MEMOREX

550/552 Flexible Disc Drive
Product Specification

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PREFACE

This manual describes typical physical and signal characteristics of the Memorex 550 (single-head) Flexible Disc Drive and the double capacity version, 552 (dual-head) Flexible Disc Drive.

TABLE OF CONTENTS

LIST OF FIGURES

Figure **Page**

LIST OF TABLES

Table **Page**

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SECTION 1
SCOPE

This document describes the operational characteristics of the Memorex single-head 550 and the dual-head 552 Flexible Disc Drives (Figure 1-1). It provides sufficient information to allow one to eight drives to be integrated successfully into the customer's data processing system. The 552 differs from the 550 physically in that the 552 has a different read/write head carriage assembly and two index detectors (i.e., one additional offset detector for the standard dual read/write heads).

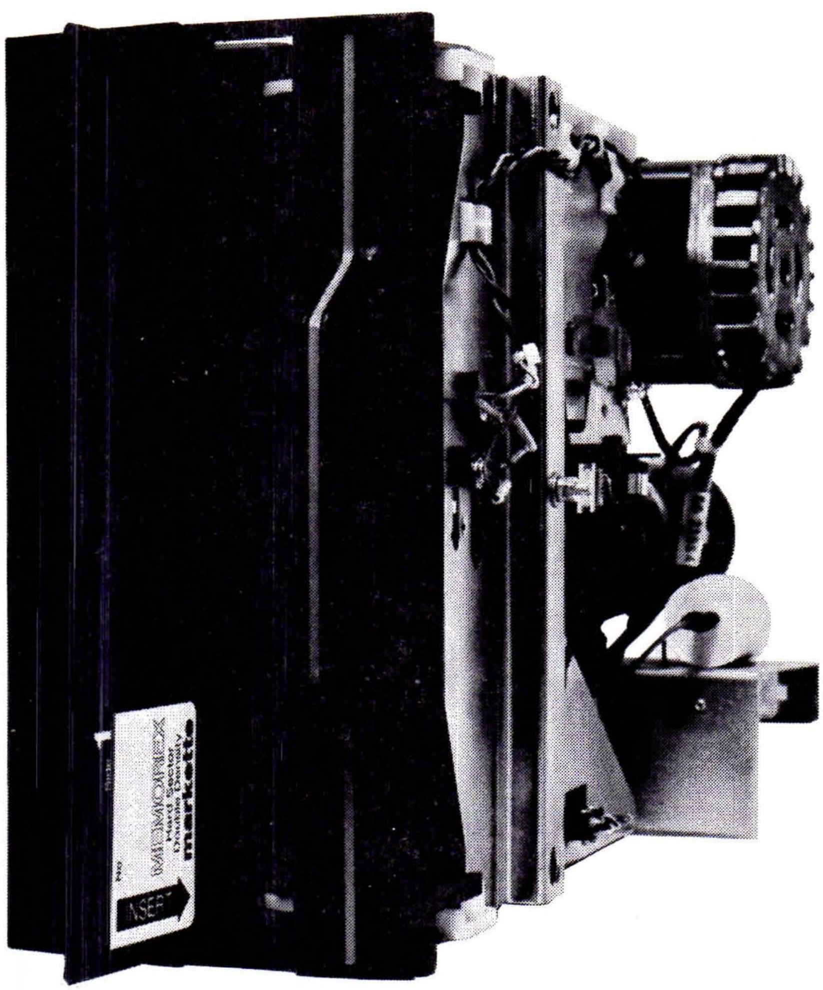

FIGURE 1-1. MEMOREX 552 FLEXIBLE DISC DRIVE

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SECTION 2
GENERAL DESCRIPTION

The 550/552 Flexible Disc Drive is a low-cost magnetic recording and playback device which is capable of using the single- or the two-sided Memorex Markette® recording media or competitive equivalents (e.g., IBM). The 552 is a double-head version of the Memorex 550 single-head drive. The 552 drive can record in single- or double-density format on either side of the recording media. Media is interchangeable between IBM 4964 two-sided drives when recorded in accordance with IBM document GP21-9257-1. The 550 Flexible Disc Drive can read and write with discs that are interchangeable with other 550 Flexible Disc drives; IBM 3741, 3742, or 3540; and with the IBM System 32 when recorded in accordance with IBM OEMI Manual GA21-9190-3.

Significant features of the 550/552 are its selective AC power requirements for both domestic and international markets, the choice of black or white front bezel with or without a File Busy lamp, soft or hard sector, and the optional features of Write Protect Detection and Program-Controlled Door Lock. Also, the 552 features dual index sensors which enable detection of whether a single- or double-sided disc has been inserted when this option has been installed by the customer.

The 550/552 is smaller and more compact than other Memorex flexible disc drives. It will fit into the standard EIA 19-inch rack in pairs if mounted horizontally and in groups of four drives if mounted vertically. See Figure 2-1 for mounting and orientation information.

Refer to Figure 2-2 for the technical description that follows. The 552 has two ceramic read/write heads mounted in a carriage that can be positioned to any one of 77 tracks. The 552 dual heads are loaded simultaneously on both sides of the diskette, and provide excellent compliance between media and read/write head with corresponding maximum media durability. The 550/552 is capable of transferring data to and from an external controller at rates of 250,000 bits per second for single-density (FM) recording or 500,000 bits per second for double-density (MFM/MMFM) recording.

The 550/552 differs from existing drives in several ways. The base is compression-molded, fiberglass-reinforced, thermosetting polyester. The head loading and disc clamping mechanisms are unique. Interlocks prevent the operator from closing the door if a flexible disc has only been partially inserted, thus eliminating possible media damage by the operator. When the door is opened, the flexible disc is partially ejected for easy removal by the operator.

The carriage positioning device consists of a three-phase, size 20, variable-reluctance stepper motor which, in conjunction with a lead screw, positions the read/write head. The stepper motor rotates the lead screw clockwise or counterclockwise in 15-degree increments, causing the heads to move from one track to another at a maximum step rate of 3 milliseconds (552) or 6 milliseconds (550). The lead screw is supported by an outboard bearing. The carriage is prohibited from rotating by a unique spring-loaded saddle bearing in the carriage. Backlash is removed by a self-lubricating, anti-backlash device which acts radially, rather than longitudinally, along the screw to reduce the offtrack effect of wear. A factory-set, permanent azimuth alignment is provided for the pole tip of each drive.

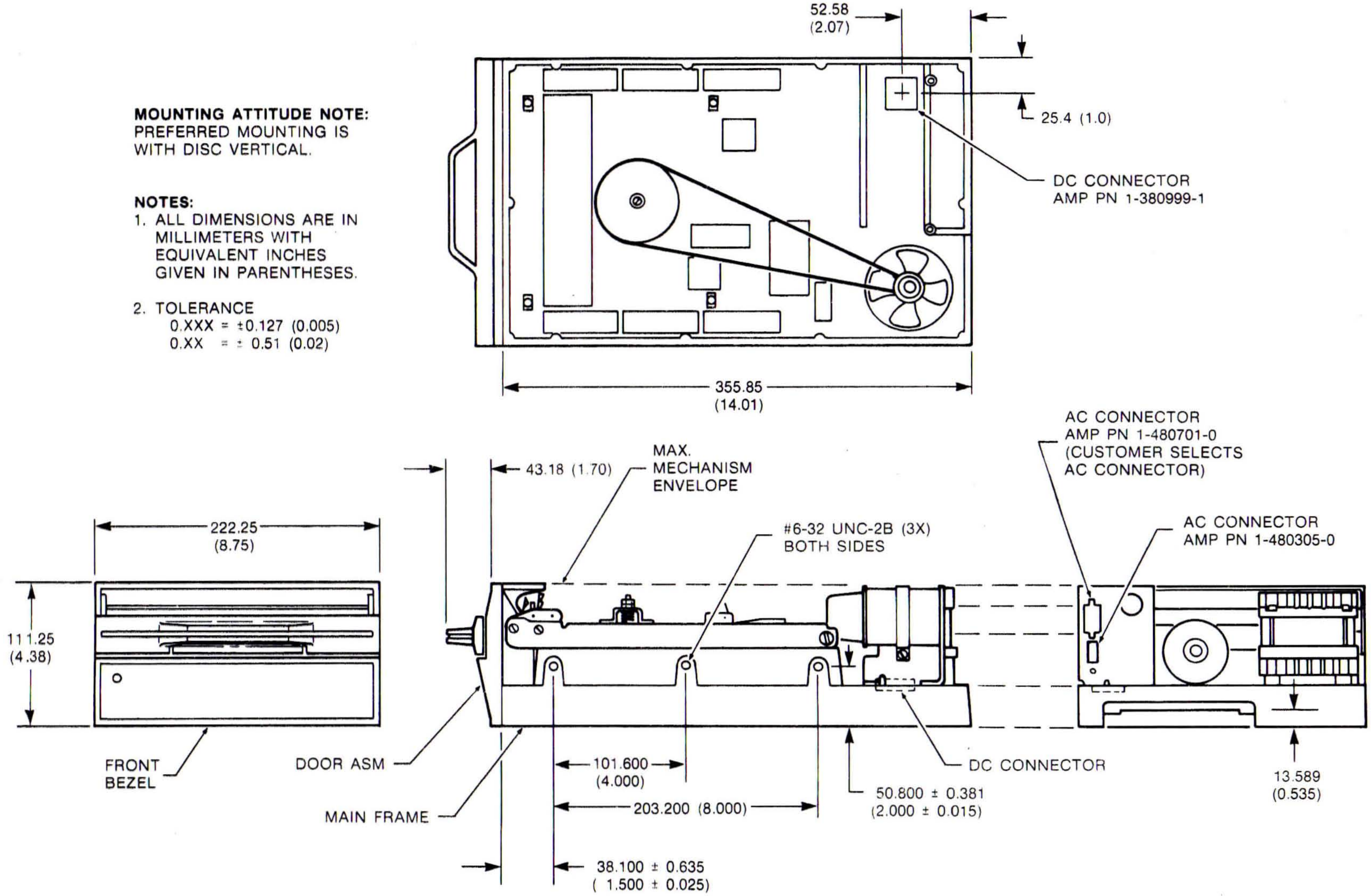

FIGURE 2-1. 550/552 FLEXIBLE DISC DRIVE MOUNTING AND PLUG INFORMATION

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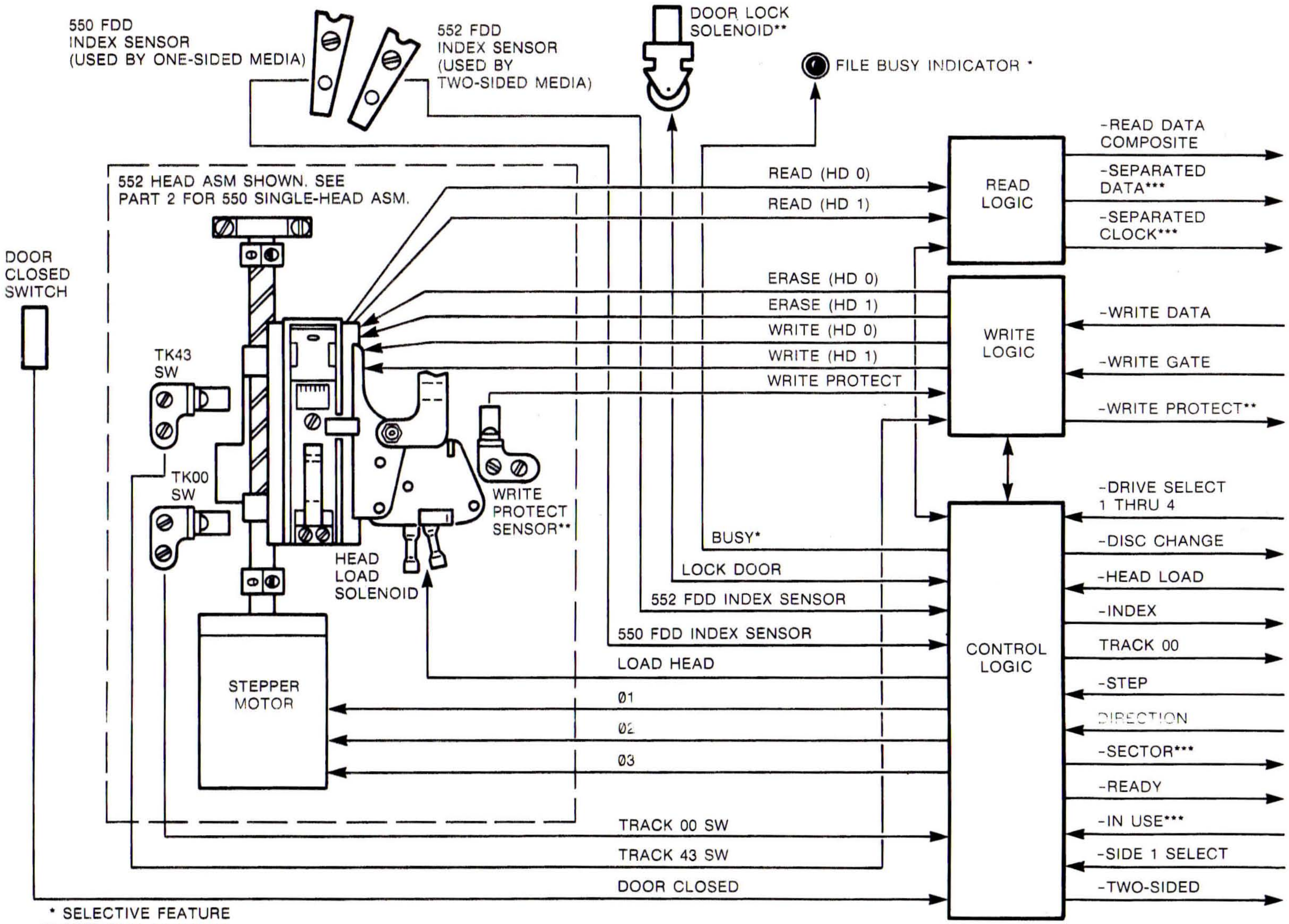

