XEBEC SYSTEMS, INC.

XFD-108

FLEXIBLE DISK SYSTEM

I/O SPECIFICATIONS

FOR

PDP-8/e FAMILY COMPUTERS

Approved by: C.J. Hurst

Date: 4-16-74

TABLE OF CONTENTS

(TABLE OF CONTENTS Con't.)

1.0 XFD-108 Flexible Disk Coupler Card

The XFD-108 flexible disk coupler is built on one logic card designed to plug into either the computer mainframe or expansion chassis.

One cable is provided to connect the coupler to the XFD-108 chassis (drive and formatter) which is mounted externally to the computer. The cable goes between the mainframe or expansion chassis and the XFD-108 chassis, and is 8' in length. (Cables up to 15' on special order).

The controller uses single-cycle data break for data transfer.

A single device address (standard = 30_8) is used; it is determined by jumpers on the coupler card and may be changed in the field if required.

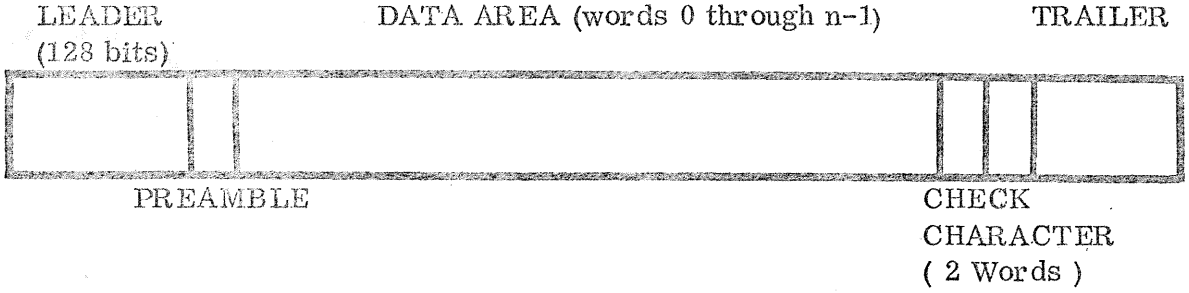
2.0 XFD-108 Input/Output Instructions

The detailed input/output machine instructions are included below for users desiring to write their own drivers. The device address assigned at the factory is 30_8. If desired, this address can be easily changed to any other 6-bit value by jumpers on the coupler card.

INPUT/OUTPUT INSTRUCTION SUMMARY

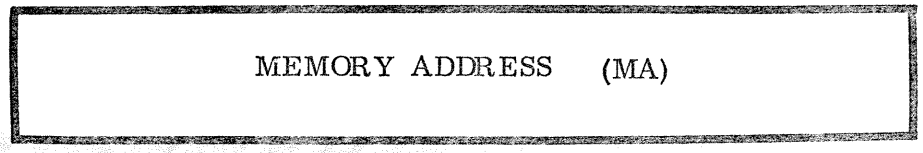
6XX0	SKNB	Skip If Not Busy
6XX1	SKNI	Skip If Not Interrupting
6XX2	SKNE	Skip If No Error
6XX3	LDMA	Load Memory Address
6XX4	LDCM	Load Command
6XX5	LDDA	Load Disk Address
6XX6	RDST	Read Status

The smallest addressable quantity on an XFD-108 disk is a sector (or block). For a system with n 12 bit words/sector, the sector format is given below. Program-accessible areas of a sector are fully described in later sections.



2.1 6XX3 -- LOAD MEMORY ADDRESS

Loads the controller memory address register with the contents of the accumulator. This instruction must not be executed while BUSY is set. The contents of the accumulator are treated as follows:



AC 0 1 2 3 4 5 6 7 8 9 10 11

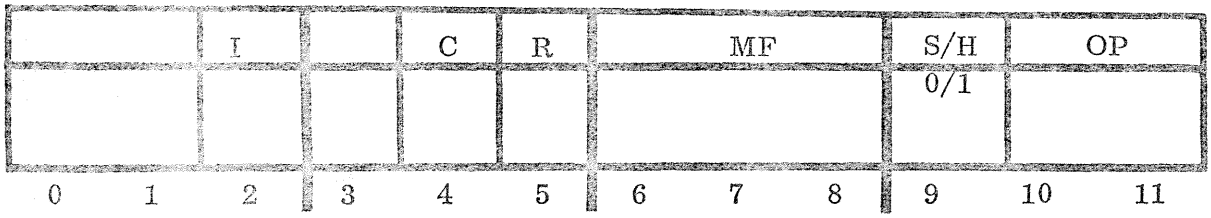
The value MA specifies the starting address of a buffer, in the computer memory, to be used by the controller during a WRITE or READ operation. After the operation is initiated, MA is incremented by the controller as successive words are transferred to or from memory.

