SECTION II
OPERATOR'S GUIDE

2-1. SYSTEM DESCRIPTION

The Altair Floppy Disk is used for mass storage of data for the Altair 8800 computer, and has a capacity of over 300K bytes per Disk with access time less than one second. A typical system using an Altair computer and Disk consists of an Altair 8800 mainframe with an 8080 CPU, 32K of memory, an I/O card for communicating to a terminal, a PROM card for initializing the system, a set of Disk Controller cards and two Disk Drives.

The software most commonly used is Altair Disk BASIC which resides in the lower 24K of memory and provides the Disk utilization routines. Altair Disk BASIC includes the standard features of BASIC, plus many extra functions that significantly increase programming power. The Software Driver for the Disk Read/Write functions is based on the Hard Sectoring technique, allowing maximum data storage on the Diskette.

The Altair computer interacts with the Disk Drives through two Disk Controller boards that plug into the Altair bus. All Control, Status and Data I/O is handled through three I/O ports dedicated to Disk Control. The circuitry in the Disk Controller consists of LSI and MSI TTL logic and performs the necessary housekeeping functions for data transfers and control of Disk Drive operations.

Inside the Altair Disk Drive cabinet is a PERTEC FD-400 Drive, a Power Supply, Line Buffers and Addressing Circuitry. The PERTEC FD-400 Drive has several features, including a direct drive D.C. motor for rotating the Diskette. This system has two advantages. First, the Drive is insensitive to line frequency variations, and second, no drive belts are required reducing maintenance.

2-2. SYSTEM SPECIFICATIONS

A. Software and System Features

Altair Disk Extended BASIC is an enhanced version of Altair Extended BASIC with added capabilities for saving and loading programs, and manipulating data files on the Disk. It requires a minimum of 24K of RAM memory for operation and utilizes random and sequential files for storing information on the Disk.

Utility Software is included with Altair Disk Extended BASIC for copying Diskettes, initializing blank Diskettes, listing directories, etc.

A Disk Bootstrap Loader is available on paper tape, cassette tape, or PROM (used with an 88-PMC PROM Memory Card). The PROM Disk Bootstrap Loader allows loading of Altair Disk Extended BASIC in less than ten seconds from the time power is turned on. A Hard Sectored format (non-IBM compatible) allows storage of over 300,000 data bytes.

B. Hardware

1. Description and Features

The Disk Controller, which acts as the interface between the Altair computer and the Disk Drives, consists of two printed circuit boards that fit in the Altair chassis. They require two slots in the computer, contain over 60 ICs, and connect to the Disk Drives via an 18-pair flat cable. The Controller can address up to 16 Drives.

The Disk Drive Unit consists of a PERTEC FD-400 Drive in an Optima™ case 5 1/2" high, 17" wide and 17 1/2" deep (same width and depth as the Altair 8800). A Power Supply and a Buffer/Address board for selecting the Drive and interconnecting multiple Disk systems are also contained in the Disk unit. A fan is included to maintain low ambient temperature for continuous operation. The Disk Drive units interconnect to each other in "daisy chain" fashion and to the Controller using 18-pair flat cables and DC-37 type 37-pin rectangular connectors.

2. Hardware Specifications

a) Access Time

Track to track: 10 ms.

Head load and settle time: 45 ms.

Average time to Read or Write: 400 ms.

Worst case: 1135 ms.

b) Rotational speed: 360 RPM (166.7 ms/rev)

c) Tracks: 77 per Disk

d) Sectoring: Hard Sectored, 32 Sectors per track, 5.2 ms/Sector (non-IBM compatible)

e) Data Transfer Rate: 250,000 bits/sec. (one 8-bit byte every 32 μs.)

f) Maximum number of Drives per system: 16

g) Data storage capacity: 310,000 bytes per Disk

h) Data bytes per sector: 128

i) Data bytes per track: 4,096

j) Disk Drive head life: over 10,000 hours of Diskette to Head contact

k) Disk Drive Mean Time Between Failure (MTBF): exceeds 4,000 hours

l) Disk Drive data reliability: not more than 1 in 10^9 soft (recoverable errors), 1 in 10^{12} hard (non-recoverable errors)

m) Power

Controller: 1.1 amps at +8v unregulated (from Altair bus)

Disk Drive Unit: 110 watts 50/60 Hz, 117/220 VAC

n) Diskette: Hard Sectored, 32 Sectors + Index hole (Dysan #101, ITC #FD 32-1000)

o) Disk Drive Unit Weight: 40 pounds

3. Operating Principle

The Disk Controller boards provide the interface between the Disk Drive Unit and the Altair bus. Serial Read Data from the Disk is converted into 8-bit parallel form by the Controller for transfer to memory via the CPU. Data is written on the Disk by converting the 8-bit bytes output from the Altair CPU to serial form. All Read and Write Data is transferred one byte at a time through the CPU.