* SELECTIVE FEATURE
** OPTIONAL FEATURE
*** CUSTOMER INSTALLABLE OPTION

FIGURE 2-2. 550/552 FLEXIBLE DISC DRIVE FUNCTIONAL DIAGRAM (Part 1 of 2)

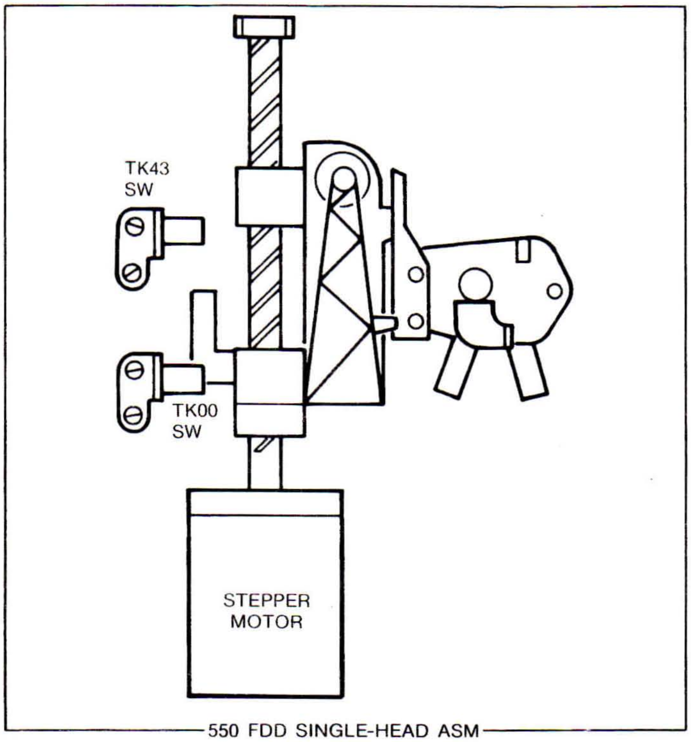

FIGURE 2-2. 550/552 FLEXIBLE DISC DRIVE FUNCTIONAL DIAGRAM (Part 2 of 2)

A synchronous motor is used to rotate the disc and to provide power for driving an axial flow fan. The motor speed is reduced by a belt and pulley arrangement to drive the media at 360 rpm.

The 550/552 incorporates several solid-state sensors to (1) detect Index/Sector holes, (2) locate Track 0 under the read/write head of Side 0, (3) switch write current from a high write current for the outer 44 tracks to a low write current for the 33 inner tracks, and (4) determine if an inserted media has been write protected.

The Head Flexure Assembly is designed for installation into the carriage for full life interchange with IBM Series 43 FD disc storage units. In operation, the heads record a track which is nominally 0.013-inch wide at a radial density of 48 tracks per inch. Two 0.006-inch wide erased guard bands lie on either side of the data track. This data-free band allows high reliability in media interchange. In normal operation, the 552's two heads gently load the recording media in such a manner that each head acts as a head-media interface force for the other, thus ensuring optimum media contact.

The 550 head loading is achieved by employing a pressure pad mounted on an arm that pivots on the carriage. Force is provided by a spring and the head is loaded by energizing a solenoid. The movement of a bail actuated by the solenoid permits the pressure pad to contact the disc and urge it gently against the head. De-energizing the solenoid moves the pressure pad away from the disc.

The 550/552 drive status, control, and read/write circuits are packaged on one printed circuit board (PCB) which can be interfaced from a 50-pin I/O connector. (See Section 7.3 for connector and mating plug definition.)

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SECTION 3
SYSTEM CONFIGURATION

3.1 GENERAL

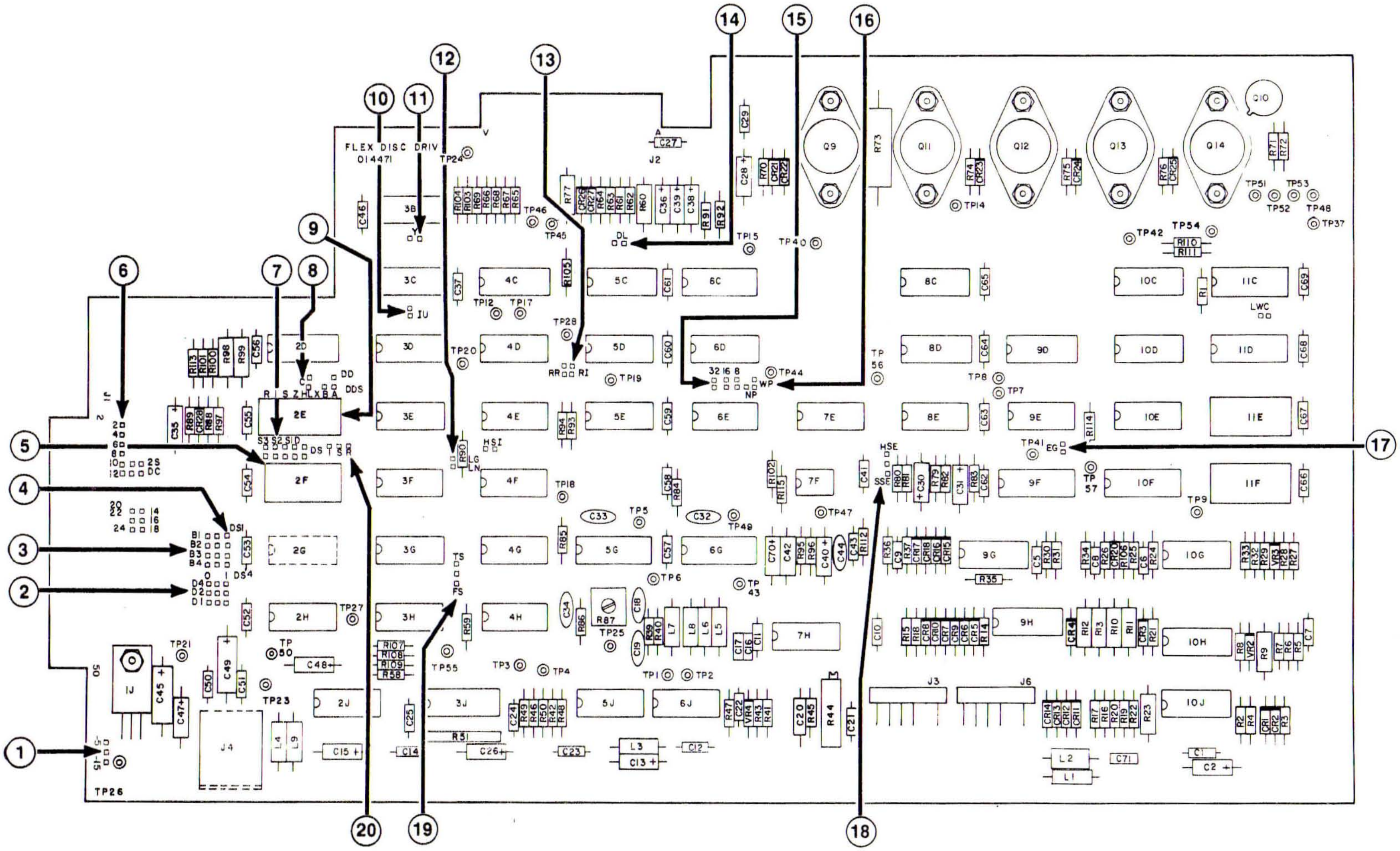
The 550/552 Flexible Disc Drive is powered and controlled externally from the customer's system. The power requirements are for a single-phase AC source to drive the AC motor. The DC requirements are for three voltages: +5 VDC, +24 VDC, and -7 to -16 VDC; or alternatively, -5 VDC. See Section 5.3, Summary of Physical Specifications, for AC and DC power requirements and frequency tolerances.

3.2 SERIAL CABLE SYSTEM

The 550/552 may be installed in a system with up to eight drives by encoding the addresses.

3.3 IMPLEMENTATION OF CUSTOMER INSTALLABLE OPTIONS

The following paragraphs describe the implementation of customer-installable options in the 550/552 and define the standard configuration as shipped from Memorex. Refer to Figure 3-1 and Table 3-1 for locations and designations of all components described in the procedures.



1. MINUS VOLTAGE
2. DRIVE SELECT; ENCODED 1 OF 8 TERMINAL POSTS AND COMPARATOR
3. SIDE 1 SELECTION VIA ONE OF DRIVE SELECT INPUTS OPTION
4. DRIVE SELECT; 1 OF 4 TERMINAL POSTS
5. 150-OHM IC
6. SPARE I/O PINS (J1-2, 4, 6, AND 8)
7. SIDE SELECT
8. HEAD LOAD; DRIVE SELECT ENCODED/NONENCODED
9. JUMPER PLUG SHUNT
10. IN USE TRACE
11. BUSY LAMP OPTION
12. SPARE SCHMIDT TRIGGER RECEIVER
13. RADIAL READY AND RADIAL INDEX
14. DOOR LOCK
15. HARD SECTOR 32, 16, OR 8
16. WRITE PROTECT
17. ERASE GATE
18. SOFT/HARD SECTOR ERASE TIMING
19. DATA/CLOCK SEPARATOR RESYNC ON 1/3 MISSING CLOCK BITS
20. RADIAL INDEX, SECTOR AND READY

FIGURE 3-1. PCB COMPONENT LOCATION

TABLE 3-1. STANDARD CONFIGURATION AS SHIPPED FROM MEMOREX

Designator/Description	Schematic Locator	Open	Short
-15	E41,E42		X
-5	E42,E43	X	
Terminators, 14-Pin DIP, 150-ohm	2F		Installed
DS1	E2,E3		X
DS2	E5,E6	X	
DS3	E8,E9	X	
DS4	E11,E12	X	
B1	E1,E2	X	
B2	E4,E5	X	
B3	E7,E8	X	
B4	E10,E11	X	
Comparator, 74LS85	2G	Not Inst.	
RR	E57,E58		X
RI	E55,E56		X
R Shunt (DIP)	2E-1,16		X
I Shunt (DIP)	2E-2,15		X
S Shunt (DIP)	2E-3,14		X
Z Shunt (DIP)	2E-4,13		X
HL Shunt (DIP)	2E-5,12		X
X Shunt (DIP)	2E-6.11		X
B Shunt (DIP)	2E-7,10		X
A Shunt (DIP)	2E-8,9		X
2S	E61,E62	X	
DL (If door lock solenoid option selected)	E39,E40		X
D (If door lock solenoid option selected)	E35,E36		X
DD	E13,E14		X
DDS	E14,E15	X	
DC	E59,E60	X	
HSI (If Hard Sector Format feature installed)	E44,E45		X
32	E46,E47		X
16	E48,E49	X	
8	E51,E50	X	
WP	E66,E67		X
NP	E65,E66	X	
Y	E29,E30	X	
C	E28,E27	X	
DS	E31,E32	X	
HSE (If Hard Sector Format feature installed)	E69,E70		X
SSE (If Soft Sector Format feature installed)	E68,E69		X
TS (For IBM compatibility)	E88,E89		X
FS	E88,E87	X	
S1	E75,E76	X	
S2	E77,E78		X
S3	E79,E80	X	

3.3.1 Negative Voltage

Normal input voltage is -7 to -16 VDC through a voltage regulator. The regulator can be bypassed by removing the jumper plug at -15 PCB terminal pair location and installing the jumper plug at the -5 terminal pair location. See Figure 3-2.

This will allow the customer to input an externally regulated -5 VDC supply to the drive.

