75736120

CONTROL DATA CORPORATION

CONTROL DATA®
FLEXIBLE DISK DRIVE

GENERAL DESCRIPTION
OPERATION
INSTALLATION AND CHECKOUT
THEORY OF OPERATION
DIAGRAMS
MAINTENANCE
MAINTENANCE AIDS
PARTS DATA
WIRE LISTS

MAGNETIC PERIPHERALS INC.
a subsidiary of
CONTROL DATA CORPORATION

HARDWARE MAINTENANCE MANUAL

EQUIPMENT MODEL _____

SERIAL NUMBER _____

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NOTES

PREFACE

This Manual provides the information needed to install, operate and maintain the Magnetic Peripheral Inc. Flexible Disk Drive and is intended to serve customer engineers and operators who require detailed information about the Flexible Disk Drive's operation.

The total content of the manual is comprised of two publications, each having a unique publication number, and is contained in one volume. The Manual's publication number (75736120) is that of the front matter, sections one through seven, and section nine. This number should be used when making reference to the Flexible Disk Drive Hardware Reference Maintenance Manual. Section VIII, Parts Data, is identified by the unique publication number 75736199.

This product is intended for use only as described in this document. Magnetic Peripherals Inc. cannot be responsible for the proper functioning of undescribed features or undefined parameters.

CONTENT

SECTION PAGE

SECTION PAGE

LIST OF ILLUSTRATIONS

LIST OF TABLES

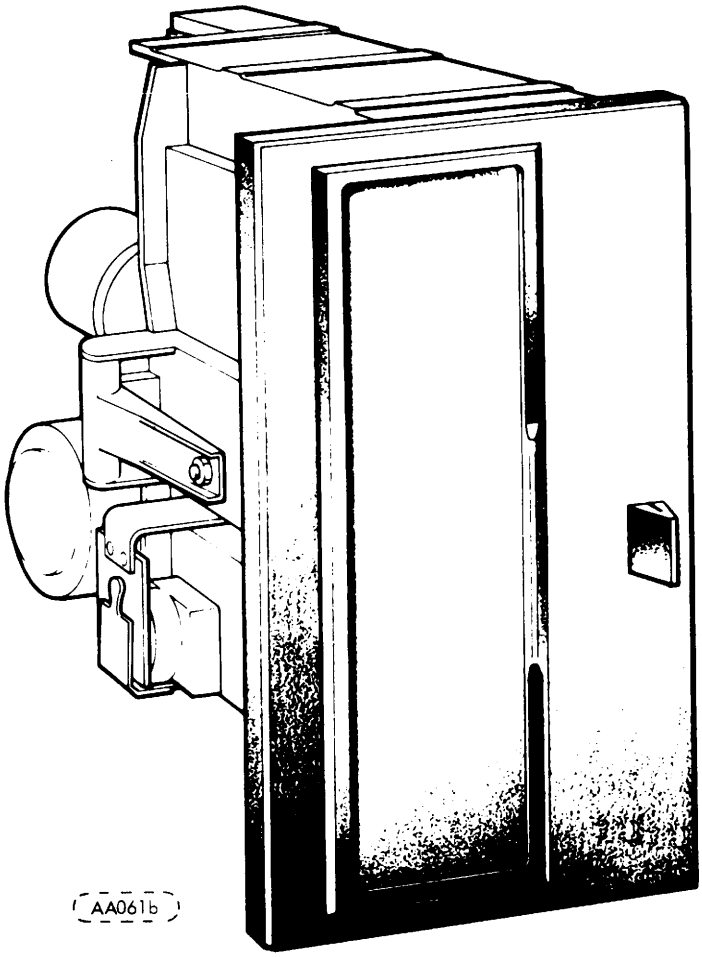


Figure 1—1. Flexible Disk Drive Unit (FDD)

1
GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual applies to the following Flexible Disk Drives: BR803A, BR803B, BR803C, BR803D, BR803L, BR803M, BR8A3A, BR8A3B, BR8A2F, BR8A2G, BR8A2H, and BR8A6B.

The Flexible Disk Drive (FDD) is a compact, portable, random access, data storage device (Figure 1-1) that interfaces with a central processor via a control unit. Input/Output data and control signals are transmitted by means of an I/O Cable.

1.2 PURPOSE AND USE OF EQUIPMENT

Data, in the form of magnetized bits, is written on, or read from the tracks of a spinning diskette. The FDD uses a single, flexible, removable diskette (one recording surface) enclosed in a sealed jacket. The unit is capable of hard sector or soft sector (missing clock) format operation, but the missing clock must be recovered externally (from the FDD).

1.3 PRODUCT DESCRIPTION

The major FDD components are the spindle, disk drive motor, read/write head, stepping motor, track indexing device and printed circuit board.

The standard features include ceramic Read/Write head, Write Fault circuitry, and Write Current Selection to maintain high read data realiability for data interchange.

Options include low heat dissipation AC spindle motor.

All FDD components are mounted on a base assembly. The front panel has a spring loaded door through which the diskette is installed. The door is mechanically linked to the disk loading mechanism and the head load interlock switch; therefore, when the door is closed the Read/Write head is loaded on the diskette in preparation for the transfer of data.

1.3.1 PHYSICAL DESCRIPTION

The physical dimensions for the equipment are as follows:

Height	5 inches
Width	8.78 inches
Depth	14.24 inches
Weight	12 lbs.

See Figure 3-1 for detailed envelope dimensions and mounting provisions.

1.3.2 ELECTRICAL DESCRIPTION

The electrical specifications for the equipment are as follows:

- D.C. Power Source (Supplied by User)

  +24 volts (±10%) @ 2.0A
  + 5 volts (± 5%) @ 2.0A
  - 5 volts (± 5%) @ 0.30A
  -12 volts (±5%) @ 0.30A

- A.C. Power Source

A.C. Power Source	Applicable Equipment Numbers
120 vac (±10%) single phase, 60 Hz ±2%	BR803A, BR8A3A, BR8A2G, BR803M
220 vac (±10%) single phase, 50 Hz ±2%	BR803B, BR803L, BR8A3B, BR8A2H, BR8A6B
220 vac (±10%) single phase, 60 Hz ±2%	BR8A2F

- A.C. Power Source (continued) — Applicable Equipment Numbers (continued)

  100 vac (±10%) single phase, 60 Hz ±2% — BR803C

  100 vac (±10%) single phase, 50 Hz ±2% — BR803D,

- Operating Current (per Table 1-1)

Table 1—1. Operating Current

START CURRENT	ACTUAL MAX. RUN CURRENT	LABEL RATING	APPLICABLE EQUIPMENT NUMBER
1.50A	0.85A	1.05	BR803A, BR803M, BR8A2G, BR8A3A
0.80A	0.50A	0.50	BR803B, BR803L, BR8A2H, BR8A3B, BR8A6B
2.0A	1.05A	1.05	BR803D
0.75A	0.50A	0.50	BR8A2F
1.8A	0.95A	1.05	BR803C

1.3.3 PERFORMANCE CHARACTERISTICS

The equipment specifications for the FDD are as follows:

- ACCESSING TIME

Maximum Access Time	770 ms
Maximum One-Track Access Time	20 ms
Average Access Time	263 ms

- RECORDING

Mode	Double Frequency
Density (nominal)	1836 bpi (outer track) 3268 bpi (inner track)
Bit Rate (nominal)	
Data Transfer Rate	249,984 Hz
Bits/Byte	8
Bits/Track	41,664
Tracks	77
Sectors	Format Determined

- DATA CAPACITY

Bytes/Track	5,208
Bits/Track	41,664
Bits/Diskette	3,208,128

- FLEXIBLE DISKETTE (Optional) — CDC 70456000; or equivalent

Diskette Dimensions	8 x 8 inches (including jacket)
Useable Diskette Recording Surfaces	1
Diskette Surface Diameter	7.88 inches
Recording Diameters	Track 76 (inner) 2.0290 inches nominal Track 00 (outer) 3.6123 inches nominal
Diskette Surface Coating	Magnetic Oxide
Diskette Velocity	360 ±3.5% rpm
Diskette Storage Envelope (Optional)	CDC 70456200; or equivalent
Diskette Storage Ten Pack Carton (Optional)	CDC 70455700; or equivalent

- READ/WRITE HEAD

Head Unit	1
Track Width	0.013 ±0.0003 inch
Track Spacing	0.02083 ±0.0006 inch
Erase to Read/Write Gap	0.035 ±0.002 inch

II
OPERATION

2.1 INTRODUCTION

The FDD is under direct control of the Input/Output and power sources. No special start-up procedure is required. Operation is fully automatic and required no operator intervention during normal operation.

2.2 OPERATING INSTRUCTIONS

Verify that power and I/O cables are securely attached before operation.

2.2.1 FLEXIBLE DISKETTE LOADING

a. Apply AC/DC power to unit.
b. Open FDD door.
c. Remove diskette from storage envelope as shown in Figure 2-1.
d. Carefully slide diskette into FDD, as shown, until jacket is solidly against stops.
e. Carefully close unit door. Ensure that jacket is properly seated, spindle has engaged diskette, and door is closed and latched.
f. Protect the empty envelope from liquids, dust, and metallic materials.

2.2.2 FLEXIBLE DISKETTE REMOVAL

a. Open FDD door to stop diskette rotation and disengage spindle.
b. Remove diskette from FDD and put it in its storage envelope.
c. Close FDD door.

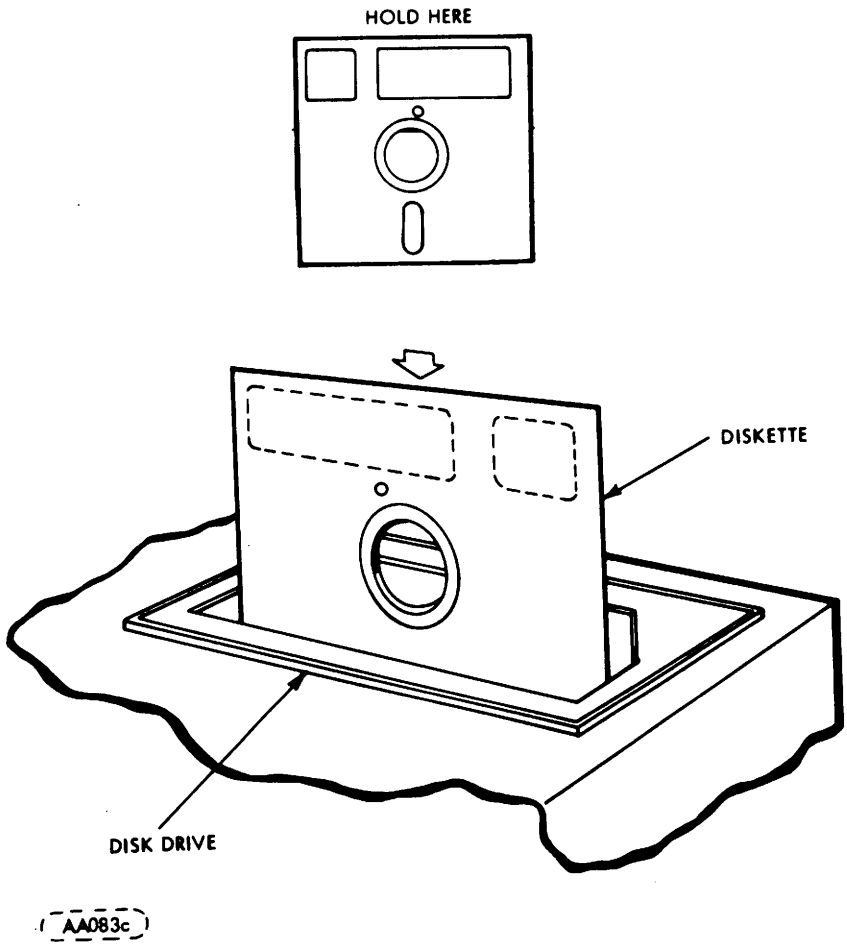


Figure 2—1. Diskette Installation

2.3 ERROR RECOVERY

The following paragraphs give information needed to recover from possible errors in equipment operation.

2.3.1 SEEK ERROR

Seek errors will rarely occur unless the stepping rate is significantly exceeded. In the event of a seek error, recalibration of track location can be achieved by repetitive Step Out commands until a Track 00 signal is received.

2.3.2 WRITE ERROR

To guard against degradation from imperfections in the media, no more than 4 attempts to write a record should be used when Read After Write errors are encountered. In the event a record cannot be successfully written within 4 attempts, it is recommended that the sector or track be labled defective and an alternate sector or track assigned. If more than 2 defective tracks are encountered, it is recommended that the diskette be replaced.

2.3.3 READ ERROR

In the event of a Read error, up to 10 attempts should be made to recover with re-reads. If after 10 attempts the data has not been recovered, step the head several tracks away and then re-position to recover the data. Unloading the head when data transfers are not imminent will increase the data reliability and extend the diskette life.

2.4 DISKETTE HANDLING RECOMMENDATIONS

Since the recorded diskette contains vital information, reasonable care should be exercised in its handling. Longer diskette life and trouble free operation will result if the following recommendations are followed.

a. Do not use a writing device which deposits flakes e.g., lead or grease pencils, when writing on diskette jacket label.
b. Do not fasten paper clips to diskette jacket edges.
c. Do not touch diskette surface exposed by jacket slot.
d. Do not clean diskette in any manner.
e. Keep diskette away from magnetic field and from ferromagnetic materials that may be magnetized.

f. Return diskette to envelope when removed from FDD.
g. Protect diskette from liquids, dust, and metallic substances at all times.
h. Do not exceed the following storage environmental conditions:

Temperature: 50° to 125° F
Relative Humidity: 8 to 80%
Maximum Wet Bulb: 85°F (29.4°C)

i. Diskettes should be stored in box or cabinet when not in use.

III
INSTALLATION AND CHECKOUT

3.1 INTRODUCTION

This section provides the information and procedures necessary to put an FDD into operation.

3.2 UNPACKING

Unpack FDD as follows:

a. Open top of corrugated carton.
b. Cut banding and lift top half of styrofoam shell from carton.
c. Lift unit in polyethylene bag from bottom half of styrofoam shell and remove unit from polyethylene bag.

During unpacking, care must be used so that any tools being used do not inflict damage to the unit. As a unit is unpacked, inspect it for possible shipping damage. All claims for this type of damage should be filed promptly with the carrier involved. If a claim is filed for damages, save the original packing materials.

3.3 INSTALLATION

Due to the small size and light weight, the FDD can be installed or mounted in any convenient location or position. To reduce possible operator errors, mounting in a vertical position, as shown in Figure 2-1, is recommended. The FDD must be installed in a location that will prevent the I/O Cable from exceeding 25 feet in length. Refer to Figure 3-1 for overall dimensions and mounting provisions.

3.4 CABLING AND CONNECTIONS

The following paragraphs cover the I/O cable and the Power Cable. Figure 3-2 shows the cable connector receptacles for the FDD unit

3.4.1 INPUT/OUTPUT CABLE

The I/O Cable Connector shown in Figure 3-3 is a required item. An optional connector kit for building this cable is available by order. The cable connector part number is also shown in Figure 3-3.

The maximum cable length from connector to connector is 25 feet. All inputs and outputs require line pairs; one line for function and one line for ground. The characteristic impedance should be approximately 100 ohms.

Table 3-1 provides information relative to connector pin/signal assignments for the I/O Cable.

3.4.2 POWER CABLE

The AC Power Cable is an optional item supplied on order. All wires are stranded wire, 18 AWG minimum with center pin connection ground.

Table 3—1. Input/Output Connector Pin Assignments

PIN NUMBER*		FUNCTION	PIN NUMBER*		FUNCTION
			27	28	-Track 00
1	2	+5 Volts		30	Not Used
3	4	+5 Volts	31	32	-Index
5	6	-5 Volts		34	Not Used
	8	Not Used	35	36	-Low Current
	10	Not Used		38	Not Used
11	12	+24 Volts	39	40	-Write Fault
13	14	+24 Volts		42	Not Used
	16		43	44	-Step Out
17	18	Read Data (Separated)	45	46	-Step In
19	20	Read Data (Composite)	47	48	-Write Enable
21	22	-Clock (Separated)	49	50	-Write Data
	24	Not Used	51	52	-Write Fault Reset
25	26	-Head Load			

*All Odd Numbered Pin Connections Listed are Ground Return except 24V Returns, 11 and 13.

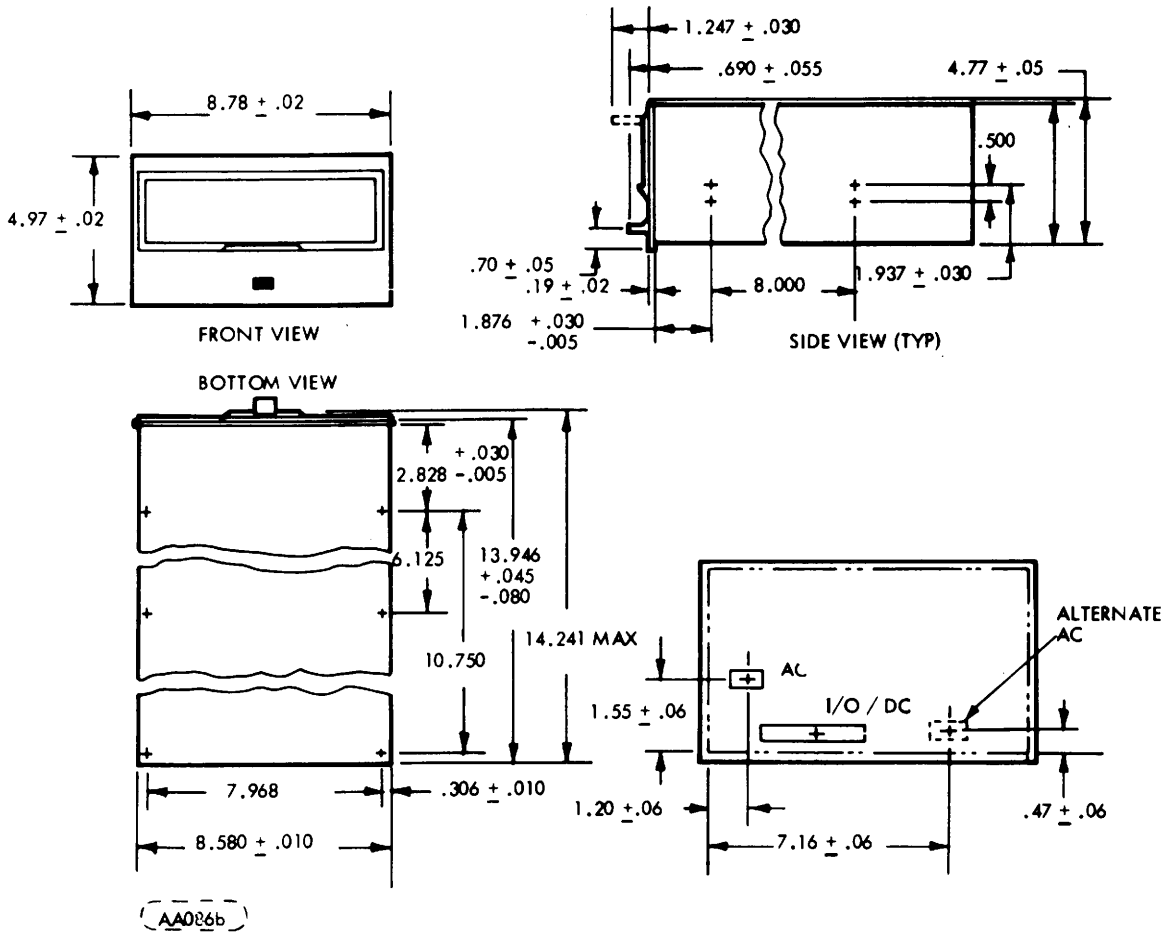


Figure 3–1. FDD Envelope Dimensions and Mounting Provisions

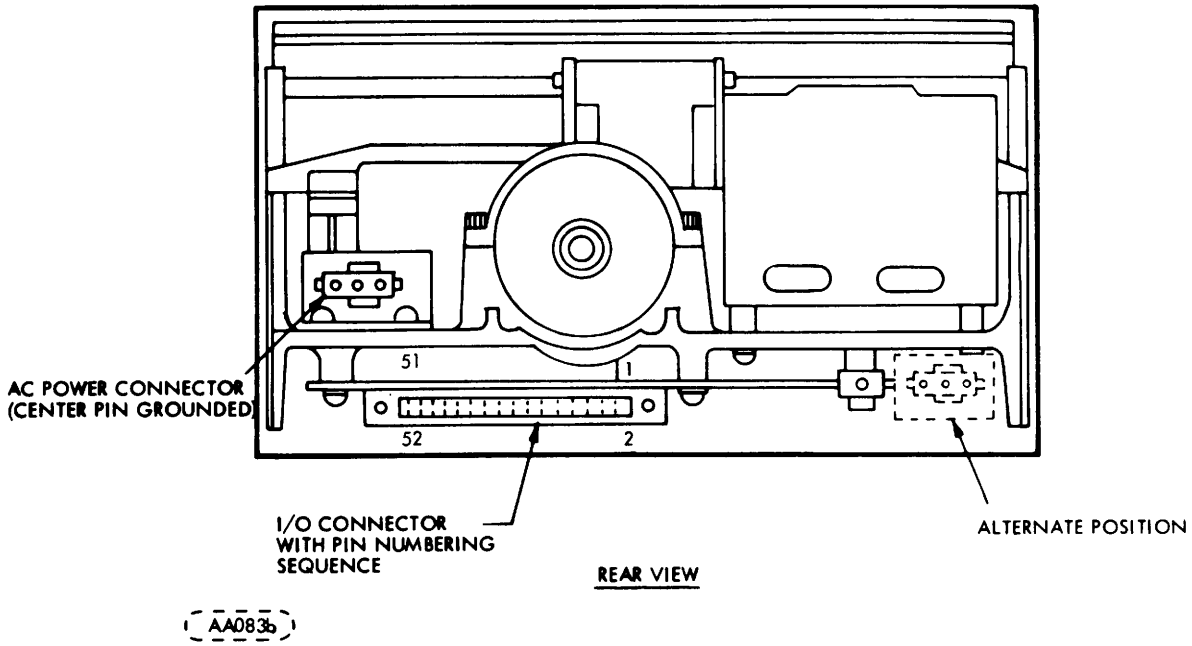
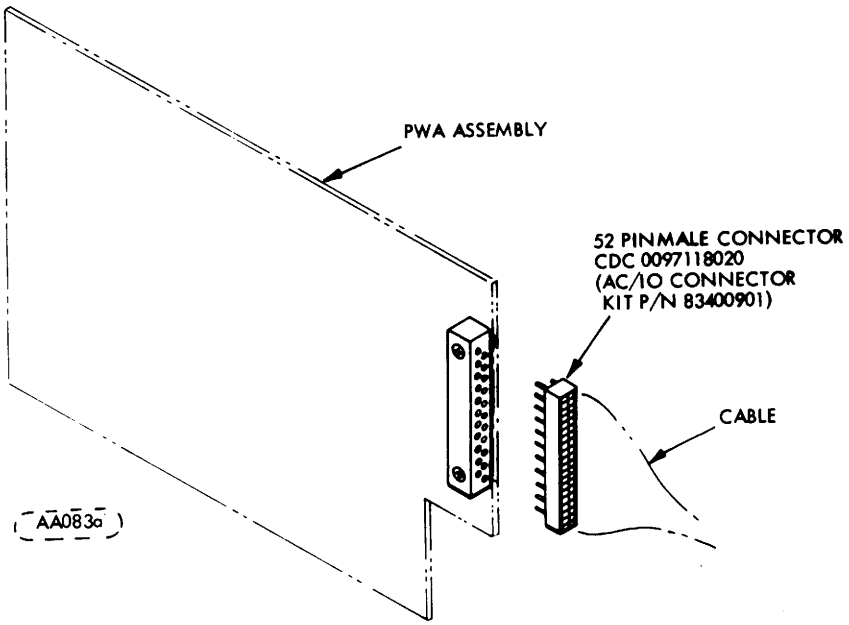
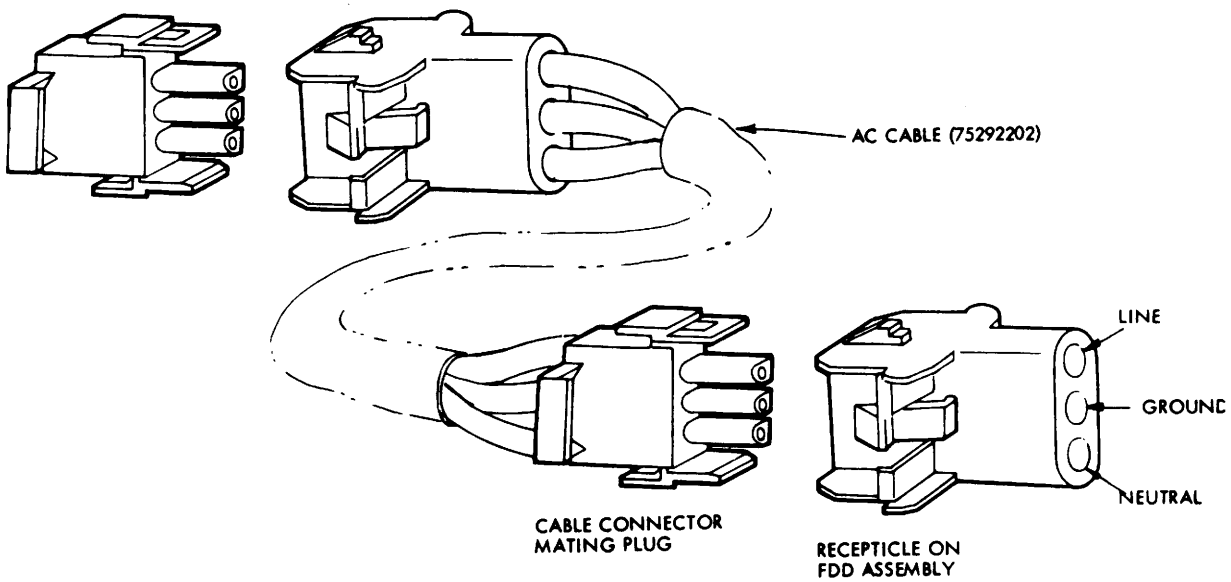


Figure 3–2. Cable Connection Locations



I/O Cable Assembly
(A)



PLUG:
AMP PN 1-480700-0
MPI PN 83435302-1

CONTACTS:
AMP PN 350536-1 (STRIP)
AMP PN 350550-1 (LOOSE)

(SOCKET)
MPI PN 83435510-9 (LOOSE

RECEPTICLE:
AMP PN 1-480701-0
MPI PN 83435402-8

CONTACTS:
AMP PN 350547-1 (LOOSE)
AMP PN 350218-1 (STRIP)

(PIN)
MPI PN 83435501-8 (STRIP)

D122c

AC Cable Assembly
(B)

Figure 3—3. Cable Connection

3.5 ENVIRONMENT

Operating and storage environments of the FDD are as follows:

Operating Status	50 to 100°F (12° f/hr maximum fluctuation) 20 to 80% relative humidity (providing there is no condensation)
Non-operating status	-30 to +150°F 5 to 95% relative humidity (providing there is no condensation). Max. Wet Bulb 80°F

3.6 INITIAL CHECKOUT

This procedure should be used to determine that FDD is operational. The procedure assumes that unit is installed and I/O and power cables are already connected.

a. Apply ac power to unit and visually check that spindle rotates.
b. Apply dc power to unit.
c. Insert diskette (see Figure 2-1).
d. Apply a Head Load Command signal to unit and close access door. Check that Head Load solenoid actuates and Door Close microswitch is actuated.
e. Apply a Stepping Command signal to unit and check that actuator steps head as commanded.
f. Remove command signals, ac and dc power from unit.

