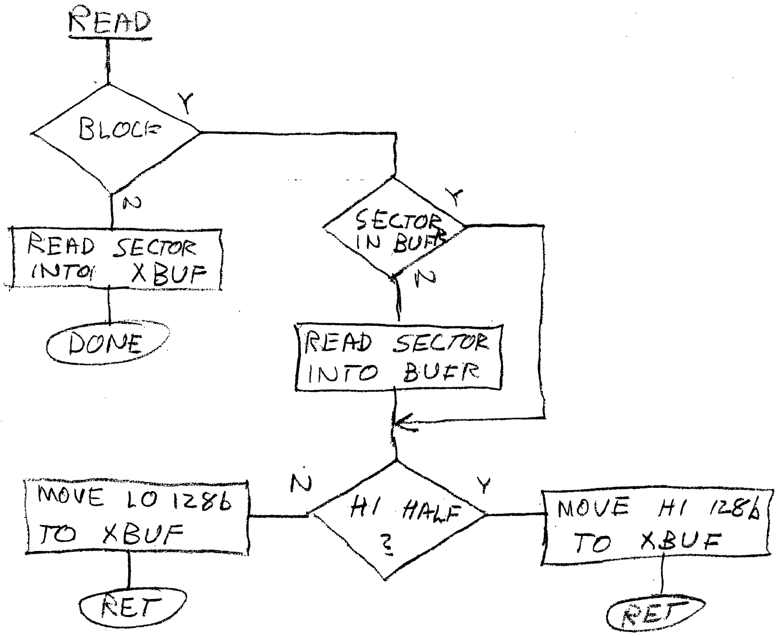
VER #1

3888	3600	SECTS.
486	450 K	DRIVE CAP.
64	64	DIR ENTS.
64	64	CHK DIR
256	256	REC /EXT
16	16	REC/BLK
52	48	SPT
2	2	RSVT

B

OLD	00:17.05
NEW NON-BLOCKED	00:16.98
NEW BLOCKED	00:36.05

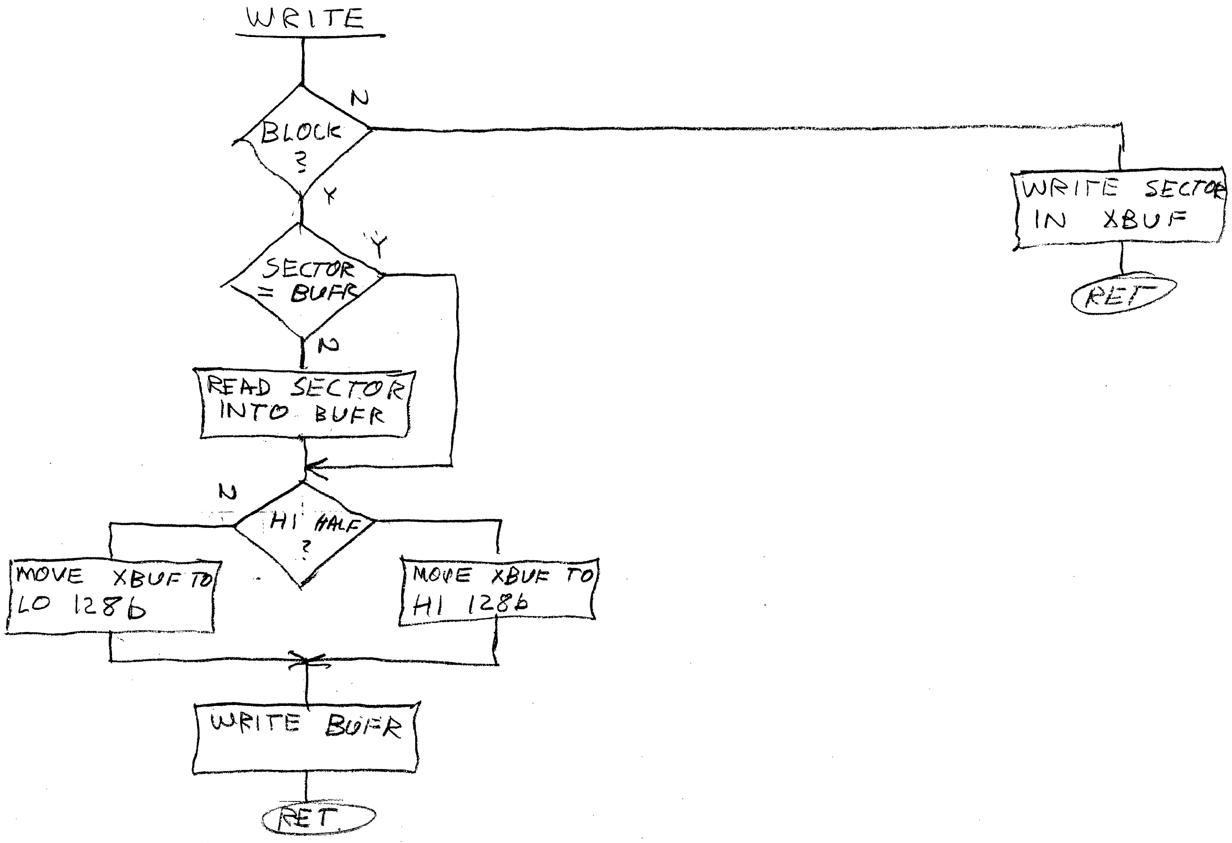
PIPING FILE TO NEW NAME
(X = FILE)