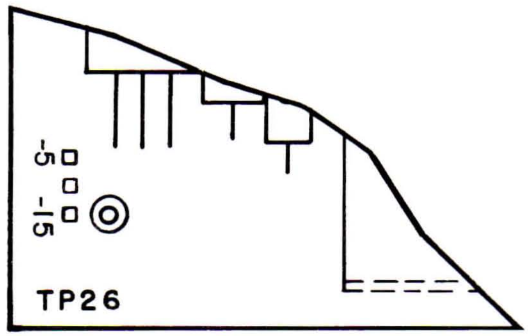


FIGURE 3-2. -7 VDC TO -16 VDC OR -5 VDC TERMINAL POST

3.3.2 Termination of Multiplexed Input Lines

The terminators for the multiplexed input lines are packaged in a DIP at PCB location 2F. **In a multidrive system, the terminator DIPs must be removed from all drives except one**. See Figure 3-3.

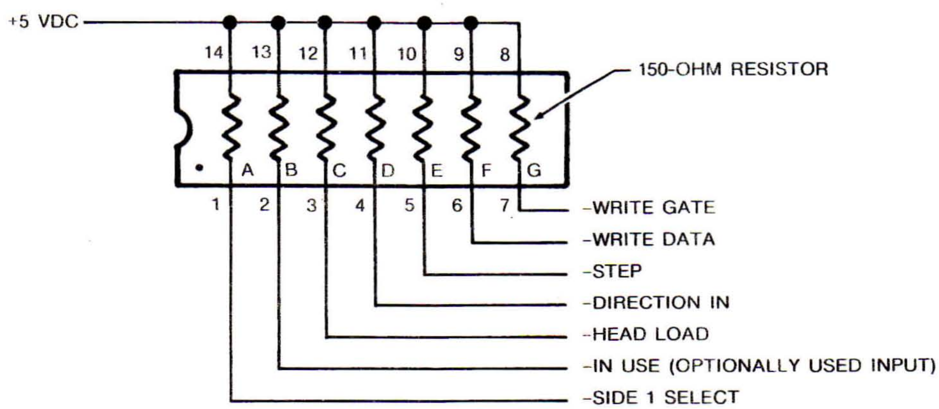


FIGURE 3-3. 150-OHM DIP

3.3.3 Drive Select

In the standard configuration as shipped from Memorex, the unit drive is selected by placing a low voltage level at I/O connector J1 pin 26. If there are multiple drives in the customer's system (up to four), the jumper plug at DS1 (E2 and E3) may be moved to one of the other terminal pairs (DS2, DS3, or DS4). Each drive is internally terminated by a 150-ohm resistor from the input line to the +5 VDC.

3.3.3.1 Select Drive Without Stepper Motor Enabled or Heads Loaded

To extend media life, this option allows the drive control signals to be monitored by the controller while the heads are unloaded and the drive has been selected.

The heads are loaded when the signal line -HEAD LOAD (J1-18) goes active. A subsequent write or read operation must wait a minimum of 35 milliseconds.

Procedure:

1. Cut X shunt of DIP located at 2E (pins 6 to 11). See Figures 3-4 and 3-5.
2. Jumper wire from the C terminal post nearest PCB DIP location 2E to a spare I/O pin at J1 (e.g., pins J1-2, 4, 6, or 8). See Figure 3-1.

3.3.3.2 Load Heads Without Selecting Drive or Stepper Motor Being Enabled

Each drive may have its own head load line (radial configuration), or all may share the same line (time multiplex configuration). Thus, when doing a copy operation from one drive to another drive, the heads may be kept loaded on all drives even though not selected, thereby eliminating the 35-millisecond head load settle time.

When the drive is selected, an 18-millisecond delay must elapse before a read/write operation can be started to allow for head settle time after the stepper motor has been energized.

Procedure:

1. Cut A shunt of DIP located at 2E (pins 7 to 10). See Figure 3-4.
2. Jumper trace DS.
3. Cut trace HL.
4. Jumper trace C.

NOTE

If the Head Load input is time-multiplexed, the line terminator DIP at 2F location must be removed from all but the last drive.

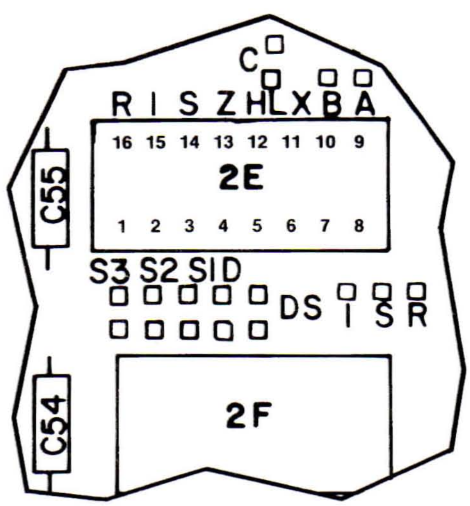


FIGURE 3-4. SIDE SELECT TERMINAL POSTS

3.3.3.3 Select Drive and Enable Stepper Motor Without Loading Heads

This option will allow the controller to restore to track zero even though the heads are not loaded (also, the door may be open).

Procedure:

1. Cut B shunt of DIP located at 2E (pins 7 to 10).
2. Jumper plug DS terminal posts. See Figure 3-11.
3. Cut HL shunt of DIP located at 2E (pins 5 to 12).
4. Jumper plug C terminal posts located between DIPs at 2D and 2E. See Figure 3-5.

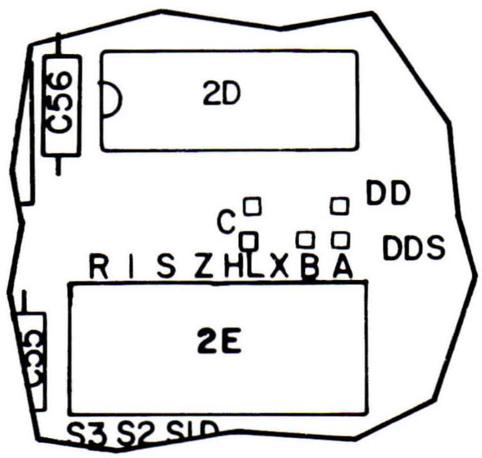


FIGURE 3-5. DRIVE SELECT OPTION

3.3.3.4 Select 1-to-8 Drives

The customer may alternately install the following circuits to implement the necessary decoding for 1-to-8 drive selection, as encoded at the controller and connected via the three I/O lines at J1 pins 28, 30, and 32. Refer to Figure 3-6 for a schematic representation of the circuits discussed in the following paragraphs.

Description	Memorex Part Number	Manufacturer's Part Number	Quantity
Comparator IC at 2G	—	TI 74LS85	1
Jumper Plugs	159301	Berg 65474-004	6
Terminal Posts	159163	Berg 75491-004	9

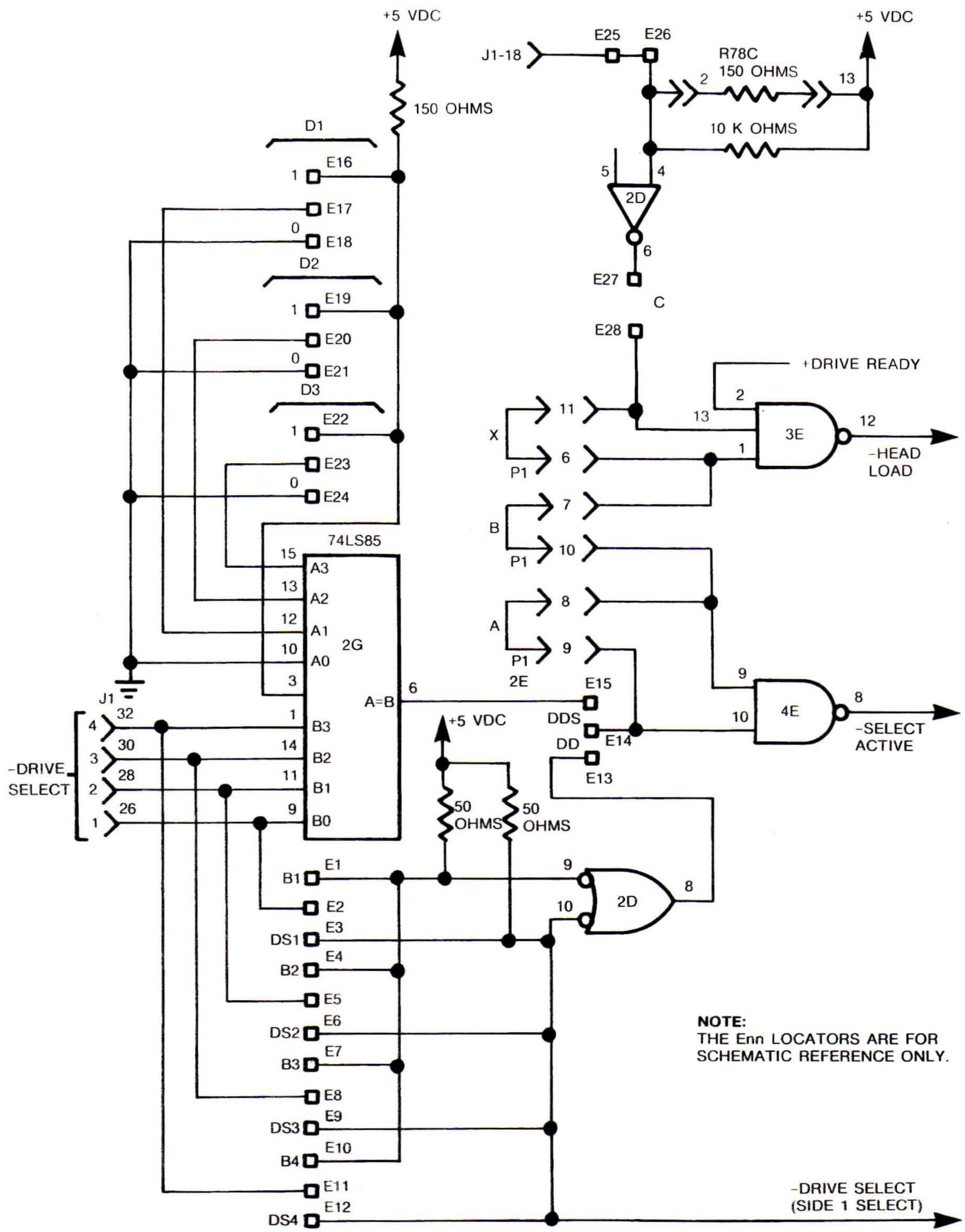


FIGURE 3-6. DRIVE SELECTION (ENCODED) CIRCUITRY

Procedure:

1. Remove any jumper plugs installed at DS1, DS2, DS3, DS4, B1, B2, B3, and B4 terminals. See Figure 3-7.

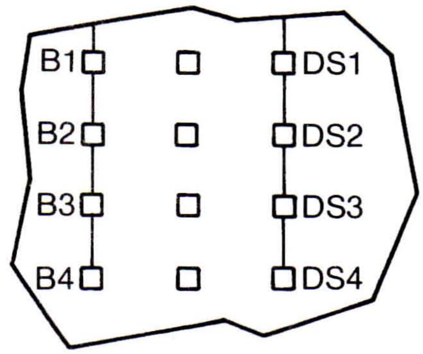


FIGURE 3-7. DRIVE SELECT TERMINAL POSTS

2. Cut the trace at DD and jumper wire DDS to the pad at A. See Figure 3-8.

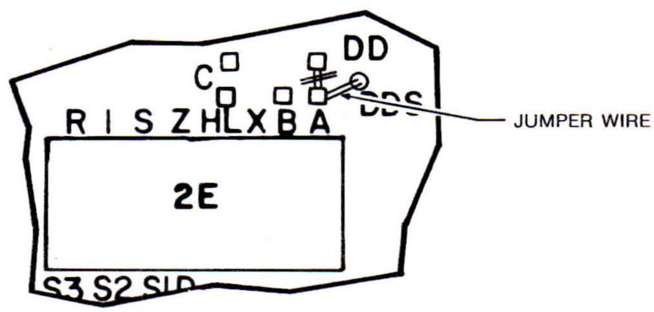


FIGURE 3-8. JUMPER PLUG SHUNT

3. Install nine terminal posts (Memorex PN 150374) at the D1, D2, D4, 0, and 1 matrix. See Figure 3-9.

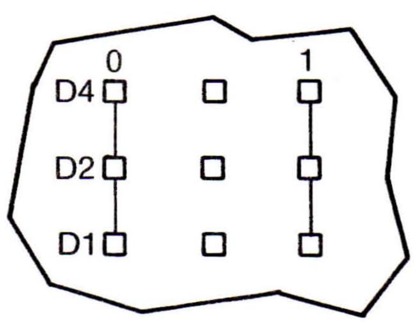


FIGURE 3-9. DRIVE SELECT DECODE

4. Install three jumper plugs on D1, D2, D4, 0, and 1 matrix as desired from the following table:

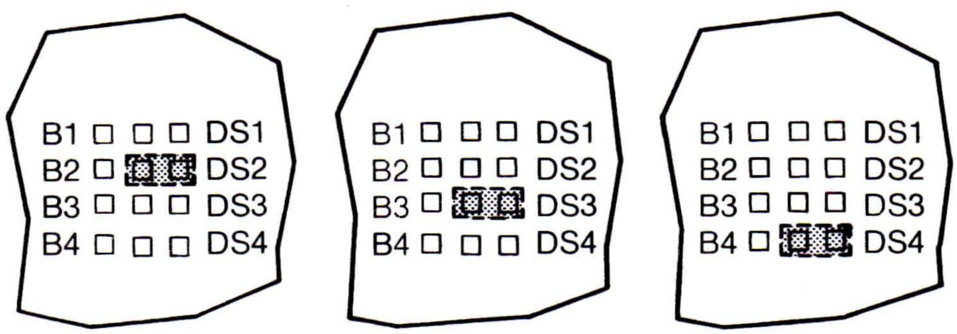
Decimal Address	A0	A1	A2	A3	B0*	B1*	B2*	B3*
				74LS85 Inputs				
1	0	1	1	1	0	1	1	1
2	0	0	1	1	0	0	1	1
3	0	1	0	1	0	1	0	1
4	0	0	0	1	0	0	0	1
5	0	1	1	0	0	1	1	0
6	0	0	1	0	0	0	1	0
7	0	1	0	0	0	1	0	0
8	0	0	0	0	0	0	0	0

Where: 1 = High Voltage
0 = Low Voltage

* 74LS85 inputs, B0, B1, B2, and B3 correspond, respectively, to J1 connector pins 26, 28, 30, and 32.