3.6.1 OPERATING FREQUENCY

If the required operating frequency is different than that which the unit is configured, the procedure for converting operating frequencies using the dual diameter reversible pulley is given in paragraph 6.8 "Frequency Conversion."

IV
THEORY OF OPERATION

4.1 INTRODUCTION

The theory of operation for the FDD is divided into two parts. The first part gives a general theory of operation. The second part gives a detail functional description of all major components both electronic and mechanical and describes all signals exchanged between the FDD and the controller.

4.2 GENERAL DESCRIPTION

The basic functions of the FDD are to (1) receive and generate control signals (2) position Read/Write head on selected tracks (3) write or read data upon command from controller.

Signals received and transmitted by the FDD are shown in Figure 4-1 and explained in Table 4-1. During write operation, the FDD receives WRITE ENABLE, LOAD HEAD, WRITE DATA and LOW CURRENT (track 43 or greater) signals and if a write fault occurs, transmits WRITE FAULT. During read operation, LOAD HEAD, READ DATA (SEPARATED), CLOCK (SEPARATED) and READ DATA (COMPOSITE) signals are transmitted by the FDD to the controller. Control signals STEP IN and STEP OUT are received during track seek operation. The FDD continuously transmits INDEX to the controller when the diskette is rotating. Track 00 is transmitted to the controller whenever the Read/Write head is at Track 00.

Positioning of the Read/Write head is accomplished by a lead screw driven by a stepper motor. The Read/Write head is mounted on a carriage which is attached to the lead screw. Each STEP OUT or STEP IN command from the user system increments the stepper motor which, in turn, rotates the lead screw 15°. Each 15° rotation of the lead screw moves the Read/Write head one track position.

Reading or writing operation begins by placing the Read/Write head in contact with the diskette at the desired track. To write data on the diskette, WRITE DATA is sent by the controller to condition the write logic, then current pulses, corresponding to the input data, are applied to the write head, causing bits on the diskette track to be correspondly magnetized. Erasure of previously recorded data is simultaneously accomplished during writing operation.

To read from the diskette, magnetized bits in the format of the previously-recorded data are sensed by the Read/Write head. This signal is amplified, separated into clock and data information both of which are transmitted to the user system.

4.3 FUNCTIONAL DESCRIPTION

Refer to Figures 4-1, 5-1, and the Schematic Diagram (Section 5) for the following discussion.

The FDD is divided into the following major functional areas:

a. Control Logic
b. Write and Fault Logic
c. Read Logic
d. Disk Drive
e. Read/Write Head

4.3.1 CONTROL LOGIC

The functions of the control logic are to generate the signals that (1) step the Read/Write head in or out upon command of the controller, (2) load the head on the diskette for read/write operations, (3) indicate when Read/Write head is at Track 00.

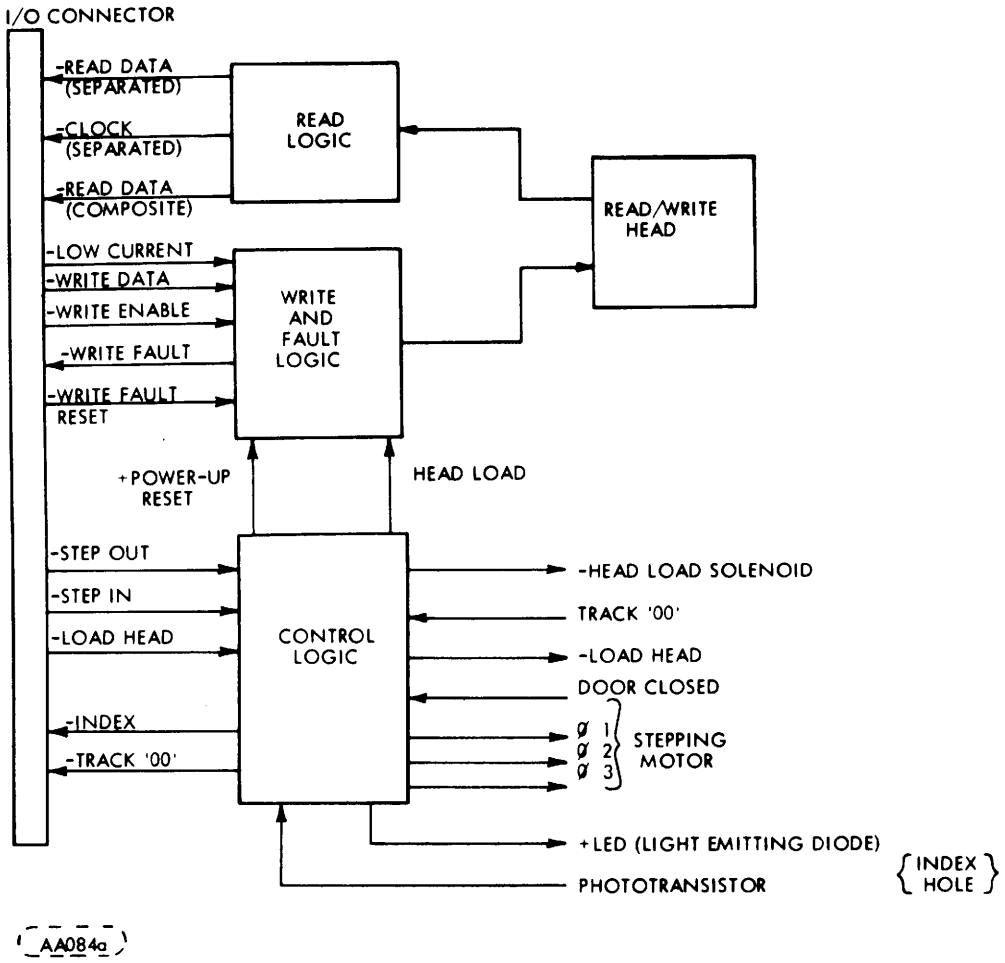


Figure 4—1. Functional Block Diagram

Movement of the Read/Write head is initiated by a STEP IN or STEP OUT command from the user system. Each command received sequentially energizes one of the three phases of the stepper motor. Whether the command is a STEP IN or STEP OUT will determine the sequence that the stepper motor phases are energized, hence the direction that the stepper motor turns. STEP IN command phase sequence is ØA, ØB, ØC, ØA .....STEP OUT command phase sequence is ØA, ØC, ØB, ØA. . . .

At initial voltage application, ØA (AND gate U15, pin 6 enabled) is energized by the output condition of a dual D-type flip-flop (U14). Either a STEP OUT or STEP IN command triggers a 3 us one-shot multivibrator and places the proper inputs on the flip-flops to satisfy the logic conditions for energizing the appropriate motor phase (ØB for STEP IN, ØC for STEP OUT). The flip-flops are clocked by the trailing edge of the 3 us one-shot pulse.

The Read/Write head can be loaded when the diskette is fully installed and the front panel door is closed. Closing the front panel door actuates the door interlock switch which completes the circuit to the head load solenoid. When the controller sends a HEAD LOAD, the head load solenoid is energized, causing the armature bail to actuate, placing the diskette against the Read/Write head.

Track 00 signal is generated when the carriage assembly closes the Track 00 switch and the outputs of the D flip-flops (U14) are in the logic condition to select stepper motor ØA. Closure of the Track 00 switch sets a R/S flip-flop (U13) which has its output NANDed with the outputs of the phase select flip-flops. The resulting output of the NAND gate (U16) generates Track 00 signal.

The beginning of each diskette track as well as each hard sector is indicated by an INDEX pulse. The diskette rotates between a light source (LED) and a sensor (phototransistor). When the index hole in the diskette passes over the light source, light is detected by the sensor. The sensor output is amplified and transmitted to the controller as the INDEX pulse.

4.3.2 WRITE AND FAULT LOGIC

A write operation begins with a WRITE ENABLE command from the controller. This command simultaneously enables the write data switching drivers (U23), the write data gates (U22), blocks the input to the read circuit by reverse biasing diodes CR13 through CR16, and after a 450 us delay energizes the erase windings. Data applied to the WRITE DATA input alternately switches a constant write current through the write drivers to the head winding. LOW CURRENT operation, used when writing on track 43 or greater, is selected by switching a series resistor (R71) into the write current source (Q18).

A WRITE FAULT signal is generated if WRITE ENABLE is commanded and the head is not loaded (head load solenoid not energized) or WRITE ENABLE is commanded and no data is applied or WRITE ENABLE is commanded but WRITE DATA is applied at the wrong rate. Either one or both of the conditions sets the WRITE FAULT latch (U26). Commanding a WRITE FAULT RESET clears the WRITE FAULT signal by resetting the WRITE FAULT latch.

4.3.3 READ LOGIC

Read operation is enabled when the Read/Write head is loaded on the diskette and WRITE ENABLE is not commanded. With WRITE ENABLE not commanded, the data blocking diodes (CR13 through CR16) are forward biased and data sensed by the Read/Write head is fed to the read data circuit. The read signal from the diskette is in the form of a sine wave (see Figure 5-1).

This analog signal is amplified, filtered, differentiated (reference U1, Q1, Q2 & Q3) and coupled to a combination differential voltage comparator and one-shot multivibrator which develops a 250 nsec pulse for each transistion of the input signal. The read data logic (U3, U4, U6, U7 and U8) separates the composite signal and simultaneously transmits CLOCK, DATA and COMPOSITE outputs to the controller. (This separation is designed for double frequency recording without missing clock only).

4.3.4 DISK DRIVE

Disk drive is accomplished by clamping the diskette between the cone assembly and a belt driven spindle (Figure 4-2). The spindle is rotated at 360 rpm by the disk drive motor.

4.3.5 READ/WRITE HEAD

The Read/Write head is in direct contact with the diskette during read or write operation. Since the head is rigidly mounted on the carriage assembly, head load is achieved by a solenoid actuated bail (Figure 4-3) allowing the head load arm to force the diskette against the Read/Write Head. The head surface is designed for maximum signal transfer to and from the magnetic surface of the diskette with minimum head/disk wear. The tunnel erase gap, DC erases the intertrack area to reduce off-track signal-to-noise ratio and permit diskette interchange between units.

4.4 CONTROL AND DATA LINE CHARACTERISTICS

Figure 4-4 depicts the control and data line transmission system used on the FDD. All signal lines must be terminated at the receiver with an impedance of 100 ohms. Transmission is by twisted pair 26AWG (min.) (one twist per inch) with a maximum line length of 25 feet. Figure 5-1 shows the timing of typical operations.

4.4.1 LOGIC LEVELS

The following definitions will be used throughout this manual:

Logic 1 (Active State)	Refers to the low-voltage condition of 0-volts (+0.5V, -0.0V).
Logic 0 (Inactive State)	Refers to the high-voltage condition of +5.0 volts (±0.5V).

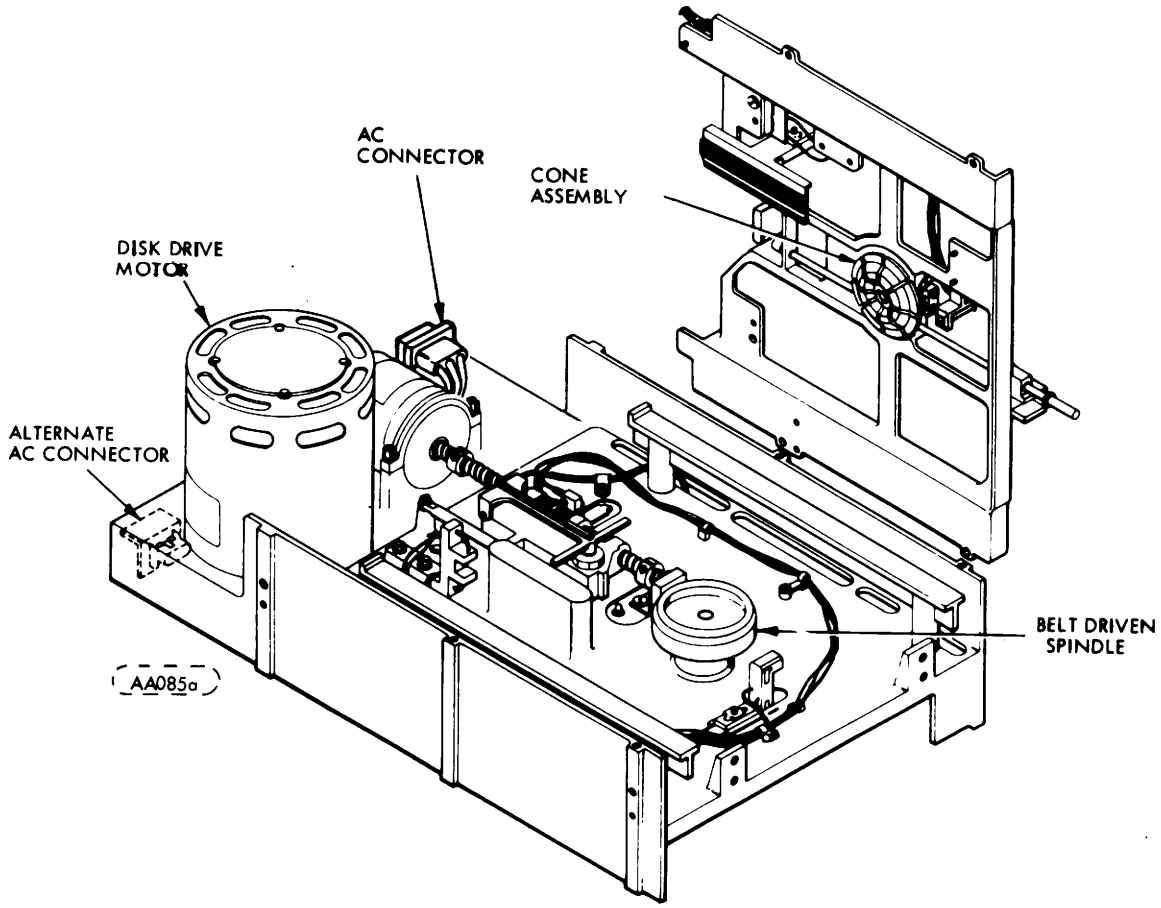


Figure 4–2 Base and Chassis Support Assembly

4.4.2 TRANSMITTER CHARACTERISTICS

The FDD uses the TTL 7440 (dual 4-input buffer or driver) to transmit all control and data signals. This transmitter is capable of sinking a current of 48ma with an output voltage of 0.5 volt.

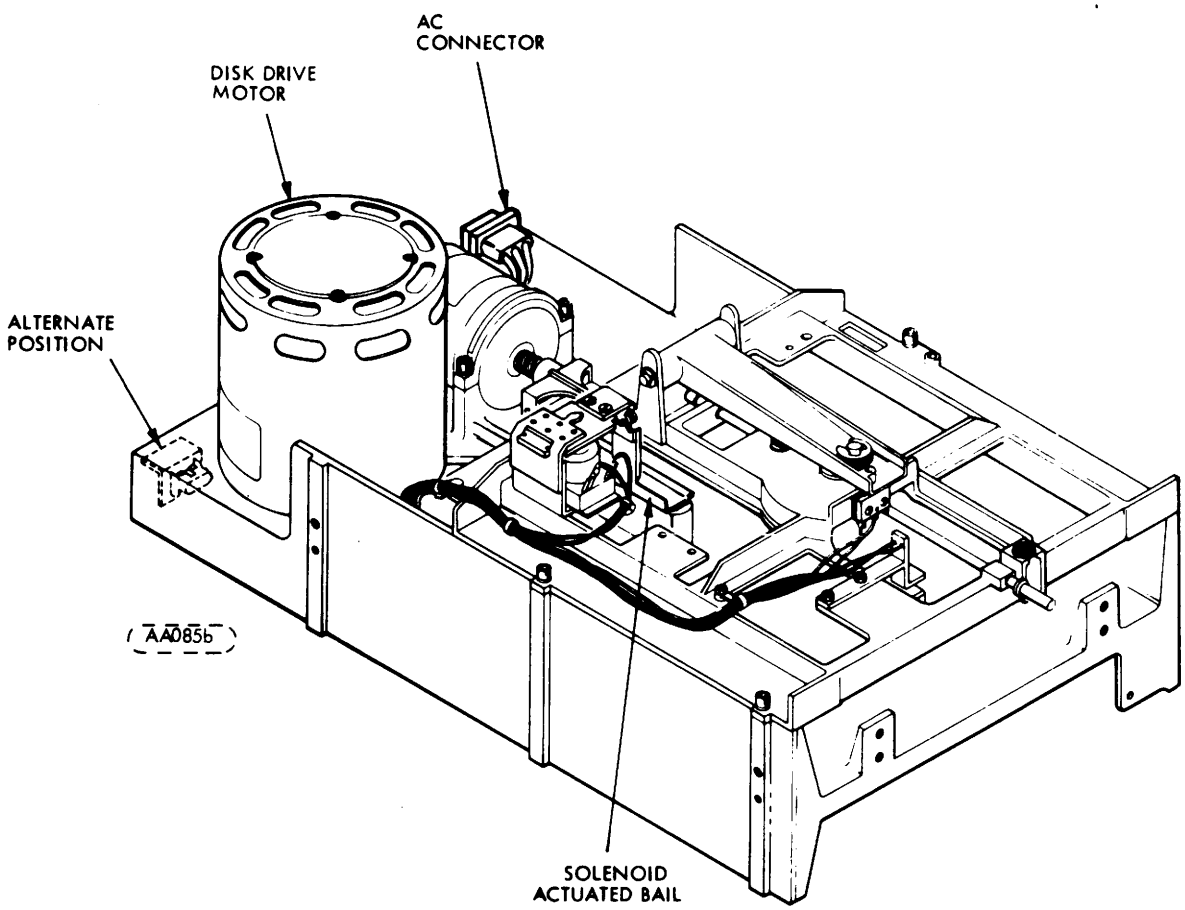


Figure 4–3. Chassis Base Assembly

4.4.3 LINE RECEIVER CHARACTERISTICS

The FDD uses an emitter follower receiver as shown in Figure 4-4 to drive 1/4 of a SN75154 quad line receiver. The input of each receiver is terminated in 100 ohms.

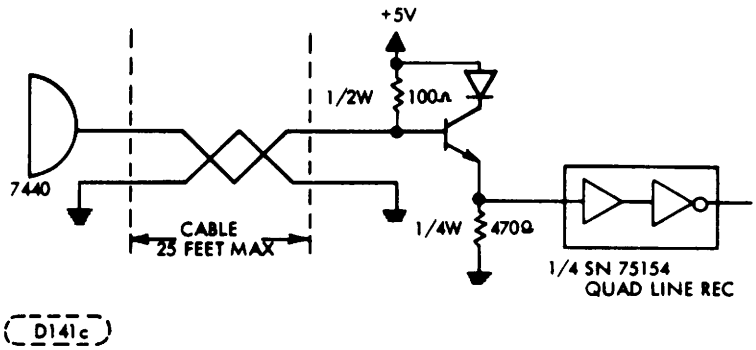


Figure 4–4. Control and Data Line Transmission System

4.4.4 CONTROL AND DATA LINE FUNCTIONS

The signals that are exchanged are described in Table 4-1 and are shown relative to a point of origin in Figure 4-1.

Table 4—1. Input/Output Lines

SIGNAL	FUNCTION
INPUT LINES	
-STEP	A 10 MICROSECOND (MINIMUM) LOGIC 1 LEVEL PULSE ON THIS LINE CAUSES THE HEAD TO MOVE ONE TRACK AS DETERMINED BY THE DIRECTION LINE.
-DIRECTION	A LOGIC 1 LEVEL ON THIS LINE AND STEP PULSE CAUSES THE HEAD TO MOVE ONE TRACK INWARD TOWARD THE CENTER OF THE DISKETTE. A LOGIC 0 LEVEL ON THIS LINE AND STEP PULSE CAUSES THE HEAD TO MOVE ONE TRACK OUTWARD FROM THE CENTER OF THE DISKETTE.
-HEAD LOAD	A LOGIC 1 LEVEL ON THIS LINE LOADS THE DISKETTE AGAINST THE HEAD THROUGH THE USE OF A PRESSURE PAD ON THE OPPOSING SIDE OF THE DISKETTE. THE LOGIC 1 LEVEL MUST BE INITIATED 60 MILLISECONDS PRIOR TO INITIATING A READ OR WRITE OPERATION TO ALLOW FOR HEAD LOAD SETTLING TIME. FOR INCREASED HEAD AND MEDIA LIFE, THIS SIGNAL SHOULD BE AT A LOGIC 0 WHENEVER A DATA TRANSFER OPERATION IS NOT IN PROCESS OR PENDING.
-WRITE ENABLE	TO ENABLE THE FDD WRITE DRIVER, THIS LINE IS HELD AT A LOGIC 1. TO DISABLE THE FDD WRITE DRIVER AND ENABLE THE FDD READ CIRCUITRY, THIS LINE IS HELD AT LOGIC 0.
-WRITE FAULT RESET	A LOGIC 1 LEVEL ON THIS LINE CLEARS THE WRITE FAULT LATCH.
-WRITE DATA	THIS LINE CONTAINS THE COMPOSITE DOUBLE FREQUENCY CODED WRITE CLOCK AND DATA INFORMATION TO THE FDD. THE WRITE CLOCK AND DATA PULSES MUST BE 250 NANOSECONDS ± 20% IN LENGTH AND ARE TRUE AT THE LOGIC 1 LEVEL. INFORMATION TO BE RECORDED ON THE DISKETTE IS DERIVED FROM THE TRAILING EDGE OF EACH PULSE, I.E., AT THE LOGIC 1 TO LOGIC 0 TRANSITION POINT.
-LOW CURRENT	THIS LINE REDUCES WRITE CURRENT FOR TRACKS 43 OR GREATER. A LOW LEVEL REDUCES WRITE CURRENT.
OUTPUT LINES	
-INDEX	THIS LINE GIVES AN INDICATION OF THE RELATIVE POSITION OF THE DISKETTE BY OUTPUTTING A LOGIC 1 PULSE FOR EVERY SECTOR HOLE OF THE DISKETTE. THE 1.5 ±0.6 MILLISECONDS PULSE IS GENERATED BY SENSING THE INDEX HOLE IN THE DISKETTE USING A PHOTO-OPTICAL TECHNIQUE.
-WRITE FAULT	A LOGIC 1 LEVEL INDICATES ONE OR MORE OF THE FOLLOWING FAULT CONDITIONS. -WRITE ENABLE WITHOUT HEAD LOAD. -WRITE ENABLE WITHOUT WRITE DATA. INCORRECT WRITE DATA RATE. A WRITE FAULT CAN BE CLEARED BY A LOGIC 1 ON THE WRITE FAULT RESET LINE.
-TRACK 00	A LOGIC 1 LEVEL INDICATES THAT THE HEAD IS POSITIONED OVER TRACK 00.
-READ DATA (SEPARATED)*	THIS LINE CONTAINS THE SEPARATED DATA INFORMATION. A LOGIC 1 LEVEL PULSE OF 250 NSEC ± 20% CORRESPONDS TO A DATA 1 BIT READ FROM THE DISKETTE.
-CLOCK (SEPARATED)*	THIS LINE CONTAINS THE SEPARATED CLOCK INFORMATION. A LOGIC 1 LEVEL PULSE OF 250 NSEC ± 20% CORRESPONDS TO A CLOCK BIT READ FROM THE DISKETTE.
-READ DATA (COMPOSITE)	THIS LINE CONTAINS THE UNSEPARATED DATA AND CLOCK INFORMATION. A LOGIC 1 LEVEL PULSE OF 250 NSEC ± 20% CORRESPONDS TO A DATA CLOCK READ FROM THE DISKETTE.