NOTE: The memory address register is set to zero when the CLEAR switch is depressed.

2.2 6XX4 -- LOAD COMMAND WORD

This instruction loads the controller command register with the contents of the accumulator, clears certain controller status flags, sets BUSY, and then initiates the operation specified by the command code. When the operation is completed, BUSY is cleared, and if interrupts are enabled, an interrupt is generated. This instruction must not be executed while BUSY is set. The contents of the accumulator are treated as follows:

AC



Bits 10-11 :

Operation Code (OP)	Operation
0	Read
1	Write
2	Check
3	Seek/No-op

Bit 9: Sector/Half-sector Transfer (S/H)

0 = One sector of data
1 = Half sector of data

Bits 6-8: Memory Field Select (MF)

Bit 5: Restore to Track 0 (R)

Bit 4: Read/Write Check Character (C)

Bit 2: Interrupt Enable/Disable (I)

0 = Disable disk interrupts
1 = Enable disk interrupts

Each of the fields are described in detail on the following pages.

2.2.1 READ OPERATION (OP = 0)

Causes the controller to input data from the selected unit directly to computer memory. Either one sector (S/H = 0) or one half-sector (S/H = 1) of data is read from the sector specified by the Disk Address word into a buffer beginning at MA in the memory field MF. Data words from the specified sector are input to consecutive memory locations beginning at the initial values of MA and MF.

When the command word is loaded, BUSY is set, a seek to the track given in the Disk Address word is initiated, and the SEEK indicator of the Status Word is set until the seek is completed. If the R (Restore) bit is set, the Read/Write head on the specified unit is first restored to track 0, and then the seek to the selected track is initiated. In either case, the seek bit remains set until head motion stops.

During each read operation, the sector preamble is automatically hardware-compared and the check character is calculated over each data word in the sector (regardless of how many words are transferred). The check character is then hardware-compared against the check character generated during the last write operation on the sector.

BUSY is set when the operation is initiated, and BUSY is reset after all the words specified by the S/H bit have been transferred (and the check character has been compared). If the I (Interrupt enable) bit has been set in the command word, an interrupt is generated at the time that BUSY is reset. (See Section 2.2.7 for effect of setting the Read/Write Check Charact bit during a read operation.)

2.2.2 WRITE OPERATION (OP = 1)

Causes the controller to output data from computer memory to the selected unit. Either one sector (S/H = 0) or one-half sector (S/H = 1) of data is written from a buffer beginning at MA in memory field MF to the sector specified by the Disk Address word. Data words are output to the specified sector from consecutive memory locations beginning at the initial values of MA and MF.

When the command word is loaded, BUSY is set and a seek to the track given in the Disk Address word is initiated and the SEEK indicator of the Status Word is set until the seek is completed. If the R (Restore) bit is set, the Read/Write head on the specified unit is first restored to track 0, and then the seek to the selected track is initiated. In either case, the SEEK bit remains set until head motion stops.

During each Write Operation, the sector preamble is automatically re-written by the controller, and the check character is calculated over each data word of the sector (regardless of how many words are transferred). If a half-sector of data is written, the remainder of the sector is automatically "padded" with zeroes, and the check character is still calculated over each word of the sector.

BUSY is set when the operation is initiated and BUSY is reset after all the words specified by the S/H bit have been transferred (and the check character has been generated). If the I (Interrupt enable) bit has been set in the command word, an interrupt is generated at the time that BUSY is reset.

If the Read/Write Check Character Bit (bit 4) is set, the check character is written from two additional words in the memory buffer. See section 2.2.7.