5. Install IC 74LS85 a PCB location 2G.

6. Install a jumper plug at DS2, DS3, and DS4 on each of the three drives located physically farthest away from the controller. See Figure 3-10. This will provide select line terminations (150-ohm resistor pull-up to +5 VDC).



8TH DRIVE 7TH DRIVE 6TH DRIVE

FIGURE 3-10. DRIVE SELECT DECODE JUMPER PLUGS

3.3.4 Door Lock

If the door lock solenoid feature is installed, the In Use input signal from the controller will cause the door lock solenoid to engage upon drive select. To de-energize the solenoid, the drive must be reselected with the In Use signal inactive. Two modes of door lock operation are possible: door lock—simultaneous and door lock—radial.

3.3.4.1 Door Lock—Simultaneous

The doors of all the drives are locked when the controller activates the In Use input signal.

Procedure:

1. Remove the jumper plug DL located near PCB location 5C. See Figure 3-1.
2. Install jumper plug at D terminal posts. See Figure 3-11.

3.3.4.2 Door Lock—Radial

Each drive utilizes a separate input line from the controller to energize and de-energize only its door lock solenoid.

Procedure:

1. Remove jumper plugs at PCB locations DL and D. See Figures 3-1 and 3-11.
2. Jumper wire the D terminal post, nearest PCB location 2D, to any spare J1 I/O pin; e.g., pin 2, 4, 6, or 8.

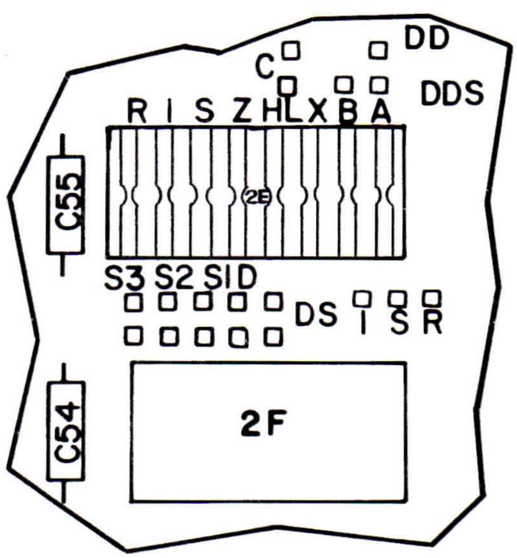


FIGURE 3-11. JUMPER PLUG SHUNT AND TERMINAL POSTS

3.3.5 Busy Lamp

If this optional feature is installed, the LED mounted on the front bezel will be lit when the drive is selected and the head(s) are loaded. The following customer-installable option will light the LED whenever the head is loaded.

Procedure:

1. Cut away shunt Z at 2E between pins 4 and 13. See Figure 3-5.
2. Install jumper plug at Y terminal posts near PCB location 3B. See Figure 3-1.

3.3.6 Side Select

The input at J1-14 (-Side 1 Select) is normally used to select which side of the 552 read/write head is to be used via a jumper plug installed at the S2 terminal posts. Two options are available: side select-direction in and side select-drive select.

3.3.6.1 Side Select-Direction In

This option allows the direction of the head motion during a step operation and subsequently the media side (or read/write head) to be used during a read or write operation by a single input line. The -Side 1 Select signal is time multiplexed with the input signal -Direction In, J1-34, from the controller.

Procedure:

1. Remove any jumper plugs at S3 and S2 terminal posts. See Figure 3-4.
2. Install a jumper plug at S1 terminal posts.

3.3.6.2 Side Select-Drive Select

For a system with a maximum of two drives, this option will provide for the media side (i.e., read/write head) to be chosen from one of three unused drive select lines. Therefore, the four bussed drive select lines can be used—two lines for drive select and side select of one drive, and the other two lines for the other drive.

Procedure:

1. Remove jumper plugs at S1 and S2 terminal posts on both drives.

2. Install jumper plug at S3 terminal posts on both drives.

3. Choose the appropriate terminal post at DS1, DS2, DS3, or DS4 for the drive select function and install a jumper plug.

4. Of the three remaining DSn locations, choose the appropriate terminal post at B1, B2, B3, or B4 and install a jumper plug for the media side select. See Figure 3-12 and the following example.

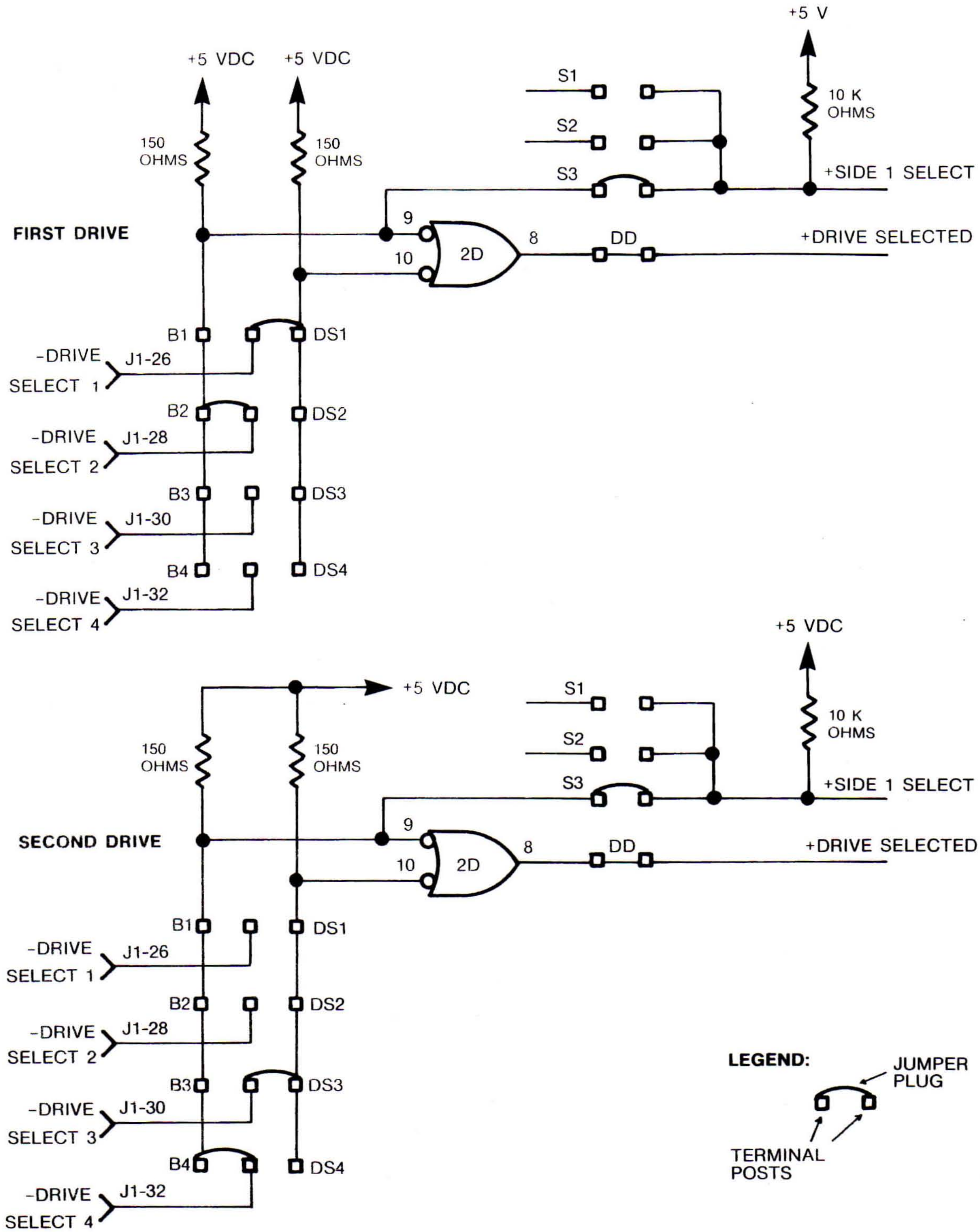


FIGURE 3-12. SIDE SELECTION USING DRIVE SELECT LINES

Example:

I/O Line	When Active	When Not Active
-Drive Select 1	Selects the first drive	—
-Drive Select 2	Selects side 1 of the first drive	Selects side 0 of the first drive
-Drive Select 3	Selects the second drive	—
-Drive Select 4	Selects side 1 of the second drive	Selects side 0 of the second drive

3.3.7 Index

The normal mode provides one Index pulse per disc revolution for soft sectoring (no sector holes). Two options are possible: hard sector index, and radial index and sector monitoring.

3.3.7.1 Hard Sector Index

This output may be optionally installed to provide the necessary change to adjust to a recording media with hard sector holes.

Procedure:

Install jumper plug at HSI located between PCB locations 4E and 4F.

3.3.7.2 Radial Index and Sector Monitoring

This option enables the customer to monitor the Index and Sector output lines even though the drive has not been selected. In this way, access time could be reduced in a multidrive system by waiting until the Index pulse, or Sector pulse (hard sector option), is nearer.

Procedure:

1. Cut away the trace at RI located near 5D and 4D. See Figure 3-13.
2. Cut away shunt I at 2E between pins 2 and 15. See Figure 3-11. (If Hard Sector selective feature has been installed, also cut away shunt S at 2E between pins 3 and 14.)

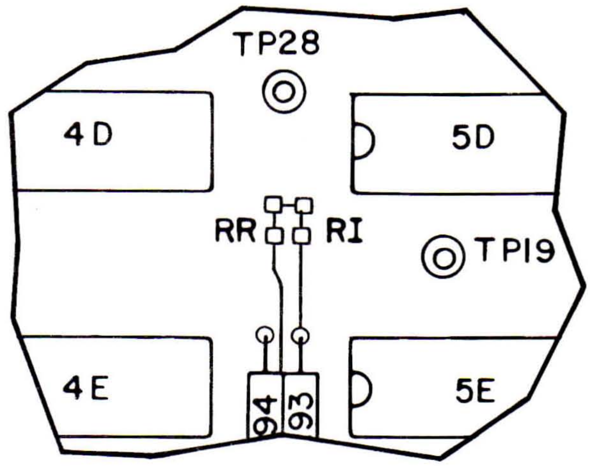


FIGURE 3-13. RADIAL TRACES

3. Add a jumper wire from pad I to one of the unused spare I/O pins (e.g., J1-2, 4, 6, or 8) pads. See Figure 3-11.

4. If selective feature option, Hard Sector, has been installed, also jumper wire from the pad at S to one of the unused spare I/O pin pads (e.g., J1-2, 4, 6, or 8). See Figure 3-1.

3.3.8 Hard Sector

This output is used for the Hard Sector selective feature option. To prepare any drive PCB for Hard Sector, simply install a jumper plug at HSI located near 4E and 4F and move the jumper plug at SSE to HSE. The sector rate will be 32 pulses per revolution unless changed by the customer to either 8 or 16 pulses per revolution.