*THE SIGNALS ARE VALID ONLY WHEN DOUBLE FREQUENCY RECORDING WITHOUT MISSING CLOCK IS USED.

(AA086a)

4.5 POSTIONING CHARACTERISTICS

The time for a single track move is 20ms including settling time. This is defined as the time to move between any pair of adjacent tracks. Multiple track moves can be made at 10ms per step plus 10ms settling time.

The random average positioning time is 263ms. This is defined as the summation of the move times for all possible moves divided by the number of possible moves.

The maximum positioning time is 770ms. This is defined as the time to move the head from track 00 to track 75 or from 75 to 00 and includes settling time.

V
DIAGRAMS

5.1 INTRODUCTION

This section contains diagrams that describe the Flexible Disk Drive in terms of the functions it performs. Figure 5-1 shows timing diagrams which illustrate signal time relationships during read, write, step-in and step-out operations.

Figure 5-2 is the Printed Circuit Board Schematics and Figure 5-3 contains the Assembly Drawing and Parts List.

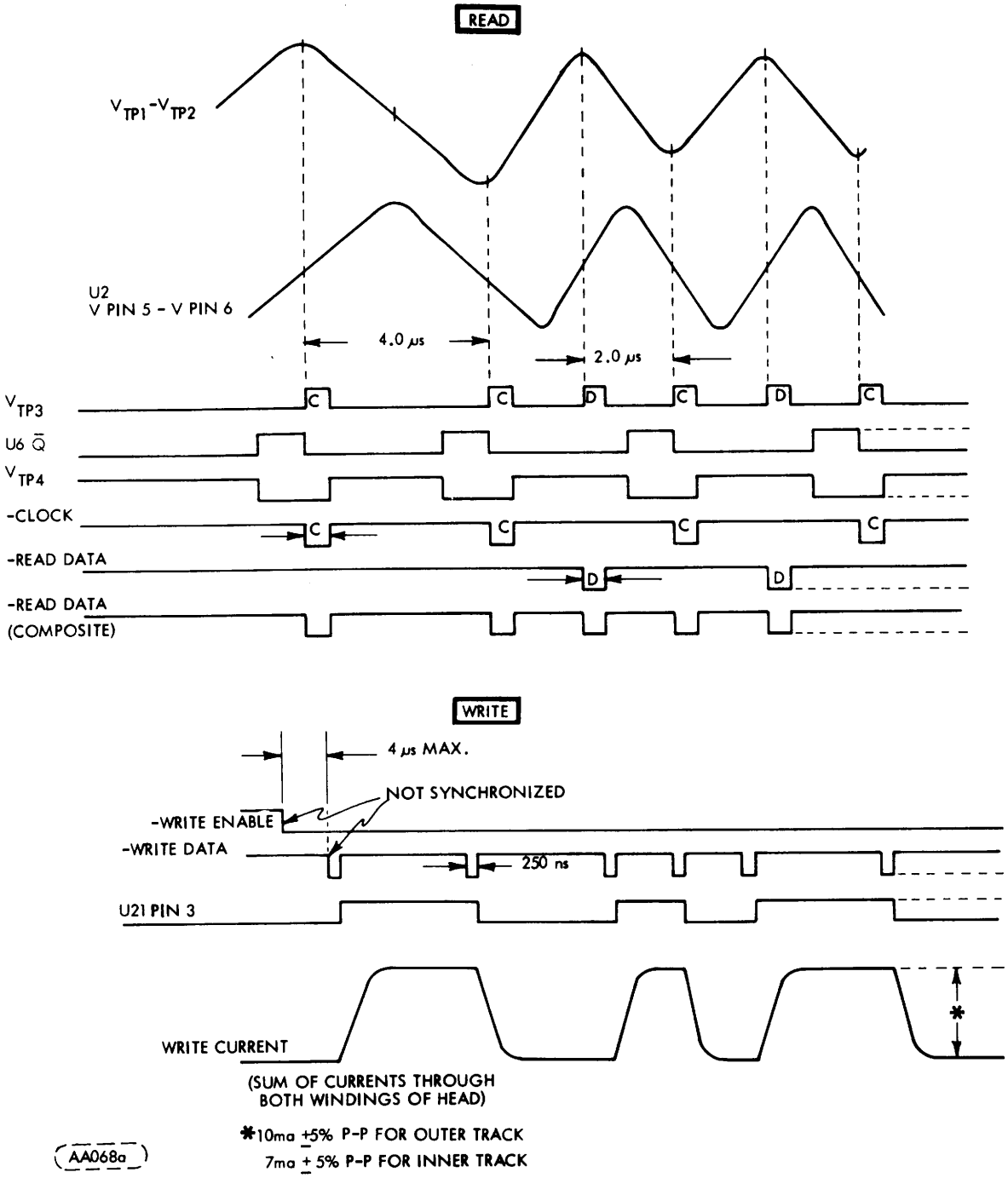


Figure 5—1. Timing Diagrams (Sheet 1 of 2)

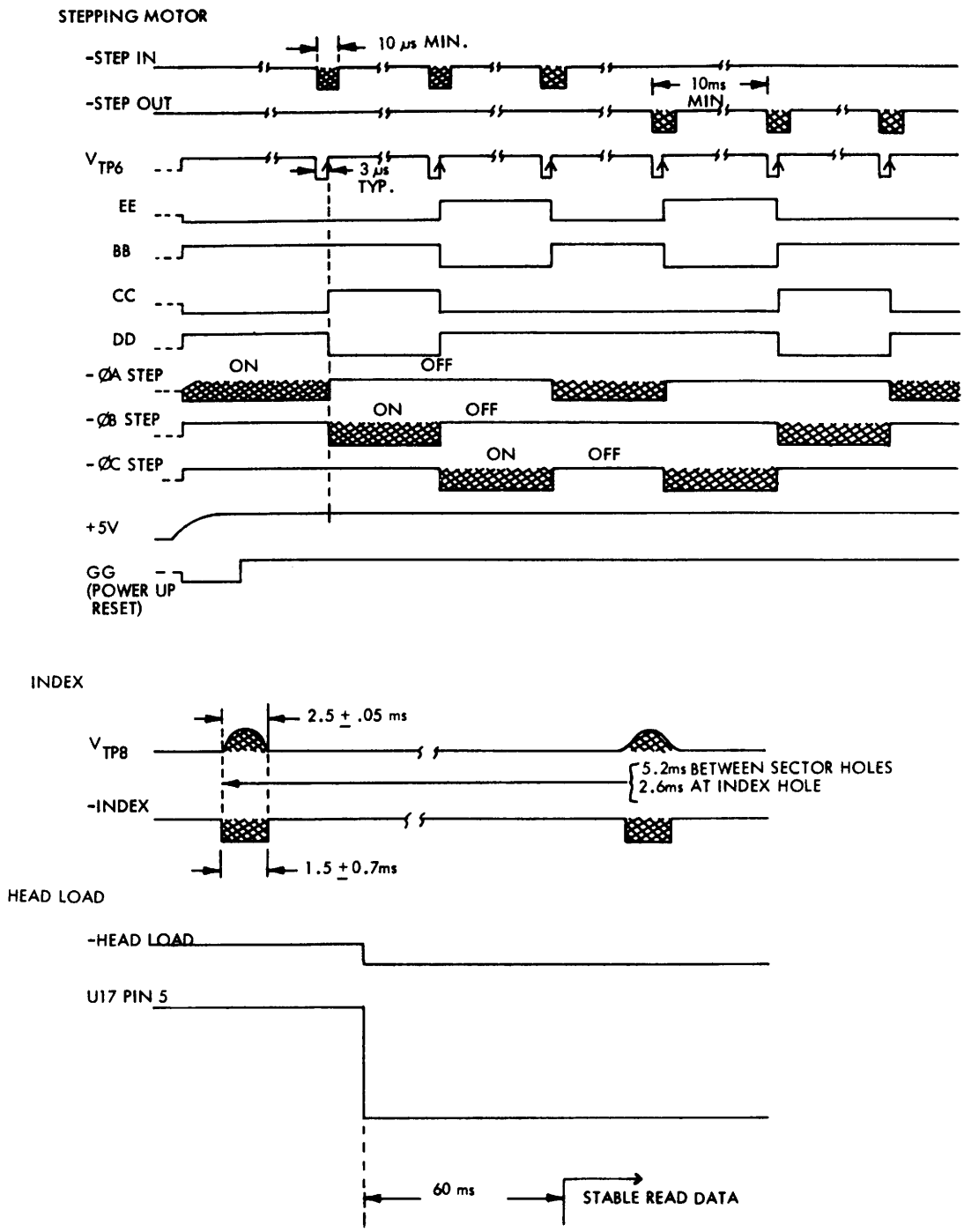


Figure 5—1. Timing Diagrams (Sheet 2 of 2)

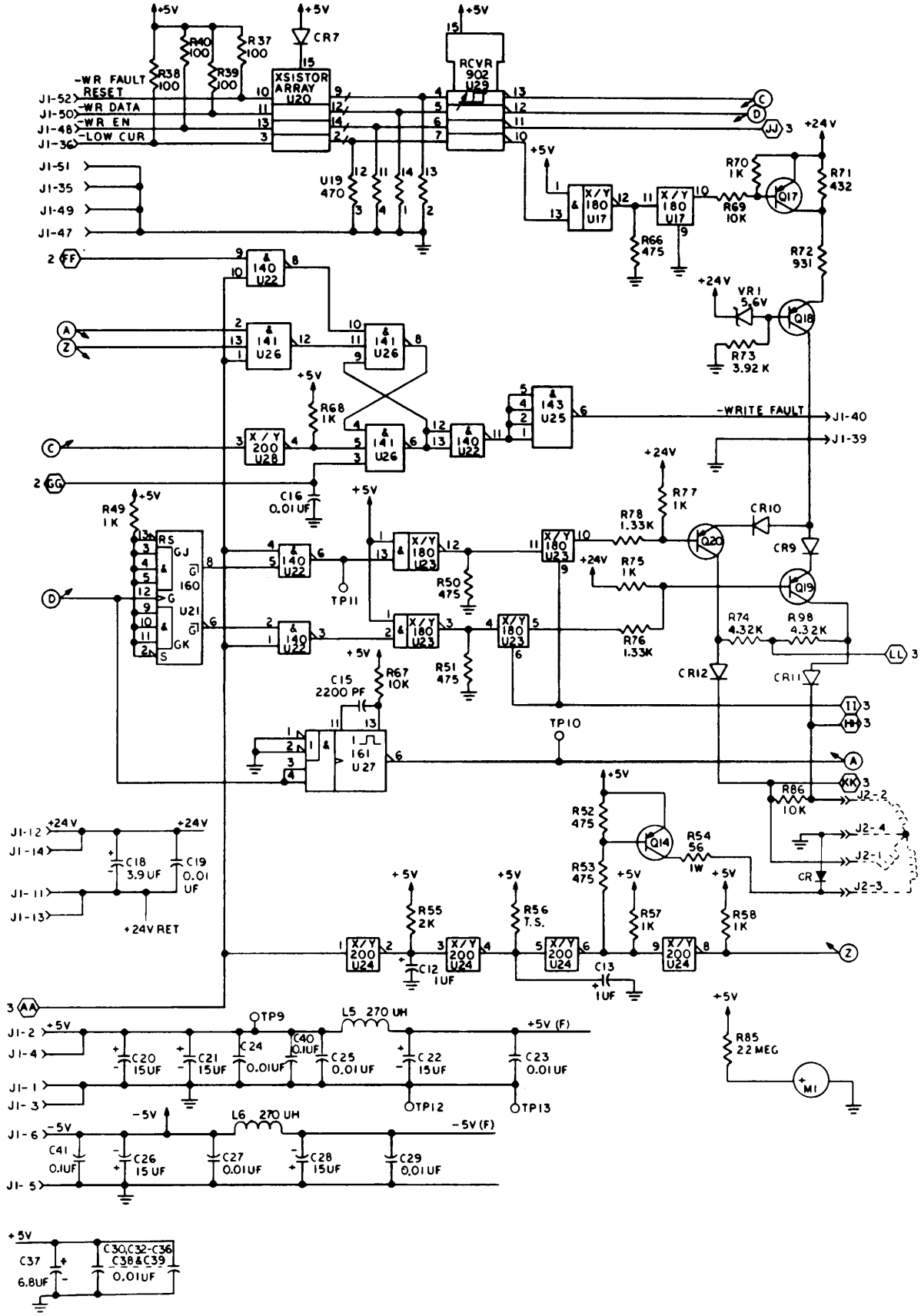


Figure 5–2. Schematics (Sheet 1 of 3)

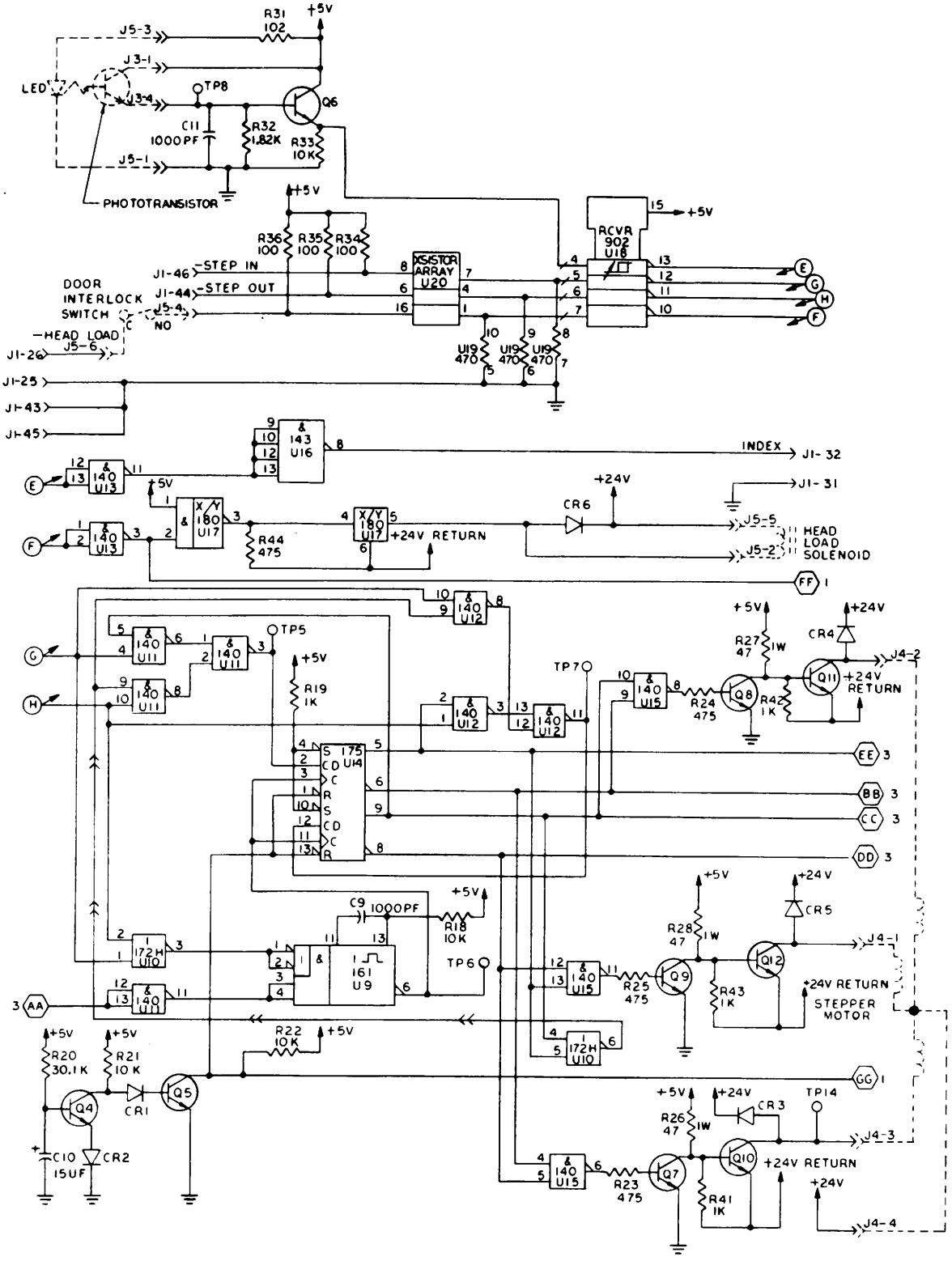


Figure 5–2. Schematics (Sheet 2 of 3)

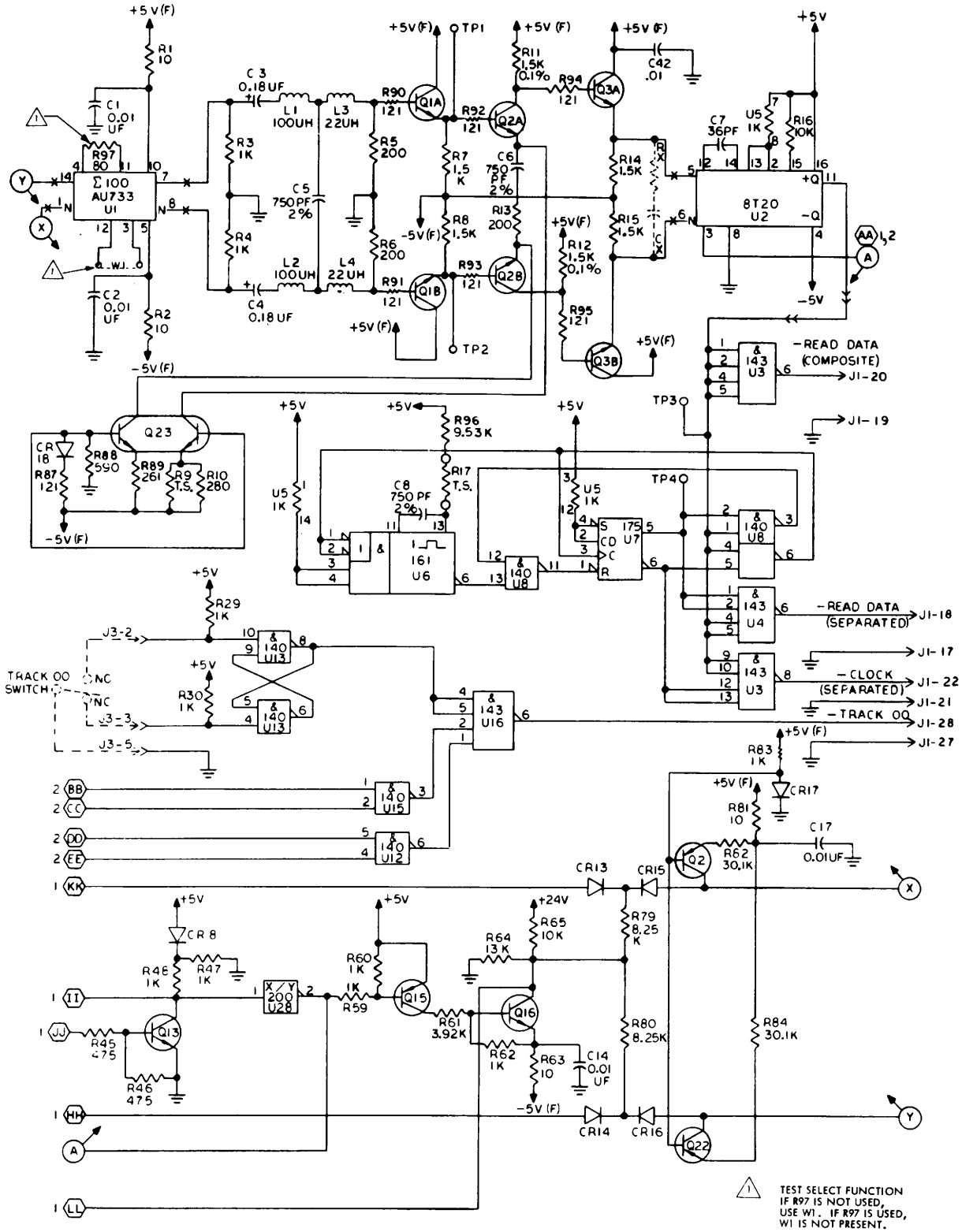


Figure 5—2. Schematics (Sheet 3 of 3)

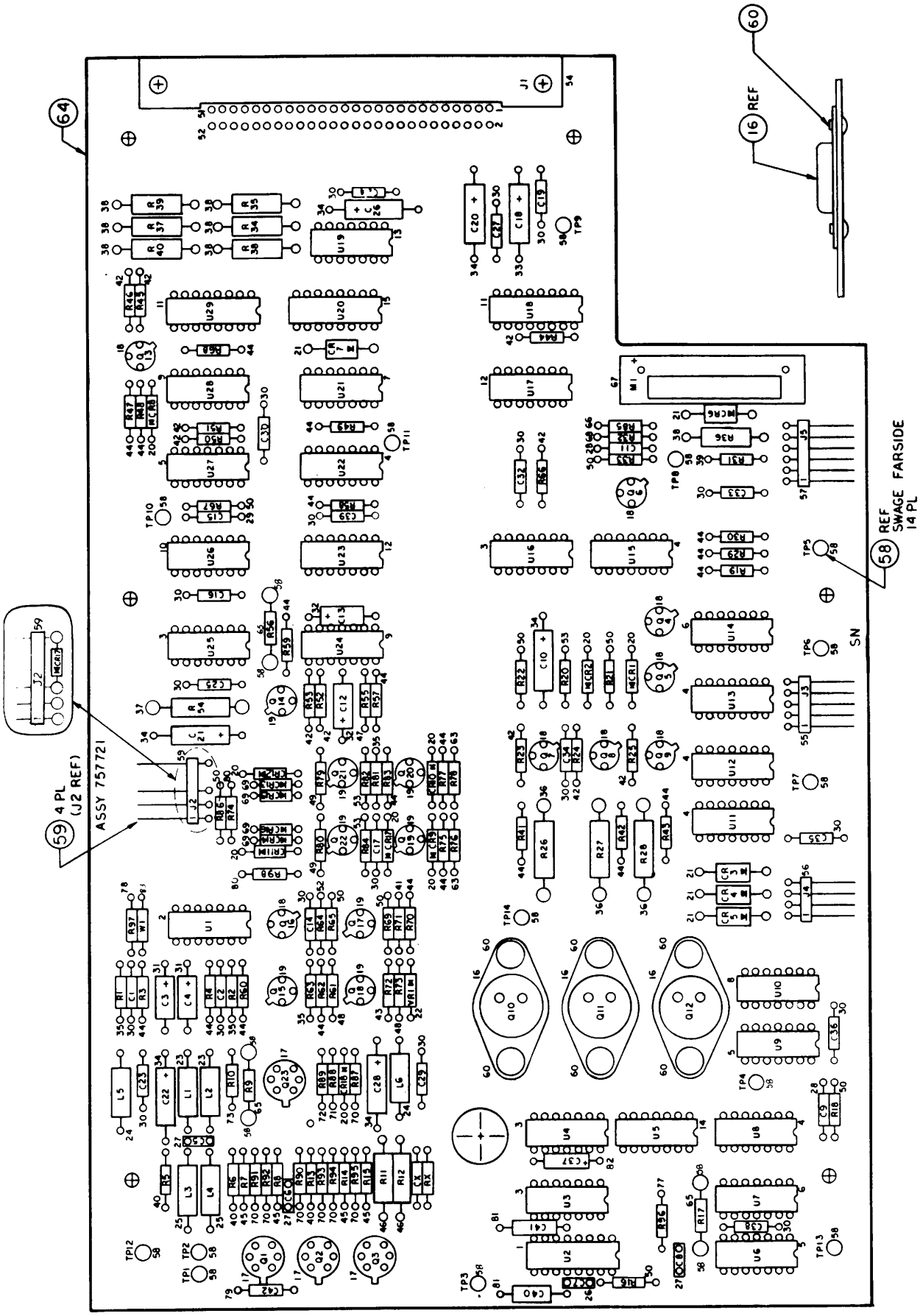


Figure 5–3. Assembly Drawing and Parts List
(Sheet 1 of 3)

Item No.	Ident. No.	Drawing Title	Remarks
	75772111-3	Comp Board Assembly	
1	15127000-6	IC TTL BDRTL	
2	15126900-8	IC Diff Video Ampf	
3	51639900-3	Integ Circ	
4	51651900-6	IC TTL4 2nd G	
5	51718600-3	IC TTL ADNR MV-A	
6	15104800-6	IC 7474	
7	50251000-1	IC TTL	
8	50251600-8	IC TTL4	
9	50254200-4	IC 7406	
10	50250700-7	IC 7410	
11	50254500-7	IC Rec2	
12	51768200-1	IC Dual	
13	75009962-4	Res Pac 2 470 (7)	
14	75009969-9	Res Pac 2 1.0K (7)	
15	15129200-0	Transistor	
16	50220601-4	Transistor NPN Pwr	
17	75722700-4	Transistor Dual NPN	
18	75722200-5	Transistor NPN	
19	16547200-2	Transistor NPN 2N290	
20	51736700-9	Diode IN914A	
21	56142000-1	Diode-Silicon	
22	50240107-8	Diode Zener	
23	94356336-1	Inductor 100UH	
24	94356341-1	Inductor 270UH	
25	94356328-8	Inductor 22UH	
26	94227215-4	Capacitor-Dripped Mic	
27	94227247-7	Capacitor Mica 750 P	
28	92496215-2	Capacitor 1000 PF	
29	92496219-4	Capacitor 2200 PF	
30	92496227-7	Cap 100V 20r .01UF	
31	38879319-2	Capacitor	
32	38879328-3	Capacitor	
33	38879335-8	Cap 50V 20r 3.9 UF	
34	24504351-8	Cap 10V 20r 15UF	
35	94360100-5	Res 1/4W 1r 10.0	
36	24507117-0	Resistor	
37	24507119-6	Resistor	
38	24500139-1	Res 100 Ohm 1/2W 5P	
39	94360201-1	Res 1/4W 1r 102	
40	94360229-2	Res 1/4W 1r 200	
41	94360261-5	Res 1/4W 1r 432	
42	94360265-6	Res 1/4W 1r 475	
43	94360293-8	Res 1/4W 1r 931	
44	94360300-1	Res 1/4W 1r 1.00K	
45	94360317-5	Res 1/4W 1r 1.50K	
46	75721500-9	Resistor	
47	94360329-0	Res 1/4W 1r 2.00K	
48	94360357-1	Res 1/4W 1r 3.92K	

Figure 5—3. Assembly Drawing and Parts List (Sheet 2 of 3)

Item No.	Ident. No.	Drawing Title	Remarks
49	94360388-6	Res 1/4W 1r 8.25K	
50	94360400-9	Res 1/4W 1r 10.0K	
52	94360411-6	Res 1/4W 1r 13.0K	
53	94360446-2	Res 1/4W 1r 30.1K	
55	75743705-8	Header-Right Angle	
54	75743909-8	Header Right Angle	
56	75743704-1	Header-Right Angle	
57	75743706-6	Header-Right Angle	
58	92498021-2	Terminal, Swaged	
59	75772401-8	Connector Hdr	
60	75738302-1	Rivet	
63	94360312-6	Res 1/4W 1r 1.33K	
64	75772004-8	Bare Board	
66	92512653-4	Res 1/4W 22 Meg	
67	94257605-9	Meter-Elapsed Time M	
68	94360325-8	Res 1/4W 1r 1.82K	
69	83432400-6	Diode 365-Disk	
70	94360208-6	Res 1/4W 1r 121	
71	94360274-8	Res 1/4W 1r 590	
72	94360240-9	Res 1/4W 1r 261	
73	94360243-3	Res 1/4W 1r 280	
77	94360394-4	Res 1/4W 1r 9.53K	
78	94360187-2	Res 1/4W 1r 80.6	
79	75808537-7	Cap 100V 10r .01UF	
80	94360361-3	Res 1/4W 1r 4.32K	
81	75808549-2	Cap 100V 10r .10UF	
82	24504312-0	Cap 6V 20r 6.8UF	
83	83409905-3	Jumper	

Figure 5—3. Assembly Drawing and Parts List (Sheet 3 of 3)

VI
MAINTENANCE

6.1 INTRODUCTION

This section contains the instructions required to maintain the FDD. The information is provided in the form of preventive maintenance, troubleshooting and corrective maintenance.