2.2.3 CHECK OPERATION (OP = 2)

Causes the controller to compare the preamble and check words on a given sector without transferring data. The sector checked is given by the Disk Address word.

When the command word is loaded, BUSY is set and a seek to the track given in the Disk Address word is initiated and the SEEK indicator of the Status Word is set until the seek is completed. If the R (Restore) bit is set, the Read/Write head on the specified unit is first restored to track 0, and then the seek to the selected track is initiated. In either case, the SEEK bit remains set until head motion stops.

During each check operation, the sector preamble is automatically hardware-compared, and the check character is calculated over each data word in the sector. The check Character is then hardware-compared against the check character generated during the last Write operation on the sector. A full sector is always checked, independent of the S/H bit.

BUSY is set when the operation is initiated, and BUSY is reset after the sector has been checked. If the I (Interrupt enable) bit has been set in the command word, an interrupt is generated at the time that BUSY is reset.

2.2.4 SEEK/NO-OP (OP =3)

Causes the controller to select the unit given in the Disk Address word and to position that unit to the track given in the Disk Address word.

When the command word is loaded, a seek to the track given in the Disk Address word is initiated, and the SEEK indicator of the Status Word is set until the seek is completed. If the R (Restore) bit is set, the Read/Write head on the specified unit is first restored to track 0, and then the seek to the specified track is initiated. In either case, the SEEK bit remains set until head motion stops.

BUSY is not affected by the SEEK/NO-OP operation; no checking is done of either preamble or check words; no data is transferred; and no preamble is written.

This operation is used primarily as a unit select operation and to effect restore

2.2.5 SECTOR/HALF SECTOR TRANSFER (Bit 9)

If this bit is set for a READ or WRITE operation, a half sector of data is transferred as follows:

WRITE: A half-sector of data is transferred starting at MA and the remainder of the sector is zeroed ("padded with zeroes").

READ: A half-sector is read into a buffer starting at MA.

Sector word count can be determined from the following table:

SECTOR/TRACK	WORDS/SECTOR	WORDS/HALF-SECTOR
16	128	64
16	160	64
10	256	128
8	256	128
8	320	128

Half-sector operations are incompatible with reading or writing the check character, and should not be attempted (See Section 2.2.7).

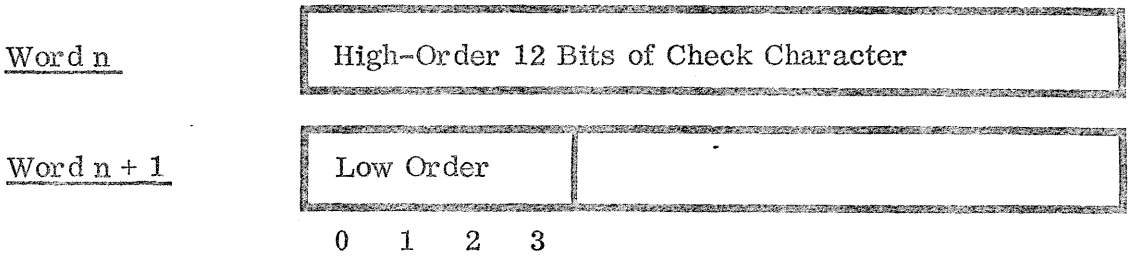
2.2.6 RESTORE (Bit 5)

If this is set, the selected unit automatically seeks to the home position. Any additional seeking (as specified in the Disk Address Word) is then performed.

BUSY is set if the rest of the command word requires it; otherwise it is unaffected.

2.2.7 READ/WRITE CHECK CHARACTER (Bit 4)

If this bit is set when a Write operation is requested (OP = 1), two more words, containing the check character, are written at the end of a sector. If there are n words per sector (that is, words 0 through n-1), then words n and n + 1 of the memory buffer should contain the 16-bit check character as follows:



If this bit is set when a Read operation is requested (OP = 0) the two words containing the check character are transferred into memory after the data words of the sector.

Reading or writing the check character is incompatible with half-sector operations, and should not be attempted.

2.2.8 Interrupt Enable/Disable (Bit 2)

If this bit is set and the operation sets BUSY, then an interrupt is generated at the time that BUSY is reset (i. e., at completion or error). Note that this means that a Seek/No-op does not generate an interrupt.