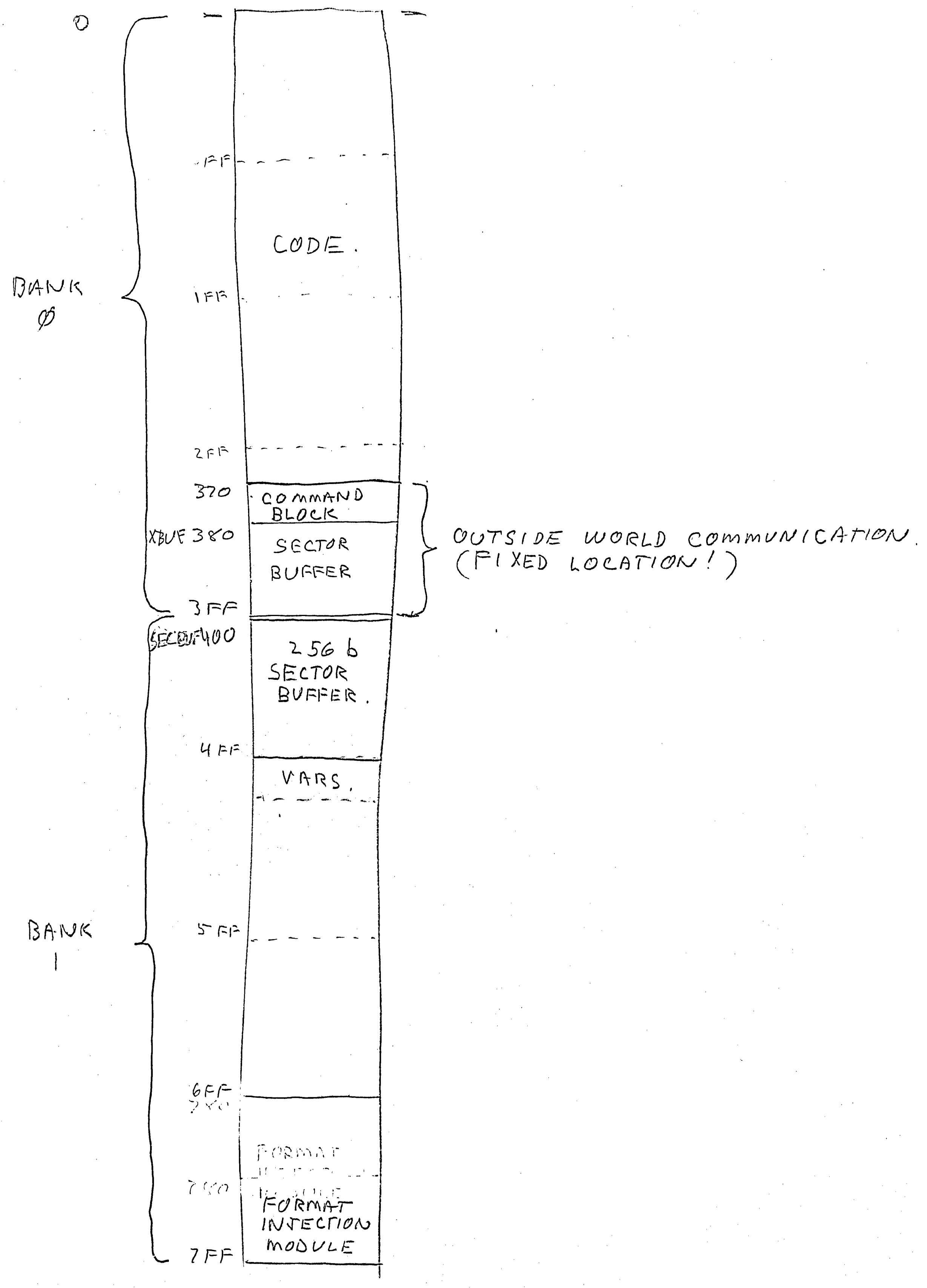


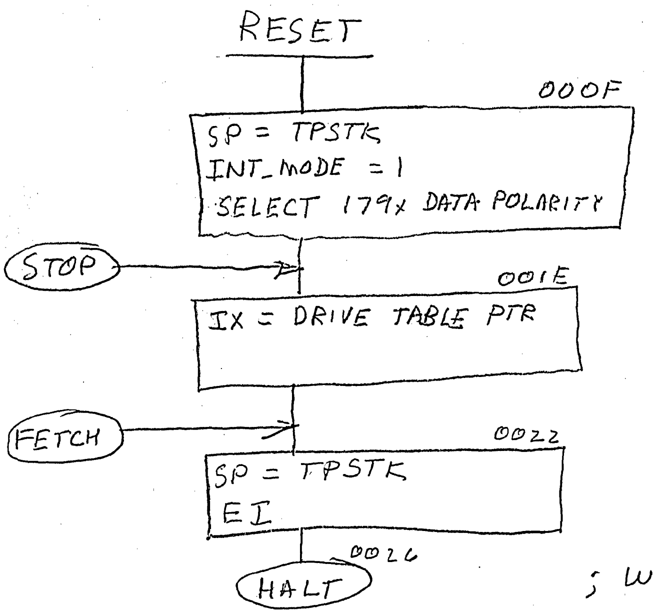
BLOCK IS BIT IN DISK DESCRIPTOR
HALF IS DETERMINED FROM BIT Ø OF SECTOR