6.2 MAINTENANCE TOOLS

The special tools (or equivalent) required to maintain an FDD as follows:

DESCRIPTION	CDC PART NUMBER
Actuator Alignment Tool	75292000
Outer Stop Gauge	83401300
Inner Stop Gauge	83401400
Feeler Gauge	12205633

The standard tools required to maintain the FDD are as follows:

- Socket Wrenches

  Sizes: 5/16", 1/4", 3/16", 11/32"

- Allen Wrenches

  Sizes: .050, 1/16", 5/64", 7/64"

6.3 PREVENTIVE MAINTENANCE

The head load pad should be inspected after 650 hours of head-load time. If pad is worn, dirty, torn or loose it should be replaced. (See Paragraph 6.7.4).

6.4 HEAD CLEANING

On occasions the Read/Write head may require cleaning. If this situation occurs clean head as follows:

CAUTION

Do not smoke while cleaning. Do not touch a head surface with fingers. Do not leave residue or lint on the head surfaces. Residual particles can result in a scored disk and/or loss of a head.

a. Use lint-free cloth to lightly drybuff head surface. Cleaning is completed if deposits are removed.

b. If oxide deposits were not removed in step (a), dampen (do not soak) cloth with head cleaning solution (91% isopropyl alcohol) and wipe head surface. Finish by lightly dry buffing again to ensure head is dry and no residue of the alcohol is left.

6.5 TROUBLESHOOTING

An improperly adjusted FDD may exhibit symptoms of one that has a malfunction; therefore, the Adjustment Procedures (Paragraph 6.6) should be performed before assuming that the unit has failed. If the malfunction still exists after the performance of the adjustment procedures, consult Table 6-1 and the Troubleshooting Flow Charts for the sumptoms observed, checks to be made, and action to be taken. Refer to Figure 6-1 for test points. Before troubleshooting is started, check all dc supply voltages.

Table 6—1. Flowchart References

Flowchart Paragraph No.	Symptoms
6.5.2	Diskette Not Rotating
6.5.3	Index Pulse Missing
6.5.4	Head Not Loading
6.5.5	Read/Write Head Not Stepping
6.5.6	No Track 00 Indication
6.5.7	Read Errors
6.5.8	Write Errors

6.5.1 DC VOLTAGE CHECK

+5V ±5% at J1-2, J1-4, and TP9
-5V ±5% at J1-6
+24V ± 10% at J1-12 and J1-14 (Return at pins J1-11, J1-13).

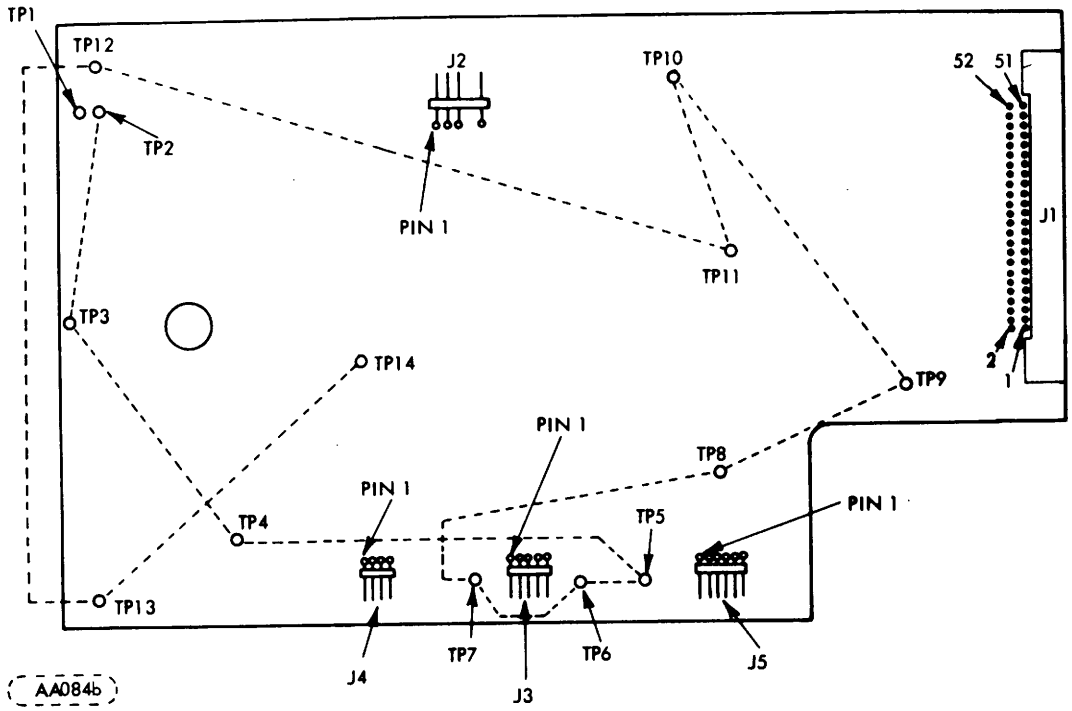


Figure 6.1 Test Points and Connector Locations

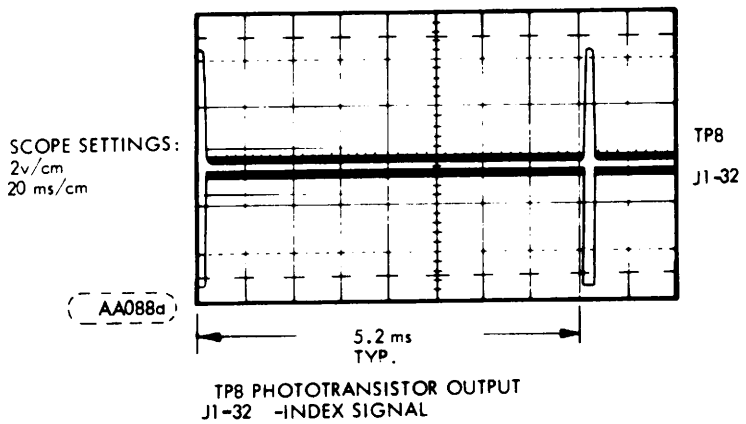


Figure 6—2 Phototransistor and -Index Signal Pulses

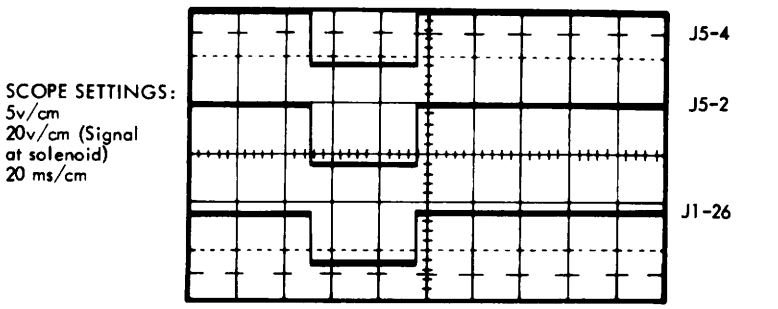


Figure 6—3. -Head Load and Door Closed Pulses

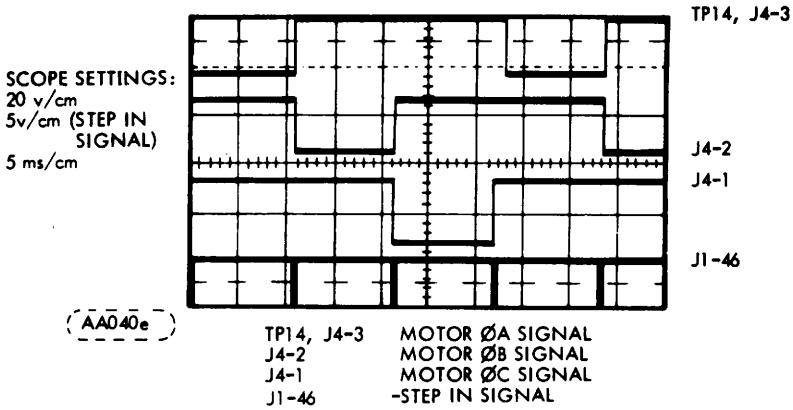


Figure 6—4. -Step In and Motor Phase Pulses

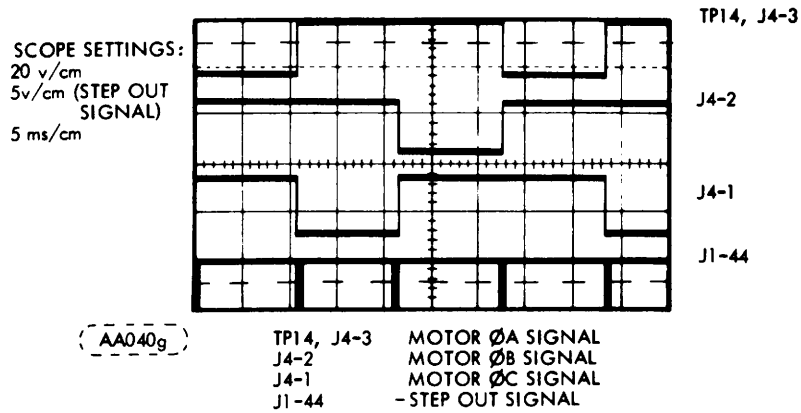


Figure 6—5. -Step Out and Motor Phase Pulses

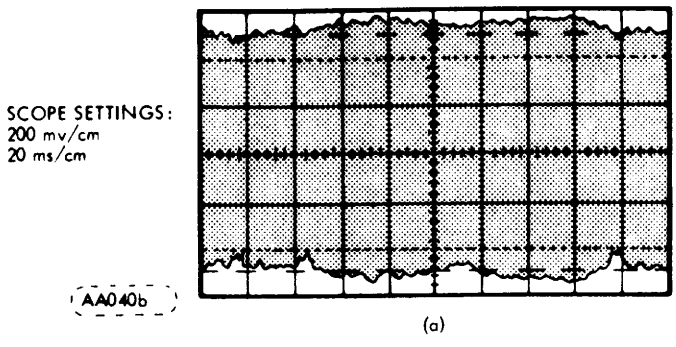


Figure 6—6. Differential Read Signal for Entire Track

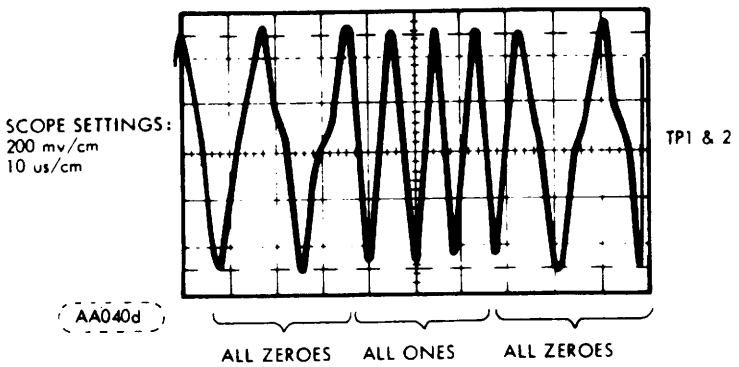


Figure 6—7. Differential Read Signal for Portion of Track

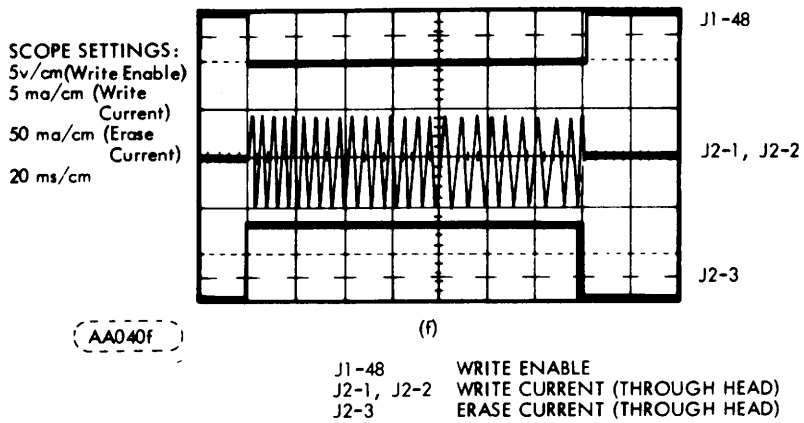


Figure 6—8. Write Enable and Write/Erases Current Pulses

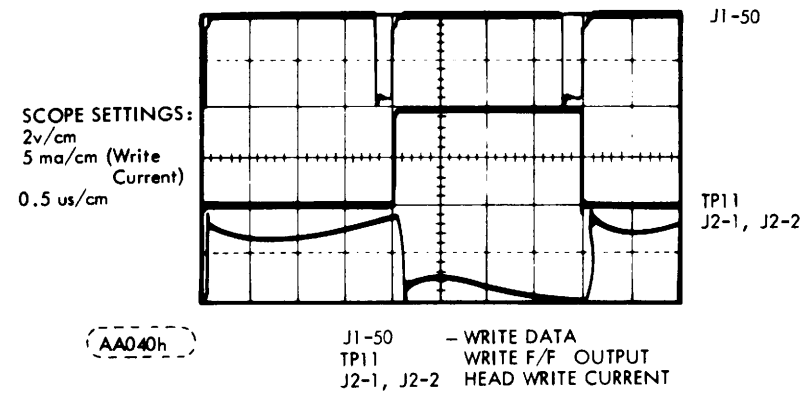


Figure 6—9. Write Data, Write F/F Output, and Head Write Current Pulses

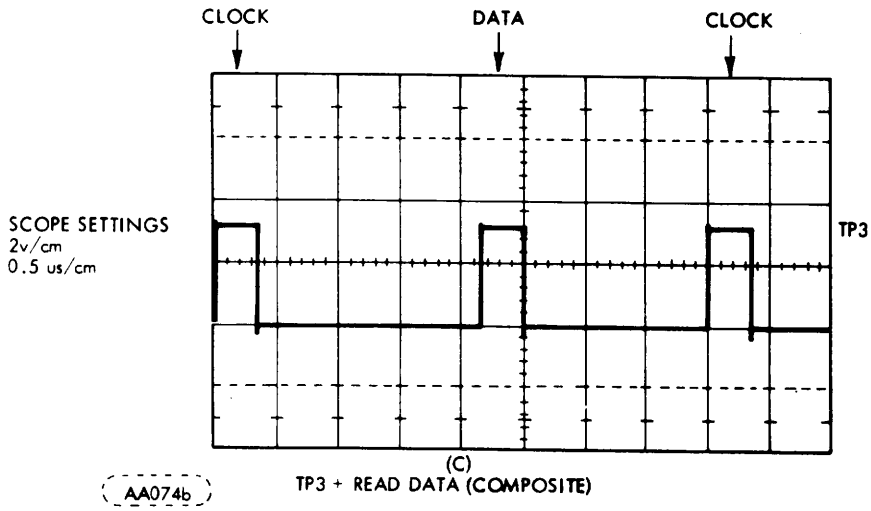


Figure 6-10. Composite Read Data

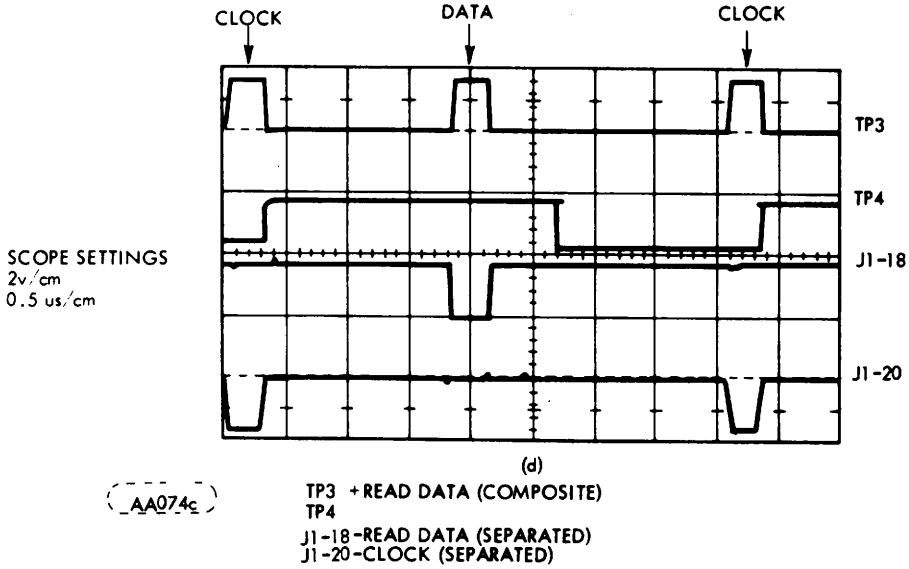
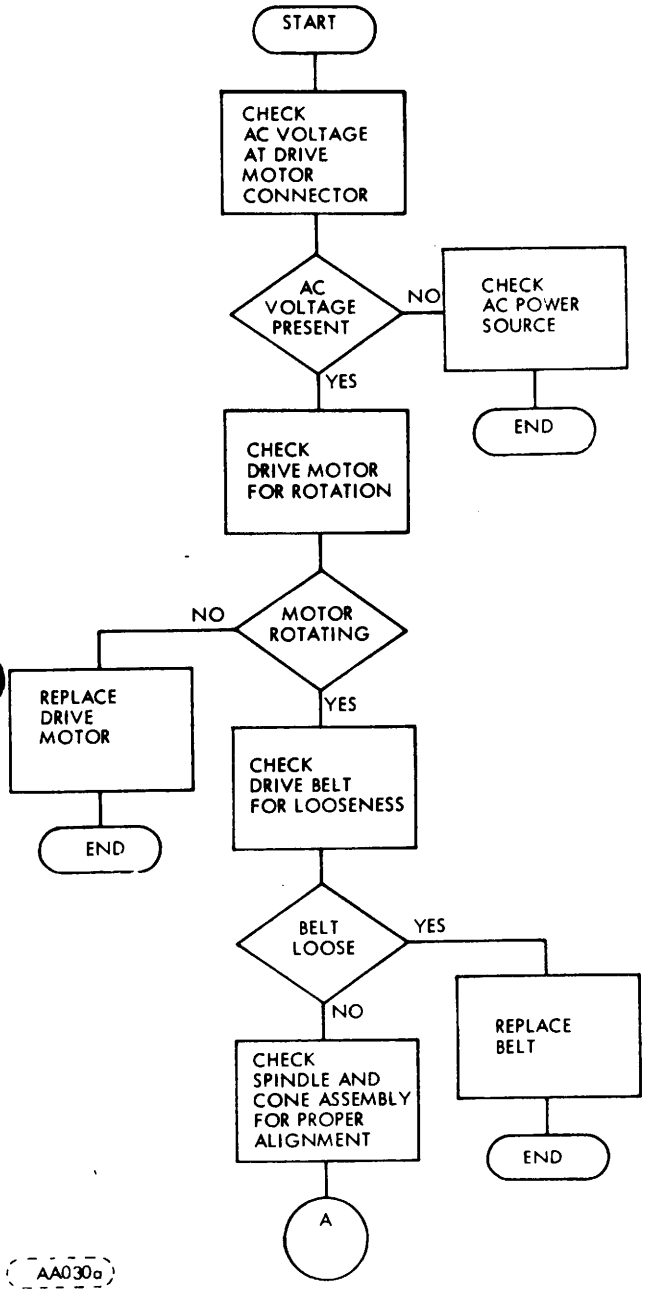
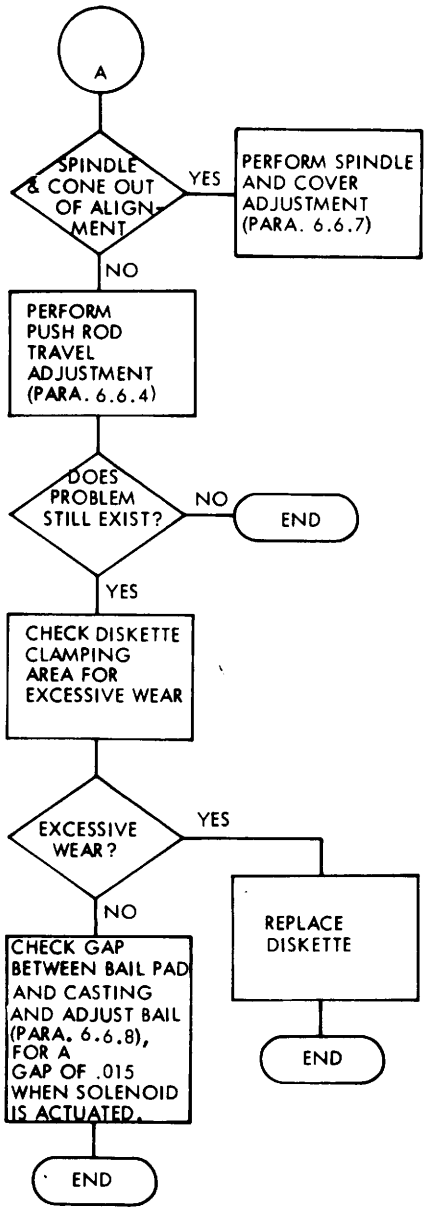