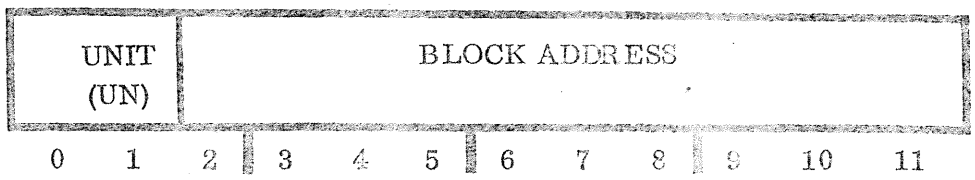
The computer does not detect the interrupt, of course, unless system interrupts are enabled with a 6001 IOT.

See Section 4.0 for an example of programming under interrupt control.

2.3 6XX5 -- LOAD DISK ADDRESS

Loads the Disk Address register of the controller, uniquely specifying a disk sector by its unit and block address.

AC



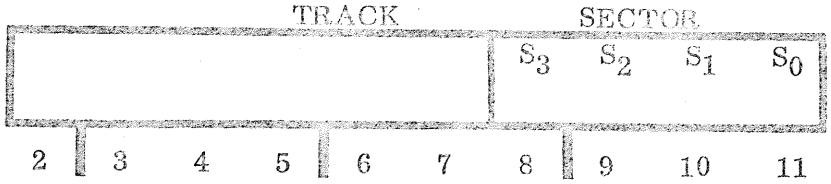
Bits 2-11 BLOCK ADDRESS

Sectors may be thought of as arranged sequentially from Block 0 to Block (Max).

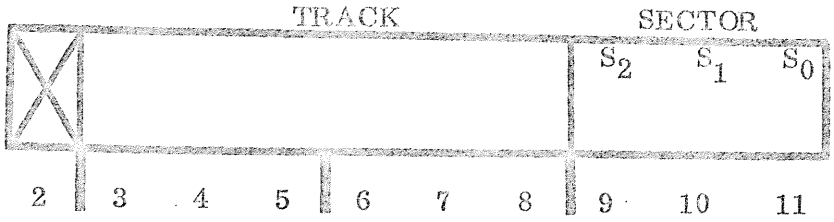
$Sectors/Track_{10}$	$Block\ (Max)_{10}$
16	1024
10	640
8	512

For 8 and 16 sector systems the block address-to track/sector address correspondence is given in the figures below.

16-Sector per Track



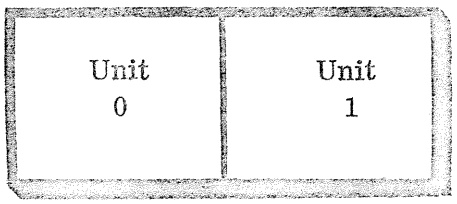
8-Sector perTrack



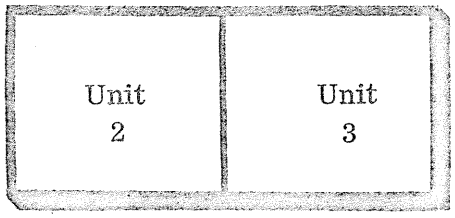
For the 10-sector/track system, no such simple correspondence holds, but the sectors are still sequentially addressed.

Bits 0-1	Unit Select	Unit
	00	Unit 0
	01	Unit 1
	10	Unit 2
	11	Unit 3

The value of UN selects the disk unit on which the requested command code is to be performed. The correlation between unit address and the physical disk unit is:



First Chassis

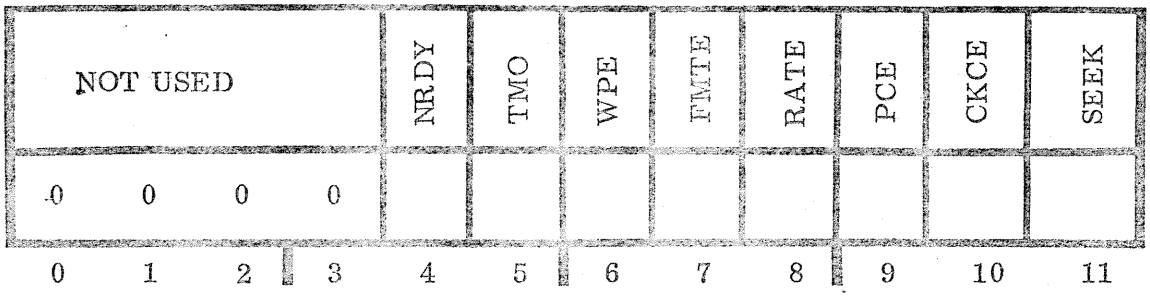


Second (Expansion) Chassis

2.4 6XX6 -- READ STATUS

Loads the accumulator with the contents of the controller status register. This instruction should not be executed when BUSY is set. Status is for the unit currently selected.

AC



Bits 0-3: Not Used: Set to 0

Bit 4:	200_8	NRDY	Not Ready
Bit 5:	100_8	TMO	Timeout Error
Bit 6:	40_8	WPE	Write Protect Error
Bit 7:	20_8	FMTE	Format Error
Bit 8:	10_8	RATE	Rate Error
Bit 9:	4	PCE	Preamble Compare Error
Bit 10:	2	CKCE	Check Error
Bit 11:	1	SEEK	Unit Seeking

2.4.1 ERRORS ALWAYS INDICATING PREMATURE TERMINATION OF AN OPERATION

2.4.1.1 NRDY -- (200_8) -- NOT READY

The specified unit is not plugged in; the unit is not up to speed; or a disk is not in place.

2.4.1.2 TMO -- (100_8) -- TIME OUT ERROR

The last operation was not completed because the sector address specified was not found within 2.5 seconds. This can be caused by specifying a non-existent sector address or by a hardware malfunction.

2.4.1.3 WPE -- (40_8) -- WRITE PROTECT ERROR

The WRITE operation was terminated because the disk in the specified unit is physically write protected; or certain fault indicators have been detected within the drive itself.

2.4.1.4 FMTE -- (20_8) -- FORMAT ERROR

During WRITE, READ, or CHECK operation, an end of sector was detected before the specified operation was completed. Could occur if pack was formatted with wrong number of sectors for the controller type.

2.4.1.5 RATE -- (10_8) -- RATE ERROR

During the last data transfer operation, data was improperly transferred. A word of data was not transferred at the time it was required. BUSY is immediately reset at the time this error occurs.

2.4.1.6 PCE -- (4) -- PREAMBLE COMPARE ERROR

During the last READ or CHECK operation, the sector preamble at the beginning of the sector was not what it should have been. No data transfer occurs.

2.4.2 STATUS INDICATORS REPORTED AFTER OPERATION IS COMPLETED

2.4.2.1 CKCE -- (2) -- CHECK CHARACTER COMPARE ERROR

The check character calculated during the last READ or CHECK operation did not match the one previously written on the sector.

2.4.2.2 SEEK --1 -- UNIT SEEKING

The unit currently selected is seeking or restoring. If BUSY is reset, this indicator is considered an error unless the last operation was a seek/no-op.

2.5 6XX0 -- SKIP IF NOT BUSY

If BUSY is zero, skip the next instruction. Otherwise, do not skip. This instruction may be executed at any time.

BUSY is set only when a READ, WRITE, or CHECK operation is being performed; BUSY is reset when the operation is complete or when an error condition is detected. BUSY is also reset when the CLEAR switch is depressed.

2.6 6XX1 — SKIP IF NOT INTERRUPTING

Skips the next instruction if the controller is not interrupting. If the controller is interrupting, no skip occurs; but the interrupt is cleared, and disk interrupts are disabled.

The interrupt occurs when BUSY is reset (after having been set by loading the command word) and disk interrupts are enabled.

Thus, the skip occurs if either BUSY is set or disk interrupts are disabled (I = 0 in command word).

Note that executing this instruction is the only way to disable/clear interrupts beside issuing I = 0 in a load command instruction (6XX4), or depressing the CLEAR switch.

2.7 6XX2 -- SKIP IF NO ERROR

Skips the next instruction if no error condition is detected.