BUFFER HAS FLAGS:

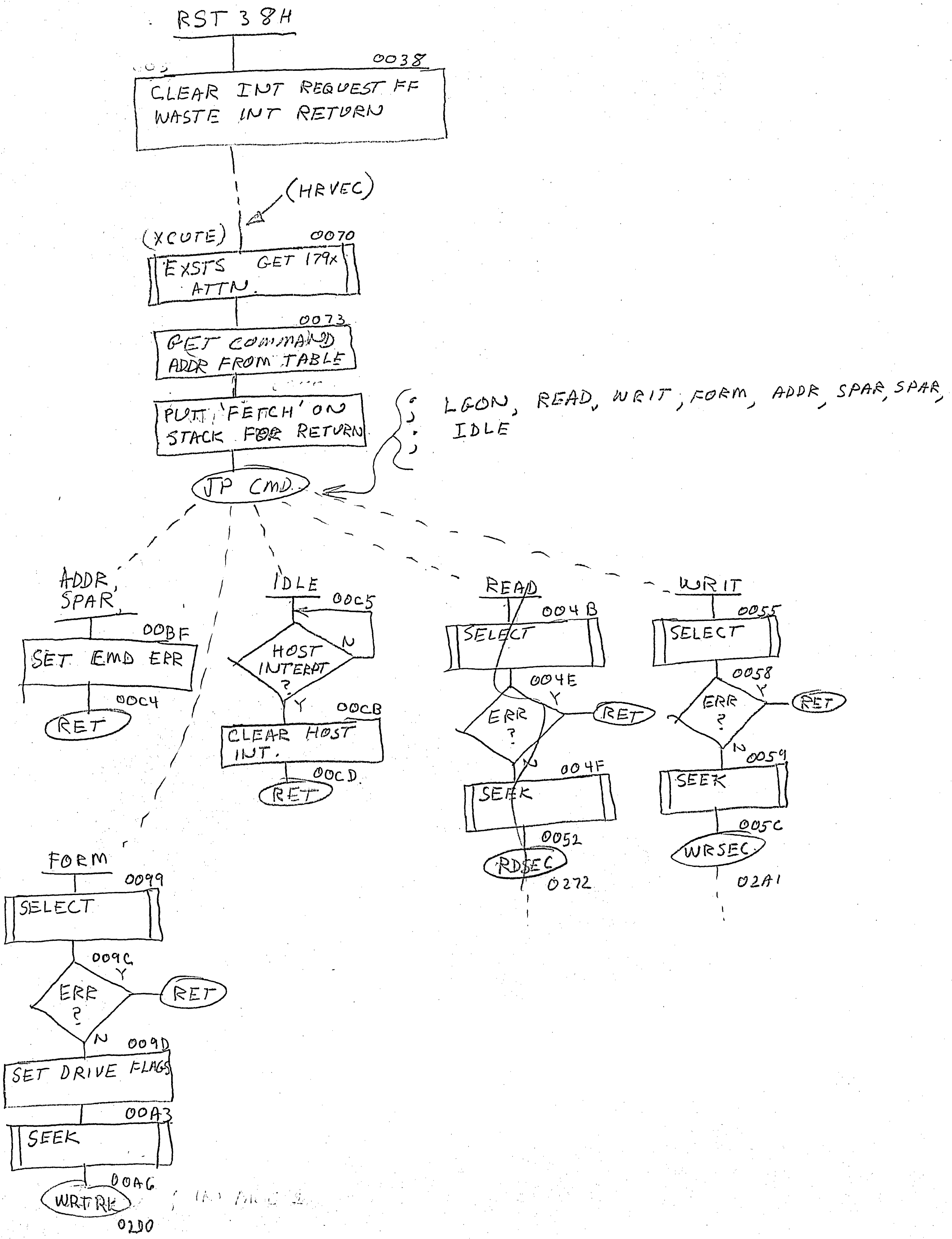
```
  BSECTOR  DB   Ø      ; Ø = UNUSED  1-255 = SECTOR #
  BTRACK   DB   Ø      ; TRACK #
  BDISK    DB  -1      ; DRIVE #
```