Disk Controller Board 1 controls I/O address selection, Sector counting, Read Data and Disk Status. Disk Controller Board 2 controls Disk Drive addressing, Write Data and Disk Drive functions.

C. Ordering Information

1. 88-DCDD includes:

a) 2 Controller boards

b) 1 Disk Drive Unit

c) 1 Interconnect cable--6 ft. long

d) 1 Assembly and Operators Manual

e) 1 Disk Extended BASIC Manual

f) 1 blank Diskette

2. 88-DISC includes:

a) 1 Disk Drive Unit (117 VAC unless otherwise requested)

b) 1 Interconnect cable--6 ft. long

c) 1 blank Diskette

3. Altair Disk Extended BASIC requiring a minimum 24K of memory for operation includes:

a) Altair Disk Extended BASIC on Diskette

b) Altair Disk Extended BASIC Manual

c) Paper tape or cassette magnetic tape Bootstrap Loader (specify when ordering)

4. Disk Bootstrap Loader on PROM

a) Order 88-PMC (PROM Memory Card) and DBL PROM (PROM programmed with Disk Bootstrap Loader routine)

5. Manuals

a) Disk Hardware Manual

b) Altair Disk Extended BASIC Manual

6. Write Protect Option is available

2-3. DISK SYSTEM BLOCK DIAGRAM DESCRIPTION (Figure 2-1)

A. Controller Board 1

Controller Board 1 performs all input functions to the Altair bus (Read Data, Sector Data, Status Information) as well as Control Addressing of all Disk to Computer I/O.

B. Controller Board 2

Controller Board 2 performs all output functions from the Altair bus (Write Data, Disk Control, Disk Enable and Drive Selection).

C. Interconnect Cable

An 18-pair flat cable with two 37-pin connectors (male on one end and female on the other) connects the Disk Drive to the Altair Disk Controller and "daisy chains" one Disk Drive to another in multiple Disk Systems.

D. Disk Drive Cabinet

1. Power Supply

The Disk Drive Cabinet contains a Power Supply for powering the Disk Buffer and Disk Drive.

