

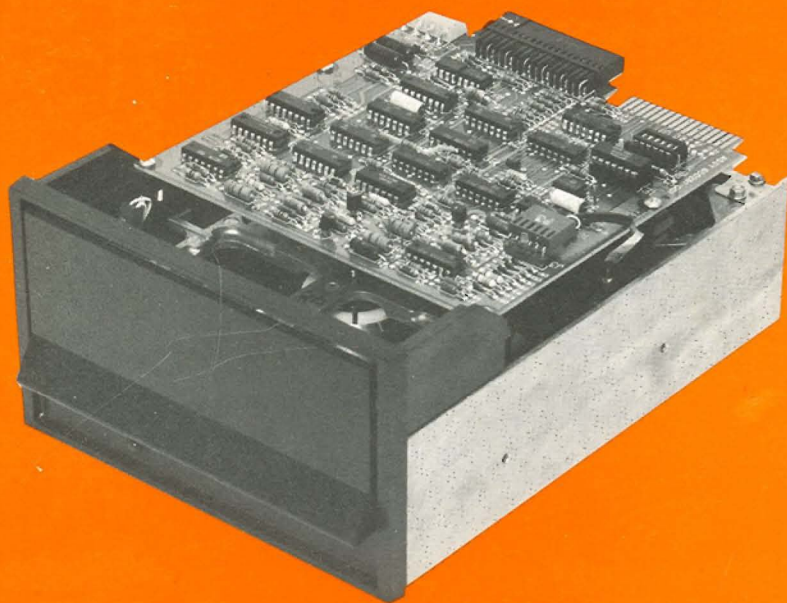
SIEMENS

OEM

Floppy Disk Drive FDD 100-5B

VOLUME 1

INSTALLATION OPERATION



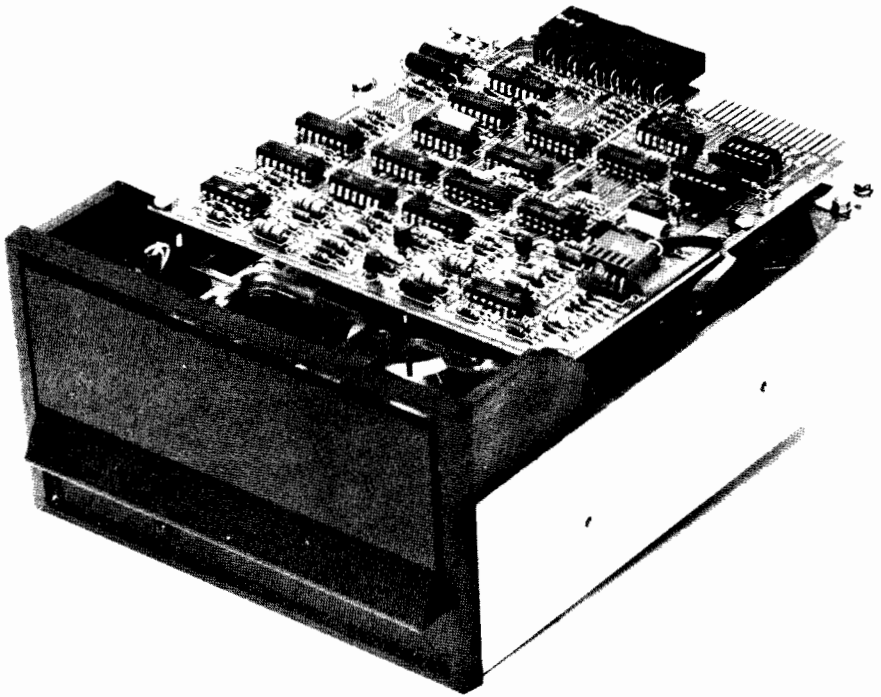
MODEL FDD100-5

FLEXIBLE DISK DRIVE
INSTALLATION AND OPERATION MANUAL

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REVISION LEVEL

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Model FDD100-5 Flexible Disk Drive

TABLE OF CONTENTS

Section	Paragraph	Page
1	GENERAL DESCRIPTION	
	1.1 SCOPE	1-1
	1.2 SPECIFICATIONS	1-2
2	INSTALLATION AND INTERFACE	
	2.1 UNPACKING AND INSPECTION	2-1
	2.2 INSTALLATION	2-1
	2.3 INTERFACE	2-1
	2.3.1 System Configuration	2-4
	2.3.2 Electrical Connectors	2-5
	2.3.3 Transmitter Characteristics	2-6
	2.3.4 Receiver Characteristics	2-6
	2.3.5 Terminator	2-7
	2.4 INTERFACE SIGNALS	2-7
	2.4.1 Input Control Lines	2-7
	2.4.2 Output Lines	2-10
	2.4.3 Data Lines	2-11
	2.5 PROGRAM SHUNT MODULE	2-12
	2.5.1 HS — Head Select Option	2-14
	2.5.2 HM — Head Motor Option	2-14
	2.5.3 Single-Drive Configuration	2-14
	2.5.4 Multiple-Drive Configuration	2-14
	2.6 OPTIONS	2-14
3	OPERATION PROCEDURES	
	3.1 GENERAL	3-1
	3.2 DISKETTE	3-1
	3.3 DISKETTE HANDLING	3-1
	3.4 LOADING THE DISKETTE	3-2
	3.5 WRITE PROTECT FEATURE	3-2
	3.6 MAINTENANCE AND REPAIR	3-3
	3.6.1 Preventive Maintenance	3-3
	3.6.2 Repair	3-3
	3.6.3 Alignment	3-3
Appendix A	SPARE PARTS LIST	A-1

LIST OF FIGURES

Figure	Title	Page
2-1	Model FDD100-5 Disk Drive, Isometric View	2-2
2-2	Outline and Mounting Dimensions	2-3
2-3	Model FDD100-5 Disk Drive System Configurations	2-4
2-4	J1 Connector Dimensions	2-5
2-5	J2 Connector Outline	2-6
2-6	Termination Configuration	2-7
2-7	Interface Signals and Input Power	2-8
2-8	Interface Timing Diagram	2-9
2-9	Index/Sector Timing	2-11
2-10	Write Timing	2-12
2-11	Read Timing	2-13
2-12	Program Shunt Module	2-13
3-1	Write Protect Feature	3-2