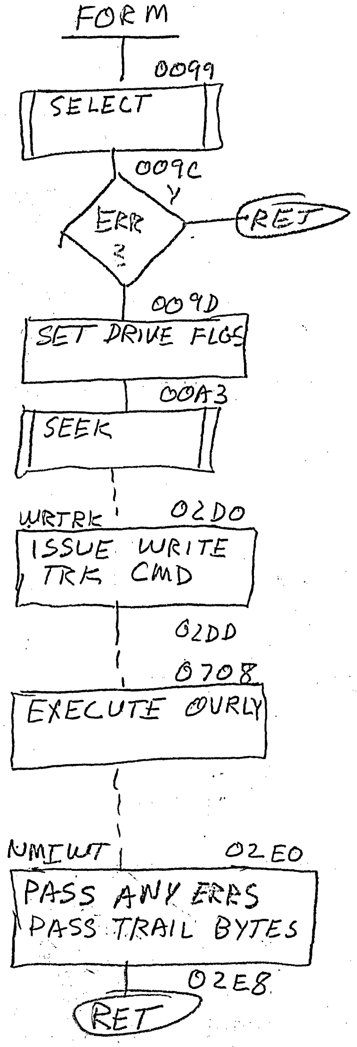

WRITE
BLOCK ?
N
Y
WRITE SECTOR IN XBUF
RET
SECTOR = BUFR
Y
N
READ SECTOR INTO BUFR
N
HI HALF ?
MOVE XBUF TO LO 128b
MOVE XBUF TO HI 128b
WRITE BUFR
RET

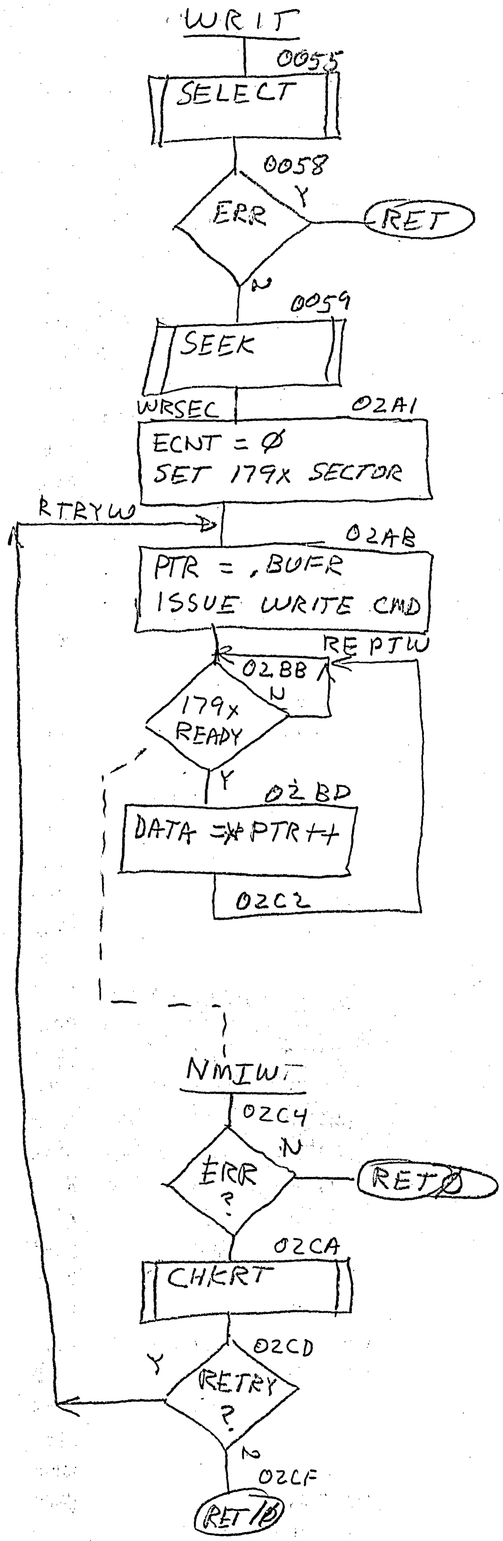

0
0FF
CODE.
BANK Ø
1FF
2FF
370
COMMAND BLOCK
XBUF 380
SECTOR BUFFER
OUTSIDE WORLD COMMUNICATION.
(FIXED LOCATION!)
3FF
SECBUF 400
256 b SECTOR BUFFER.
4FF
VARS.
BANK 1
5FF
6FF
7C0
FORMAT
780
FORMAT INJECTION MODULE
7FF