3.3.8.1 Eight Sector Pulses

Procedure:

1. Cut away trace 32 located between 6D and 6E. See Figure 3-14.
2. Add jumper wire between 8 pads.

3.3.8.2 Sixteen Sector Pulses

Procedure:

1. Cut away trace 32 located between 6D and 6E. See Figure 3-14.
2. Add jumper wire between 16 pads.

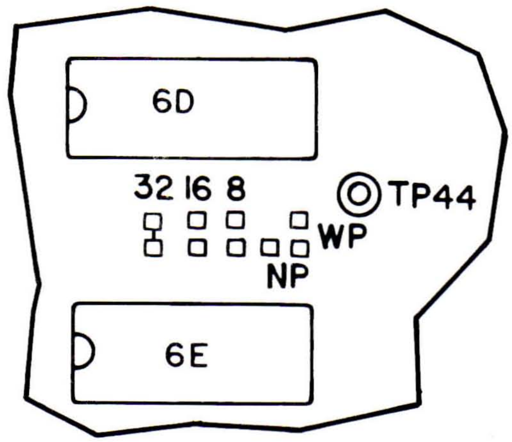


FIGURE 3-14. SECTOR AND WRITE PROTECT

3.3.9 Ready (Radial)

This output can be optionally converted to a radial output; i.e., the output can be monitored independent of whether the drive is selected.

Procedure:

1. Cut away trace RR located near 4D and 5D. See Figure 3-13.
2. Add a jumper wire from pad R to one of the unused spare I/O pin pads.

3.3.10 Disc Change

This customer-installable option output is enabled by installing a jumper plug at DC terminal posts located near the J1-12 pad.

A latch will be set upon drive select and will normally stay set until the drive is no longer ready. If the door is opened before the drive has been deselected, however, the latch will be reset to activate the Disc Change signal while the drive is selected. The latch will be set again, however, upon the next drive select time. See Figure 3-15.

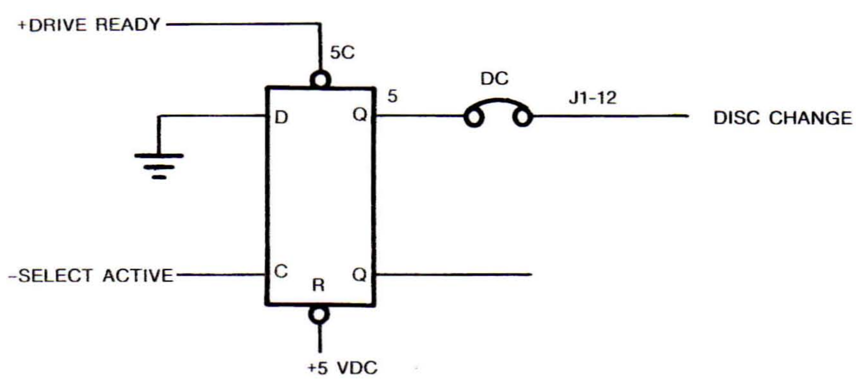


FIGURE 3-15. DISC CHANGE LATCH

3.3.11 Data/Clock Separator (FM Format Only)

This function inhibits the resynchronization of the separator for a series of three or less missing clock transitions when a frequency modulation soft sector format is used (normal). For this normal mode (missing clock address (IBM) format), terminal post pair TS is connected by a jumper plug. See Figure 3-16.

If a frequency modulation hard sector format, or non-IBM format, is used (optional), the resynchronization will take place after any missing clock transition. To implement this optional mode (no missing clock address mark format), move the jumper plug from TS to the wire-wrap pins at terminal point pair FS.

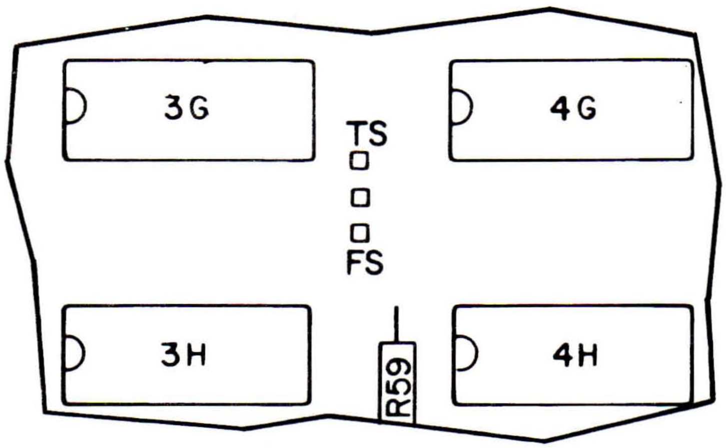


FIGURE 3-16. INTERNAL SEPARATOR SYNC

3.3.12 Write Protect Bypass

The Write Protect optional feature causes the write operation to be inhibited and the controller notified that a disc has been installed with a write protect notch. This protect feature can be bypassed to allow the drive to write on a disc which has an open write protect notch. The write protect line driver will continue to provide the controller with an indication of the state of the write inhibit detector.

Procedure:

1. Cut away trace WP located near 6D. See Figure 3-14.
2. Add jumper wire at NP pads.

3.3.13 In Use

This input is normally not enabled. It may be optionally enabled to light the Busy lamp and/or lock the drive door when either or both optional features are installed. A second option is to use an alternate input signal to provide the same function as the In Use signal.

3.3.13.1 In Use—In Use Signal

Procedure:

Install a jumper plug at D terminal posts located between 2E and 2F. See Figure 3-4.

3.3.13.2 In Use—Alternate Input Signal

Procedure:

1. Cut trace 16 located near J1-16. See Figure 3-1.
2. Add jumper wire from 16 pad, farthest away from J1-16 contact, to any unused spare I/O pin.

3.3.14 Erase Current Delay Time

The erase current turn-on and turn-off times are referenced to the write gate signal, and are different for soft and hard sector. See Figure 3-17.

Procedure:

1. Jumper plug SSE terminal posts for soft sector formats.
2. Jumper plug HSE terminal posts for the hard sector format selective feature option.

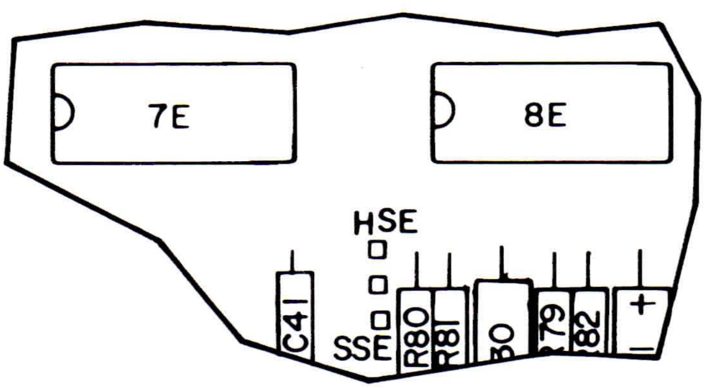


FIGURE 3-17. CURRENT DELAY

3.3.15 Erase Gate

The erase delay times are normally controlled internally by the drive, but can be controlled optionally by the Erase Gate input from the controller.

Procedure:

1. Cut away trace EG located between 9E and 9F.
2. Add jumper wire from EG pad to LG pad as shown in Figure 3-18.
3. Add a jumper wire from LN pad to any of the spare I/O pin pads near J11.
4. Add a 150-ohm pull-up resistor from pad LN to +5 VDC.

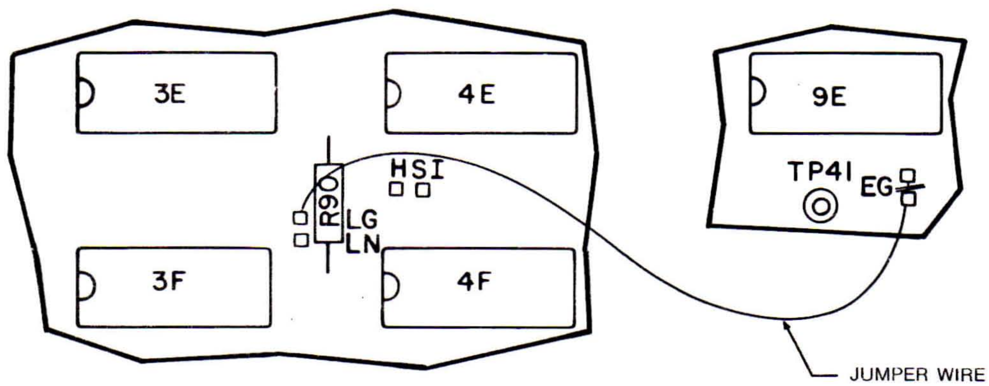


FIGURE 3-18. ERASE GATE

3.3.16 Write Current

The write current is normally controlled internally to switch to a lower write current value when at the 33 inner track positions. The write current may be controlled optionally by an external controller.

Procedure:

1. Cut trace LWC located between 11C and 11D.
2. Add jumper wire from LWC pad as shown in Figure 3-19 to one of the unused spare I/O pin pads.

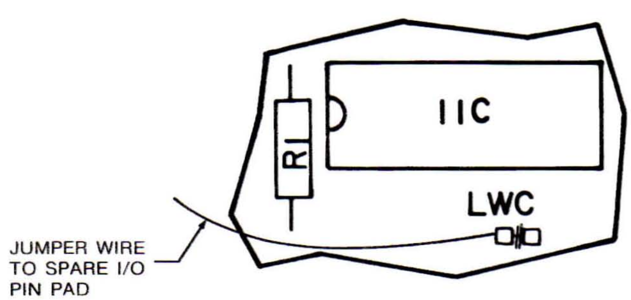


FIGURE 3-19. WRITE CURRENT

SECTION 4
RECORDING CHARACTERISTICS

4.1 RECORDING MODES

Data may be recorded onto the media by the 550/552 Flexible Disc Drive in one of two modes—single-density mode (FM) or double-density mode (MFM or MMFM). The encoding algorithm performed external to the drive by the controller is defined below with illustrations (Figure 4-1) for both FM and MFM/MMFM.

FM—A clock bit occurs at the leading edge of every bit cell time.

Any data bit occurs at the bit cell time half-bit position.

MFM—Any data bit occurs at the bit cell time half-bit position.

A clock bit occurs at the leading edge of a current bit cell only if:

1. there is no data bit to be written in the current bit cell time, and

2. there was no data bit written in the previous bit cell time.

MMFM—Any data bit occurs at the bit cell time half-bit position.

A clock bit occurs at the leading edge of a current bit cell time only if:

1. there is no data bit to be written in the current nor previous bit cell time, and

2. there was no clock bit written in the previous bit cell time.

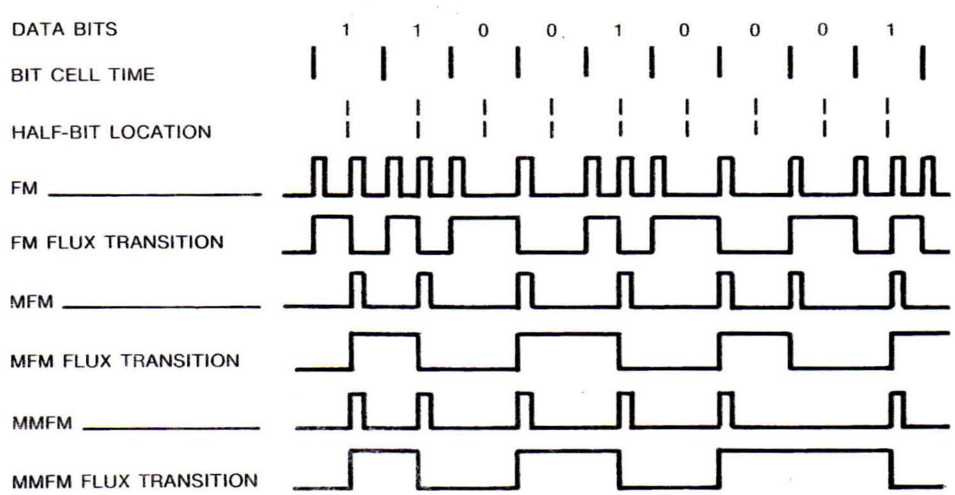


FIGURE 4-1. COMPARISON OF FM, MFM, AND MMFM RECORDING

4.2 MEDIA

The 550 and 552 recording media recommended by Memorex are listed in the Summary of Functional Specifications (Section 5.2). Data can be written onto or read from either side 0 or side 1 (550, side 0 only) as the disc turns freely within the jacket. During read or write operations, the head(s) is in contact with the rotating disc.

The 552 has been designed to operate on any disc cartridge used for single-sided or two-sided operation and that meets the requirements set forth in *The IBM Diskette General Information Manual,* IBM Publication GA21-9182. Assuming compatible data format records, any two-sided disc is interchangeable between any two-sided disc drives.

4.3 DISC FORMATTING CONSIDERATIONS

Several drive and controller parameters must be considered when selecting a disc format. These include instantaneous revolution tolerance, physical index hole detection tolerance, read preamplifier recovery time, and the distance between the read/write gap and the erase core at the drive level; and write oscillator tolerance at the controller level.

An example of a two-sided recording media preinitialized to the industry standard for double-density application is shown below in Figure 4-2 and Table 4-1 with IBM's Diskette 2D, PN 1766872, 26 sectors of 256-byte records (reference IBM Document GA21-9257-1). Side 0, track 0 is initialized in single-density (FM) whereas the remaining 76 tracks on side 0 and the 77 tracks on side 1 are initialized in double-density (MFM).