LIST OF TABLES

Table	Title	Page
1-1	Model FDD100-5 Disk Drive Specifications	1-2
1-2	Unformatted Data Capacity	1-3
2-1	Recommended Connectors — P1	2-5
2-2	Options	2-15

SECTION 1

GENERAL DESCRIPTION

1.1 SCOPE

This manual describes interfacing and operation of the Model FDD100-5 Flexible Disk Drive, and is divided into the following three sections:

- Section 1 — General Description
- Section 2 — Installation and Interfacing
- Section 3 — Operation Procedures

1.2 SPECIFICATIONS

Specifications for the Model FDD100-5 Disk Drive are listed in Table 1-1. Unformatted data capacity specifications are listed in Table 1-2.

Table 1-1. Model FDD100-5 Disk Drive Specification

GENERAL		
Parameter	Characteristics	
	35 Tracks	40 Tracks
Track Density:	48 TPI	48 TPI
Rotational Speed:	300 \pm 3 rpm	300 \pm 3 rpm
Data Transfer Rate:	125K bits/sec	125K bits/sec
Access Time —		
Track-to-Track:	25 msec	25 msec
Average Random Access Time:	298 msec	340 msec
Settle Time:	15 msec	15 msec
Average Latency:	100 msec	100 msec
Recording Density (FM):	2581 BPI (inner track)	2768 BPI (inner track)
Data Flux Density:	5162 fci (inner track)	5536 fci (inner track)
Head Load Time:	50 msec	50 msec
Power-Up Delay:	1 sec	1 sec
PHYSICAL		
Parameter	Characteristics	
Height:	3.25 \pm 0.02 inches (in.) (8.255 \pm 0.0508 cm) 3.38 \pm 0.02 in. (8.582 \pm 0.0508 cm) over front bezel	
Width:	5.75 \pm 0.02 in. (14.605 \pm 0.0508 cm)	
Length:	8.00 in. (20.32 cm) max.	
Net Weight:	3.5 pounds (1.5876 kg)	
Shipping Weight:	4.5 pounds (2.0412 kg)	
Media Requirements —		
Type 820 (or equivalent):	Soft-Sector Format	
Type 821 (or equivalent):	10 Physical Sectors	
Type 822 (or equivalent):	16 Physical Sectors	
Power:	+12VDC \pm 5%, 1.8A max., 0.80A typ., 100 mV p-p max. ripple +5VDC \pm 5%, 0.7A max., 0.4A typ., 50mV p-p max. ripple	
Typical Power Dissipation:	12W operating 7W standby	

Table 1-1. Model FDD100-5 Disk Drive Specifications (continued)

ENVIRONMENTAL	
Parameter	Characteristics
Temperature Range — Operating:	4 to 46°C (40 to 115°F)
Shipping or Storage:	-40 to 60°C (-40 to 140°F)
Wet Bulb (maximum):	36.3°C (78°F)
Relative Humidity Range — Operating:	20 to 80%, noncondensing
Shipping or Storage:	5 to 95%, noncondensing
RELIABILITY	
Parameter	Characteristics
Mean Time Between Failure (MTBF):	8500 hours (assume 25% power-on cycle for spindle-drive motor)
Mean Time To Repair (MTTR):	0.5-hour
Media Life (with approved media):	Not less than 3×10^6 passes per track
Design Life:	5 years

Table 1-2. Unformatted Data Capacity Specifications

Capacity	Single Density (FM)		Double Density (MFM, M ² FM)	
	Single Side	Double Side	Single Side	Double Side
Track:	3.13K bytes	3.13K bytes	6.26K bytes	6.26K bytes
Diskette (35 Tracks):	109.4K bytes	218.8K bytes	218.8K bytes	437.6K bytes
(40 Tracks):	125.0K bytes	250.0K bytes	250.0K bytes	500.0K bytes

SECTION 2

INSTALLATION AND INTERFACE

2.1 UNPACKING AND INSPECTION

During unpacking and inspection, use the following procedure:

- A. Remove contents of shipping container and inspect for in-transit damage. If damage is evident, notify carrier and manufacturer. Specify nature and extent of damage.
- B. Verify that contents of shipping container agree with shipping list. Notify a Company representative if anything is missing.
- C. Verify that model designation and serial number agree with those on shipping invoice.
- D. Inspect assemblies for loose hardware and connectors; if necessary, tighten hardware.

2.2 INSTALLATION

The Model FDD100-5 Disk Drive may be mounted in one of the following positions:

- A. Horizontally, with PWB facing up as shown in Figure 2-1.
- B. Vertically, on either the right or left side, with the door opening to one side or the other side.
- C. Vertically, with the door opening upward.
- D. Any combination of A, B, and/or C.

Figure 2-2 shows outline and mounting dimensions.

2.3 INTERFACE

Communication between the Model FDD100-5 Disk Drive and the controller is established through an I/O cable. Power to the Model FDD100-5 Disk Drive is applied through a separate cable. Input interface signal lines are terminated by a resistor network that offers an impedance of 132 Ohms. For ideal signal transmission, the input/output (I/O) cable should have a characteristic impedance of 132 Ohms. Maximum cable length between the controller and the last disk drive should be not greater than 10 feet (3.048 m).