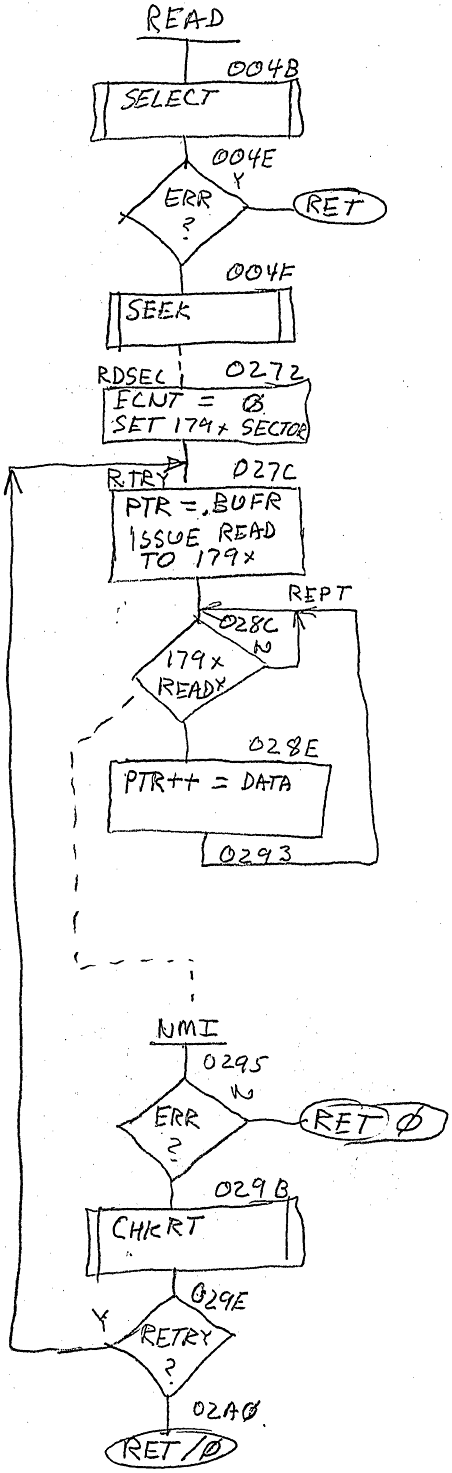


; WAIT FOR HOST COMMAND (INT)


RST 38H
0038
CLEAR INT REQUEST FF
WASTE INT RETURN
(HRVEC)
(XCUTE)
0070
EXSTS GET 179x
ATTN.
0073
GET COMMAND
ADDR FROM TABLE
PUT 'FETCH' ON
STACK FOR RETURN
JP CMD
LGON, READ, WRIT, FORM, ADDR, SPAR, SPAR,
IDLE
ADDR,
SPAR,
00BF
SET CMD ERR
00C4
RET
IDLE
00C5
HOST
INTERPT
?
N
Y
00CB
CLEAR HOST
INT.
00CD
RET
READ
004B
SELECT
004E
Y
ERR
?
RET
N
004F
SEEK
0052
RDSEC
0272
WRIT
0055
SELECT
0058
Y
ERR
?
RET
N
0059
SEEK
005C
WRSEC
02A1
FORM
0099
SELECT
009C
Y
ERR
?
RET
N
009D
SET DRIVE FLAGS
00A3
SEEK
00A6
WRTRK
0200

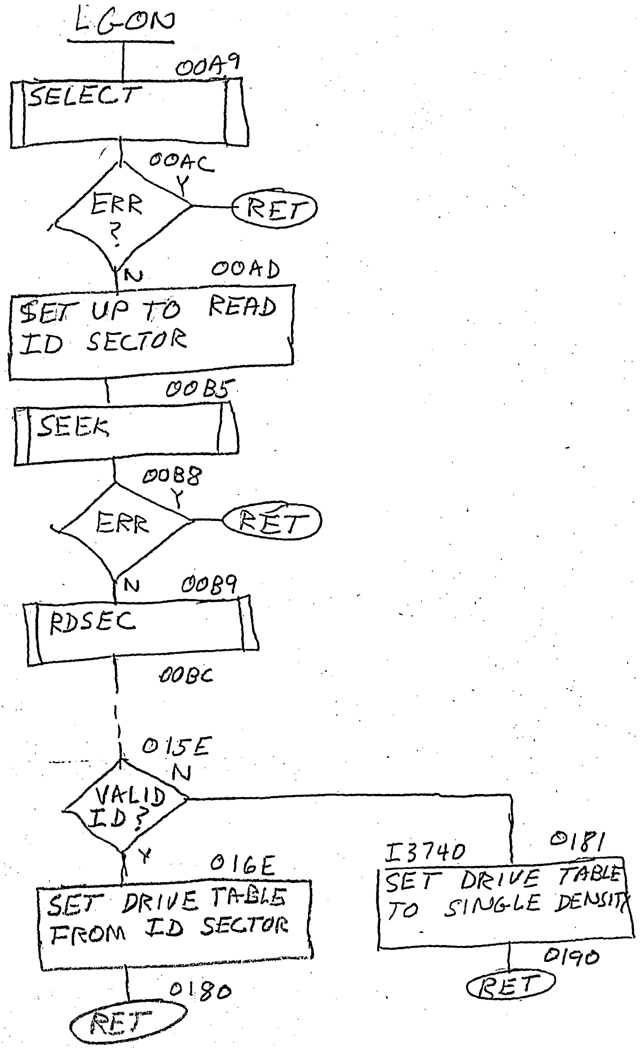

FORM
0099
SELECT
009C
Y
ERR ?
RET
009D
SET DRIVE FLGS
00A3
SEEK
WRTRK
02D0
ISSUE WRITE TRK CMD
02DD
0708
EXECUTE OVRLY
NMIWT
02E0
PASS ANY ERRS
PASS TRAIL BYTES
02E8
RET