Figure 6-11. -Clock, -Read Data, and Composite Read Data

6.5.2 DISKETTE NOT ROTATING

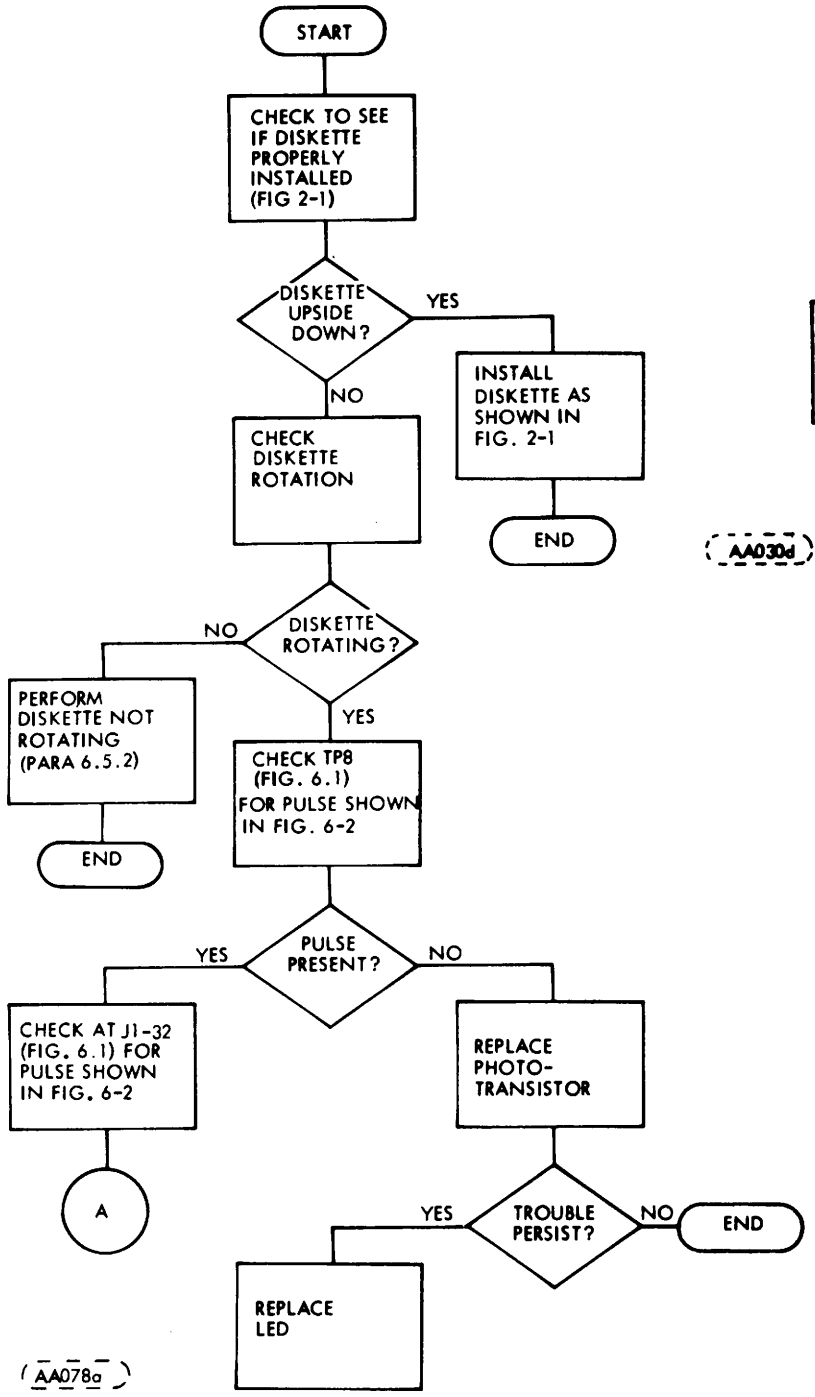


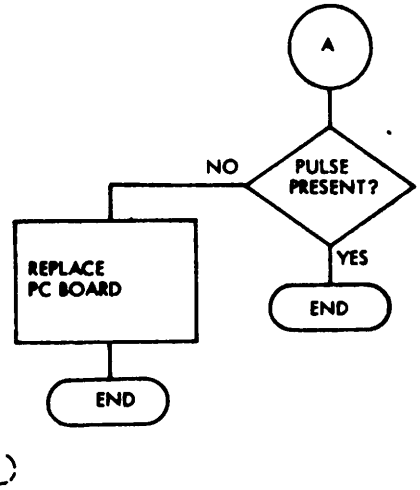
AA030a



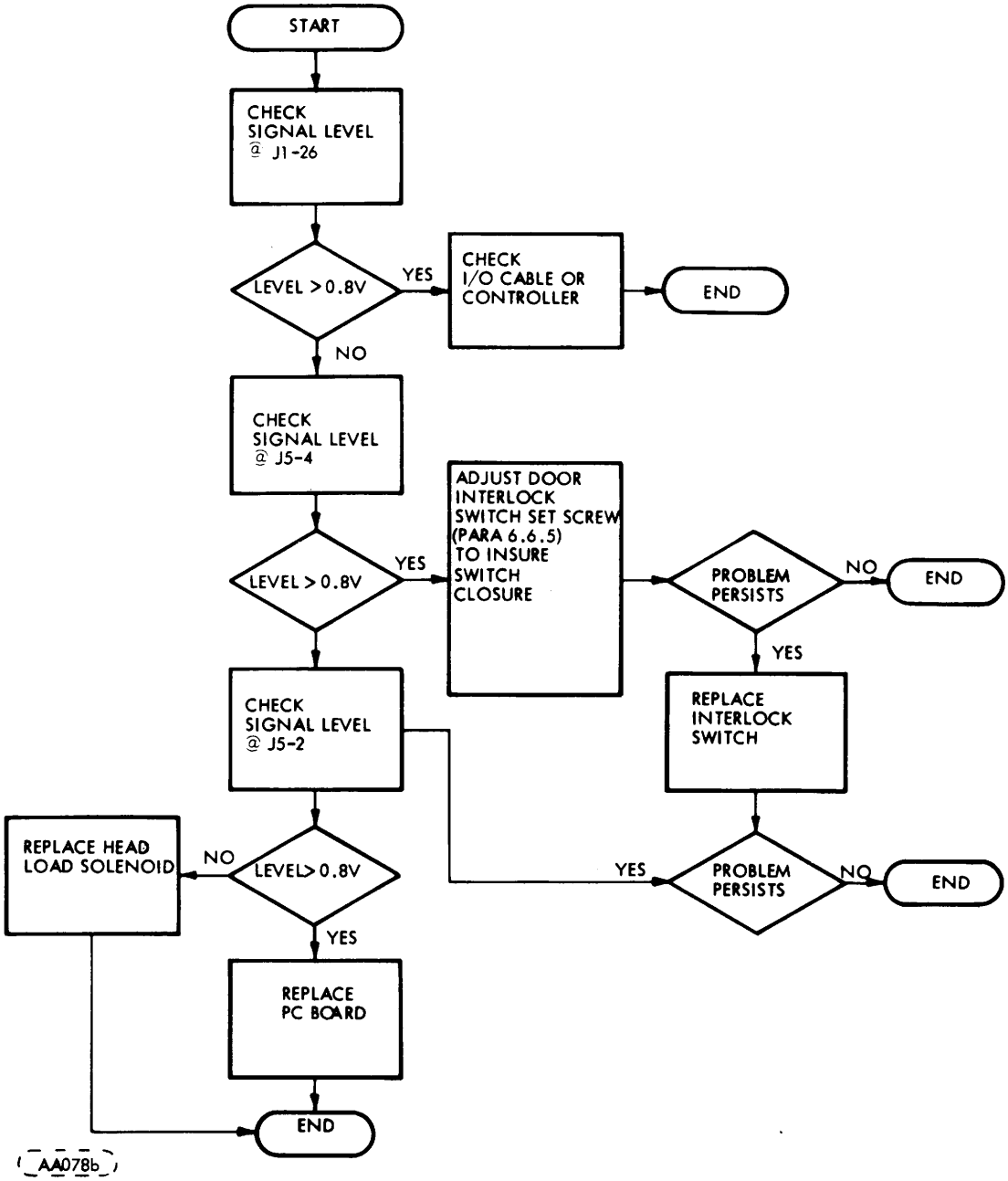
AA030b

6.5.3 INDEX PULSE MISSING

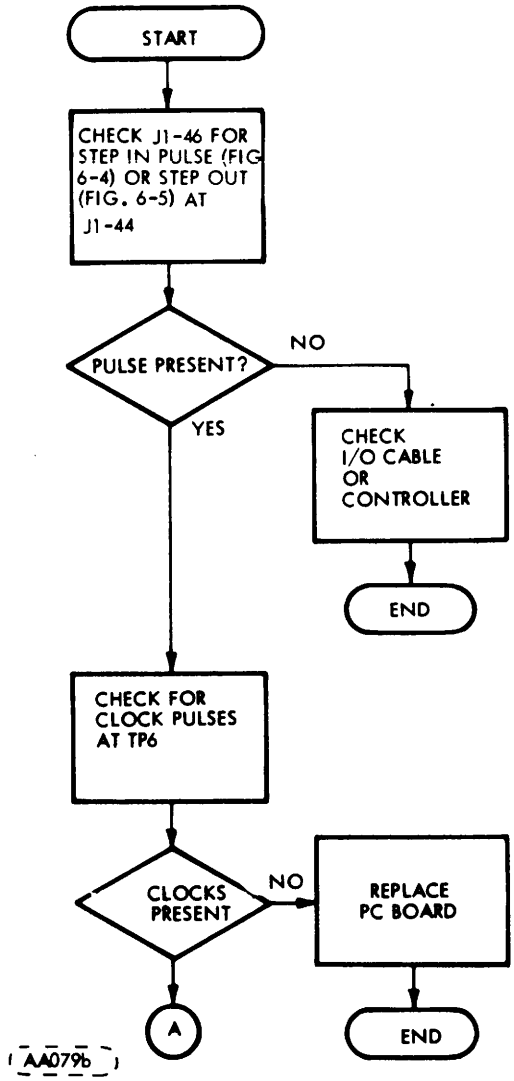


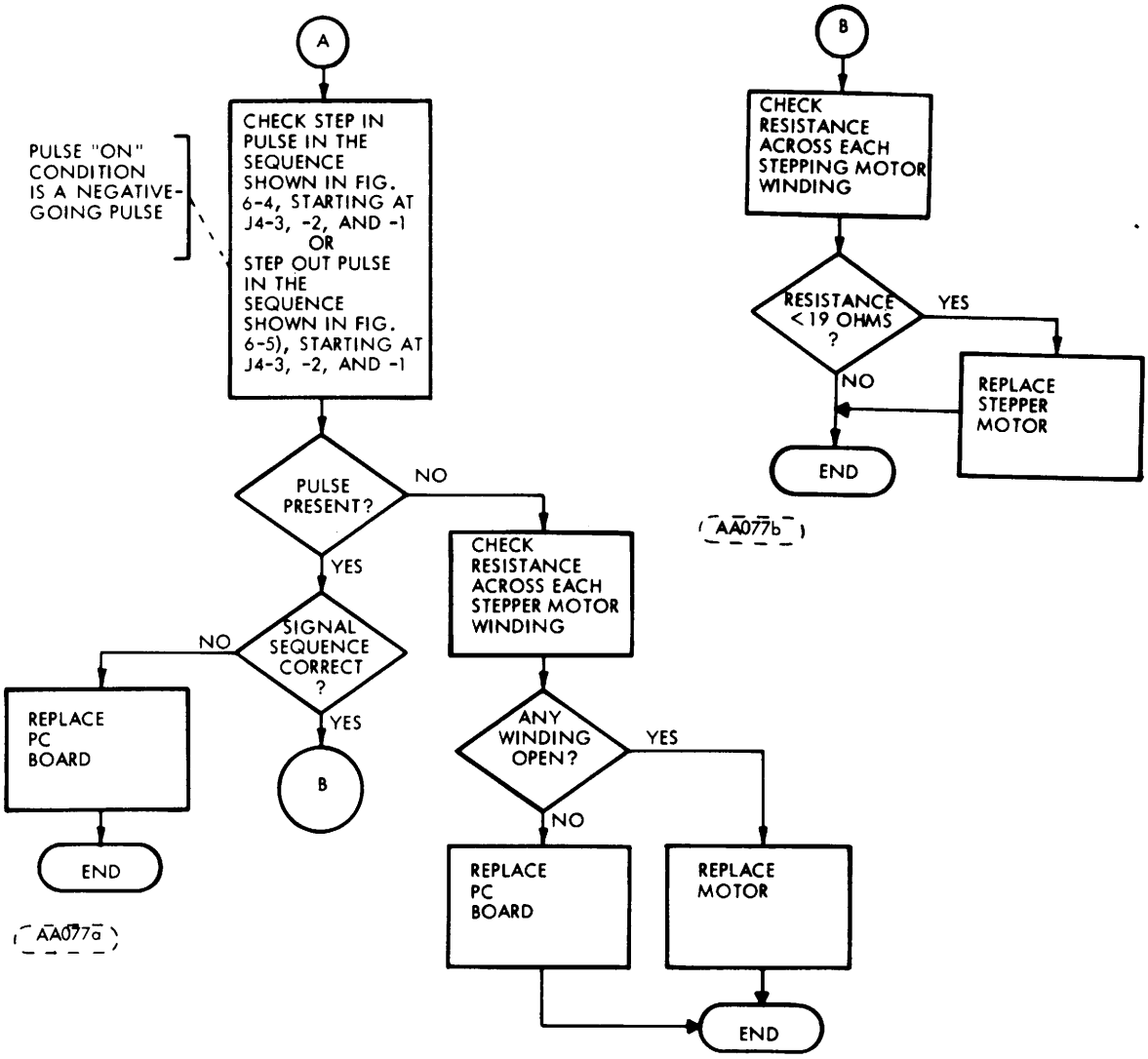


6.5.4 HEAD NOT LOADING

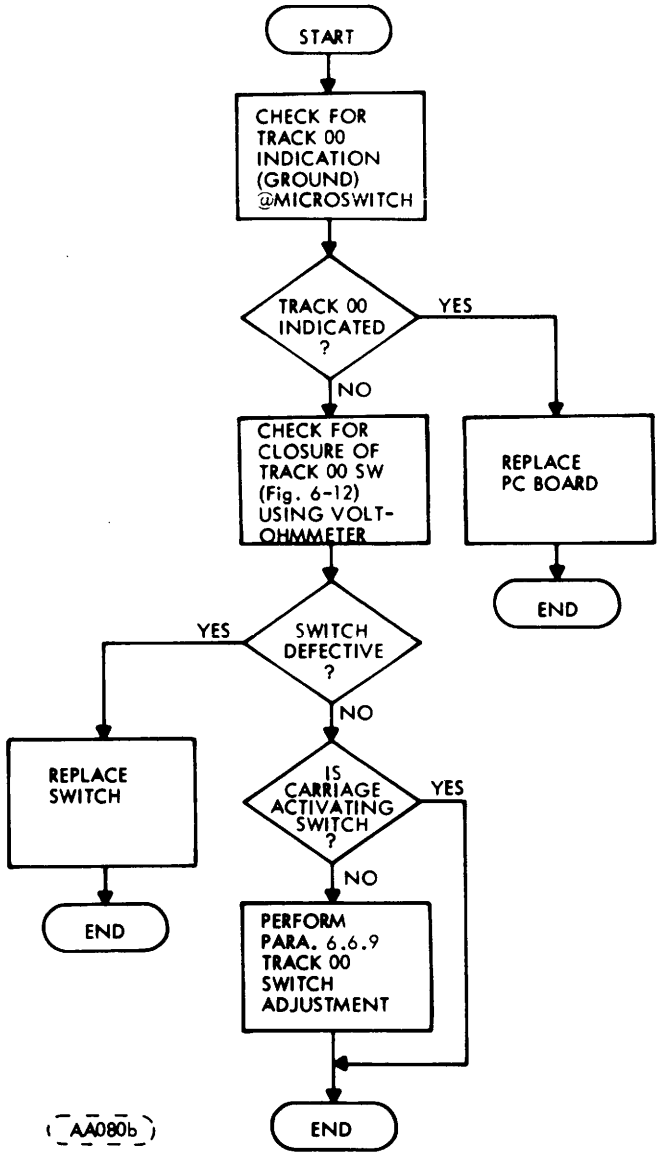


6.5.5 READ/WRITE HEAD NOT STEPPING

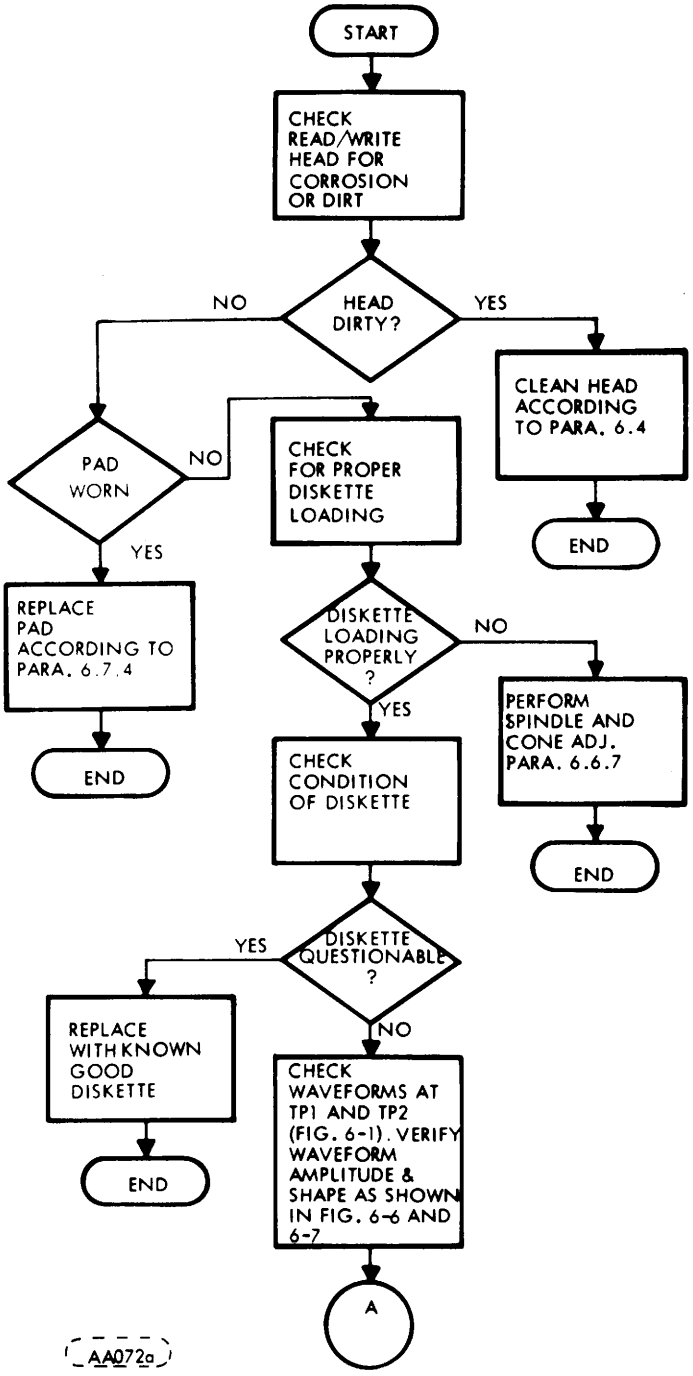



A
CHECK STEP IN PULSE IN THE SEQUENCE SHOWN IN FIG. 6-4, STARTING AT J4-3, -2, AND -1
OR
STEP OUT PULSE IN THE SEQUENCE SHOWN IN FIG. 6-5), STARTING AT J4-3, -2, AND -1
PULSE "ON" CONDITION IS A NEGATIVE-GOING PULSE
PULSE PRESENT?
NO
YES
SIGNAL SEQUENCE CORRECT ?
NO
YES
REPLACE PC BOARD
END
B
AA077a
CHECK RESISTANCE ACROSS EACH STEPPER MOTOR WINDING
ANY WINDING OPEN?
YES
NO
REPLACE PC BOARD
REPLACE MOTOR
END
B
CHECK RESISTANCE ACROSS EACH STEPPING MOTOR WINDING
RESISTANCE <19 OHMS ?
YES
NO
REPLACE STEPPER MOTOR
END
AA077b

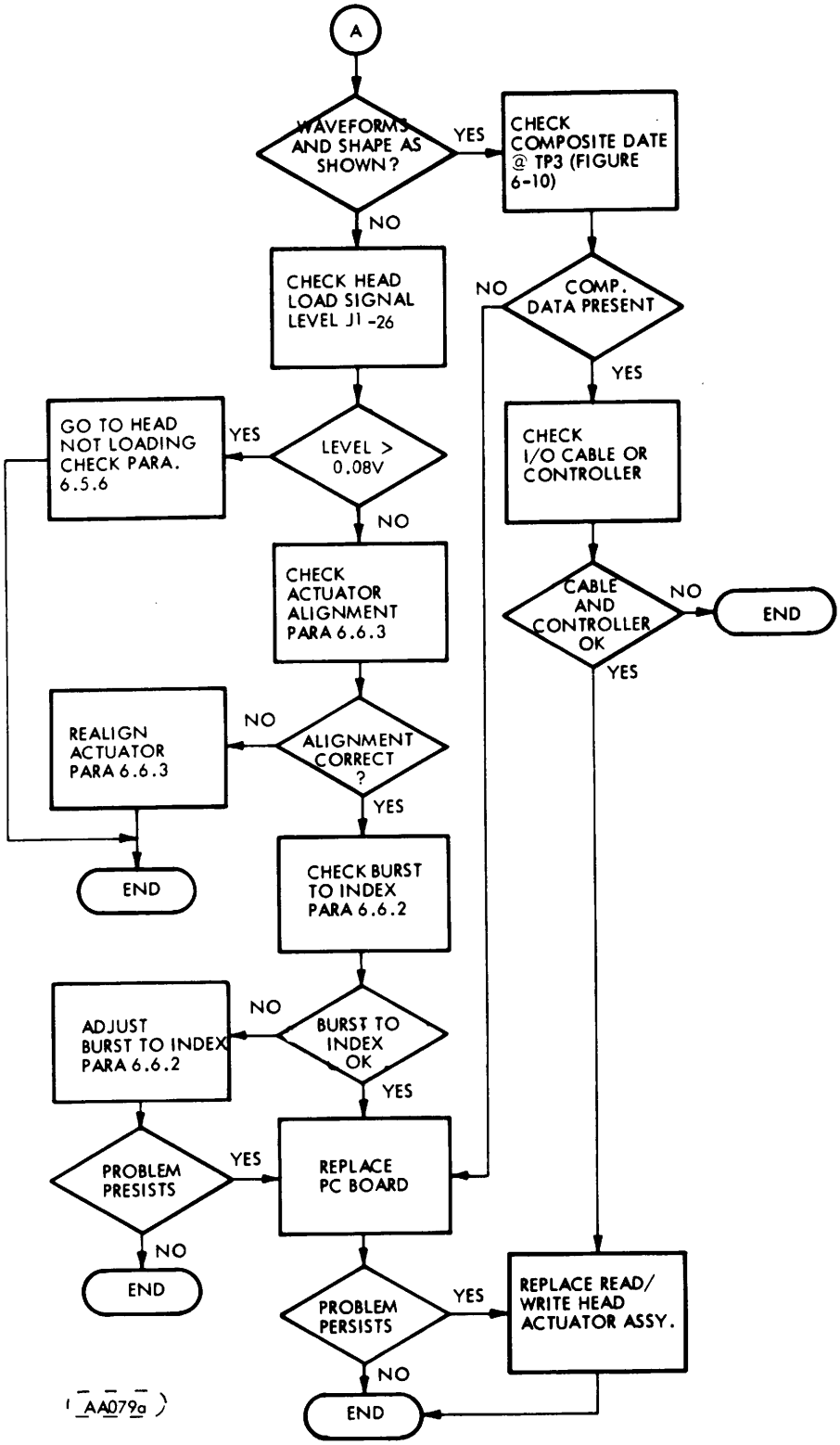
6.5.6 NO TRACK '00' INDICATOR



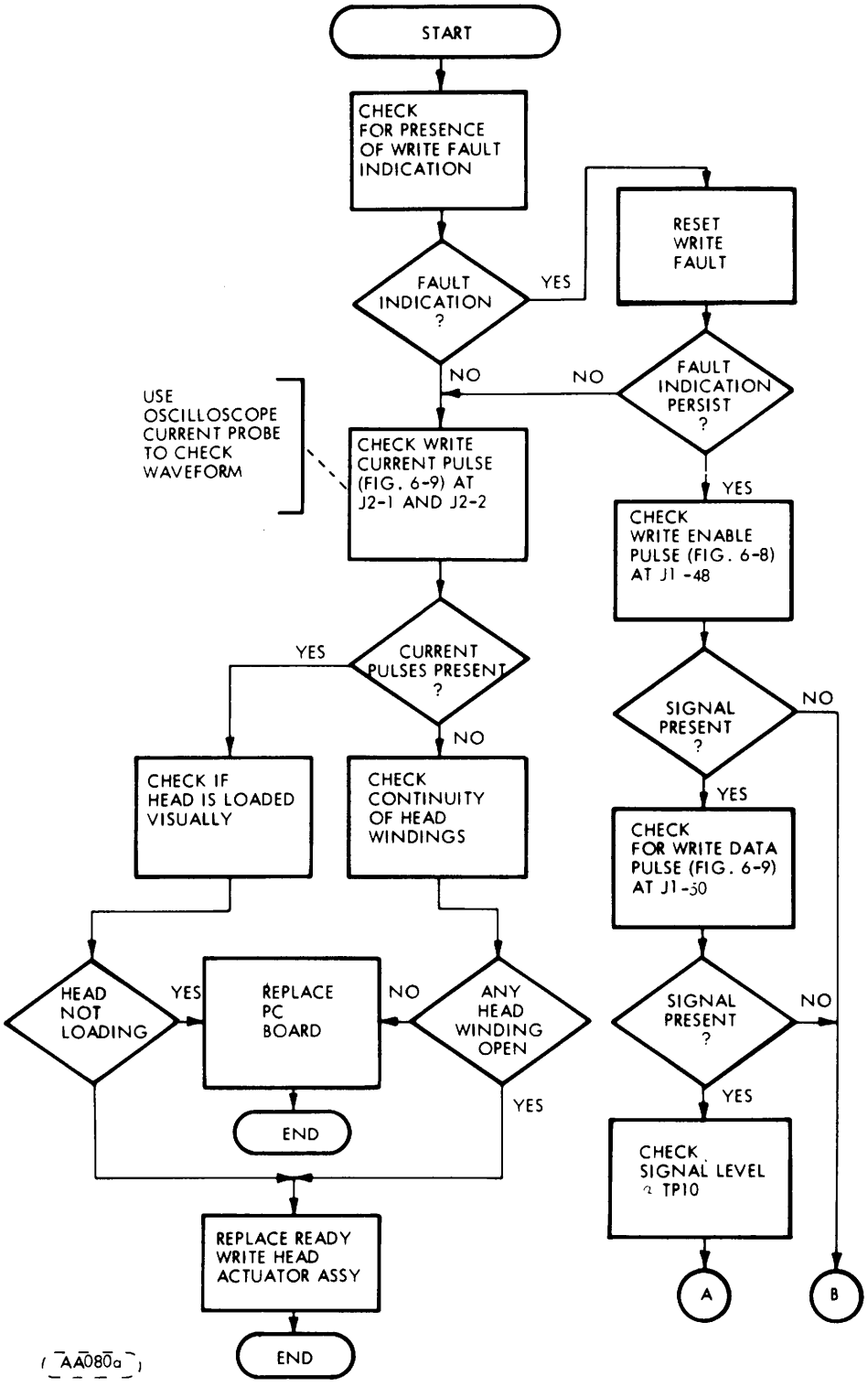
6.5.7 READ ERRORS

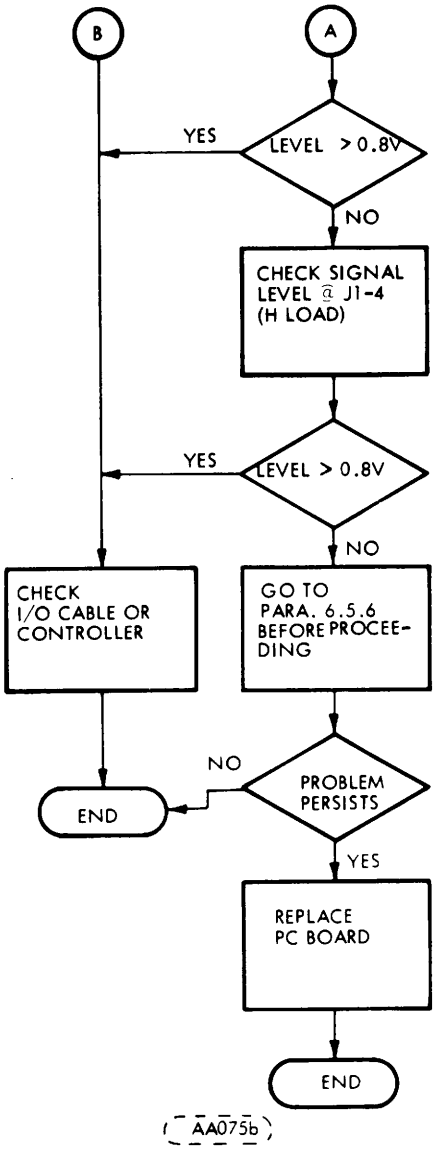


6.5.7 continued



6.5.8 WRITE ERRORS




B
A
YES
LEVEL > 0.8V
NO
CHECK SIGNAL LEVEL @ J1-4 (H LOAD)
YES
LEVEL > 0.8V
NO
CHECK I/O CABLE OR CONTROLLER
GO TO PARA. 6.5.6 BEFORE PROCEEDING
NO
PROBLEM PERSISTS
END
YES
REPLACE PC BOARD
END
AA075b