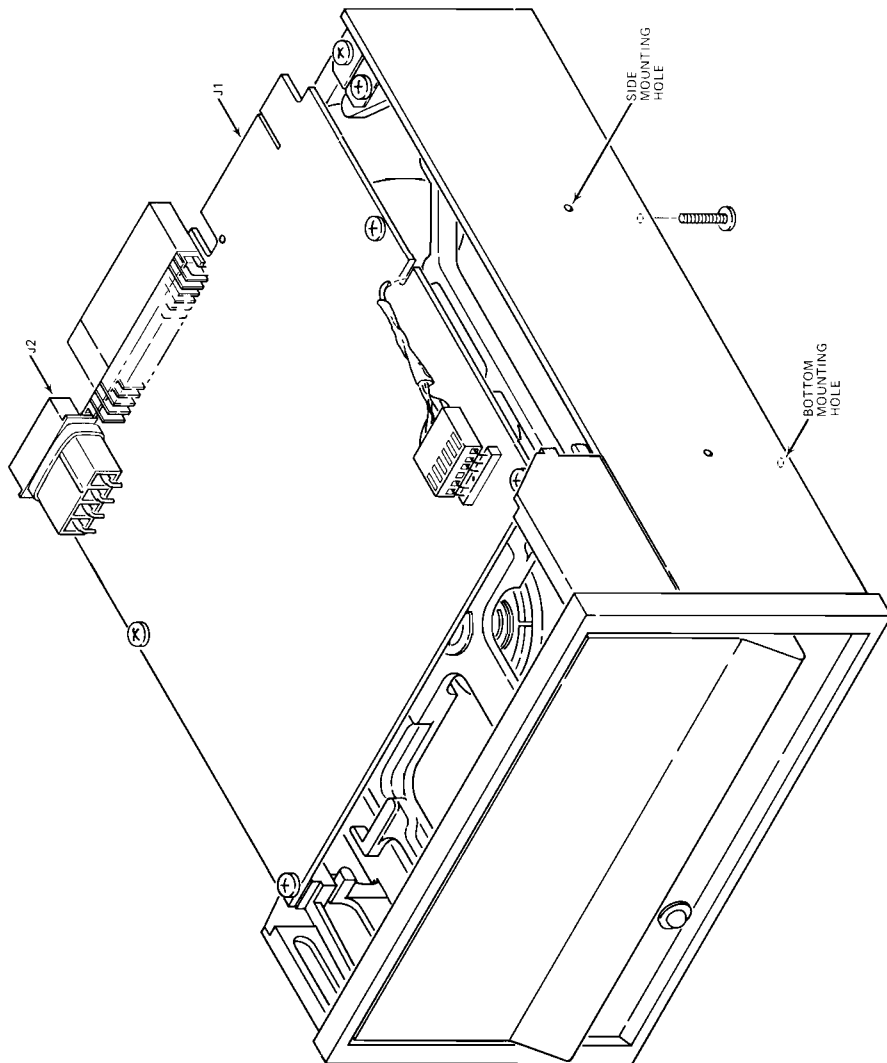
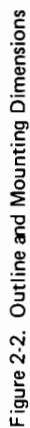


Figure 2-1. Model FDD100-5 Disk Drive, Isometric View



2.3.1 SYSTEM CONFIGURATION

The Model FDD100-5 Disk Drive can be connected in either a star or daisy-chain configuration as shown in Figure 2-3.

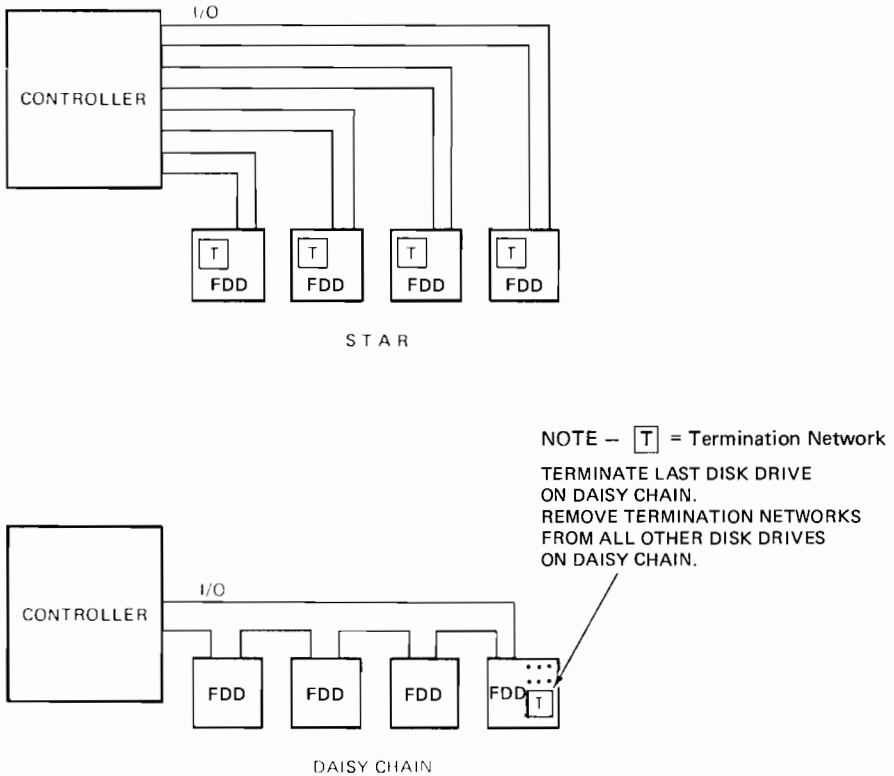


Figure 2-3. Model FDD100-5 Disk Drive System Configurations

In the star configuration, each disk drive requires a termination network; in the daisy-chain configuration, only the last disk drive in the daisy chain requires a termination network. Either system configuration can interface with up to four Model FDD100-5 Disk Drives.

2.3.2 ELECTRICAL CONNECTORS

The interface between the Model FDD100-5 Disk Drive and the controller consists of two connectors: J1 and J2. J1 provides the signal interface and J2 provides DC power. There is also a frame ground "Fast-On" terminal.

2.3.2.1 Signal Interface Connector. The signal interface (J1) is a 34-pin PWB edge connector with dimensions as shown in Figure 2-4. Even-numbered pins are located on the component side of the PWB, and odd-numbered pins are located on the solder side. Pin 2 is located closest to the corner of the PWB. A slot is provided between pins 4 and 6 for connector keying. The recommended connectors for P1 are listed in Table 2-1.