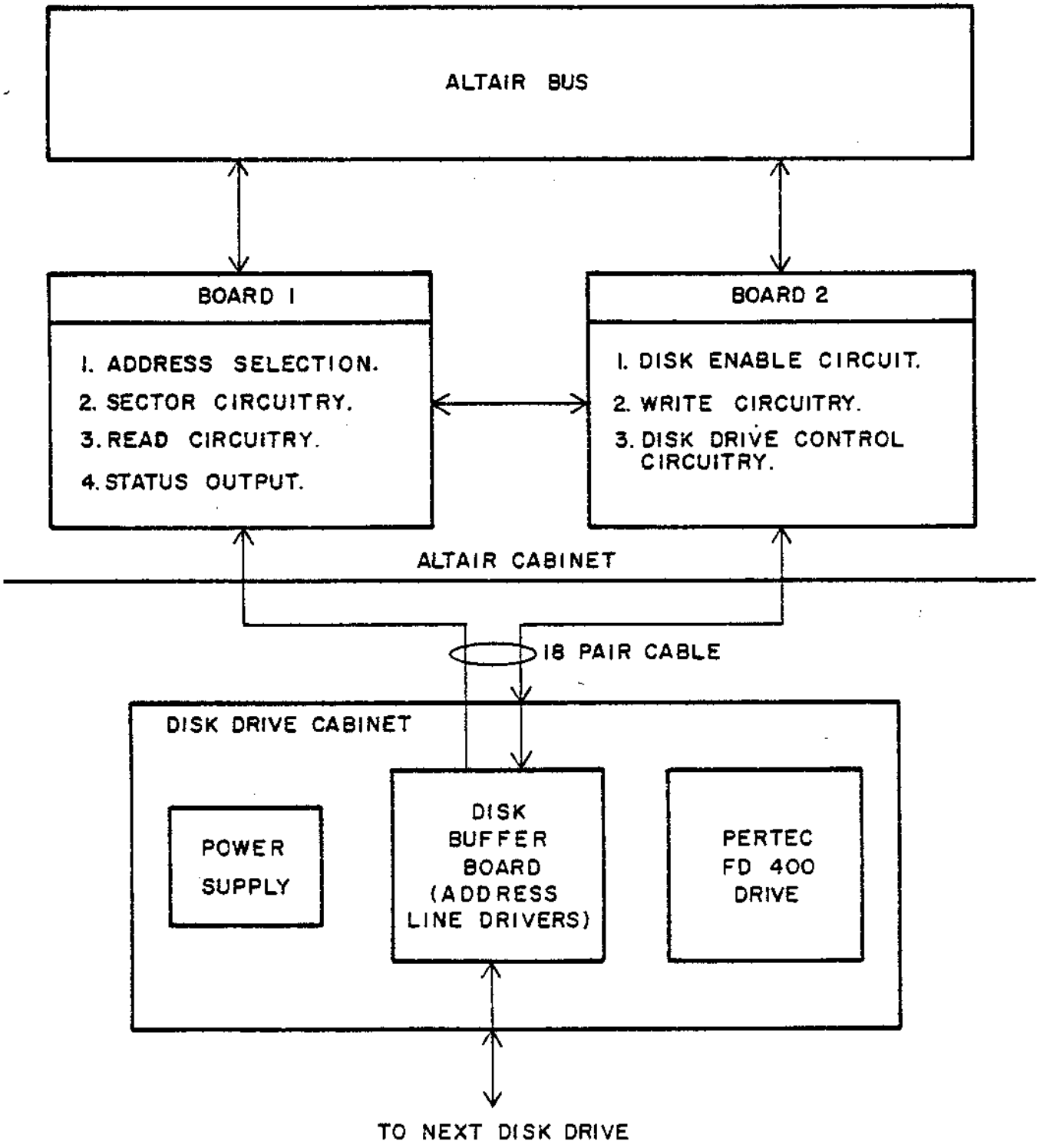

Figure 2-1. Disk System Block Diagram

2. The Disk Buffer

The Disk Buffer board contains the necessary line drivers and receivers for interconnection with long cables to the Disk Drive. In addition, it contains the Disk Drive Address Circuitry that allows the controller to select one of 16 Disk Drives. The Disk Buffer board also contains the line drivers for connection of multiple Disk Systems.

3. The Disk Drive

The Disk Drive (PERTEC FD-400) contains the mechanism and electronics that actually Read and Write data on the Diskette.

2-4. CONNECTION OF DISK SYSTEM

A. Controller Boards

1. Items Supplied
   a) Controller Board 1 (vertical and horizontal rows of ICs)
   b) Controller Board 2 (with short cable wired to it)
   c) Controller Cable (with 37-pin connector on one end and 3 miniature connectors on the other end)
   d) Connector Mounting Bracket and Hardware
2. Connection of Controller Boards
   a) Take cover off Altair computer (power off).
   b) Feed miniature (flat) connector ends of Controller cable through hole on connector panel in back of Altair computer. (37-pin connector outside chassis, miniature connectors inside chassis). Disregard this step if the chassis has mounting hole for 37-pin connector.
   c) Facing the front of the computer ay Controller board 1 flat in front of you on the Altair chassis with components up and stab connector to the right.
   d) Connect the short wired cable of board 2 to the 20-pin connector on board 1 (note polarization key of connector and missing pin on the PC board).
   e) Place board 2 flat, to the left of board 1 with components up and stab connector to the right.

f) Connect 20-pin miniature connector on Controller cable to 20-pin connector on board 2. Note keying.

g) Take 10-pin connector on Controller cable with the orange and yellow wires connected to it and connect to 10-pin connector on board 2. Note Keying.

h) Take remaining 10-pin connector on Controller cable with white and gray wires on it and connect to 10-pin connector on board 1. Note Keying.

i) Be sure wires from connector go out between card guides, and do not catch on card guides.

j) Push cards firmly into connector on Altair motherboard.

k) Install 37-pin connector in bracket and on back of Altair computer, stradling 2 connector holes. Use #4-40 x 5/16 screws, #4 lockwashers and #4-40 nuts.

> NOTE
>
> If unit has holes for 37-pin socket, disregard installation of bracket. Mount connector using #4-40 hardware on INSIDE of back panel.

B. Disk Drive Connection to Altair Computer

Connect the male connector of the six foot flat cable to Disk Controller connector on Altair computer. Connect the female end to connector on the Disk Drive marked "TO CONTROLLER."

C. Multiple Disk Drive Connection

1. With multiple Disk Drives, the Disks should have sequential addresses, i.e., for a 3-Drive System you should have Disks with addresses Ø, 1 and 2. They may be connected in any order. The Disk Address is determined by four jumper wires in the Disk Buffer PC board inside the Drive and may be changed. See Table 3-A for the Disk Address Chart, indicating the wiring of the jumpers on the Disk Buffer PC board.

2. Connect the Disks by using the 6 ft. flat cable. Connect the male connector to the connector marked "FROM NEXT DISK" on the Disk Drive connected to the Controller. The other end of the cable connects to the next Disk Drive connector marked "TO CONTROLLER." This procedure is repeated for added Disk Drives.