In soft sector formatting, the index hole in the recording media is the physical indication that the start of a revolution has occurred. Immediately upon detection of the index pulse, the controller writes a series of bytes (GAP4A) to allow for variations in the physical index hole detection, rotational speed, and tolerances between medias and disc drives (interchangeability). Following this gap, a series of sync (00) bytes is written which allows sufficient time during a subsequent read operation for the data/clock separator to become synchronized. (See "Double Density Guide" Application Note for further discussion of data/clock separation.) Following the sync bytes, a series of unique bytes are written which serve as index address mark and identification.

The index field is separated from the first sector sync bytes of the ID field by a series of bytes forming GAP1. The first sector follows the GAP1 series of bytes with a series of sync bytes to allow time for the data/clock separator synchronization just prior to the data ID field address mark. The address mark is a series of unique bytes which identify the data ID field. Track number, side 0/1, sector number, single-/double-density information precede two bytes of cyclic redundancy check (CRC) bits for the previous eight bytes. (See the 26th sector of Figure 4-2 for locations of these fields.)

The data ID field is separated from the sector data field by a series of bytes (GAP2) which allows for speed and oscillator variations, and erase core clearance of the ID field CRC bytes prior to a write gate turn-on for a write operation.

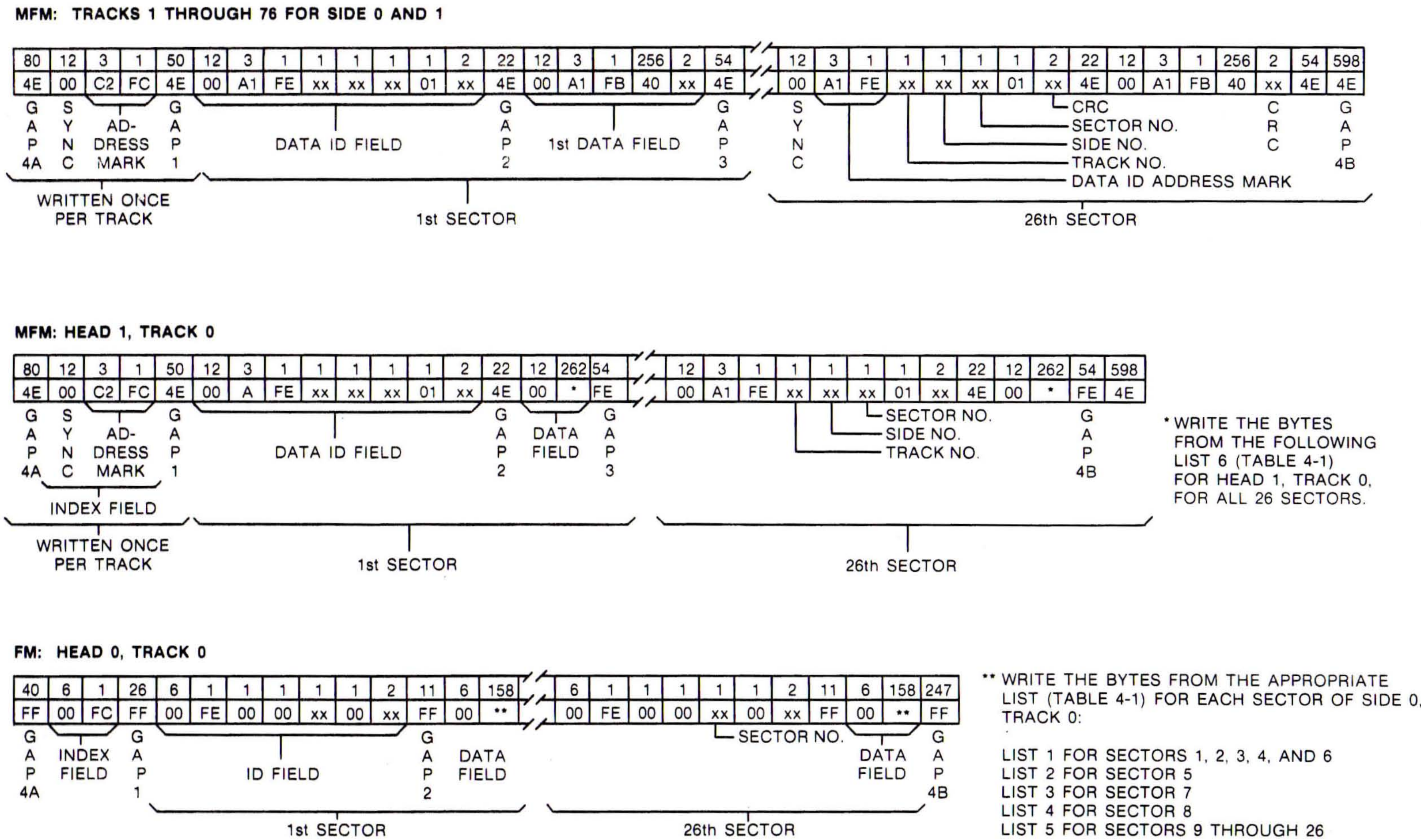


FIGURE 4-2. IBM TWO-SIDED, 26-SECTOR (256-BYTE RECORDS) FORMAT

MEMOREX

TABLE 4-1. DATA FIELDS FOR RECORDING DUAL-HEAD MEDIA INITIALIZATION

List 1

Number of Bytes	Hexadecimal Value
1	FB(Note 1)
80	40
48	00
2	xx (Note 2)
27	FF

List 2

Number of Bytes	Hexadecimal Value
1	FB(Note 1)
1	C5
1	D9
1	D4
1	C1
1	D7
123	40
2	xx (Note 2)
27	FF

List 3

Number of Bytes	Hexadecimal Value
1	FB(Note 1)
1	E5
1	D6
1	D3
1	F1
1	C9
1	C2
1	D4
1	C9
1	D9
1	C4
61	40
1	D4
3	40
1	F1
3	f0
1	E6
48	40
2	xx (Note 2)
27	FF

List 4

Number of Bytes	Hexadecimal Value
1	FB(Note 1)
1	C8
1	C4
1	D9
1	F1
1	40
1	C4
1	C1
1	E3
1	C1
13	40
2	40
1	F2
1	F5
1	F6
1	40
1	F0
1	F1
2	F0
1	F1
1	F1
1	F7
1	F4
1	F1
1	F2
1	F6
4	40
1	C8
30	40
1	F0
1	F1
2	F0
1	F1
49	40
2	xx (Note 2)

List 5

Number of Bytes	Hexadecimal Value
1	F8 (Note 1)
1	C4
1	C4
1	D9
1	F1
1	40
1	C4
1	C1
1	E3
1	C1
2	xx (Note 3)
11	40
2	40
1	F2
1	F5
1	F6
1	40
1	F7
1	F5
2	F0
1	F1
1	F1
1	F7
1	F4
1	F1
1	F2
1	F6
4	40
1	C8
30	40
1	F7
1	F5
2	F0
1	F1
49	40
2	xx (Note 2)
27	FF

Note 1: Three missing clock pulses at bit 2, 3, and 4 positions.
Note 2: CRC for previous 129 bytes.
Note 3: First sector 07_{hex}, increment for each sector written to 26_{hex}.

TABLE 4-1. DATA FIELDS FOR RECORDING DUAL-HEAD MEDIA INITIALIZATION (Continued)

Number of Bytes	Hexa-decimal Value	Number of Bytes	Hexa-decimal Value	Number of Bytes	Hexa-decimal Value
List 6		1	F4	1	F2
3	A1	1	F1	1	F5
1	F8	1	F2	1	F6
1	C4	1	F6	1	40
1	C4	4	40	1	F7
1	D9	1	C8	1	F5
1	F1	30	40	2	F0
1	40	1	F7	1	F1
1	C4	1	F5	1	F1
1	C1	2	F0	1	F7
1	E3	1	F1	1	F4
1	C1	49	40	1	F1
2	xx (Note 4)	1	C4	1	F2
13	40	1	C4	1	F6
1	F2	1	D9	4	40
1	F5	1	F1	1	C8
1	F6	1	40	30	40
1	40	1	C4	1	F7
1	F7	1	C1	1	F5
1	F5	1	E3	2	F0
2	F0	1	C1	1	F1
1	F1	2	xx (Note 5)	49	40
1	F1	11	40	2	xx (Note 6)
1	F7	2	40	54	4E

Note 4: For first sector, write 27; increment by two decimally for successive sectors.
Note 5: For first sector, write 28_{10}, then increment by two for each successive sector.
Note 6: CRC for the previous 260 bytes.

The data field is preceded by a series of bytes to provide time for the data/clock separator to synchronize. A series of address mark bytes follows which may not conform to the double-density encoding rules (i.e., missing clock bits within the address marks), as may the index, ID, and data address marks. See Figure 4-3 for examples of encoding address marks. A series of user data bytes precedes two bytes of CRC. The sector ID and data field is then separated from the next sector, or the final track gap, by a series of bytes called GAP3. GAP3 provides time to allow the write gate turn-off after an update write, and allows time for the erase core to clear the data field CRC bytes. GAP3 also allows for variations in speed, the write oscillator, the read preamplifier recovery time, and system turnaround time to read the following ID field.

GAP4B is the last gap prior to the physical index. This gap allows for speed and write oscillator variations during a format write and variations in the physical index hole detection, and therefore, may vary in the number of bytes.

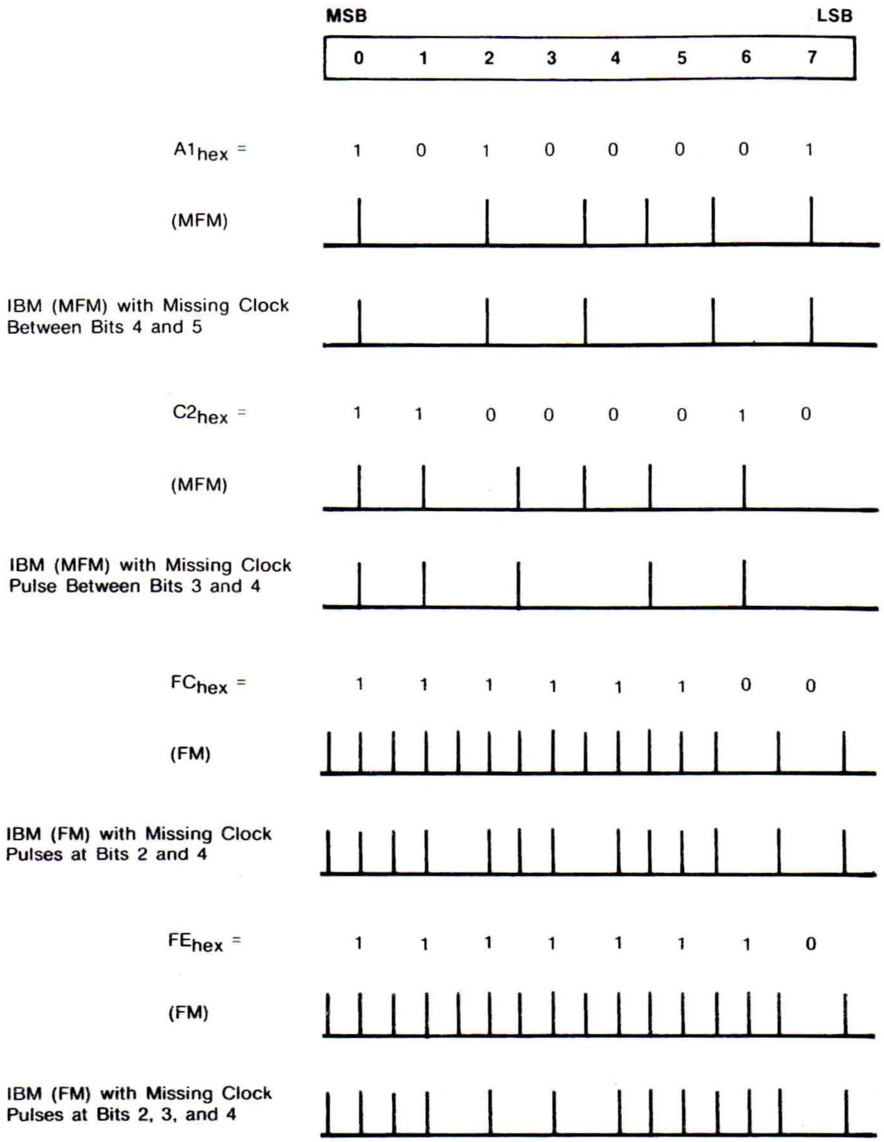
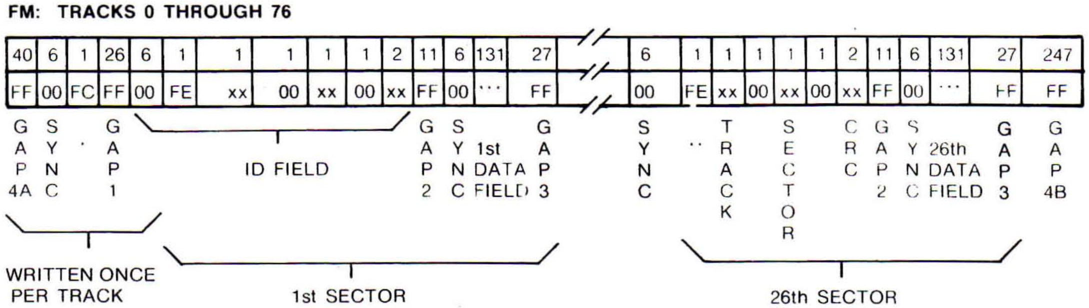