Table 2-1. Recommended Connectors – P1

Type of Cable	Manufacturer	Connector P/N	Contact P/N
Twisted Pair, 26	AMP	583717-5	1-583616-1
Flat Cable	3M "Scotchflex"	3463-0001	N.A.

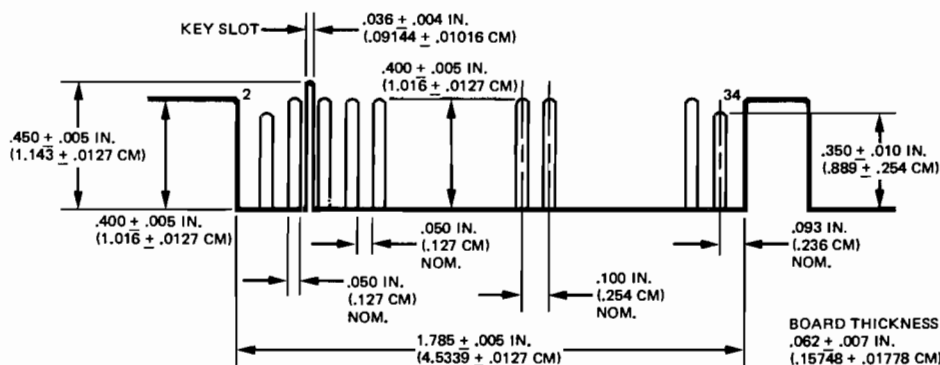


Figure 2-4. J1 Connector Dimensions

2.3.2.2 Power Connector. The DC power connector (J2) is mounted opposite to J1 on the component side of the PWB. Power connector J2 is a 4-pin AMP P/N 1-480426-0. The recommended mating connector for P2 is AMP P/N 1-480424-0 that uses AMP pins P/N 60619-1. The recommended wire size is No. 18 AWG. Figure 2-5 shows the pin-numbering sequence of J2. The +5V and +12V power returns are tied together and connected to the chassis at the disk drive. rive.

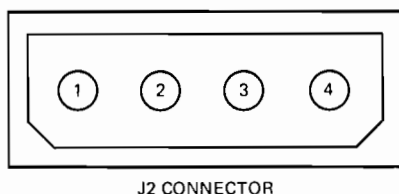


Figure 2-5. J2 Connector Outline

2.3.2.3 Frame Ground. The Model FDD100-5 Disk Drive must be grounded to the controller to ensure proper operation and low noise susceptibility. The AC ground or neutral wire should be connected to the disk drive frame. A Fast-On tab is provided on the disk drive. This tab is an E.T.C. P/N 3431, and the mating connector is AMP P/N 60972-1. Means for AC coupling only between frame and logic ground are provided on the main disk drive PWB; however, use of this feature may increase noise susceptibility in the disk drive. Modification is made by removing R53 (1M) from main disk drive PWB.

2.3.3 TRANSMITTER CHARACTERISTICS

The Model FDD100-5 Disk Drive uses an SN7438 IC or equivalent to transmit all control and data signals. This IC can sink 48 milliamperes at a low level of 0.4-volt. Output signals are to be terminated by a 132-Ohm resistor network at the controller interface.

2.3.4 RECEIVER CHARACTERISTICS

The Model FDD100-5 Disk Drive uses an SN7414 IC or equivalent to receive all transmitted signals from the controller. The input of each receiver is terminated by a resistor network.

2.3.5 TERMINATOR

The resistor network that is used to terminate all input signals is inserted in or removed from a socket on the PWB. Network impedance is 132 Ohms provided by a 220-Ohm resistor to +5V together with a 330-Ohm resistor to DC ground as shown in Figure 2-6. Each Model FDD100-5 Disk drive is shipped with a terminator installed.