2-5. USING THE DISK DRIVE

A. Diskette Information

1. Always keep Diskette in envelope when not in use.
2. Keep Diskette away from heat, magnetic fields (flourescent lights, power transformers, etc.) and dust.
3. Never touch recording surface of Diskette (opposite label side).
4. Always label the Diskette, using an adhesive label. Do not write on label after it is attached to the Diskette.
5. The type of Diskette used is Hard Sectored (32 Sector holes and 1 Index hole). Blank Diskettes are available from MITS for $15.00 each. The Diskettes are not IBM compatible. Recommended Diskettes are Dysan 101, ITC FD32-1000, etc.

B. Operating the Disk Drive

1. Depending on door style, open door to Disk Drive by pulling out and down, or releasing latch by pulling up on tab.
2. Insert Diskette into Drive with label side up, making sure it catches on retaining tab.
3. Close door to Disk Drive. Disk "PWR" light will go off.
4. The "PWR" LED indicates the on state except for about 5 seconds when the power is turned on, or for about 5 seconds after the door is closed. When the "PWR" light is on, it indicates that the Disk Drive may be enabled and that programs may be activated to access the Disk. This delay allows the Disk Drive motor speed time to stabilize.
5. NEVER open Disk Drive door or turn power off when DISK ENABLE and HEAD LOAD lights are on. It is possible to interrupt the software during a Write function and destroy data on the Diskette.
6. Consult software documentation on methods for loading BASIC and utilizing software. For applications in which the user writes his own software, refer to Altair Disk Controller I/O Information, page 15.
7. Keep the 18-pair flat interconnect cable away from power cords. If there is excess cable, fold it and secure with a rubber band.
8. It is very important that the Altair computer and Disk Drives be connected to a grounded power outlet. If you must use a ground-

ing outlet adapter, be sure the green wire is connected to a good earth ground such as a cold water pipe.

Table 2-A. Disk Buffer/Drive Address Wiring

Disk Address	Pads 1	2	3	4
(0000) 0	$\overline{A}$	$\overline{B}$	$\overline{C}$	$\overline{D}$
(0001) 1	A	$\overline{B}$	$\overline{C}$	$\overline{D}$
(0010) 2	$\overline{A}$	B	$\overline{C}$	$\overline{D}$
(0011) 3	A	B	$\overline{C}$	$\overline{D}$
(0100) 4	$\overline{A}$	$\overline{B}$	C	$\overline{D}$
(0101) 5	A	$\overline{B}$	C	$\overline{D}$
(0110) 6	$\overline{A}$	B	C	$\overline{D}$
(0111) 7	A	B	C	$\overline{D}$
(1000) 8	$\overline{A}$	$\overline{B}$	$\overline{C}$	D
(1001) 9	A	$\overline{B}$	$\overline{C}$	D
(1010) 10	$\overline{A}$	B	$\overline{C}$	D
(1011) 11	A	B	$\overline{C}$	D
(1100) 12	$\overline{A}$	$\overline{B}$	C	D
(1101) 13	A	$\overline{B}$	C	D
(1110) 14	$\overline{A}$	B	C	D
(1111) 15	A	B	C	D

C. Altair Disk Controller I/O Information

1. Address Codes for I/O

	Address	Mode	
a)	$\emptyset 1\emptyset_8$	Out	Selects, latches and enables Controller and Disk Drive
b)	$\emptyset 1\emptyset_8$	In	Indicates status of Disk Drive and Controller
c)	$\emptyset 11_8$	Out	Controls Disk Function
d)	$\emptyset 11_8$	In	Indicates Sector position of Disk
e)	012_8	Out	Write Data
f)	012_8	In	Read Data

2. Address Code Definitions (in order as listed above)

a) Selection of Disk Drive Output on Channel $\emptyset 1\emptyset_8$

D0 LSB, D1, D2, D3 MSB — Enables 1 of 16 Drives (each Drive has a unique address, selected by 4 jumper wires) and enables Controller (on Disk Drive Buffer PC card)

D4, D5, D6 — Not used, User Selectable

D7 — Clears (Disables) Disk Control if set to 1 (D0-D6 are User Selectable). Disk Control is also cleared by opening the Disk Drive door or turning the Disk Drive power off.