6.6 ADJUSTMENT PROCEDURES

6.6.1 ACTUATOR ALIGNMENT (Tool)

The Actuator Alignment Tool (CDC 75292000) must be used to perform this procedure. Also, the FDD must be connected to the user system or to a test set to perform this procedure.

a. Remove connector J5.
b. Remove chassis support assembly by removing four (4) socket head screws (Figure 6-12).
c. Move carriage assembly (Figure 6-12) to the rearmost position by turning outer stop in a counter-clockwise direction.
d. Apply dc voltage to the FDD.

NOTE

Step (c) ensures that Read/Write head is aligned on approximately track 00 and step motor ØA is energized.

e. Place alignment tool on spindle assembly as shown in Figure 6-13. Ensure that alignment tool contacts carriage at contact point B (see Figure 6-13).
f. If there is a gap between the edge of the alignment tool and carriage at the contact point B, it will be necessary to loosen the phototransistor mount screws and move the mount so that contact at point B is possible.
g. Now check to see if a gap exists between the end of the tool and the carriage assembly (Gap A in Figure 6-13). If so, slightly loosen the right stepper motor clamp screw (Figure 6-13).
h. Rotate stepper motor in direction required to eliminate gap.
i. Tighten stepper motor clamp screw and check gap again. Repeat steps f through h, as required, to eliminate gap.
j. Loosen sector photo-transistor mount screws and move mount until it contacts alignment tool, as shown in Figure 6-13. Tighten transistor mount screws.

NOTE

Make sure that the opposite end of alignment tool is still in contact with carriage at contact point B after completion of step i.

k. Remove alignment tool.
l. Place outer stop gauge (CDC P/N 83401300) against carriage as shown in Figure 6-13.
m. Loosen outer stop screw and move outer stop until tooth contacts stop gauge as shown in Figure 6-13. Tighten stop screw and remove gauge.
n. Step Read/Write head into track 76.
o. Place inner stop gauge (CDC P/N 83401400) against carriage as shown in Figure 6-13.

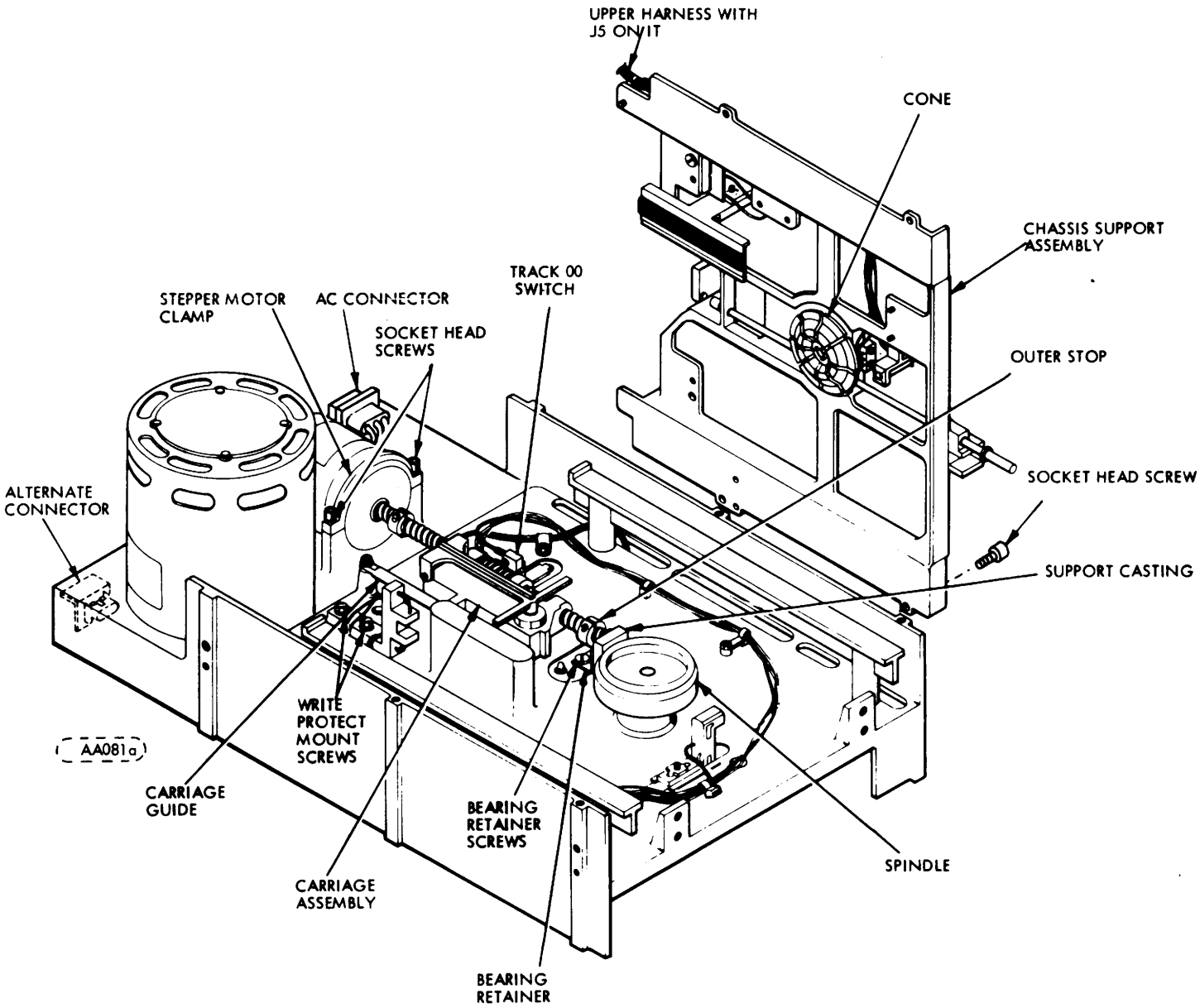


Figure 6-12. Base and Chassis Support Assembly

p. Loosen inner stop screw and move inner stop until it contacts stop gauge as shown in Figure 6-13. Tighten stop screw and remove gauge.
q. Recheck all adjustments made in this procedure and repeat all steps having out-of-tolerance indications.
r. Replace chassis support assembly and install four socket head screws.
s. Perform "Push Rod Travel Adjustment" procedure.

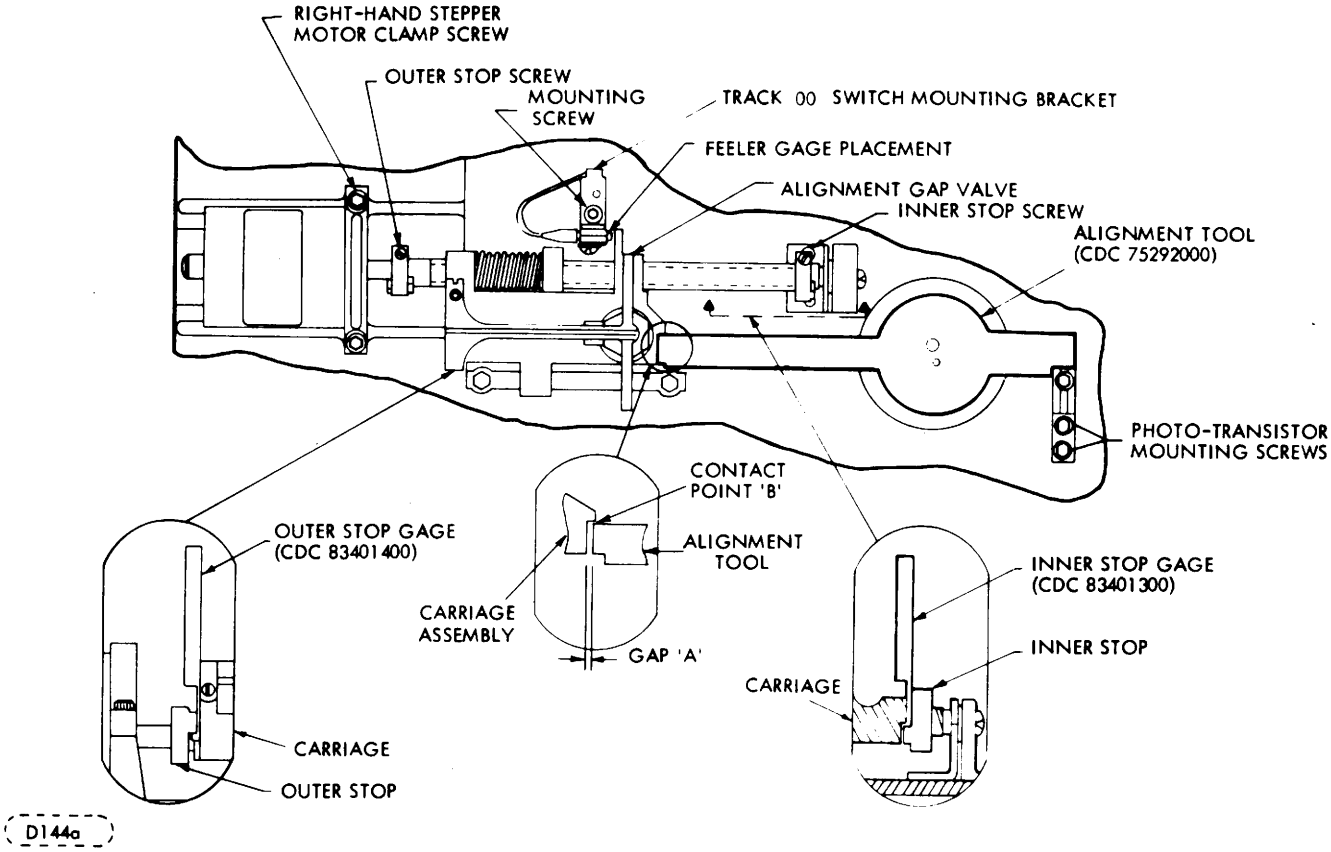


Figure 6-13. Alignment Tool Installation

6.6.2 BURST TO INDEX CHECK AND ADJUSTMENT

The Alignment Diskette is used to perform this procedure.

a. Install the alignment diskette.

CAUTION

The Alignment Diskette is for read only. Extreme caution should be used to assure this diskette is not written on. In addition, be sure diskette is removed from unit before AC or DC power is turned off at the tester.

b. Seek to Track Zero, then seek to track one and Read.

c. Connect Channel 1 of scope to TP1 on the PWA, Channel 2 to Index (by means of an IC clip) on U16, Pin 8 of the PWA. Set up the scope as follows:

Chan 1 Volt/Div To: 0.1 volt/div
Chan 2 Volt/Div To: 2 volt/div

Chan 1 voltage to: AC
Chan 2 voltage to: AC

Source to: Chan 1
Coupling to: Low Freq. (Hi Freq. Reject)

Vert. Mode to: Add
Slope (Sync) to: Pos.

Trig. Mode to: Normal
Time Base to: 50 us/div

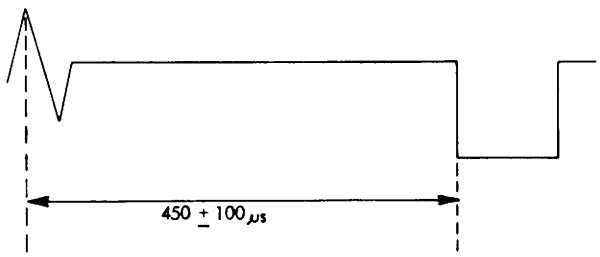
d. Adjust the time from write splice bit to the leading edge of the index pulse until it measures 450 ±100us (from 350us to 550us). (Refer to Figure 6-14) to adjust the write splice to index time, loosen the allen head screw holding the phototransistor (located on bottom of chassis toward the front of the unit). Using the adjustment handle protruding through the casting, move the phototransistor until the specification is met. Tighten the allen screw while observing the scope signal. Verify that the adjustment did not change. If the adjustment cannot be achieved, it may be necessary to adjust the LED sensor located on the top plate assembly.

e. After the adjustment has been made and specification met, change the scope time base to 0.5 ms/div and verify that the index pulse width measures 1.5 ±0.6 ms (from 0.9 ms to 2.1ms). If the index pulse width is not within specification, adjust the LED sensor located on the top plate assembly. If the pulse width cannot be adjusted to meet specifications, the sensor assembly or PWA must be replaced and steps "a" through "e" repeated.

f. Seek to Track Zero then seek to track 76 and read. Scope is to remain set as defined in the original setup in step "c". It may be necessary to adjust the sync level slightly to stabilize the trace. Verify that the time from the write splice bit to the leading edge of the index pulse is 450 ±100us (from 350us to 550us). (Refer to Figure 6-14). If the specification is not met, perform the adjustment routine defined in step "d" including the verification of the index pulse width in Step "e".

g. All scope settings are to remain as defined in the original setup in step "c", but it may be necessary to slightly adjust the sync. Seek to track 00 then seek to track 1 and perform a read. While observing the signal on the scope, remove and reinsert the diskette three times.

   After each insertion, verify that the change in the time from write splice to leading edge of index is less than 50 us. If the change is greater than 50 us, the cone and spindle must be aligned or replaced (see section 6.6.7) and steps "a" through "g" repeated.



AA036c

Figure 6-14. Write Splice Bit to Index Timing

6.6.3 ACTUATOR ALIGNMENT (Diskette)

The Alignment Diskette is used to perform this procedure.

a. Install the alignment diskette.

CAUTION

The alignment diskette is for read only. Extreme caution should be used to assure this diskette is not written on. In addition, be sure diskette is removed from unit before AC or DC power is turned off at tester or user system.

b. Step to track 38 (00100110) and perform a read.

c. Connect Channel 1 of scope to TP1 on the PWA and Channel 2 to TP2 on the PWA.

d. Connect the external sync probe to index at U16 pin 8 on PWA by means of an IC clip.

e. Set up the scope as follows:

Channel 1: volts/div to: 0.1 volts/div
Channel 2: volts/div to: 0.1 volts/div (inverted)
Channel 1: input to: AC
Channel 2: inputs to: AC
Vertical Mode to: Add
Slope (Sync) to: Positive
Trigger Source to: External
Trigger Coupling to: Low Frequency (High Frequency Reject)
Trigger Mode to: Normal
Time Base to: 20 msec/div

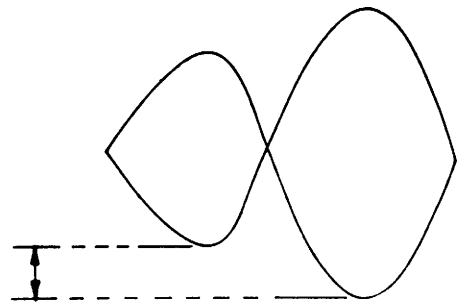
NOTE

Scope trace after trigger level is adjusted for repetitive trace should display an envelope of Data "Cateyes" consisting of two lobes (Refer to Figure 6-15A).

f. Change the volts/div of Channel 1 and Channel 2 to 0.02 volts/div. Move the trace on the scope (Position Knob) up until the bottom of the two lobes are setting approximately on the base line (Refer to Figure 6-15B). For a correctly aligned unit, the voltage difference between the bottoms of both lobes must be less than 25 mV.

g. If not in alignment, loosen the stepper motor clamp mounting screws to where a gap exists between the clamp and casting (See Figure 6-16) and slowly rotate the stepper motor to adjust the amplitude until the amplitude of both lobes is the same, that is, the difference between the bottoms of both lobes is less than 5mV.

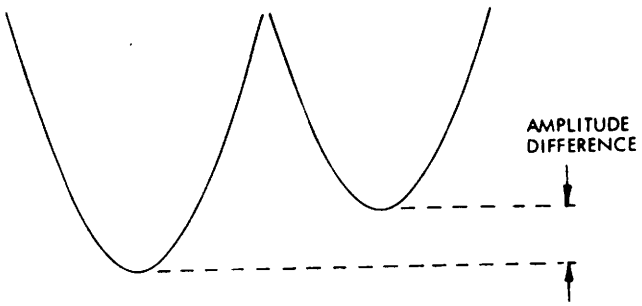
SCOPE TRACE A



(AA042b)

"CATEYES" PRELIMINARY HEAD ALIGNMENT

SCOPE TRACE B



(AA042a)

"CATEYES" FINAL HEAD ALIGNMENT

Figure 6-15. Head Alignment Amplitude

h. Tighten the stepper motor clamp. Return to track 00, then seek back to track 38. Verify that the 5mv specification is still met. If the specification is not met, readjust the stepper motor, return to zero and seek back to track 38. Repeat the adjustment until the 5mv specification is met.

j. Remove alignment diskette.

k. Place outer stop gauge (CDC P/N 83401300) against carriage as shown in Figure 6-13.

l. Loosen outer stop screw (see Figure 6-13) and move outer stop until tooth contacts stop gauge as shown in Figure 6-13. Tighten stop screw and remove gauge.

m. Step Read/Write head to track 76.

n. Place inner stop gauge (CDC P/N 83401400) against carriage as shown in Figure 6-13.

o. Loosen inner stop screw (See Figure 6-13) and move inner stop until it contacts stop gauge as shown in Figure. Tighten stop screw and remove gauge.

p. Perform Track 00 Switch Adjustment Paragraph 6.6.9.

q. Recheck all adjustments made in this procedure and repeat all steps having out-of-tolerance indications.

6.6.4 PUSH ROD TRAVEL ADJUSTMENT

This procedure must be performed whenever chassis support (Figure 6-16) is removed and replaced.

a. With front panel door closed, verify that a gap exists between the retaining ring and the disk load bushing of approximately 0.030 inch (refer to Figure 6-16). Perform step b if out of adjustment.

b. Adjust disk load arm set screw (Figure 6-16) until gap is approximately 0.030 inch, with door closed.

c. Proceed to Door Interlock Switch Adjustment (paragraph 6.6.5)

6.6.5 DOOR INTERLOCK SWITCH ADJUSTMENT

This procedure must be performed whenever the Push Rod Travel Adjustment procedure is performed.

a. Verify that interlock switch closes (when closing the door) prior to the door latching. Perform step (b) if switch and door are out of sync.

b. With door closed, adjust set-screw at end of disk load arm (Figure 6-16) while holding door closed against metal stop. Adjust set-screw until micro-switch is almost adjusted flush to top of switch case. This ensures that as the nylon tips on the push-rod wears down, the switch will still close.

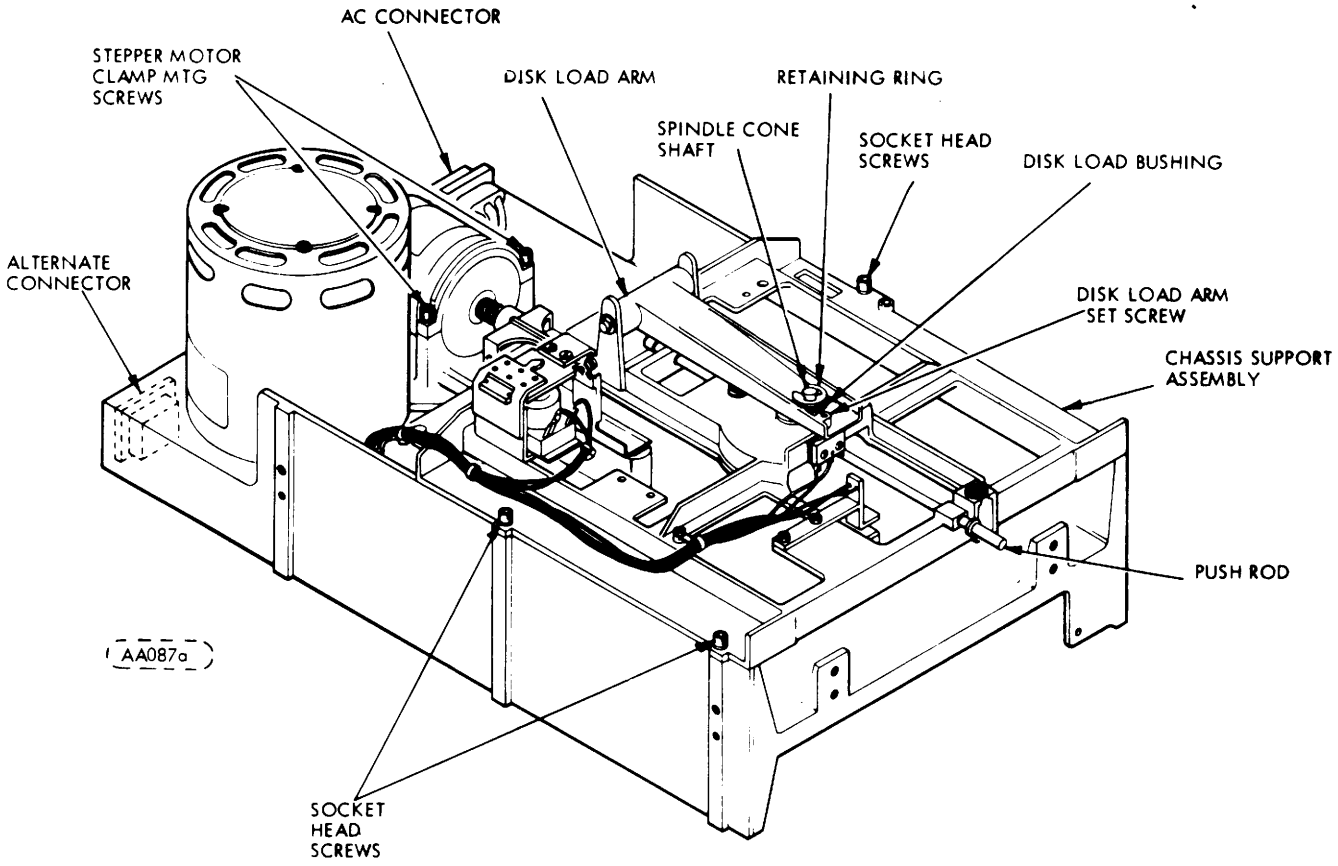


Figure 6-16. Chassis Base Assembly

6.6.6 DISK LOAD SOLENOID ADJUSTMENT

This procedure must be performed whenever the solenoid or bail are removed or the screw holding the bail becomes loose.

a. Place a .072" feeler gauge on boss of bottom support casting underneath bail.