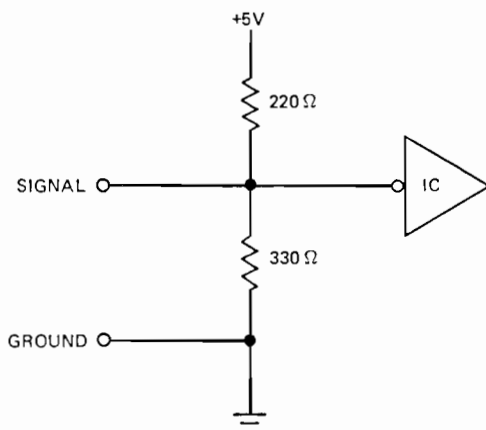


Figure 2-6. Termination Configuration

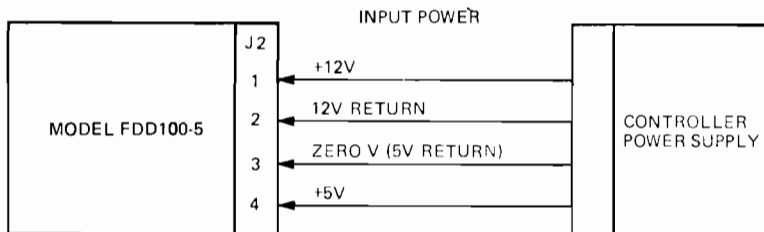
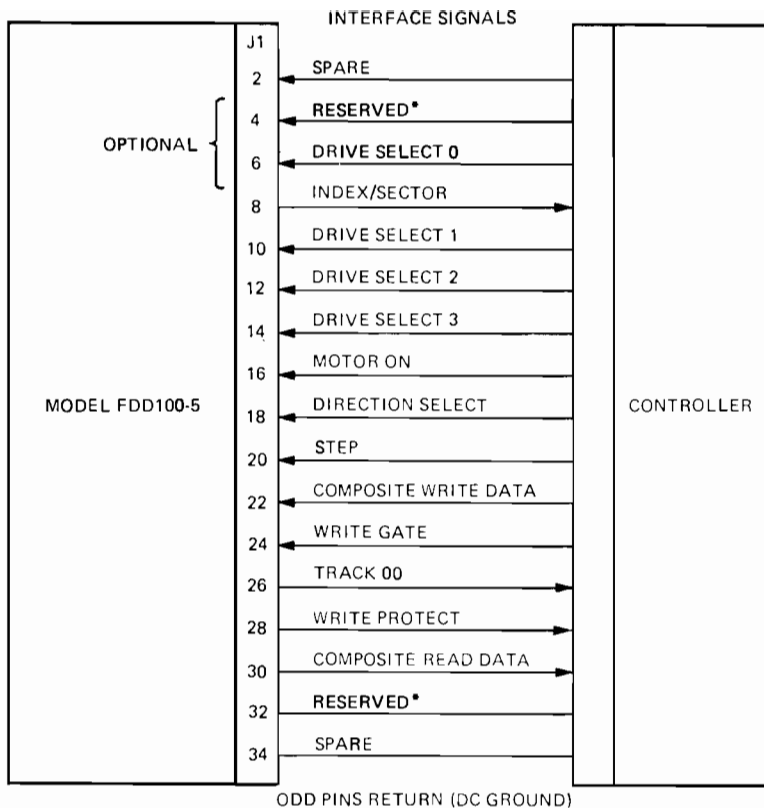
2.4 INTERFACE SIGNALS

A diagram of the Model FDD100-5 Disk Drive interface signals is shown in Figure 2-7, and the interface signal timing requirements are shown in Figure 2-8.

2.4.1 INPUT CONTROL LINES

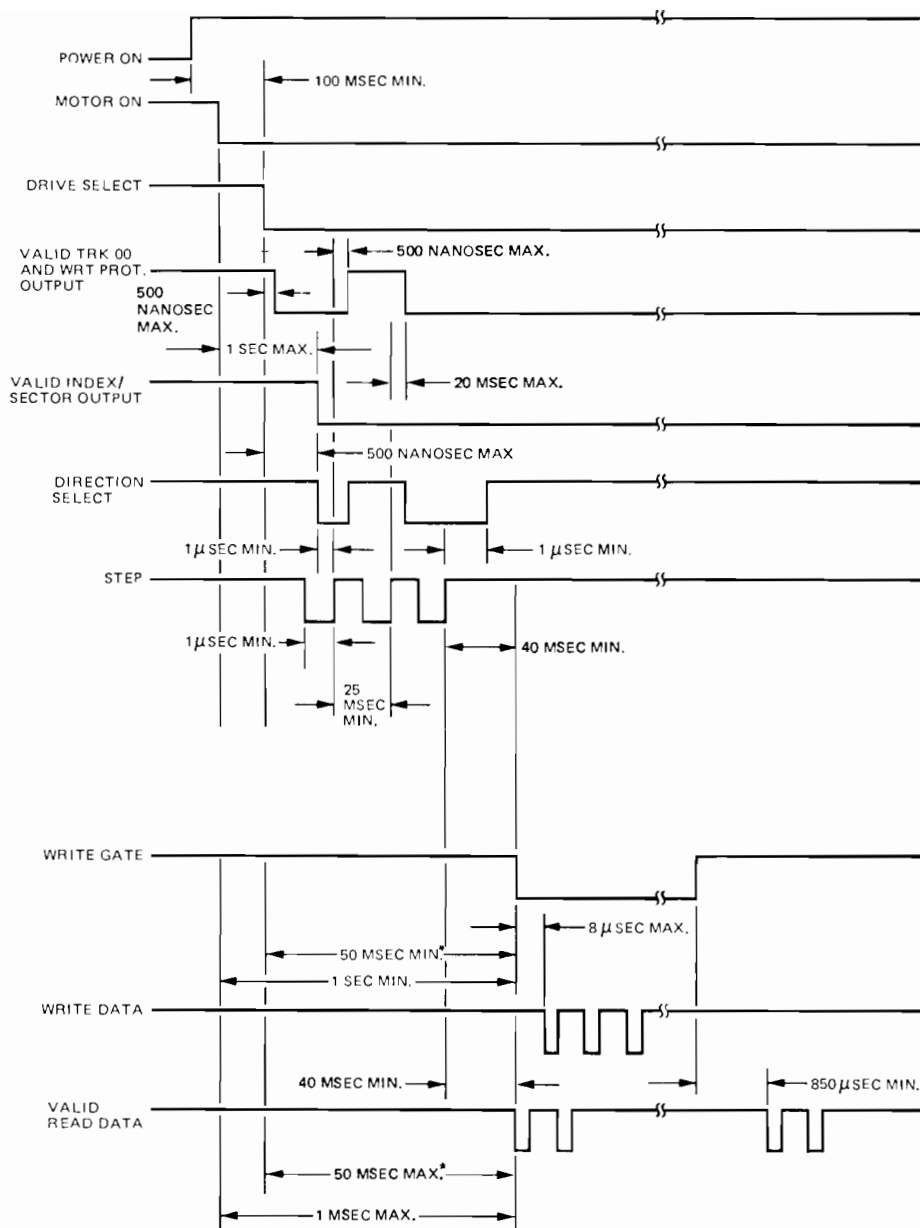
Input control signals are carried by eight lines; one of which is optional.

2.4.1.1 Drive Select Lines. There are four Drive Select lines: DS1 (J1-10), DS2 (J1-12), and DS3 (J1-14) are standard, and DS0 (J1-6) is optional. A low (true) level on any one of these lines allows the controller to communicate with the disk drive assigned to that line. During all communication with the disk drive, the line must remain true because all transmitters and receivers are gated



*THESE PINS HAVE BEEN RESERVED FOR USE BY THE MODEL FDD200-5 DISK DRIVE.

Figure 2-7. Interface Signals and Input Power



*IF HEAD LOAD WITH SELECT. IF HEAD IS ALREADY LOADED 500 NANOSECONDS.