NOTE

1) If Disk Drive door is open, Drive and Controller cannot be enabled.
2) If Disk power if off, Drive and Controller cannot be enabled.
3) If Disk interconnect cable is not connected between the Controller and the Drive, Drive and Controller cannot be enabled.

b) Status ($\emptyset 1\emptyset_8$ - INPUT) indicates Disk Status when Drive and Controller are enabled. Also provides valid INTE Status (D5) from the Altair bus when the Controller is enabled.
True Condition = 0, False = 1
All False if Disk and Controller are not enabled

D0 - ENWD (Enter New Write Data) - indicates Write Circuit is ready for new data byte to be written. It occurs every 32 µs. and starts 280 µs. after Sector True (when Write enabled). It is reset by outputting to the Write Data Channel ($\emptyset 12_8$).

D1 - Move Head - indicates head movement allowed when True (STEP IN or STEP OUT). Goes False for 10 ms., True 1 ms., False 20 ms. after step command. May step every 10 ms.
Goes False during Write and 475 µs. after Write to allow completion of TRIM ERASE.

D2 - HS (Head Status) - True 40 ms. after head loaded or step command (if stepping with head already loaded). Indicates when head is properly loaded for Reading and Writing. Also enables Sector Position Channel when True.

D3 - Not Used = Ø

D4 - Not Used = Ø

D5 - INTE - indicates interrupt enabled.

D6 - TRACK 0 - indicates when head is on outermost track.

D7 - NRDA (New Read Data Available) - indicates that the Read Circuit has 1 byte of data ready to be taken from the Read Data Channel ($Ø12_8$). After the sync* bit is detected, it occurs every 32 μs. and is reset by an input instruction on Channel $Ø12_8$. The byte containing the sync bit is the first byte read from the Disk.

c) Control ($Ø11_8$ - Out) - Controls Disk operations when Disk Drive and Controller enabled. A True signal (logic 1) on a data line will control the Disk as follows:

DØ - STEP IN - steps Disk head in one position to higher numbered track

D1 - STEP OUT - steps Disk head out one position to lower numbered track

D2 - HEAD LOAD - loads head onto Disk - enables Sector Position Status

D3 - HEAD UNLOAD - removes head from Disk surface; may be unloaded immediately after WRITE ENABLE (Write and Trim Erase Circuits hold head loaded until completed)

D4 - IE (INTERRUPT ENABLE) - enables interrupts to occur when SRO True (see Sector definition)

D5 - ID (INTERRUPT DISABLE) - disables interrupt circuit. Interrupt Circuit also disabled by clearing Disk Control.

*See WRITE ENABLE (D7) of part c (Channel $Ø11_8$ - Out)

D6 - HCS (HEAD CURRENT SWITCH) - must be True when outputting a Write instruction with the head on tracks 43-76. This reduces head current and optimizes resolution on inner tracks (automatically reset at end of Writing a Sector).

D7 - WRITE ENABLE - Initiate Write sequence as follows:

1) Disk selected and enabled, head loaded, enabling Sector Status.
2) (Sector True) detected for desired Sector, Write Circuit enabled by software.
3) 200 μs. from WRITE ENABLE, TRIM ERASE automatically turned on. 280 μs. from start of Sector, ENWD goes True, sync byte written by software.
4) First byte written always has most significant (D7) bit (sync bit), a logic 1 (most significant bit written first).
5) ENWD goes True every 32 μs. Maximum number of data bytes per Sector is 137 (including sync).
6) The last or 138th byte written must be a 000. This will be written for the remainder of the Sector. Ignore ENWD from this point to end of Sector.
7) At end of Sector, the Write Circuit automatically disabled. TRIM ERASE disabled 475 μs. later.

NOTE

a) Write Circuit will continue Writing last byte output on Channel $Ø12_8$ to the end of that Sector.
b) Head may be unloaded anytime during Write cycle if no Read or Write function is expected after current Write cycle. Once Write is enabled, it holds the head loaded for the required time. (For Writing and TRIM ERASE).

d) Sector position ($Ø11_8$-INPUT) with Disk Drive and Controller enabled, and 40 ms. after head is loaded, is as follows:
DO-SRO-Sector True-True when = 0 and is 30 μs. long. The

Write mode should begin as soon as DO goes True. Write Data will be requested 280 μs. after DO goes True and Read Data will be available 140 μs. after SDO goes True.

Sector #	Ø	1	2	3.....31
	BIT PATTERN			
D1-SR1-	Ø	1	Ø	1..... 1
D2-SR2-	Ø	Ø	1	1..... 1
D3-SR3-	Ø	Ø	Ø	Ø..... 1
D4-SR4-	Ø	Ø	Ø	Ø..... 1
D5-SR5-	Ø	Ø	Ø	Ø..... 1
D6 and D7 Not Used (=1)				

e) Write Data ($Ø12_8$ - Output) Output on the ENWD Status request.

f) Read Data ($Ø12_8$ - Input) Input on the NRDA Status flag.