NOTE

Caution must be taken to ensure gauge is not under foam padding.

b. Energize solenoid.
c. Loosen machine screw on bail (Figure 6-17).
d. Adjust Bail so it is flat against the top of the gauge.

NOTE

On early units, the upper portion of bail was not channel shaped. When adjusting these units, the spacing must be checked at both ends of the bail to ensure it is parallel to the boss.

e. Tighten machine screw

6.6.7 SPINDLE AND CONE ADJUSTMENT

This procedure must be performed whenever the spindle and cone are out of alignment or whenever the actuator assembly is removed or replaced.

a. Loosen chassis support assembly (Figure 6-16).
b. Position chassis assembly so that the cone fits into the spindle (Figure 6-12).
c. Push down on the spindle cone shaft so cone sets in spindle (Figure 6-12).
d. Rotate spindle to assure all cone teeth are properly set.
e. Release spindle cone shaft.
f. Repeat steps c through e several times.
g. Secure socket lead screws (Figure 6-16) and again recheck steps c through e.

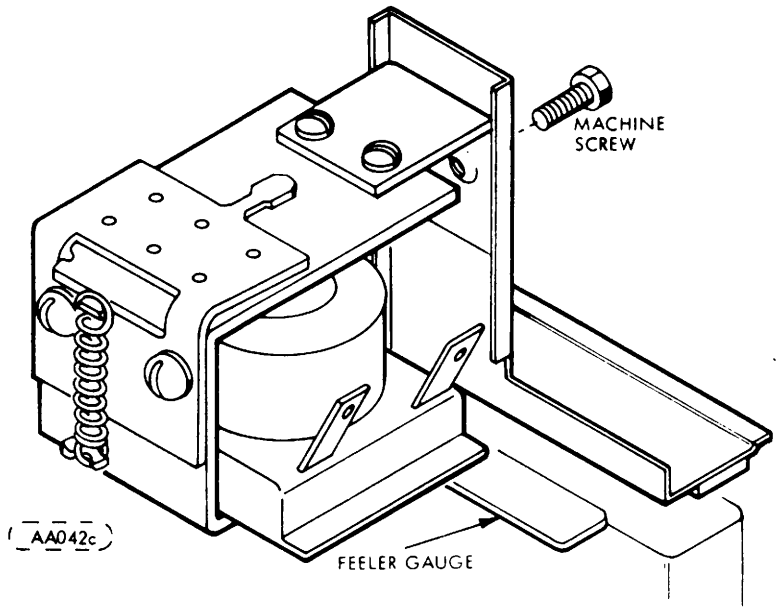


Figure 6–17. Disk Load Solenoid

6.6.8 HEAD LOAD BAIL

Perform this procedure whenever the head load solenoid or polyested foam pad are replaced. Refer to Figure 6-18.

a. Loosen bail mounting screw.
b. Manually depress solenoid armature.
c. Insert a 0.015" shim between foam strip on bail and cast support.
d. Insure that bail is parallel to support and tighten mounting screw.

6.6.9 TRACK '00' SWITCH ADJUSTMENT

Perform either the mechanical or electrical procedure given below whenever the Track 00 switch has been replaced, or the device fails to give current Track 00 indication, or if head has been realigned.

- Mechanical Adjustment

a. Step read/write head out to track 01.

b. Place a .010 feeler gauge between carriage assembly and track 00 switch, as shown in Figure 6-13.

c. Verify that track 00 switch closes by observing Track 00 signal at terminal J3-2 on Component Board Assembly 75865208.

d. If Track 00 signal does not occur, loosen track 00 switch bracket mount screw and rotate switch bracket forward until Track 00 signal occurs.

- Electrical Adjustment

e. Step Read/Write head out to Track 00.
f. Do a continuous one track seek (back and forth between Track 00 and 01).
g. Verify that the duty cycle of the signal observed at terminal J3-2 is 50%.
h. If Track 00 signal is not 50% duty cycle, loosen Track 00 switch bracket mount screw and rotate switch bracket until Track 00 signal is set to 50% duty cycle.

6.7 REMOVAL AND REPLACEMENT PROCEDURES

The following procedures give the proper sequence for removal and replacement of major assemblies. To avoid damage to parts, the procedure must be performed in sequence.

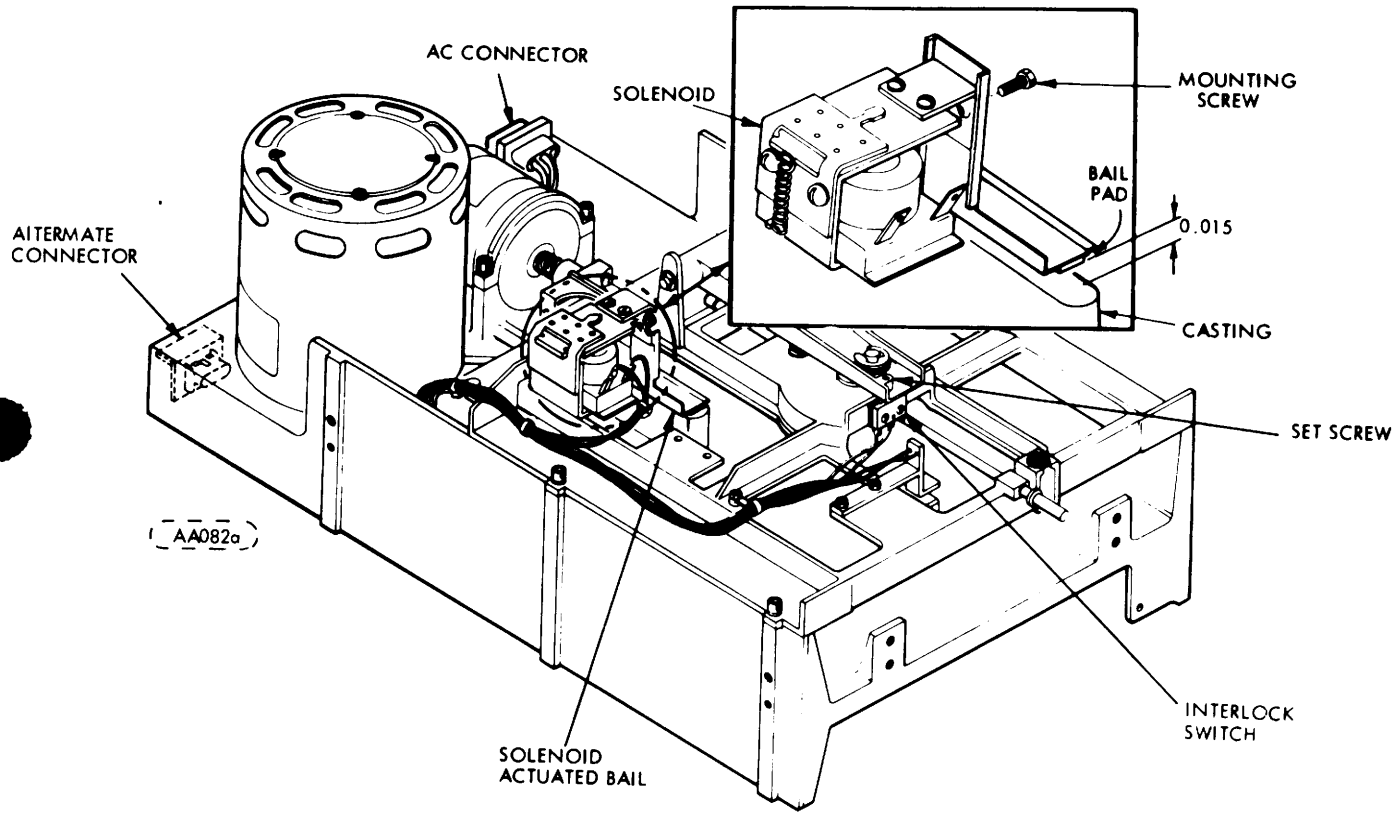


Figure 6—18. Bail Alignment

6.7.1 PRINTED CIRCUIT BOARD (PWA)

a. Disconnect I/O Cable from J1.
b. Disconnect harnesses from J2, J3, J4, J5, and J6 on printed circuit board.
c. Remove two screws from printed circuit board adjacent to connector J1 (Figure 6-19).
d. Remove PWA by detatching it from the four push-in clips shown in Figure 6-19.
e. To replace printed circuit board push clips through printed circuit board.
f. Replace two screws adjacent to connector J1.

6.7.2 ACTUATOR ASSEMBLY

a. Open front panel door.
b. Disconnect harness from J2 and J4 on printed circuit board.
c. Remove four (4) socket head screws securing chassis support (Figure 6-16).
d. Slide chassis support back far enough to clear push rod (Figure 6-16) of front panel and lift support clear of chassis.
e. Remove two (2) screws securing bearing retainer (Figure 6-12).
f. Remove stepper motor clamp by removing two socket head screws (Figure 6-12). Remove Cable Clamp.
g. Carefully slide actuator assembly (stepper motor, actuator, and bearings at the end of stepper shaft) straight out toward the rear of the FDD until unit is clear of the casting.
h. Before replacing actuator assembly, apply Molycote (P/N 95016100) to stepper motor shaft. This should be applied sparingly whenever the carriage, carriage nut, or the stepper shaft is replaced.
i. To replace actuator assembly, slip bearings into support casting, Figure 6-12. (Assure carriage assembly is fitted on carriage guide.)

CAUTION

The wavy spring washer between the two bearings can prevent the bearings from being inserted into the support casting if the washer has slipped off-center and sticks out beyond the circumference of the bearings. If this happens, loosen the retainer screw on the end of the shaft so the bearings can separate and the washer be repositioned. The screw must be retightened after the bearings are successfully inserted.

j. Replace stepper motor clamp and two socket head screws (Figure 6-12).
k. Secure the bearing retainer by replacing the two bearing retainer screws (Figure 6-12).

CAUTION

The bearing retainer clamp should have an included angle of approximately 92° between the base and side. When base is securely fastened to chassis, this will assure proper tension on bearings. If a gap exists between bearing and retainer or if bearing is being bound up by retainer, this angel must be checked.

l. Perform Actuator Alignment Procedure, (paragraph 6.6.1).
m. Perform Spindle and Cone Adjustment, (paragraph 6.6.7).
n. Perform Push-Rod Travel Adjustment, (paragraph 6.6.4).

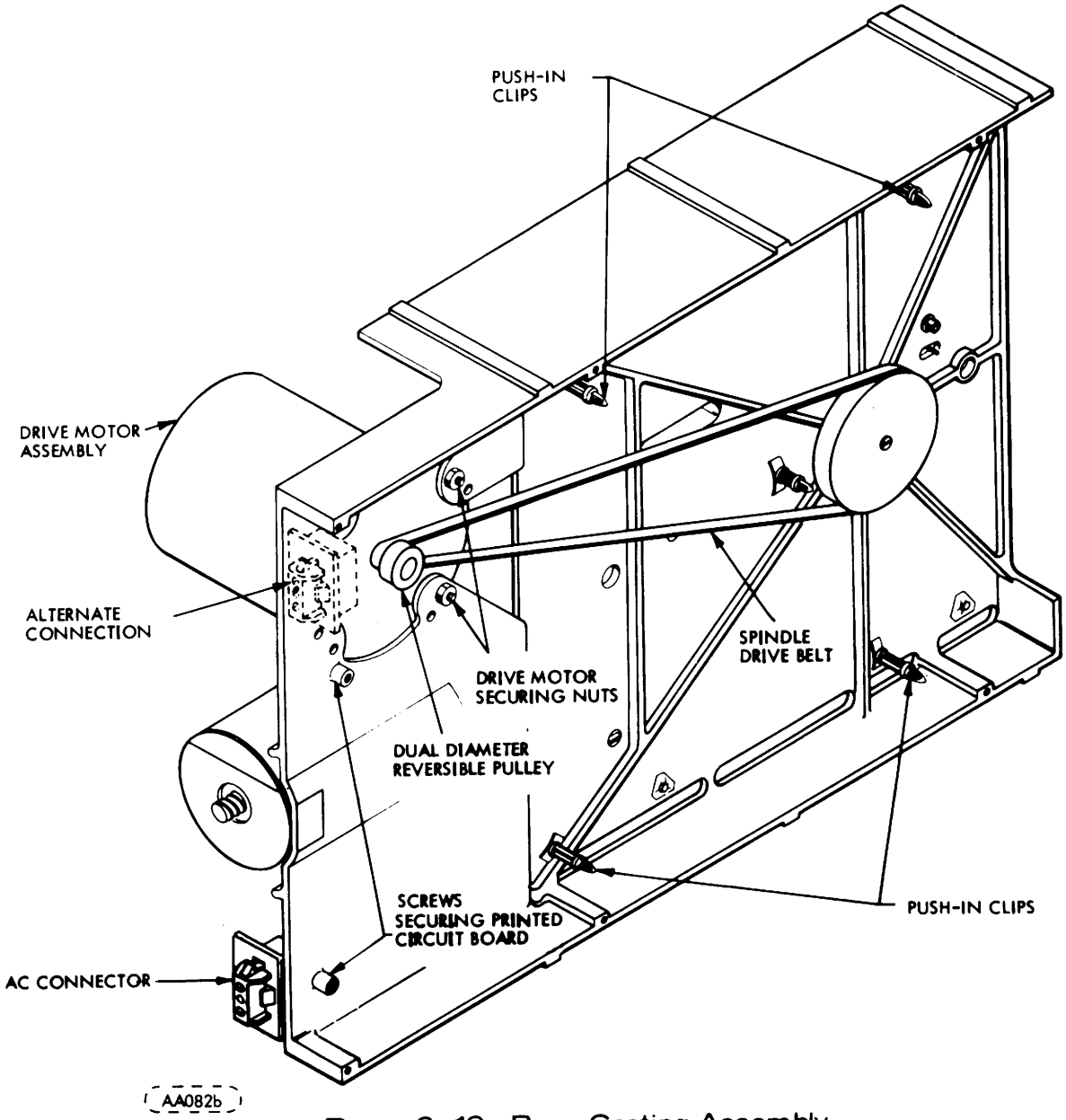


Figure 6-19. Base Casting Assembly

6.7.3 DRIVE MOTOR ASSEMBLY

a. Perform removal procedure for printed circuit board (paragraph 6.7.1).
b. Remove screws securing drive motor cable clamps.
c. Remove AC connector from bracket. (Figure 6-19)
d. Remove spindle drive belt (Figure 6-19).
e. Remove three (3) nuts securing drive motor (Figure 6-19).
f. Remove drive motor assembly (drive motor, capacitor, and AC connector).
g. To replace drive motor assembly perform, in reverse order, steps f through a substituting word replace for word remove.

6.7.4 HEAD LOAD PAD REPLACEMENT

a. Remove power from the unit.
b. Move the carriage assembly to its rear most position (toward the stepper motor) by turning the aft part of the stepper motor shaft (Figure 6-20). This will provide clearance for lifting the head load arm.
c. Lift the head load arm until the head load pad is visible (see Figure 6-20).
d. If head load arm is a 77603108 (Figure 6-20) proceed to step h, else go to next step.
e. Remove the used pad with a sharp tool, if necessary, and discard. Be sure to remove all of the old pad and adhesive. Alcohol may be used on old adhesive.
f. Remove the protective backing from the new head load pad and position pad in approximate center of recess in head load arm. Press pad firmly to insure adhesion with a clean tongue depressor or with thumb using a lint-free cloth to protect the pad from grease or dirt.
g. Go to step n.
h. Loosen clamping screw holding rim of head load pad.
i. Insert screw driver and rotate head load pad so flatten side will clear clamping screw.
j. Remove Pad Holder Assembly.
k. Insert new Assembly, with flat side facing clamping screw.
l. Assuring that head load pad is fully seated, rotate pad 180°.
m. Tighten clamping screw to hold pad in place.
n. Lower arm gently onto head.

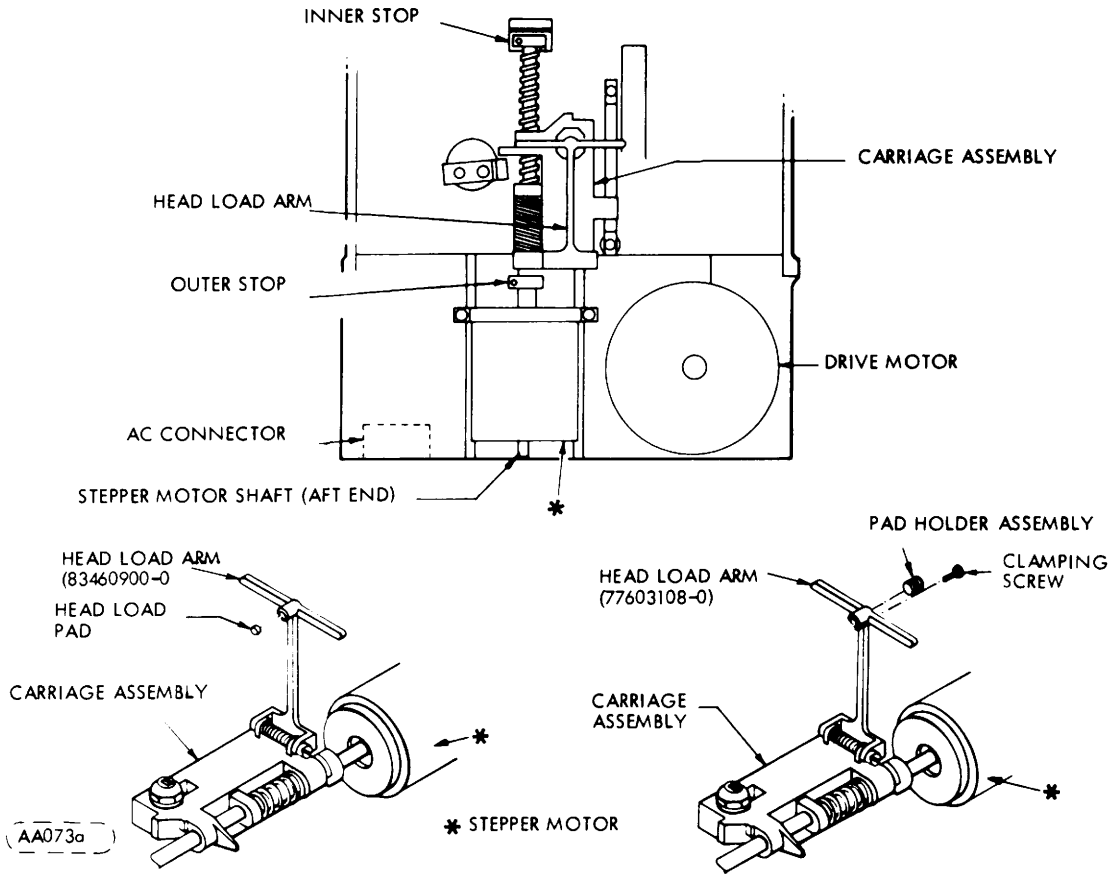


Figure 6-20. Head Load Pad Replacement Illustration

6.8 FREQUENCY CONVERSION

6.8.1 OPERATING FREQUENCIES CONVERSION PROCEDURE

This procedure should be used to convert the FDD unit from 60 Hz operation to 50 Hz operation or vice versa. This is accomplished by reversing the dual diameter reversible pulley on the spindle motor shaft (Figure 6-19) using the following steps:

a. Remove AC power.
b. Remove Printed Circuit Board Assembly per paragraph 6.7.1.
c. Remove the belt from the spindle motor pulley. (Accessible from the under side of unit.)
d. Loosen set-screw and remove pulley.
e. Reverse pulley and replace on motor shaft.
f. Position pulley allowing tolerance of 0.072" ±0.010" between shoulder of motor mounting screws and pulley (Figure 6-21).
g. Tighten down set-screw.
h. Replace belt and Printed Circuit Board.

CAUTION

It is IMPORTANT that the new operating frequency be marked on the units rating nameplate.

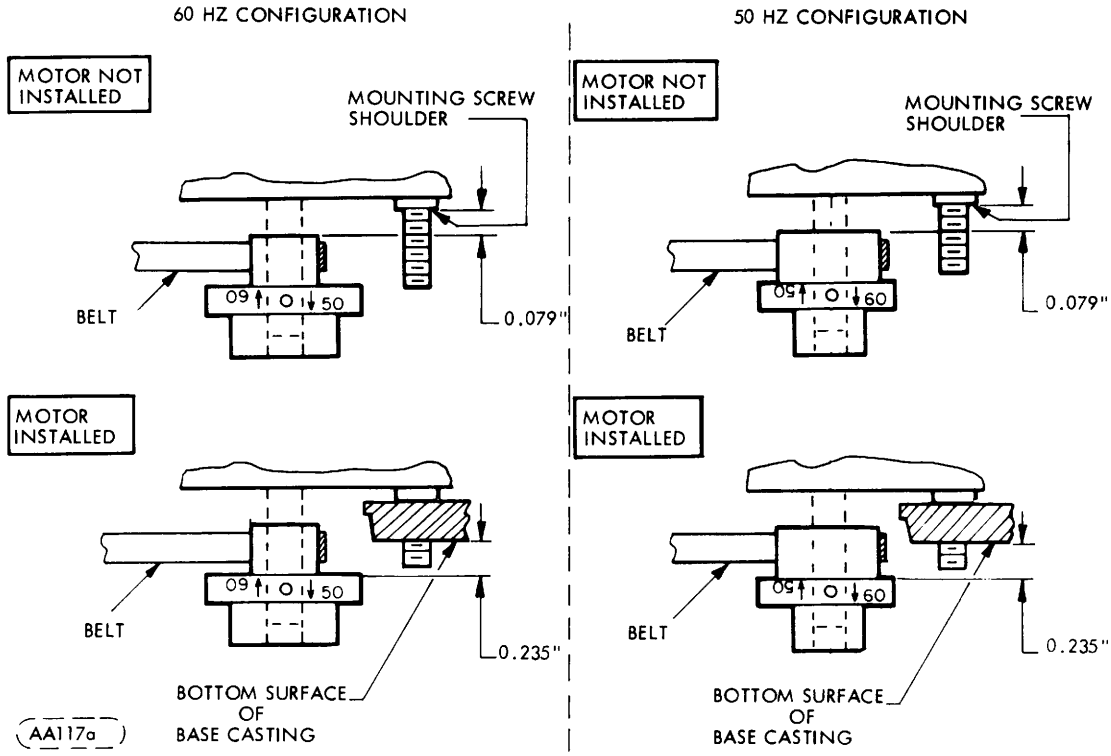


Figure 6-21. Drive Pulley Reversal

VII
MAINTENANCE AIDS

7.1 INTRODUCTION

This section contains detailed information on the logic circuits used in the FDD. The logic consists of two types of circuits: discrete component and integrated circuits (IC). Integrated circuits are contained within a single chip and discrete component circuits contain individually identifiable resistors, capacitors, transistors, etc.

7.2 PHYSICAL DESCRIPTION (LOGIC)

All components are mounted on one side of the printed circuit board. The board is 8 x 11 inches and contain both IC and discrete component circuits.

7.3 USE OF RELATIVE LEVEL INDICATORS

The relative level indicator is a small triangle located on the input or output to a logic block. The presence or absence of this indicator indicates the conditions that are necessary to satisfy the function of the logic block. The presence of the triangle indicates a 0 logic level on that line is needed to satisfy the function. The absence of the triangle indicates a logical 1 is needed to satisfy the function.

The relative level indicator depicts the occurrence of inversion. Figure 7-1 shows some representative examples of the relative level indicator being used in this manner.

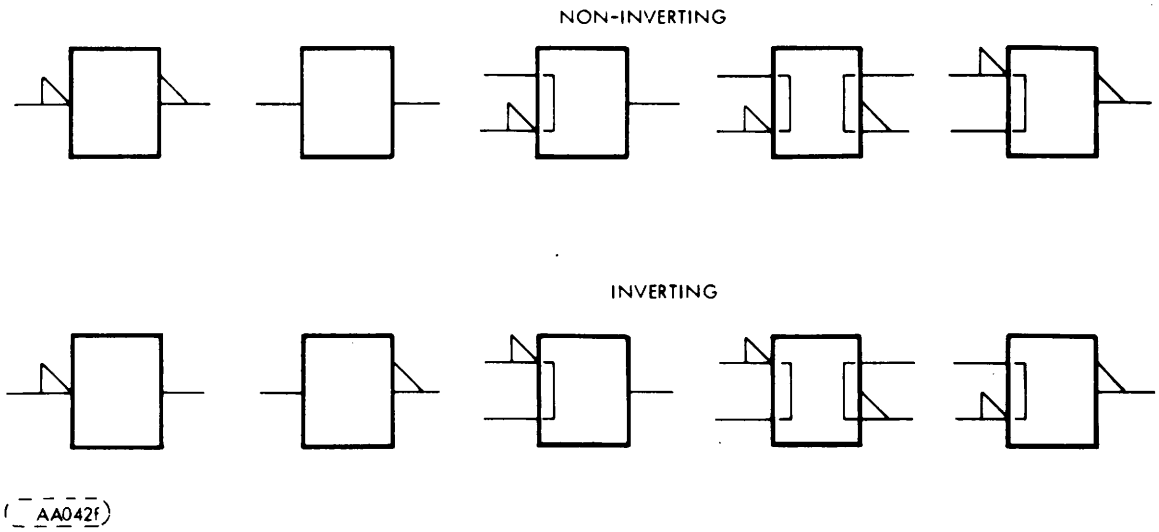


Figure 7—1. Inversion Conventions

7.4 INTEGRATED CIRCUITS

Figure 7-2 shows an example of a schematic block and the information that it contains. The first line gives the function symbol which identifies the logic function that the block performs. Refer to Figure 7-3 for a summary of function symbols. The second line gives the CDC element number. Refer to Table 7-2 for a cross reference between the CDC element number and the manufacturers type. The third line on the schematic block gives the circuit reference designation.