Figure 2-8. Interface Timing Diagram

with a corresponding Drive Select line; therefore, they can be activated only by the corresponding Drive Select command from the controller. In a multiple-drive system, the user must alter the program shunt module to allow the multiplexing of the I/O lines. An optional interface line may be assigned to the DS0 (J1-6) line.

2.4.1.2 Motor On (J1-16). This feature is provided for the user to directly control (via the interface) the DC spindle motor. A low level at the interface turns the spindle motor on. The spindle takes one second after this line is activated to come up to speed. A one second delay should occur after Motor On and before any reading or writing is attempted. If such feature is not desirable, the spindle motor can be kept on by permanently grounding the Motor On line; however, use of this feature is recommended to reduce average power consumption and increase overall life of the disk drive. If the Motor On signal is used, the program shunt module may require changing if the Head Load with Motor On option is selected.

2.4.1.3 Direction Select (J1-18). This line controls the direction of travel of the read/write head. A low level on this line causes the head to move toward the center of the spindle only when a Step pulse occurs. The direction select signal should be stable from 1.0 microsecond before to 1.0 microsecond after the trailing edge of Step.

2.4.1.4 Step (J1-20). A low pulse on this line, together with Direction Select, initiates a single-track move of the head. Head movement begins on the trailing edge of this pulse. Minimum pulse width should be not less than 1.0 microsecond and the maximum pulse repetition rate should be one pulse every 25 milliseconds.

2.4.1.5 Write Gate (J1-24). A low level on this line enables Composite Write Data to be written on the diskette. A high (false) level on this line enables the stepper motor logic and Composite Read Data line so that Read data may be read from the diskette.

2.4.2 OUTPUT LINES

Output signals from disk drive to controller are carried by three lines; Track 00, Index/Sector, and Write Protect.

2.4.2.1 Track 00 (J1-26). A low level on this line informs the controller that the position of the read/write head is at track 00. Subsequent step-out pulses are ignored by the disc drive.

2.4.2.2 Index/Sector (J1-8). For soft sector operation that uses single-hole media, this line transmits a reference Index pulse once every diskette rotation to indicate the beginning of a track. For hard sector operation that uses multi-hole media, this line transmits the Index pulse and all Sector pulses, where Sector pulses indicate the beginning of a sector. Pulse width for both Index and Sector is 4 ± 1.5 milliseconds. An optional set of photosensors are installed on some configurations of the Model FDD100-5 Disk Drive to enable either side of the diskette to be recorded. Index/Sector timing is shown in Figure 2-9.

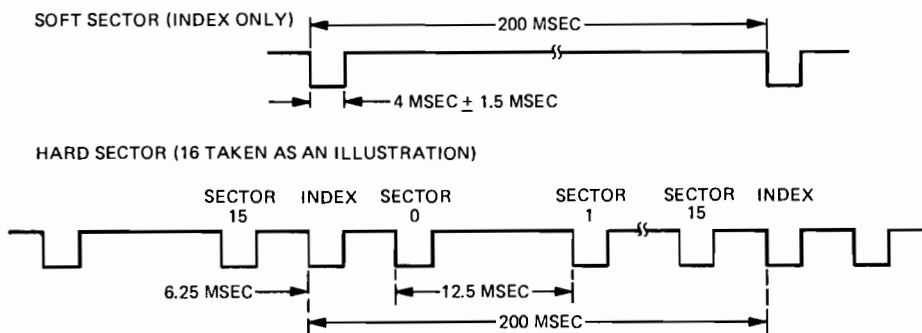


Figure 2-9. Index/Sector Timing

2.4.2.3 Write Protect (J1-28). A photosensor assembly senses the presence or absence of a notch in the diskette. If a notch is not detected, a low-level signal is transmitted to the controller to indicate that a Read-only diskette has been inserted into the Model FDD100-5 Disk Drive. This condition also inhibits writing data on the diskette.

2.4.3 DATA LINES

Data lines are used to write data on or to read data from the diskette.

2.4.3.1 Composite Write Data (J1-22). The controller uses this line to transmit information to be encoded on the diskette of the selected disk drive. Pulse widths of clock and data bits should

be a minimum of 250 nanoseconds and a maximum of 2.1 microseconds. At 125 kHz, the clock interval is 8 microseconds, while the clock-to-data or data-to-clock interval is 4 microseconds. The write clock frequency should be held within ± 0.5 percent. Write timing is shown in Figure 2-10.

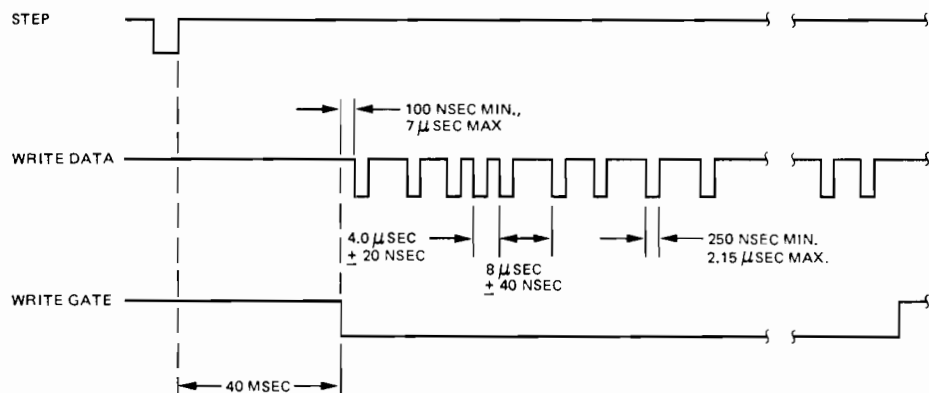


Figure 2-10. Write Timing

2.4.3.2 Composite Read Data (J1-30). This line furnishes previously recorded information to the controller. Information is transmitted in the encoding scheme used without discriminating between clock and data bits. Decoding of data is accomplished by the controller. Data and clock pulse widths are 1 microsecond \pm 250 nanoseconds at the encoded frequency. Read timing is shown in Figure 2-11.