D. Read/Write Function Timing

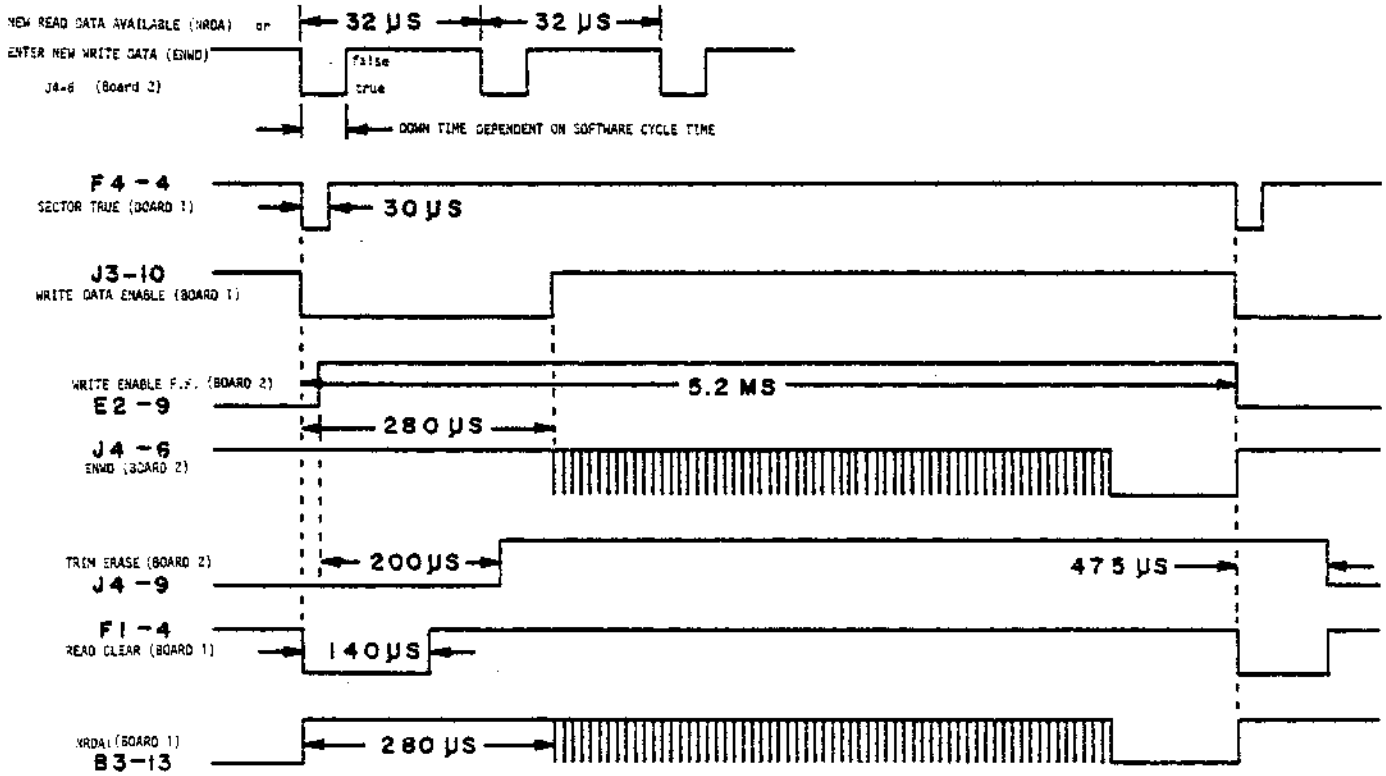

Figure 2-2. Read/Write Function Timing

E. Assembly Code to Read and Write a Sector

Program 2-I is provided to help users write their own Assembly language subroutines to Read and Write Data on the Floppy Disk. It is assumed that the Disk being used has already been enabled and positioned to the correct track.

Two data bytes at a time are always Read or Written so that the CPU can keep up with the data rate of the Floppy Disk (1 byte/32 μs). After two bytes are Read or Written, the CPU resynchronizes with the next "byte ready" Status from the Floppy Disk Controller.