WRIT
0055
SELECT
0058
Y
ERR
RET
N
0059
SEEK
WRSEC
02A1
ECNT = Ø
SET 179x SECTOR
RTRYW
02AB
PTR = ,BUFR
ISSUE WRITE CMD
REPTW
02BB
N
179x
READY
Y
02BD
DATA =*PTR++
02C2
NMIWT
02C4
N
ERR
?
RETØ
02CA
CHKRT
02CD
Y
RETRY
?
N
02CF
RET/Ø



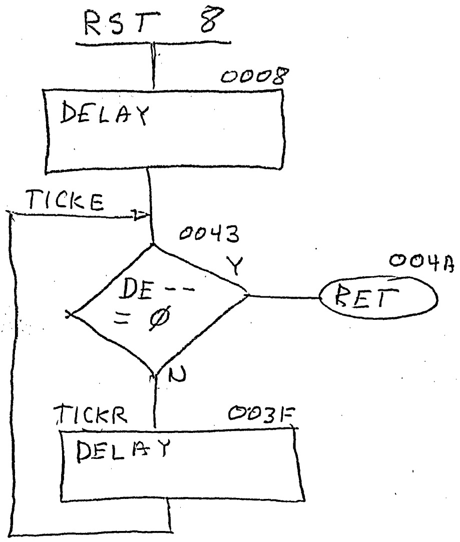
;179x DONE INTERRUPT

LOG-ON COMMAND



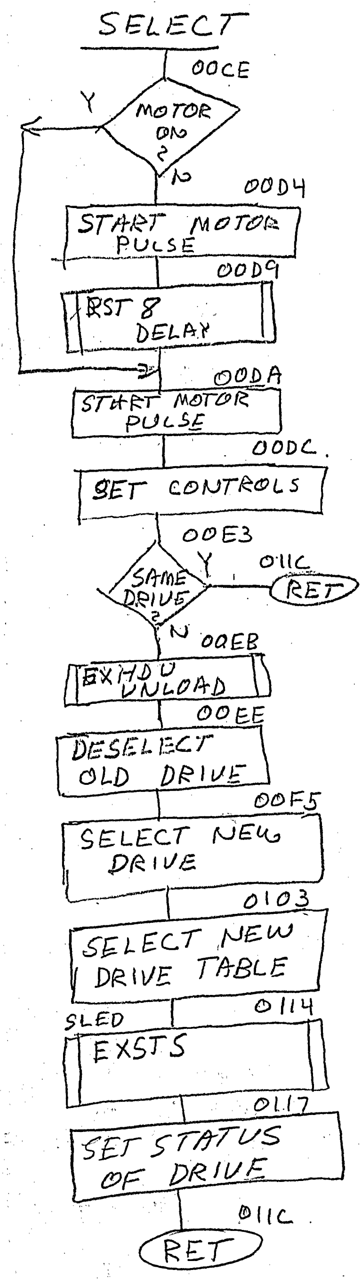
TIMING DELAY

ENTRY - DE = # (100μs)



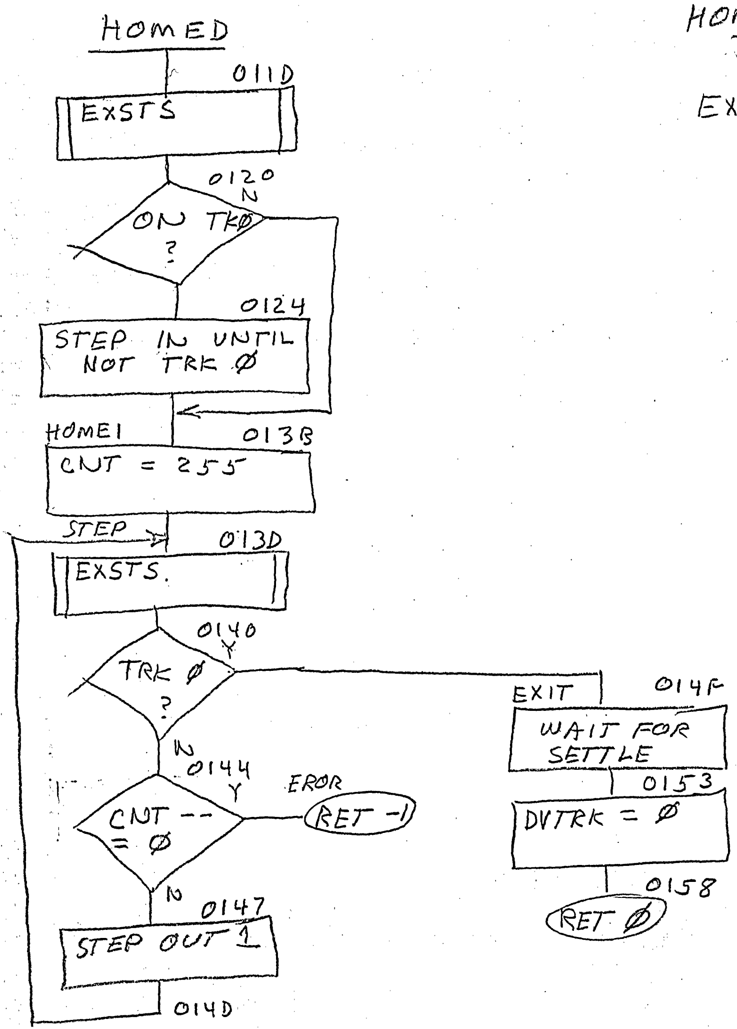
DRIVE SELECT SUBR.