2.5 PROGRAM SHUNT MODULE

Figure 2-12 shows the program shunt module with the program shunt installed. The module is an IC socket located on the PWB near J1. The IC socket has seven sets of pin receptacles, while the program shunt has six sets of pins. One set of pin receptacles at either end of the IC socket is always unused.

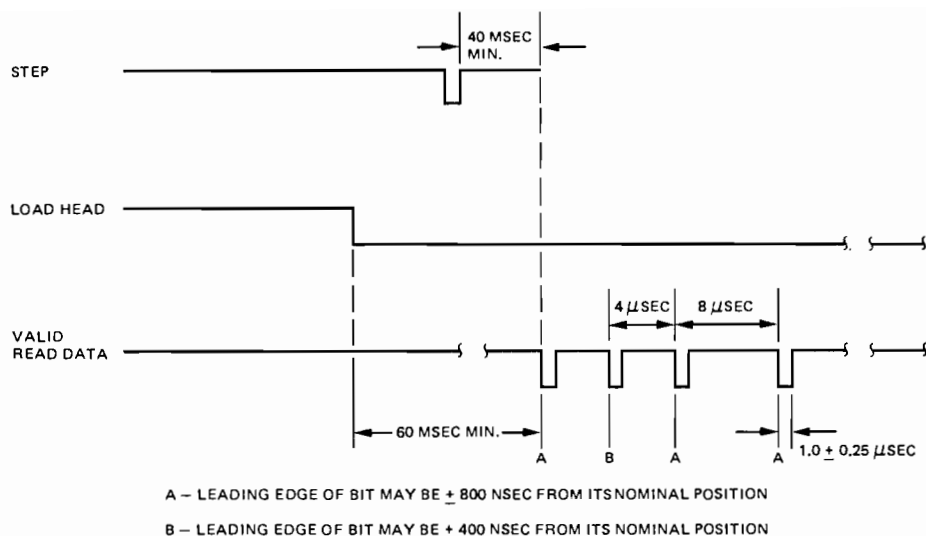
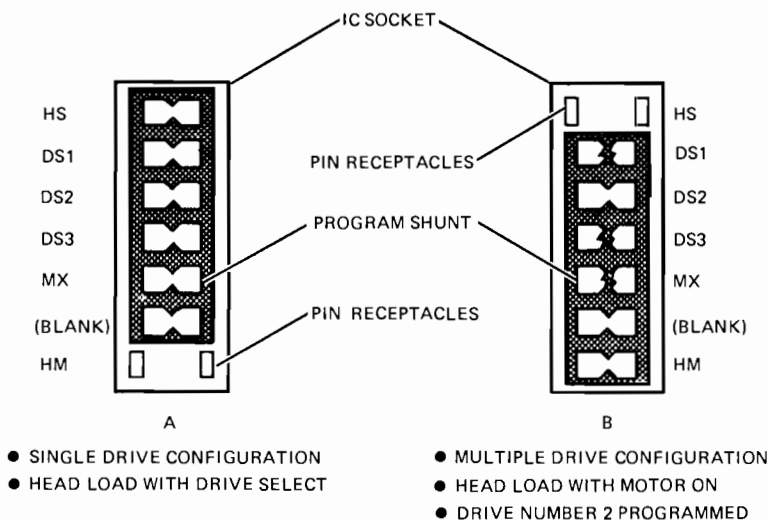


Figure 2-11. Read Timing



HS – HEAD SELECT – HEAD IS LOADED BY DRIVE SELECT SIGNAL
 DS1 – DRIVE SELECT 1 – SELECT SIGNAL FOR DRIVE ONE.
 DS2 – DRIVE SELECT 2 – SELECT SIGNAL FOR DRIVE TWO.
 DS3 – DRIVE SELECT 3 – SELECT SIGNAL FOR DRIVE THREE.
 MX – MULTIPLEX – MUST BE CUT FOR MULTIPLE DRIVE CONFIGURATION.
 HM – HEAD MOTOR – HEAD IS LOADED BY MOTOR ON SIGNAL.

Figure 2-12. Program Shunt Module

2.5.1 HS – HEAD SELECT OPTION

The Head Select option causes the head of the disk drive to load when the Drive Select signal is received. The program shunt is installed so that the HS position is short circuited (see Figure 2-12A). The HS position can be used in either single-drive or multiple-drive configuration.

2.5.2 HM – HEAD MOTOR OPTION

The Head Motor option causes the head of the disk drive to load when the Motor On signal is received. The program shunt is installed so that the HM position is short circuited (see Figure 2-12B). The HM position can be used in either single-drive or multiple-drive configuration.

2.5.3 SINGLE-DRIVE CONFIGURATION

With a single-drive configuration, the program shunt need not be altered in any way except to select either the HS or HM positions. Any Drive Select signal will activate the select light and load the head if HS is programmed.

2.5.4 MULTIPLE-DRIVE CONFIGURATION

With a multiple-drive configuration, the MX (Multiplex) position and two of the three DS (Drive Select) positions must be cut (see Figure 2-12B). The shunt positions can be cut by using AMP special tool, P/N 435705, or by bending the leg of the program shunt away from the socket before installation to provide the necessary open-circuit condition.

2.6 OPTIONS

The Model FDD100-5 Disk Drive can be modified by the customer to operate by other than the standard methods described in subsection 2.5. The modifications can be made by connecting option pads or cutting jumpers, or by using the optional interface lines at J1 connector pins 2, 4, 6, 32, and 34, or by altering the program shunt module. Available options are listed and described in Table 2-2.