The "error" condition is detected whenever any of the status indicators, except for the SEEK indicator, is set. That is, "error" is the inclusive OR of status bits 4-10 of the Status Word: NRDY, TMO, WPE, FMTE, RATE, PCE, or CKCE.

3.0 Bootstrapping from the XFD-108

3.1 Hardware Bootstrap Options

A variety of hardware options may be included in the XFD-108 coupler, including a choice of two types of disk bootstrap and a choice of high or low-speed paper tape (RIM) bootstraps.

3.1.1 Implemented Program Load (IPL)

The IPL option, if included, allows the user to bootstrap from the XFD-108 and begin execution of a program by means of an external switch. The format of the bootstrap block read into core is given in Section 3.1.2 under the description of the XFD/ROM bootstrap option. IPL is intended for use with a PDP-8/e family computer with no front panel, and does not operate if a front panel is present. (Unless SW is up.)

3.1.2 ROM Bootstrap Option (XFD/ROM)

The XFD/ROM option is intended for use with a PDP-8/e family computer with a front panel with an SW switch. If included, it allows the user to move one bootstrap block from the XFD-108 to memory and begin execution of the data in this block.

The XFD/ROM when executed, moves one sector (block) of data from Block 0 (sector 0 of track 0 of unit 0) of the XFD-108 to memory locations 0 through (sector size-1) of memory field o. When the transfer is complete a jump to location 1 occurs, and program execution begins at that location. Thus, the bootstrap block must be written on Block 0 in such a way that the first executable instruction will be read into location 1 (the second word of the block). The foregoing description also applies to the IPL option.

To execute the XFD/ROM bootstrap:

Halt the computer.
Set the SW switch UP.
LOAD ADDRESS 7740_8.

Depress CLEAR.
Depress CONTINUE (or START).
Set the SW switch DOWN.

3.1.3 Paper Tape Bootstrap Options (RIM/ROM)

If the XFD/ROM bootstrap option is included, the user has a choice of hardware-implemented RIM bootstraps. Only one of the high-speed or low-speed RIM. Loaders may be implemented at any time; the choice is made by a single jumper on the coupler card.

To execute the RIM/ROM bootstrap:

Halt the computer; insert the Binary Loader tape in the appropriate tape reader.
Set the SW switch UP

LOAD ADDRESS 7756_8.
LOAD MEMORY FIELD as desired.
Depress CLEAR.
Depress CONTINUE (or START).
Set the HALT switch DOWN to halt RIM loader.
Set the SW switch DOWN.

3.2 Key-in Bootstrap

Lacking the rather convenient XFD/ROM (and RIM/ROM) bootstrap, the following bootstrap may be keyed into memory from the front panel Switch Register:

Location	Contents
XX00	6305
XX01	6304
XX02	6300
XX03	5202
XX04	5001

Begin execution at location XX00. This bootstrap may, with suitable changes to location XX04, be put anywhere in Memory Field 0 outside the area overlaid by the bootstrap block. It simulates the action of the IPL and XFD/ROM bootstrap options, with the exception of Memory Field Selection. Note that depressing CLEAR when beginning execution both clears the Memory Address register and the accumulator, thus setting up the proper Memory/Disk addresses.

3.3 OS/8 Key-in Bootstrap

If the Xebec Systems version of OS/8 is resident on an XFD-108 disk (as systems device), the following abbreviated bootstrap is useful:

Location	Contents
20	6305
21	6304
22	5022

LOAD ADDRESS 20; LOAD MEMORY FIELD 0; depress CLEAR and CONTINUE. OS/8 will be booted into memory and respond in the usual way with a dot (.) at the left-hand margin of the keyboard console.

```
                / PROGRAMMING EXAMPLE 1

                /
                / THIS PROGRAM COPIES EACH SECTOR OF THE
                / DISK IN UNIT 0 TO THE CORRESPONDING SECTOR
                / OF UNIT 1.  TRANSFERS ARE DONE WITHOUT INTERRUPTS.
                / FULL SECTOR TRANSFERS ARE DONE IN EACH CASE,
                / AND IT IS ASSUMED THAT A 10-SECTOR/REVOLUTION
                / DRIVE IS USED(THUS THERE ARE 640 BLOCKS
                / TO TRANSFER.).

                /
        6300            SKNB=6300       /SKIP ON NOT BUSY
        6302            SKNE=6302       /SKIP ON NO ERROR
        6303            LDMA=6303       /LOAD MEMORY ADDRESS
        6304            LDCM=6304       /LOAD COMMAND
        6305            LDDA=6305       /LOAD DISK ADDRESS
        6306            RDST=6306       /READ STATUS

        0200            *200
00200   7200    INITL,  CLA
00201   1847            TAD DLKLM       /SET UP BLOCK
00202   3850            DCA BLKCT       /-COUNTER
00203   3851            DCA BLOCK       /ZERO BLOCK #
00204   4221    RESTR,  JMS DRIVER      /RESTORE ON
00205   0103            0103            /-UNIT 0
00206   4221            JMS DRIVER      /RESTORE ON
00207   0103            0103            /-UNIT 1
00210   7200    START,  CLA
00211   4221            JMS DRIVER      /READ BLOCK
00212   0000            0000            /-FROM UNIT 0
00213   4221            JMS DRIVER      /WRITE BLOCK
00214   0001            0001            /-TO UNIT 1
00215   2251            ISZ BLOCK       /BUMP BLOCK #
00216   2250            ISZ BLKCT       /MORE TO DO?
00217   5210            JMP START       /-YES: LOOP
00220   7402            HLT             /-NO: HALT
```

```
                    /
                    /  XFD-108 DRIVER
                    /
00221   0000  DRIVER, 0
00222   7200          CLA
00223   1621          TAD I DRIVER      /MASK UNIT #,
00224   0253          AND UNMSK         /--ADD TO BLOCK #
00225   1251          TAD BLOCK         /--TO CREATE DISK ADDRESS
00226   6305          LDDA              /LOAD DISK ADDRESS

00227   7200          CLA
00230   1252          TAD MEMAD         /LOAD
00231   6303          LDMA              /--MEMORY ADDRESS

00232   7200          CLA
00233   1621          TAD I DRIVER      /MASK OP AND
00234   0254          AND OPMSK         /--RESTORE BITS
00235   6304          LDCM              /LOAD COMMAND

00236   6306          SKDB              /DISK BUSY?
00237   5236          JMP .-1           /--YES:  WAIT
00240   6302          SKNE              /--NO: ANY ERROR?
00241   5244          JMP ERROR         /---YES: GO READ STATUS
00242   2221          ISZ DRIVER        /----NO: EXIT DRIVER
00243   5621          JMP I DRIVER

00244   6306  ERROR,  RDST              /READ STATUS
00245   7402          HLT               /--AND HALT
00246   5244          JMP RESTR         /RESTORE BOTH UNITS
                                        /--AND RETRY

00247   6666  BLKLM,  -1200
00250   0000  BLKCT,  0
00251   0000  BLOCK,  0
00252   0400  MEMAD,  400
00253   6000  UNMSK,  6000
00254   6777  OPMSK,  777
                    /
                    $$$$
```

```
                    /  PROGRAMMING EXAMPLE 2
                    /
                    /  THIS PROGRAM COPIES EACH SECTOR OF THE
                    /  DISK IN UNIT 0 TO THE CORRESPONDING SECTOR
                    /  OF UNIT 1.  TRANSFERS ARE DONE UNDER INTERRUPTS.
                    /  FULL SECTOR TRANSFERS ARE DONE IN EACH CASE.
                    /  AND IT IS ASSUMED THAT A 10-SECTOR/REVOLUTION
                    /  DRIVE IS USED(THUS THERE ARE 640 BLOCKS
                    /  TO TRANSFER.).
                    /
            6300            SKNB=6300       /SKIP ON NOT BUSY
            6301            SKNI=6301       /SKIP IF NOT INTERRUPTING
            6302            SKNE=6302       /SKIP ON NO ERROR