FIGURE 4-3. TWO-SIDED UNIQUE ADDRESS MARKS

An example of a one-sided disc preinitialized to an FM format, as described in IBM's one-sided diskette OEMI manual (GA21-9190-3), is shown in Figures 4-4 and 4-5, and Table 4-2. The initialization of a blank disc prepares it for the customer's use by recording data addresses on tracks 1 through 76 and by recording identifying information about data on track 0, the index track. The initialization data as read for IBM-compatible 26 sector, 128-byte records (IBM PN 2305830) is as follows:

FM: TRACKS 0 THROUGH 76



· INDEX ID ADDRESS MARK
·· DATA ADDRESS MARK
··· WRITE THE BYTES FROM THE APPROPRIATE LIST FOR EACH SECTOR AS FOLLOWS (SEE TABLE 4-2):

LIST 1 FOR TRACK 0, SECTORS 1, 2, 3, 4, AND 6
LIST 2 FOR TRACK 0, SECTOR 5
LIST 3 FOR TRACK 0, SECTOR 7
LIST 4 FOR TRACK 0, SECTOR 8
LIST 5 FOR TRACK 0, SECTORS 9 THROUGH 26
LIST 6 FOR TRACKS 1 THROUGH 76, SECTORS 1 THROUGH 26

FIGURE 4-4. IBM ONE-SIDED, 26-SECTOR (128-BYTE RECORD) FORMAT

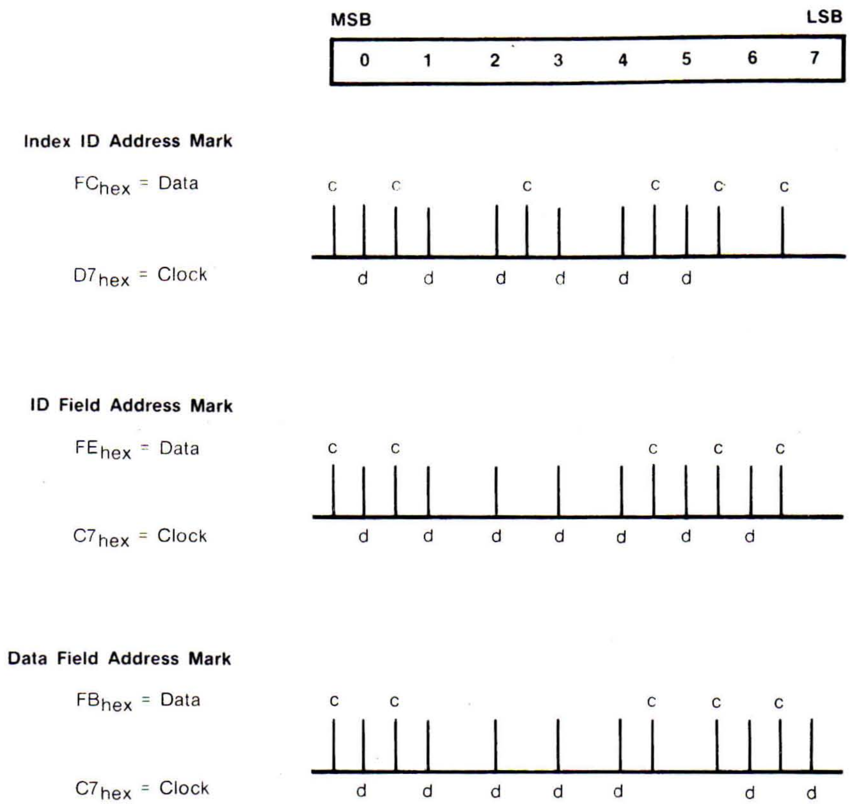


FIGURE 4-5. SINGLE-HEAD UNIQUE ADDRESS MARKS

TABLE 4-2. DATA FIELDS FOR RECORDING SINGLE-SIDED DISC INITIALIZATION

List 1

Number of Bytes	Hexa-decimal Value
1	FB(Note 4)
80	40
48	00
2	xx (Note 2)
27	FF

List 2

Number of Bytes	Hexa-decimal Value
1	FB(Note 4)
1	C5
1	D9
1	D4
1	C1
1	D7
75	40
48	00
2	xx (Note 2)
27	FF

List 3

Number of Bytes	Hexa-decimal Value
1	FB(Note 4)
1	E5
1	D6
1	D3
1	F1
1	C9
1	C2
1	D4
1	C9
1	D9
1	C4
69	40
1	E6
48	00
2	xx (Note 2)
27	FF

List 4

Number of Bytes	Hexa-decimal Value
1	FB(Note 4)
1	C8
1	C4
1	D9
1	F1
1	40
1	C4
1	C1
1	E3
1	C1
15	40
1	F0
1	F8
1	F0
1	40
1	F0
1	F1
2	F0
1	F1
1	40
1	F7
1	F3
1	F0
1	F2
1	F6
35	40
1	F0
1	F1
2	F0
1	F1
1	40
48	00
2	xx (Note 2)
27	FF

List 5

Number of Bytes	Hexa-decimal Value
1	F8 (Note 4)
2	C4
1	D9
1	F1
1	40
1	C4
1	C1
1	E3
1	C1
2	xx (Note 3)
13	40
1	F0
1	F8
1	F0
1	40
1	F7
1	F4
2	F0
1	F1
1	40
1	F7
1	F3
1	F0
1	F2
1	F6
35	40
1	F7
1	F4
2	F0
1	F1
1	40
48	00
2	xx (Note 2)
27	FF

List 6

Number of Bytes	Hexa-decimal Value
1	FB (Note 4)
128	E5
2	xx (Note 2)
27	FF

Note 1: IBM-Compatible CRC for the five previous bytes. The polynomial is: $G(X) = 1 + X^5 + X^{12} + X^{16}$ with the accumulating register set to all ones prior to transfer.

Note 2: Same as Note 1 except for prior 129 bytes.

Note 3: These two bytes will be EBCDIC '09' (i.e., hex F0F9) the first time written, EBCDIC '10' (i.e., hex F1F0) the second time written, etc., and EBCDIC '26' (i.e., hex F2F6) the last time written on each track.

Note 4: The missing clock bit pattern for this byte is hex C7.

MEMOREX

SECTION 5
SUMMARY OF SPECIFICATIONS AND OPERATING TOLERANCES

5.1 SUMMARY OF PERFORMANCE SPECIFICATIONS

	Single Density	Double Density
Capacity (kilobytes):		
Unformatted		
Two Sides (552 FDD)	800.0	1600.0
One Side (550 FDD)	400.0	800.0
One Track	5.2	10.4
IBM Format (128-byte sectors)		
Two Sides (552 FDD)	500.0	1000.0
One Side (550 FDD)	250.0	500.0
One Track	3.3	6.7
Transfer Rate (kilobits/second):	250	500
Latency (average, milliseconds):	83	83
Access Time (milliseconds):		
Track-to-Track (552)	3	3
Track-to-Track (550)	6	6
Average (including settle)	91	91
Settling Time	15	15
Head Load Time	35	35

5.2 SUMMARY OF FUNCTIONAL SPECIFICATIONS

	Single Density	Double Density
Rotational Speed	360 rpm	360 rpm
Recording Density Side 0, Track 76	3269.98 bpi	6539.96 bpi
Recording Density Side 1, Track 76 (552 FDD)	3410.25 bpi	6820.51 bpi
Track Density	48 tpi	48 tpi
Number of Tracks:		
550 FDD	77	77
552 FDD	154	154
Number of Heads:		
550 FDD	1	1
552 FDD	2	2
Encoding Format	FM	MFM/MMFM
Alignment Disc	Dysan 360/2	Dysan 360/2

Media Requirement:

	Product	Memorex Cat. No.	Capacity*
Markette 1s (Single-Headed Drives, Single-Density Media)	IBM-Compatible (128 bytes/sector)	32013060	1.9
	IBM-Compatible, Reversible (128 bytes/sector)	32011729	3.8
	32 Hard Sector	32013015	3.2
	32 Hard Sector, Reversible	32013025	6.4
	IBM-Compatible, System 6	32013066	2.5
Markette 1d (Single-Headed Drives, Double-Density Media)	IBM-Compatible (128 bytes/sector)	32013090	3.8
	IBM-Compatible, Reversible (128 bytes/sector)	32013093	7.6
	32 Hard Sector	32013091	6.4
	32 Hard Sector, Reversible	32013094	12.8
Markette 2s (Double-Headed Drives, Single-Density Media)	Soft Sector (256 bytes/sector)	32013106	4.7
	32 Hard Sector	32013108	6.4
Markette 2D (Double-Headed Drives, Double-Density Media)	Soft Sector (256 bytes/sector)	32013103	9.4
	Soft Sector (1024 bytes/sector)	32013104	10.1
	32 Hard Sector	32013105	12.8

*Data storage capacity in millions of bits.

5.3 SUMMARY OF PHYSICAL SPECIFICATIONS

Environmental Limits

Ambient Temperature	= 4.4 to 46.1°C (40 to 115°F)
Relative Humidity	= 20 to 80%
Maximum Wet Bulb	= 25°C (78°F)

AC Power Requirements

50/60 ± 0.5 Hz

110/115 VAC Installations = 85 to 127 VAC at 0.35 Amps typical

200/230 VAC Installations = 170 to 253 VAC at 0.23 Amps typical

DC Power Requirements

+24 VDC ±10% at 1.3 Amps typical
+ 5 VDC ± 5% at 0.8 Amps typical
− 7 VDC to −16 VDC at 0.07 Amps typical
− 5 VDC ± 5% at 0.05 Amps typical (customer-selectable option)

Mechanical Dimensions

Height	= 22.23 cm (8.75 inches)
Width	= 11.13 cm (4.38 inches)
Depth	= 35.56 cm (14.00 inches)
Weight	= 4.73 kg (10.70 pounds)
Bezel/Door Clearance	= 4.29 cm (1.69 inches)

Heat Dissipation

57 watts (195 BTU/hr. typical)

5.4 SUMMARY OF RELIABILITY SPECIFICATIONS

MTBF:	5000 power-on hours (heavy usage) 8000 power-on hours (typical usage)
MTTR:	30 minutes
Component Life:	15,000 power-on hours
Error Rates:	
*Soft Read Error	1×10^9 consecutive bits read
Hard Read Error	1×10^{12} consecutive bits read
Seek Errors	1×10^6 seeks
Media Durability:	
Passes per Track	3.5×10^6
Media Insertions	30,000+
Head Loads	40,000 (distributed)

* The soft error rate is valid for both single-density and double-density and worst-case bit shift data patterns.

The FM read data separation will have 60% data window (2.8 microseconds).

The MFM and MMFM data windows are recommended at 50% and 60%, respectively.

The FM formats with address marks having three missing clock pulses (e.g., IBM) and FM formats without missing clock pulses will transfer data without error for 1×10^9 bits minimum.

MEMOREX

SECTION 6
INTERFACE DEFINITION

6.1 GENERAL

This section provides a definition for each of the input and output signals at the 550/552 Flexible Disc Drive to external controller interface connector (J1). The entire set of I/O signals is digital and is logically defined below.

Drive-to-Controller Interface (J1)

J1-2 J1-4 J1-6 J1-8	Spare I/O Pins
J1-10 -Two-Sided J1-12 -Disc Change	Output: Drive Status
J1-14 -Side 1 Select J1-16 -In Use J1-18 -Head Load	Input: Drive Control
J1-20 -Index J1-22 -Ready J1-24 -Sector	Output: Drive Status
J1-26 -Drive Select 1 J1-28 -Drive Select 2 J1-30 -Drive Select 3 J1-32 -Drive Select 4	Input: Drive Enable
J1-34 -Direction In J1-36 -Step	Input: Drive Control
J1-38 -Write Data J1-40 -Write Gate	Input: Data and Enable
J1-42 -Track 00 J1-44 -Write Protect	Output: Drive Status
J1-46 -Read Data J1-48 -Separated Data J1-50 -Separated Clock	Output: Drive Data

Input Signal Line Definitions (J1):

Logic 0 = 0.0 to 0.4 VDC at 40 mA maximum
Logic 1 = 2.5 to 5.25 VDC at 0.0 mA
Z_{in} = 150 Ohms

The following five input signals may be multiplexed, providing the customer with a multidrive system: -Side 1 Select, -Direction In, -Step, -Write Data, and -Write Gate. These inputs may be multiplexed by the -Drive Select 1 through 4 input signal lines. The five input signals are terminated at the drive by a resistor IC (0.25-watt, 150-ohm) at the 2F location. The resistor IC should be removed from all but the farthest drive for a multidrive system.