Table 2-2. Options

Option	Modification
Drive Select 0 (DS0)	Adds DS0 input line to spare interface line so that system can accommodate four disk drives. If J1-6 is designated as DS0, cut etch between pads E and F, then add jumper between pads E and G.
Write Protect to Interface Only	This option indicates to the interface that a Write Protected or Non-Write Protected diskette is installed in the disk drive; it does not inhibit writing. Cut etch between pads C and D.
Write Inhibit Controlled by Interface Line	Cut etch between pads C and D, then add jumper from pad C to pad associated with spare interface line.
Independent Head Load (Pin J1-6)	Add jumper between pads E and R. Modify program shunt module to select <u>neither</u> HM nor HS.
Motor On with Select	Cut etch between pads M and N; then add jumper between pads G and P.
Indicator Lamp with Motor On	Cut etch between pads G and H; then add jumper between pads H and P.
Indicator Lamp . . with Interface Only	Cut etch between pads G and H; then add jumper from pad H to pad associated with selected spare interface line.
Select Disk Drive without Loading Head	Place program shunt module in HM position. (Load head only with Motor On signal.)
<p>Note</p> <p>Upon implementing any optional modification, verify that associated interface line is properly terminated.</p>	

SECTION 3

OPERATION PROCEDURES

3.1 GENERAL

There are no front panel controls on the Model FDD100-5 Disk Drive. A single front panel indicator lamp lights when the disk drive is selected. All power and control functions are handled through the interface. Operating procedures consist primarily of loading and unloading the diskette.

3.2 DISKETTE

The diskette recording medium is contained in a sealed envelope that measures 5.25 inches (13.335 cm) square. The diskette recording medium is 5.125 inches (13.0175 cm) in diameter and is made of mylar coated with magnetic oxide on both sides. The diskette has 40 circular tracks that are spaced 0.02083-inch (0.529082 mm) apart.

3.3 DISKETTE HANDLING

Protection of the diskette requires the same careful handling specified for computer magnetic tapes. Use the following procedure:

- A. Return the diskette to its storage envelope whenever it is removed from the disk drive.
- B. Keep diskettes away from magnetic fields and ferromagnetic materials.
- C. Replace storage envelopes when they become worn, cracked, or distorted.
- D. Do not write on the plastic jacket with a lead pencil or ball-point pen; use a felt-tip pen.
- E. Do not touch or try to clean the diskette surface. Abrasions may cause loss of data.
- F. Do not expose diskette to heat or sunlight. Exposure to temperatures in excess of 51.6°C (125°F) may cause irreversible damage to the diskette.

3.4 LOADING THE DISKETTE

To load the diskette, open the door on the front panel of the Model FDD100-5 Disk Drive, insert the diskette and close the door. A door interlock mechanism prevents the door from closing if the diskette is not properly loaded. The door may be closed without a diskette being loaded.

3.5 WRITE PROTECT FEATURE

The diskette is protected from being written on when a Write Protect tab is used. Figure 3-1 shows an unprotected (Read and Write) and a Write-protected (Read-only) diskette. A photoelectric sensor detects the presence or absence of a notch in the side of the diskette. When the open notch is sensed, writing is allowed. When the notch is not sensed (covered with a tab), writing is inhibited, and a status signal informs the controller that a Write Protect condition exists. Optional modification of the disk drive electronics may cause the Write Protect signal to go only to the interface, and writing will not be inhibited (see Table 2-2).

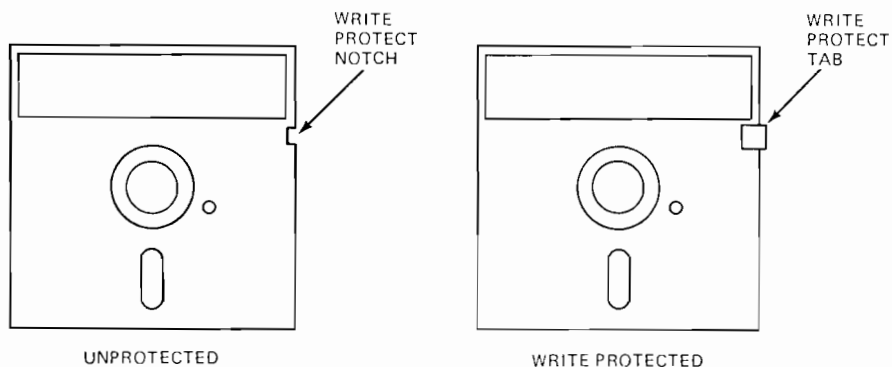


Figure 3-1. Write Protect Feature

3.6 MAINTENANCE AND REPAIR

Maintenance and repair is covered in the Operation and Maintenance manual P/N 620450-001.

3.6.1 PREVENTIVE MAINTENANCE

Under normal operating conditions, preventive maintenance is not required.

3.6.2 REPAIR

If the disk drive becomes inoperative for any reason, assembly, removal and replacement procedures are included in Section 5 of the separately furnished Operation and Maintenance manual. Spare parts are listed in Appendix A of this manual.

3.6.3 ALIGNMENT

Alignment procedures for the disk drive are provided in Section 5 of the Operation and Maintenance manual. Alignment can be accomplished by using those procedures and a Dysan Corp. Alignment Diskette P/N 224/2. The Alignment Diskette is available from Dysan Corp., Santa Clara, CA.

APPENDIX A

SPARE PARTS LIST – MODEL FDD100-5 DISK DRIVE

Part Number	Description
650281-001	Assembly, PWB, Main
640204-001	Assembly, PWB, Servo Control
630321-100	Assembly, Spindle Drive Motor
630300-001	Assembly, Stepper Motor
650168-001	Assembly, Head Carriage
650166-001/002	Assembly, Carrier
640181-001	Assembly, Diskette Guide, Right Spare
640181-003/004	Assembly, Diskette Guide, Left Spare
640162-001	Assembly, Index Sensor
640155-001	Assembly, Head-Load Solenoid
630258-001	Assembly, Head-Load Pad
630289-001	Belt, Spindle Drive
617500-001	LED, Status Indicator
650199-001	Bezel
640186-001	Door
618808-001	Switch, (TRK 00)
618550-006	Shunt, Programmable
650190-001	Assembly, Clutch

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