            6303            LDMA=6303       /LOAD MEMORY ADDRESS
            6304            LDCM=6304       /LOAD COMMAND
            6305            LDDA=6305       /LOAD DISK ADDRESS
            6306            RDST=6306       /READ STATUS

            0001            *1
000001  5402                JMP I 2
000002  0265                INTRPT

            0200            *200
000200  7200    INIT,.      CLA
000201  1301                TAD BLKLN       /SET UP BLOCK
000202  3392                DCA BLKCT       /--COUNTER
000203  3383                DCA BLOCK       /ZERO BLOCK #
000204  3310                DCA INTFL       /ZERO INTERRUPT FLAG
000205  4238    RESTR,      JMS DRIVER      /RESTORE ON
000206  0103                0103            /--UNIT 0
000207  4238                JMS DRIVER      /RESTORE ON
000210  0103                0103            /--UNIT 1
000211  7200    START,      CLA
000212  4238                JMS DRIVER      /READ BLOCK
000213  1000                1000            /--FROM UNIT 0
000214  4224                JMS WAITI       /WAIT FOR INTERRUPT
000215  4238                JMS DRIVER      /WRITE BLOCK
000216  3001                3001            /--TO UNIT 1
000217  4224                JMS WAITI       /WAIT FOR INTERRUPT
000220  2383                ISZ BLOCK       /BUMP BLOCK #
000221  2392                ISZ BLKCT       /MORE TO DO?
000222  5211                JMP START       /--YES: LOOP
000223  7402                HLT             /--NO: HALT
                    /
                    /  WAIT FOR INTERRUPT
                    /
000224  0000    WAITI,      0
000225  7200                CLA
000226  1310    WAITL,      TAD INTFL
000227  7640                SZA CLA         /HAS INTERRUPT COME?
000230  5226                JMP WAITL       /--NO: WAIT
000231  5624                JMP I WAITI     /--YES
                    /
```

```
                    /  XFD-I06 DRIVER
                    /
00232  0000  DRIVER, 0
00233  7200         CLA
00234  1632         TAD I DRIVER      /MASK UNIT #,
00235  0305         AND UNMSK         /--ADD TO BLOCK #
00236  1303         TAD BLOCK         /--TO CREATE DISK ADDRESS
00237  6305         LDDA              /LOAD DISK ADDRESS
00240  7200         CLA
00241  1304         TAD MEMAD         /LOAD
00242  6303         LDMA              /--MEMORY ADDRESS
00243  7200         CLA
00244  1632         TAD I DRIVER      /MASK OP AND
00245  0306         AND OPMSK         /--RESTORE BITS
00246  6304         LDCW              /LOAD COMMAND
00247  7200         CLA
00250  1632         TAD I DRIVER      /WAS INTERRUPT
00251  6239         ISZ DRIVER        /--REQUESTED?
00252  0307         AND INMSK
00253  7450         SNA
00254  5260         JMP DRIVA         /--NO, JUST RESTORE
00255  3610         DCA INTFL         /--YES, TURN ON
                                      /-----INTERRUPT FLAG
00256  6001         6001              /ENABLE SYSTEM INTS,
00257  5632         JMP I DRIVER      /EXIT DRIVER
00260  6305  DRIVA, LDDA             /IS UNIT SEEKING?
00261  7010         RAR
00262  7430         SZL CLA
00263  5260         JMP DRIVA         /--YES, WAIT
00264  5632         JMP I DRIVER      /--NO, UNIT DRIVED
                    /
                    /  INTERRUPT PROCESSOR
                    /
00265  6002  INTERR, 6002              /DISABLE SYSTEM INTS,
00266  7200         CLA
00267  3610         DCA INTFL         /ZERO INTERRUPT FLAG
00270  6301         SINT              /WAS IT DISK?
00271  7410         SKP
00272  5276         JMP ERROR         /--NO, ERROR
00273  6306         SNDN              /ANY ERROR?
00274  5276         JMP ERROR         /--YES,
00275  5632         JMP I .           /RETURN FROM INTERRUPT
00276  6306  ERROR, RDST              /READ STATUS
00277  7402         HLT               /--AND HALT
00300  5665         JMP RESTR         /RESTORE BOTH UNITS
                                      /--AND RETRY
00301  0000  BLKLN, -1200
00302  0000  BLKCT, 0
00303  0000  BLOCK, 0
00304  0400  MEMAD, 400
00305  0000  UNMSK, 6000
00306  1777  OPMSK, 1777
00307  1000  INMSK, 1000
00310  0000  INTFL, 0
                    $$$$
```