Program 2-I. Assembly Code to Read and Write a Sector

```
; CALL WITH NUMBER OF DATA BYTES TO WRITE IN [A]
; AND POINTER TO DATA BUFFER IN [H,L]
; ALL REGS DESTROYED.
DSKO:  MOV    C,A             ; SAVE # OF BYTES IN C
       MVI    A,136           ; CALCULATE NUMBER OF ZEROS TO WRITE
       SUB    C               ; SUBTRACT THE NUMBER OF DATA BYTES
       MOV    B,A             ; NUMBER OF ZEROS+1
       CALL   SECGET          ; LATENCY
       MVI    A,128           ; ENABLE WRITE WITHOUT SPECIAL CURRENT
       OUT    9
;
; CALL WITH [B]=NUMBER OF ZEROS [C]=NUMBER OF DATA BYTES
; AND [H,L] POINTING AT OUTPUT DATA
;
OHLDSK: MVI   D,1              ; SETUP A MASK (READY TO WRITE)
        MVI   A,128            ; HIGH BIT (D7) ALWAYS ON IN FIRST BYTE
        ORA   M                ; OR ON DATA BYTE
        MOV   E,A              ; SAVE FOR LATER
        INX   H                ; INCREMENT BUFFER POINTER
NOTYTD: IN    8                ; GET WRITE DATA READY STATUS
        ANA   D                ; TEST STATUS BIT
        JNZ   NOTYTD           ; NOT READY TO WRITE, WAIT
        ADD   E                ; ADD BYTE WE WANT TO SEND TO ZERO
        OUT   1Ø               : SEND THE BYTE
        MOV   A,M              ; GET NEXT BYTE TO SEND
        INX   H                ; MOVE BUFFER POINTER AHEAD
```

```
        MOV   E,M               ; GET NEXT DATA BYTE
        INX   H                 ; MOVE BUFFER POINTER AHEAD AGAIN
        DCR   C                 ; DECREMENT COUNT OF CHARS TO SEND
        JZ    ZRLOP             ; IF DONE, QUIT & GO TO ZRLOP
        DCR   C                 ; DECREMENT COUNT OF CHARS AGAIN
        OUT   1Ø                ; SEND THIS BYTE
        JNZ   NOTYTD            ; STILL MORE CHARS, DO THEM.
ZRLOP:  IN    8                 ; GET READY TO WRITE
        ANA   D                 ; IS IT READY
        JNZ   ZRLOP             ; IF NOT, LOOP
        OUT   1Ø                ; KEEP SENDING FINAL BYTE
        DCR   B                 ; DECREMENT COUNT OF BYTES TO SEND
        JNZ   ZRLOP             ; KEEP WAITING
        EI                      ; RE-ENABLE INTERRUPTS
        MVI   A,8               ; UNLOAD HEAD
        OUT   9                 ; SEND COMMAND
        RET                     ; DONE
; DISK INPUT ROUTINE.  ENTER WITH POINTER
; OF 137 BYTE BUFFER IN [H,L].  ALL REGS DESTROYED.
DSKI:   CALL  SECGET            ; POINT TO RIGHT SECTOR
        MVI   C,137             ; GET # OF CHARS TO READ
READOK: IN    8                 ; GET DISK STATUS
        ORA   A                 ; READY TO READ BYTE
        JM    READOK
        IN    1Ø                ; READ THE STUFF
        MOV   M,A               ; SAVE IN BUFFER
        INX   H                 ; BUMP DESTINATION POINTER
        DCR   C                 ; LESS CHARS
        JZ    RETDO             ; IF OUT OF CHARS, RETURN
        DCR   C                 ; DECREMENT COUNT OF CHARS
        NOP                     ; DELAY INTO NEXT BYTE
        IN    1Ø                ; GET NEXT BYTE
        MOV   M,A               ; SAVE BYTE IN BUFFER
        INX   H                 ; MOVE BUFFER POINTER
        JNZ   READOK            ; IF CHARS STILL LEFT, LOOP BACK
```

```
RETDO:  EI                      ; RE-ENABLE INTERRUPTS
        MVI   A,8               ; UNLOAD HEAD
        OUT   9                 ; SEND COMMAND
        RET
SECGET: MVI   A,4               ; LOAD THE HEAD
        OUT   9
        DI                      ; DISABLE INTERRUPTS
SECLP2: IN    9                 ; GET SECTOR INFO
        RAR                     ; FIX UP SECTOR #
        JC    SECLP2            ; IF NOT, KEEP WAITING
        ANI   31                ; GET SECTOR #
        CMP   E                 ; IS IT THE ONE WE WANTED
        JNZ   SECLP2            ; TRY TO FIND IT
        RET
```

F. Disk Boot Loader Octal Listing

Program 2-II is an octal listing of the Disk Boot Loader for Disk Systems without cassette or paper tape capabilities:

Program 2-II. Disk Boot Loader Listing

ADDRESS	CONTENTS	ADDRESS	CONTENTS	ADDRESS	CONTENTS
46ØØØ	363	46Ø5Ø	ØØ4	4612Ø	132
46ØØ1	Ø61	46Ø51	3Ø2	46121	114
46ØØ2	142	46Ø52	Ø45	46122	Ø35
46ØØ3	115	46Ø53	114	46123	333
46ØØ4	257	46Ø54	Ø76	46124	Ø12
46ØØ5	323	46Ø55	Ø2Ø	46125	167
46ØØ6	Ø1Ø	46Ø56	365	46126	Ø43
46ØØ7	Ø76	46Ø57	325	46127	3Ø2
46Ø1Ø	ØØ4	46Ø6Ø	3Ø5	4613Ø	1Ø4
46Ø11	323	46Ø61	325	46131	114
46Ø12	Ø11	46Ø62	Ø21	46132	341
46Ø13	3Ø3	46Ø63	2Ø6	46133	Ø21
46Ø14	Ø31	46Ø64	2ØØ	46134	327
46Ø15	114	46Ø65	Ø41	46135	114
46Ø16	333	46Ø66	324	46136	ØØ1
46Ø17	Ø1Ø	46Ø67	114	46137	2ØØ
46Ø2Ø	346	46Ø7Ø	333	4614Ø	ØØØ
46Ø21	ØØ2	46Ø71	Ø11	46141	Ø32
46Ø22	3Ø2	46Ø72	Ø37	46142	167
46Ø23	Ø16	46Ø73	332	46143	276
46Ø24	114	46Ø74	Ø7Ø	46144	3Ø2
46Ø25	Ø76	46Ø75	114	46145	3Ø1
46Ø26	ØØ2	46Ø76	346	46146	114
46Ø27	323	46Ø77	Ø37	46147	2ØØ
46Ø3Ø	Ø11	461ØØ	27Ø	4615Ø	1Ø7
46Ø31	333	461Ø1	3Ø2	46151	Ø23
46Ø32	Ø1Ø	461Ø2	Ø7Ø	46152	Ø43
46Ø33	346	461Ø3	114	46153	Ø15
46Ø34	1ØØ	461Ø4	333	46154	3Ø2
46Ø35	3Ø2	461Ø5	Ø1Ø	46155	141
46Ø36	Ø16	461Ø6	267	46156	114
46Ø37	114	461Ø7	372	46157	Ø32
46Ø4Ø	Ø21	4611Ø	1Ø4	4616Ø	376
46Ø41	ØØØ	46111	114	46161	377
46Ø42	ØØØ	46112	333	46162	3Ø2
46Ø43	ØØ6	46113	Ø12	46163	17Ø
46Ø44	ØØØ	46114	167	46164	114
46Ø45	333	46115	Ø43	46165	Ø23
46Ø46	Ø1Ø	46116	Ø35	46166	Ø32
46Ø47	346	46117	312	46167	27Ø

ontinued on next page

ADDRESS	CONTENTS	ADDRESS	CONTENTS	ADDRESS	CONTENTS
4617Ø	3Ø1	4624Ø	333	4631Ø	17Ø
46171	353	46241	Ø1Ø	46311	323
46172	3Ø2	46242	346	46312	ØØ1
46173	265	46243	ØØ2	46313	3Ø3
46174	114	46244	3Ø2	46314	311
46175	361	46245	24Ø	46315	114
46176	361	46246	114	46316	172
46177	Ø52	46247	Ø76	46317	274
462ØØ	325	4625Ø	ØØ1	4632Ø	3ØØ
462Ø1	114	46251	323	46321	173
462Ø2	325	46252	Ø11	46322	275
462Ø3	Ø21	46253	3Ø3	46323	311
462Ø4	ØØØ	46254	Ø43	46324	2Ø4
462Ø5	377	46255	114	46325	ØØØ
462Ø6	315	46256	Ø76	46326	114
462Ø7	316	46257	2ØØ	46327	Ø44
4621Ø	114	4626Ø	323	4633Ø	Ø26
46211	321	46261	Ø1Ø	46331	126
46212	332	46262	3Ø3	46332	Ø26
46213	276	46263	ØØØ		
46214	114	46264	ØØØ		
46215	315	46265	321		
46216	316	46266	361		
46217	114	46267	Ø75		
4622Ø	322	4627Ø	3Ø2		
46221	256	46271	Ø56		
46222	114	46272	114		
46223	ØØ4	46273	Ø76		
46224	ØØ4	46274	1Ø3		
46225	17Ø	46275	ØØ1		
46226	376	46276	Ø76		
46227	Ø4Ø	46277	117		
4623Ø	332	463ØØ	ØØ1		
46231	Ø54	463Ø1	Ø76		
46232	114	463Ø2	115		
46233	ØØ6	463Ø3	1Ø7		
46234	ØØ1	463Ø4	Ø76		
46235	312	463Ø5	2ØØ		
46236	Ø54	463Ø6	323		
46237	114	463Ø7	Ø1Ø		