EXIT - ZF: OK
NZ: ERROR, NOT READY

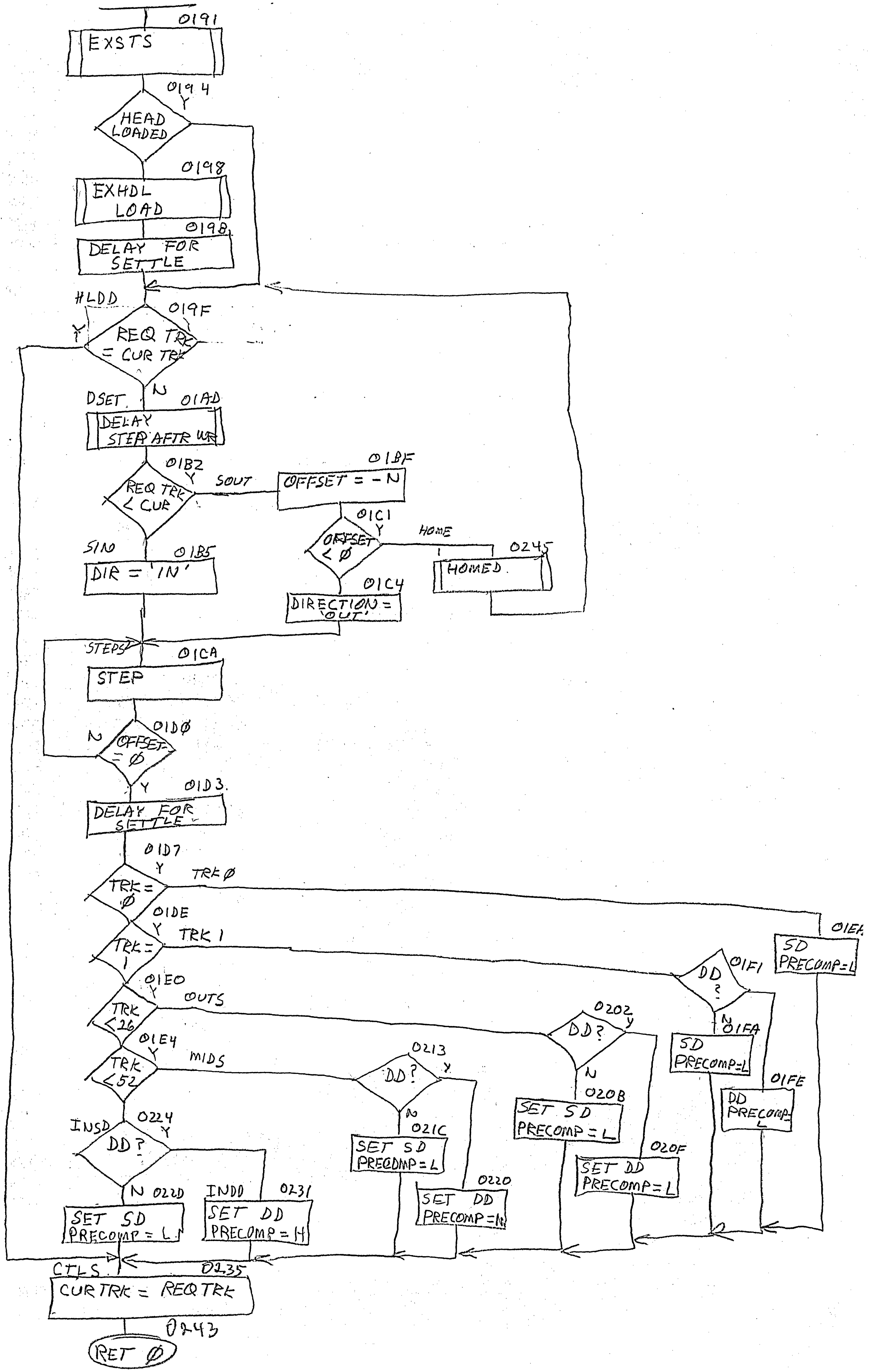


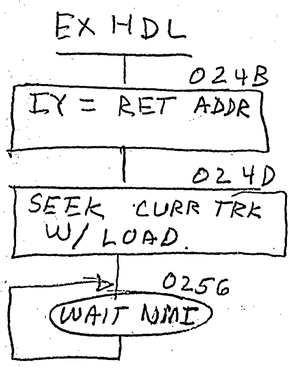
HOME CURRENT DRIVE TO TRACK Ø SUBR.

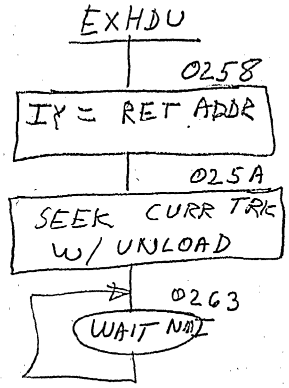
EXIT - ZF : OK
NZ : ERROR.