Output Signal Line Definitions (J1):

All output signals are open collector drives capable of sinking 40 mA at low voltage level. At a high voltage level, the leakage current will not exceed 0.25 mA. The following is a recommended circuit and interface cable.

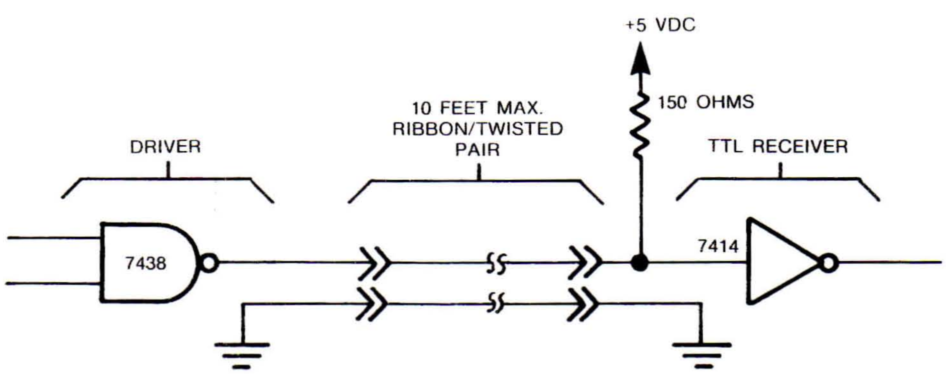


FIGURE 6-1. I/O LINE DRIVER/RECEIVER

6.2 DRIVE-TO-CONTROLLER INTERFACE (J1)

6.2.1 -Two-Sided (Customer-Installable Option) (J1-10)

This output signal will change from a high to a low voltage level indicating that a two-sided diskette has been inserted if the 2S terminal posts have a jumper plug inserted. (This output pin can be alternately used as a spare I/O pin.)

6.2.2 -Disc Change (Customer-Installable Option) (J1-12)

This output signal will change from a high to a low voltage level upon drive select after having been selected and the door having been opened (i.e., from a ready condition to a not ready condition and back to a ready condition).

6.2.3 -Side 1 Select (J1-14)

A high voltage level at this input will cause the side 0 read/write head to be selected. A low voltage level at this input will cause the side 1 read/write head to be selected. A minimum of 100 microseconds must elapse between changes from one read/write head to another before a read or write operation can commence.

6.2.4 -In Use (Customer-Installable Option) (J1-16)

This input has no effect on the standard PCB configuration operation.

6.2.5 -Head Load (Customer-Installable Option) (J1-18)

This input has no effect on the standard PCB configuration operation.

6.2.6 -Index (J1-20)

An output pulse is provided for each revolution. The pulse width is 1.8 ± 0.6 milliseconds for soft sector format, or 0.4 ± .0.2 milliseconds for hard sector formats. The period for this pulse train is 166.66 ± 3.33 milliseconds.

An index pulse leading edge in the 32-hard-sector format (customer-installable option), shall be between 2.545 and 2.75 milliseconds from the most previous sector pulse leading edge.

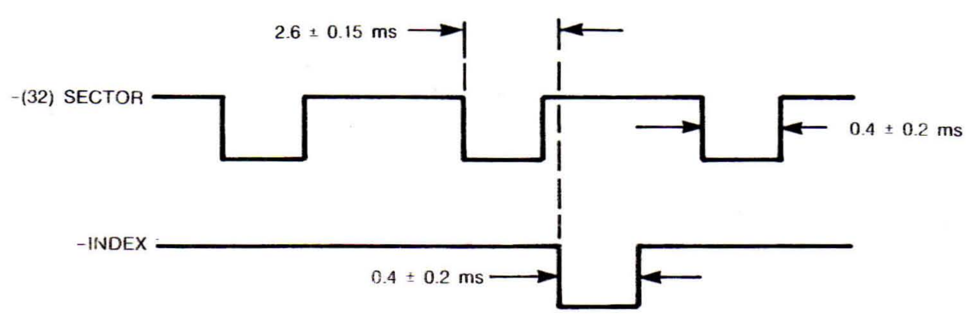


FIGURE 6-2. INDEX/SECTOR TIMING

6.2.7 -Ready (J1-22)

When the diskette has been inserted and the door closed, a low voltage level will signify that the AC and DC powers are on and at least two index pulses have been counted.

NOTE

If a single-sided diskette is installed, the Ready signal will switch to a low voltage level when side 0 is selected, or to a high voltage level (not ready) if side 1 is selected. If a two-sided diskette (552 FDD application) is installed, the Ready signal will go low when either read/write head (side) is selected.

6.2.8 -Sector (Customer-Installable Option) J1-24)

An output pulse is provided for each hard sector hole detected in the media. The number of pulses per revolution may be 32, 16, or 8 depending on the option selected. The pulse width is the same as the hard sector index pulse width (0.4 ± 0.2 milliseconds).

6.2.9 -Drive Select 1 through 4 (J1-26, 28, 30, and 32)

In the standard PCB configuration, a separate single line is used for each drive selection by customer use of jumper plugs (DS1 through DS4).

6.2.10 -Direction In (J1-34)

The trailing edge of a step pulse will cause the stepper motor to move 0.0208-inch radially in toward the center of the diskette when this input has been at a low voltage level for at least 1 microsecond, or radially outward from the center if this signal has been at a high voltage level for at least 1 microsecond.

6.2.11 -Step (J1-36)

The trailing edge of the step pulse (i.e., a low voltage to a high voltage transition) will cause the read/write head to be repositioned over an adjacent track, depending on the level of the -Direction In input signal. The pulse width of this input signal must be at least 1 microsecond and the minimum time between pulses cannot be less than 3 milliseconds. A write or read operation can follow a step operation any time after a minimum of 18 milliseconds has elapsed.

6.2.12 -Write Data (J1-38)

Each transition from a high to a low voltage level will cause a magnetic flux reversal to occur at the read/write head gap, thereby writing a data bit (or clock bit) onto the recording media (diskette). When writing data/clock in the FM encoded format, the pulse width can be between 0.15 and 1.10 microseconds and the period between pulses for an all data bit zeroes (i.e., clock pulses only) is 3.98 to 4.02 microseconds. The write data pulse train period for an all ones (one data pulse interleaved between pairs of clock pulses) is 1.99 to 2.01 microseconds.

6.2.13 -Write Gate (J1-40)

A low voltage level on this input will enable the write data circuits and disable the read data output circuits. A high voltage level on this input will enable the read data circuits and outputs; i.e., Read Data, Separated Data, and Separated Clock.

6.2.14 -Track 0 (J1-42)

A low voltage level signal at this output occurs when Track 0 is located under the read/write head. Phase A of the stepper motor is the only phase on for this condition.

6.2.15 -Write Protect (Optional Feature) (J1-44)

If Optional Feature 312376 is selected, this output signal will go from a high to a low voltage level to indicate that a diskette has been inserted which has been write-protected. The media is write-protected when the diskette write-protect notch is open; thus, the write operation is disabled. The write operation onto a write-protected diskette can be enabled by placing a tab over the diskette write-protect notch.

NOTE

IBM does not have write-protected notched diskettes.

6.2.16 -Read Data (J1-46)

This output line provides the composite data and clock pulse train during a read operation and switches from a high to a low voltage level when a recorded data or clock bit is read.

The allowable bit shift (pulse jitter) of a read data pulse (FM) or a read clock pulse at this output is ±0.2 microseconds and ±0.4 microseconds, respectively. The pulse width of the read data/clock pulse is 0.2 ±0.05 microseconds.

6.2.17 -Separated Data (Customer-Installable Option) (J1-48)

This output line provides the separated data from the composite read data and clock signal, and except for the removed clock pulses has the same timing characteristics as the read data output signal; i.e., a pulse width equal to 0.2 ±0.05 microseconds with ±0.2 microseconds pulse jitter allowable.

6.2.18 -Separated Clock (Customer-Installable Option) (J1-50)

This output line divides the separated clock from the composite read data and clock signal, and except for the removed data pulses, has the same timing characteristics as the read data output signal; i.e., pulse width equal to 0.2 ±0.05 microseconds and ±0.4 microseconds pulse jitter allowable.

SECTION 7
SELECTIVE AND OPTIONAL FEATURES, INSTALLATION ACCESSORIES AND AVAILABLE PUBLICATIONS

7.1 SELECTIVE FEATURES

7.1.1 Primary Power and Frequencies (Customer chooses 1 of 8)

	Factory Installation Numbers for Connectors			
	552 FDD		550 FDD	
Description	AMP 1-480305-0	-480701-0	-480305-1	-480701-1
110 VAC, 60 Hz	312368	*312381	312142	*312295
110 VAC, 50 Hz	312369	312382	312143	312296
220 VAC, 60 Hz	312370	312383	312144	312297
220 VAC, 50 Hz	312371	312398	312145	312298

*Indicates default selection

7.1.2 Front Bezel (Customer chooses 1 of 4)

Description		Factory Installation Number	
Color	LED Indicator	552 FDD	550 FDD
White	With	312364	312158
White	Without	312365	312211
Black	Without	*312366	*312236
Black	With	312367	312237

*Indicates default selection

7.1.3 Sector (Customer chooses 1 of 2)

	Factory Installation Number	
Description	552 FDD	550 FDD
Soft	*312407	*312416
Hard (32 Sectors)	312417	312418

*Indicates default selection

7.1.4 Trim Strip (Customer chooses 1 of 2)

	Factory Installation Number	
Description	552 FDD	550 FDD
Orange Trim Strip	*312465	*312463
No Trim Strip	312466	312464

7.2 OPTIONAL FEATURES (Customer may choose either or both)

Description	Factory Installation Number 552 FDD	550 FDD
Write Protect Emitter and Detector Assembly Installed	312376	312146
Door Lock Solenoid Assembly Installed	312377	312159
Horizontal Mounting		312425

7.3 INSTALLATION ACCESSORIES

Description	MRX PN	Comments
AC Connector Kit	312247	Housing: AMP PN 1-480303-0 Contacts (3): AMP PN 61117-1 (Mates to Connector AMP PN 1-480305-0)
AC Connector Kit	312399	Housing: AMP PN 1-480700-0 Contacts (3): AMP PN 350550-1 (Mates to Connector AMP PN 1-480701-0)
DC Connector Kit	312248	Housing: AMP PN 1-480270-0 Contacts (6): AMP PN 61117-1 (Mates to PCB Connector AMP PN 1-380999-0)
I/O Edge Connector Kit	312249	Housing: AMP PN 1-58717-1 Contacts (50): AMP PN 583616-4 (Twisted Pair, 26 AWG)
I/O Edge Connector Kit	312250	Ribbon Cable, 50 conductors Housing: 3M PN 3415-0001
DC Cable Adapter ASM Kit	312406	Housing: AMP PN 1-480270-0 Contacts (6): AMP PN 61117-1 (Socket) Wired to Housing: AMP PN 1-480402-0 Contacts (6): AMP PN 61118-1 (Pin)
552 FDD Alignment Disc	312391	Dysan 360/2, or equivalent
550 FDD Alignment Disc	312218	Dysan 360/2, or equivalent

7.4 AVAILABLE PUBLICATIONS

Description	MRX PN	Comments
550/552 FDD Technical Manual	804254	Pub. No. 550/552.60-XX
550/552 FDD Product Specification	804260	Pub. No. 550/552.80-XX

SECTION 8
DC POWER

The DC power is furnished by the customer to J4 located on the printed circuit board (PCB). The J4 connector assembly has a housing (MRX PN 159789) and six pin contacts (AMP PN 1-380999-0).

The mating plug connector assembly has a housing (AMP PN 1-480700-0) and six socket contacts (AMP PN 61117-1).

J4 Pin No.	Voltage (DC Volts)	Tolerance	Current (Amps)
1	+24	±10%	1.3
2	+24 (Return)		
3	-7 to -16		0.07
(or *)	-5	± 5%	0.05
4	Minus Volt Return		
5	+5	± 5%	0.8
6	+5 (Return)		

*Customer-installable option

The +24 VDC input to the stepper motor is reduced to +5 VDC 15 milliseconds after every step pulse, thus decreasing the average power consumption by 95%.

COMMENTS FORM

550/552 FDD PRODUCT SPECIFICATION—550/552.80-00

Please send us your comments; they will help us produce better publications. For our reference, please include publication number, revision level, and page number. When applicable, reference specific paragraph numbers. Possible areas to comment on: accuracy, clarity, organization, audience suitability, and illustrations.

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