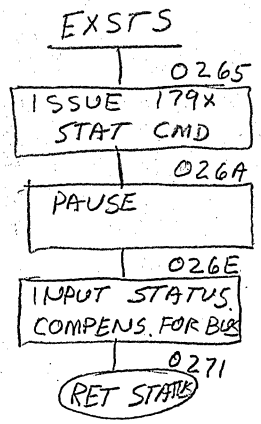


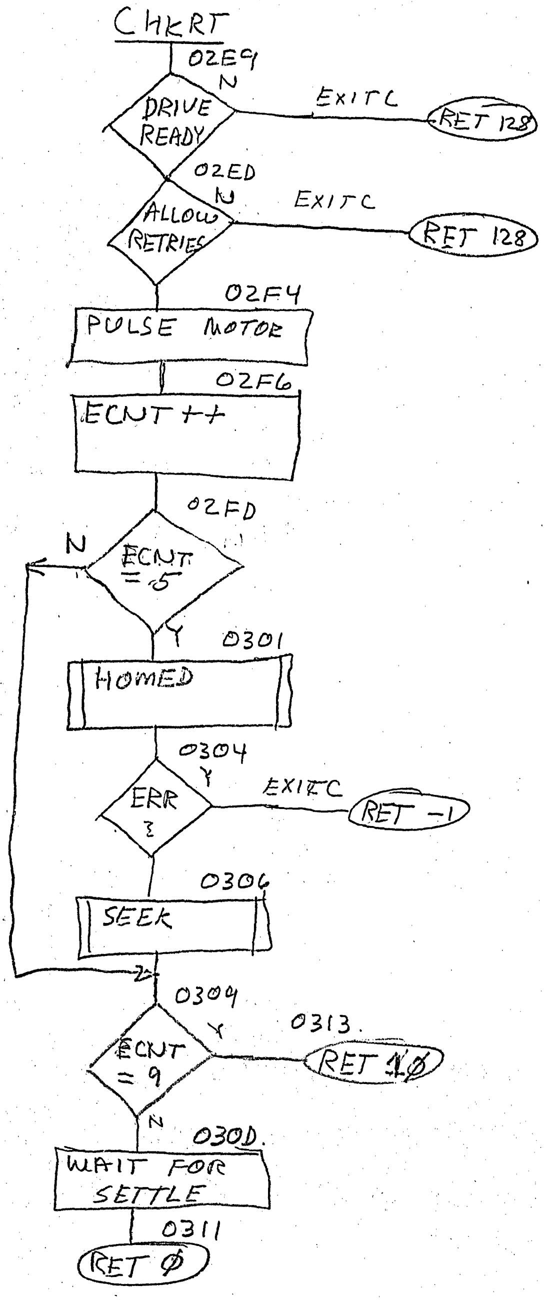
SEEK


0191
EXSTS
0194
Y
HEAD LOADED
0198
EXHDL LOAD
0198
DELAY FOR SETTLE
HLDD
019F
Y
REQ TRK = CUR TRK
N
DSET
01AD
DELAY STEP AFTR WR
01B2
Y
SOUT
REQ TRK < CUR
01BF
OFFSET = -N
01C1
Y
HOME
OFFSET < Ø
0245
HOMED
01C4
DIRECTION = 'OUT'
SIN
01B5
DIR = 'IN'
STEPS
01CA
STEP
01DØ
N
OFFSET = Ø
Y
01D3
DELAY FOR SETTLE
01D7
Y
TRK Ø
TRK = Ø
01DE
Y
TRK 1
TRK = 1
01EA
SD PRECOMP=L
01F1
DD ?
N
01FA
SD PRECOMP=L
01FE
DD PRECOMP=L
01E0
Y
OUTS
TRK < 26
0202
Y
DD ?
N
020B
SET SD PRECOMP = L
020F
SET DD PRECOMP=L
01E4
Y
MIDS
TRK < 52
0213
Y
DD ?
N
021C
SET SD PRECOMP=L
0220
SET DD PRECOMP=N
INSD
0224
Y
DD ?
N
022D
SET SD PRECOMP = L
INDD
0231
SET DD PRECOMP = H
CTLS
0235
CURTRK = REQTRK
0243
RET Ø


EX HDL
024B
IY = RET ADDR
024D
SEEK CURR TRK W/ LOAD.
0256
WAIT NMI


EXHDU
0258
IY = RET ADDR
025A
SEEK CURR TRK W/ UNLOAD
0263
WAIT NMI


EXSTS
0265
ISSUE 179X STAT CMD
026A
PAUSE
026E
INPUT STATUS. COMPENS. FOR BUG
0271
RET STATUS


CHKRT
02E9
N
DRIVE READY
EXITC
RET 128
02ED
N
ALLOW RETRIES
EXITC
RET 128
02F4
PULSE MOTOR
02F6
ECNT++
02FD
N
ECNT = 5
Y
0301
HOMED
0304
Y
ERR ?
EXITC
RET -1
0306
SEEK
Z
0309
Y
0313.
ECNT = 9
RET 1Ø
N
030D.
WAIT FOR SETTLE
0311
RET Ø