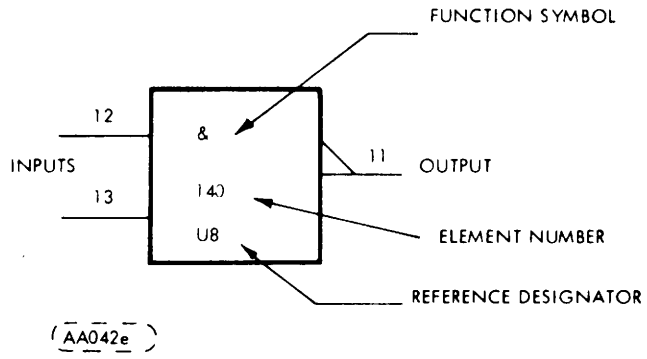


Figure 7—2. Integrated Circuit

Table 7—1. CDC Element Number Cross Reference

CDC DESIGNATION		MFG. DESIGNATION	
ELEMENT	PART NO.	TYPE	FUNCTION
140	51651900	7400 or 9002	QUAD 2-INPUT NAND
141	50250700	7410 or 9003	TRIPLE 3-INPUT NAND
143	51639900	7440 or 9009	DUAL 4-INPUT BUFFER
160	50251000	7472	J/K MS FLIP-FLOP
161	51718600	9601 or 74122	RETRIGGERABLE MULTIVIBRATOR
172H	50251600	3002	QUAD 2-INPUT NOR
175	50251500	3060 or 74H74	DUAL TYPE D FLIP-FLOP
180	51768200	75450	DUAL PERIPHERAL DRIVER
200	50254200	7406	HEX INVERTER
302	15126900	733	OPERATIONAL AMPLIFIER
902	50254500	75154	QUAD RECEIVER
8T20	15127000	8T20	BIDIRECTIONAL ONE-SHOT

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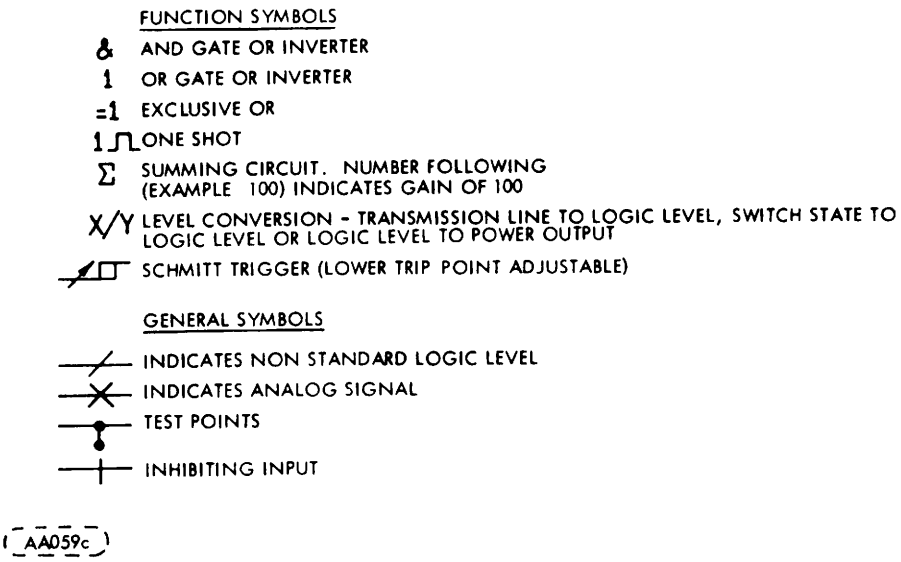

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Figure 7—3. Schematic Symbols

VIII
PARTS DATA

8.1 INTRODUCTION

This section contains an illustrated parts breakdown that describes and illustrates all variations of the Flexible Disk Drive (FDD). In general, parts are in disassembly sequence but do not necessarily indicate the maximum recommended disassembly of parts in the field.

8.2 ILLUSTRATIONS

Item numbers within a circle (1) indicate an assembly (group of parts). Item numbers without a circle, 1, indicate a single part; a group of parts that are pinned or press fitted together; or a group of parts which is normally replaced as an assembly.

8.3 PARTS LISTS

In addition to the accompaning parts list on each illustration, two additional Parts Lists are available; the Top-Down Assembly/Component Parts List and the Cross Reference Index. Instruction for the use of all Parts lists in paragraph 8.6.

8.4 TOP MECHANICAL AND ASSEMBLY LOCATOR

In conjunction with Table 8-1, Figure 8-1 serves two purposes;

1. When used with Table 8-1, it identifies all unique parts and assemblies for each FDD variation.
2. It identifies by sheet location where all major assemblies are broken down.

8.4.1 TOP MECHANICAL ASSEMBLY (TMA)

To determine what parts are used on a particular model, find the applicable model in Table 8-1. The corresponding item number represents the last three digits of the TMA number. Example: Model BR803N, TMA number 75744013. The item numbers at the top of Table 8-1 corresponds with the item numbers in Figure 8-1. All parts and assemblies that apply will be identified with an 'X' ('0' means not applicable).

8.5 REPLACEMENT PARTS

When ordering replacement parts for the FDD, the inclusion of the Model designation and the figure, item and part identification numbers for each part ordered will ensure positive identification of parts.

NOTE

Replacement parts for all OEM engineering evaluation units (BRXXXX TMA099) must be obtained from MPI OEM Engineering.

Table 8-1. Top Mechanical Assembly Configurator

	I	ITEM NUMBERS					
	T T	1111111111	1111111111	1111111111	1111111111	1111111111	111111111
MODELS	M E	0000000001	1111111112	2222222223	3333333334	4444444445	555555555
	A M	1234567890	1234567890	1234567890	1234567890	1234567890	123456789
BR803A	001	XX00000000	0000X00000	0000000000	0X0000X000	XX0X0XX000	0000X0000
BR803B	002	X0X0000000	0000X00000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR803C	003	X00X000000	0000X00000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR803D	004	X000X00000	0000X00000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR803E	005	XX00000000	00000X0000	0000000000	00X000X000	XX0X0XX000	0000X0000
BR803F	006	X0X0000000	00000X0000	0000000000	00X000X000	XX0X00X000	0000X0000
BR803G	007	XX00000000	00000X0000	0000000000	000X00X000	XX0X0XX000	0000X0000
BR803H	008	X0X0000000	00000X0000	0000000000	000X00X000	XX0X00X000	0000X0000
BR805A	009	XX00000000	0000000000	0000X00000	0000X0X000	XX0X0XXX00	0000X0000
BR805B	010	X0X0000000	0000000000	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR805C	011	X00X000000	0000000000	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR805D	012	X000X00000	0000000000	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR803N	013	XX00000000	0000000X00	0000X00000	0000X0X000	XX0X0XXX00	0000X0000
BR803P	014	X0X0000000	0000000X00	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR803R	015	X00X000000	0000000X00	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR803S	016	X000X00000	0000000X00	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR803J	017	X0000X0000	00000X0000	0000000000	00X000X000	XX0X00X000	0000X0000
BR803K	018	X0000X0000	00000X0000	0000000000	000X00X000	XX0X00X000	0000X0000
BR803L	019	X0000000000	0000X00000	000000000X	00000XX000	XX0000X000	0000X000X
BR803M	020	X0000000000	0000X00000	000000000X0	00000XX000	XX000XX000	0000X000X
	021						
	022						
	023						
	024						
BR8A2A	025	XX00000000	000000X000	00000X0000	0X0000X000	XX0X0XX000	0000X0000
BR803T	026	X0000X0000	0000000X00	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR805E	027	X0000X0000	0000000000	0000X00000	0000X0X000	XX0X00XX00	0000X0000
BR8A3A	028	X0000000000	X000X00000	0000000000	0X0000X000	XX0X0XX000	0000X0000
BR8A3B	029	X0000000000	0X00X00000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR8A2B	030	X0X0000000	000000X000	00000X0000	0X0000X000	XX0X00X000	0000X0000
BR8A2C	031	X00X000000	000000X000	00000X0000	0X0000X000	XX0X00X000	0000X0000
BR8A2D	032	X0000X0000	000000X000	00000X0000	0X0000X000	XX0X00X000	0000X0000
BR8A2E	033	X000X00000	000000X000	00000X0000	0X0000X000	XX0X00X000	0000X0000
BR8A2F	034	X0000000000	00X0X00000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR8A2G	035	XX00000000	000000000X	0000000000	0X0000X000	XX00XXX000	0000X0000
BR8A2H	036	X0X0000000	000000000X	0000000000	0X0000X000	XX00X0X000	0000X0000
BR8A2J	037	XX00000000	000000X000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR8A2K	038	X0X0000000	000000X000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR8A2L	039	X00X000000	000000X000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR8A2M	040	X0000X0000	000000X000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR8A2N	041	X000X00000	000000X000	0000000000	0X0000X000	XX0X00X000	0000X0000
BR8A2P	042	X000000000X	0000000000	X000000000	0X00000X0X	00XX0000XX	XXXXX0000
BR8A2R	043	X000000X00	00000000X0	0000000000	0X00000X00	X0XX0000XX	XXXXX0000
BR8A4A	044	X0000000000	0000000000	X00000XX00	0X00000X0X	00X00000XX	XXXXXXXX0
BR8A4B	045	X0000000000	000X000000	X00000X000	0X00000X0X	00X00000XX	XXXXXXXX0
BR8000	046	0000000000	0000000000	0000000000	0000000000	0000000000	000000000
BR8A5A	047	X0000000X0	000000X000	0X000X0000	0X0000X000	XX0X00X0X0	0000X0000
BR8A5B	048	X000000X00	000000X000	0X000X0000	0X0000X000	XX0X00X0X0	0000X0000
BR8000	049	0000000000	0000000000	0000000000	0000000000	0000000000	000000000
BR8000	050	0000000000	0000000000	0000000000	0000000000	0000000000	000000000
BR8A6B	051	X0X0000000	0000X00000	0000000000	0X0000X000	XX0X00X000	0000X0000
BRXXXX	099	OEM ENGINEERING UNIT					

ITEM	IDENT NO	DESCRIPTION	WHERE USED
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA
102	75291920-9	DRIVE MOTOR ASM	TMA
103	75291923-3	DRIVE MOTOR ASM	TMA
104	75291926-6	DRIVE MOTOR ASM	TMA
105	75291927-5	DRIVE MOTOR ASM	TMA
106	75291928-2	DRIVE MOTOR ASM	TMA
107	75291925-8	DRIVE MOTOR ASM	TMA
108	75747904-3	DRIVE MOTOR ASM	TMA
109	75747903-5	DRIVE MOTOR ASM	TMA
110	75747905-0	DRIVE MOTOR ASM	TMA
111	75291921-7	DRIVE MOTOR ASM	TMA
112	75291922-5	DRIVE MOTOR ASM	TMA
113	75291924-1	DRIVE MOTOR ASM	TMA
114	77830681-1	DRIVE MOTOR ASM	TMA
115	757721XX-X	COMPONENT BOARD ASM	TMA
116	758672XX-X	COMPONENT BOARD ASM	TMA
117	758817XX-X	COMPONENT BOARD ASM	TMA
118	758652XX-X	COMPONENT BOARD ASM	TMA
119	758952XX-X	COMPONENT BOARD ASM	TMA
120	757721XX-X	COMPONENT BOARD ASM	TMA
121	778310XX-X	COMPONENT BOARD ASM	TMA
122	778324XX-X	COMPONENT BOARD ASM	TMA
125	83427801-2	WRITE PROTECT ASM	TMA
126	83427802-0	WRITE PROTECT ASM	TMA
127	77830690-2	DISKETTE DETECT ASM	TMA
128	77830680-3	DRIVE MOTOR ASM	TMA
129	77834213-9	DRIVE MOTOR ASM	TMA
130	77834214-7	DRIVE MOTOR ASM	TMA

ITEM	IDENT NO	DESCRIPTION	WHERE USED
132	83401801-2	FRONT PANEL ASM	TMA
133	83401802-0	FRONT PANEL ASM	TMA
134	83401803-8	FRONT PANEL ASM	TMA
135	83401804-6	FRONT PANEL ASM	TMA
136	83401805-3	FRONT PANEL ASM	TMA
137	75791506-1	ACTUATOR ASM	TMA
138	75791507-9	ACTUATOR ASM	TMA
140	77830685-2	UPPER HARNESS ASM	TMA
141	75747301-2	UPPER HARNESS ASM	TMA
142	83403502-4	LOWER HARNES ASM	TMA
143	83403503-2	LOWER HARNESS ASM	TMA
144	83403700-4	CONNECTOR BRACKET	TMA
145	75272300-7	CONNECTOR BRACKET	TMA
146	77830538-3	CSA LABEL	TMA
147	77594901-9	TRACK SWITCH ASM	TMA
148	83460101-5	AMP CONN KIT	TMA
149	75746700-6	CAPACITOR BRACKET	TMA
150	77594800-3	BURROUGHS DECAL	TMA
151	77594701-3	TRACK SENSE ASM (OPT)	TMA
152	77830976-5	ADAPTER LH SIDE	TMA
153	77830975-7	ADAPTER RH SIDE	TMA
154	10125603-0	WASHER	TMA
155	93592240-1	SCREW-WASHER	TMA
156	77830641-5	AC CONN & RELAY ASM	TMA
157	77830995-5	COVER	TMA
158	17901508-6	SCREW	TMA
159	75293801-9	STRAP-TIE	TMA
327	83460701-2	PAD-HEAD LOAD	326

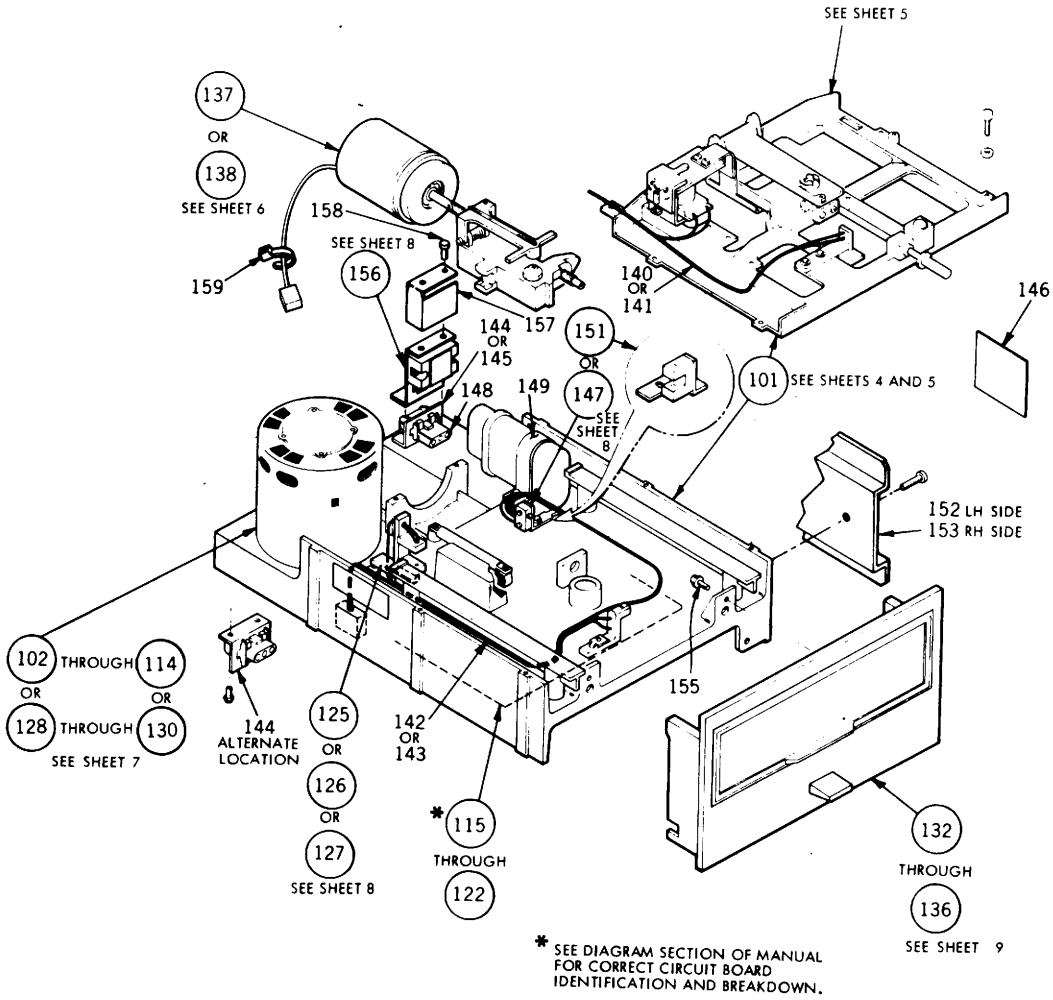
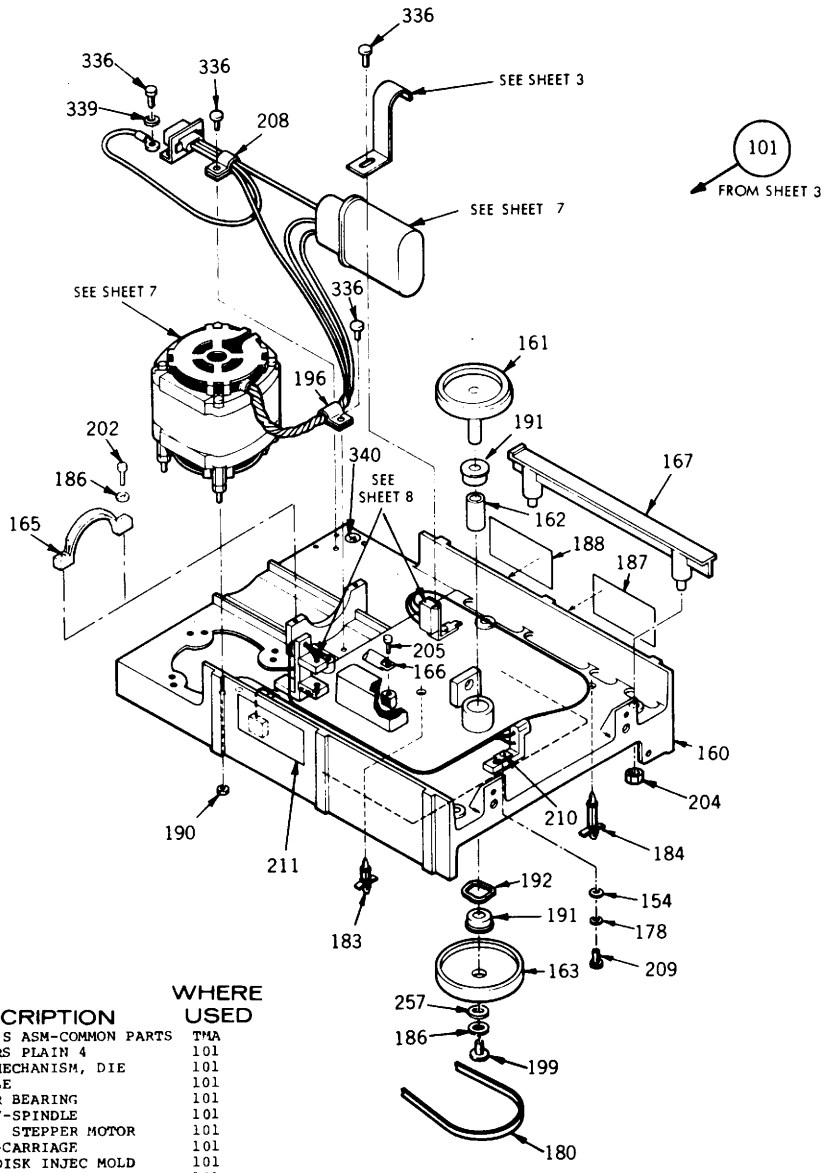
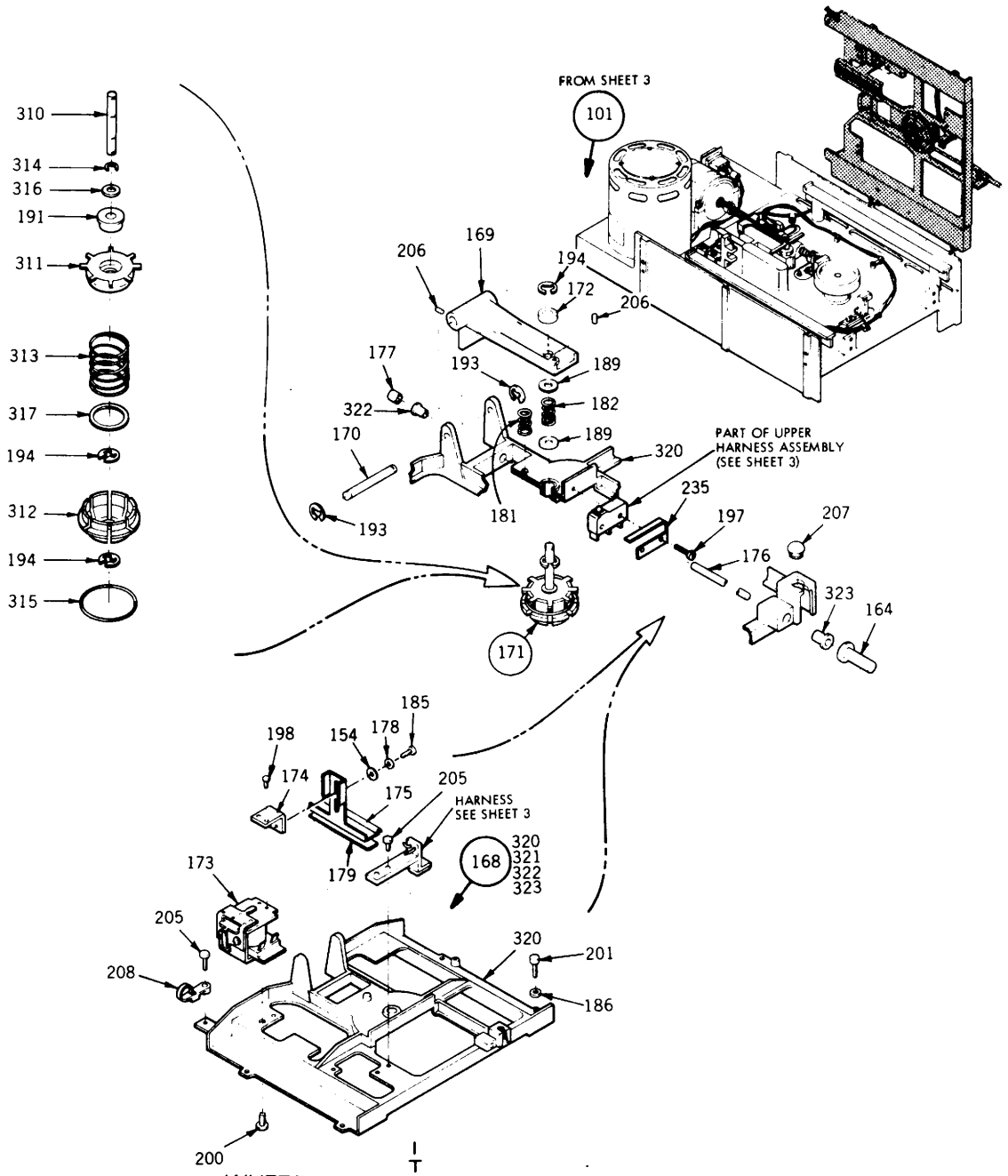


Figure 8-1. Top Mechanical Assembly



ITEM	IDENT NO	DESCRIPTION	WHERE USED
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA
154	10125603-0	WASHERS PLAIN 4	101
160	75791700-0	BASE-MECHANISM, DIE	101
161	83403601-4	SPINDLE	101
162	75747000-0	SPACER BEARING	101
163	75745200-8	PULLEY-SPINDLE	101
165	83461800-1	CLAMP, STEPPER MOTOR	101
166	75292400-1	GUIDE-CARRIAGE	101
167	83401700-6	RAIL-DISK INJEC MOLD	101
178	10125801-0	WASHERS SPR LOCK	101
180	75293203-8	BELT-FLAT	101
183	75774732-4	CLIP-PUSH IN	101
184	75774736-5	CLIP-PUSH IN	101
186	10125803-6	WASHERS SPR LOCK	101
187	15101800-9	IDENT PLATE	101
188	73454511-4	PLATE IDENT	101
190	94217702-3	NUT-SELF LOCK, STL 8	101
191	92073022-3	BEARING FLANGED	101
192	93529005-6	WASHER-SPRING WAVE	101
196	16402506-6	CLAMP CABLE	101
199	09000403-7	SCREW BIND HEAD	101
202	10126222-8	SCREW HEX SOC HD	101
204	77832438-4	NUT, SELFTHD	101
205	93592086-8	SCR HEX SELF TAP	101
208	92602003-3	CLAMP, CABLE-NYLON	101
209	10126214-5	SCR HEX SOC HD CAP	101
210	83427900-2	PLATE-NUT	101
211	72959302-0	LABEL-FIELD CHANGE L	101
257	10125605-5	WASHER	101
336	93592160-1	SCREW, SELF TAP	101
339	10126401-8	STAR LOCK WASHER	101
340	75731302-8	LABEL, EARTHING	101

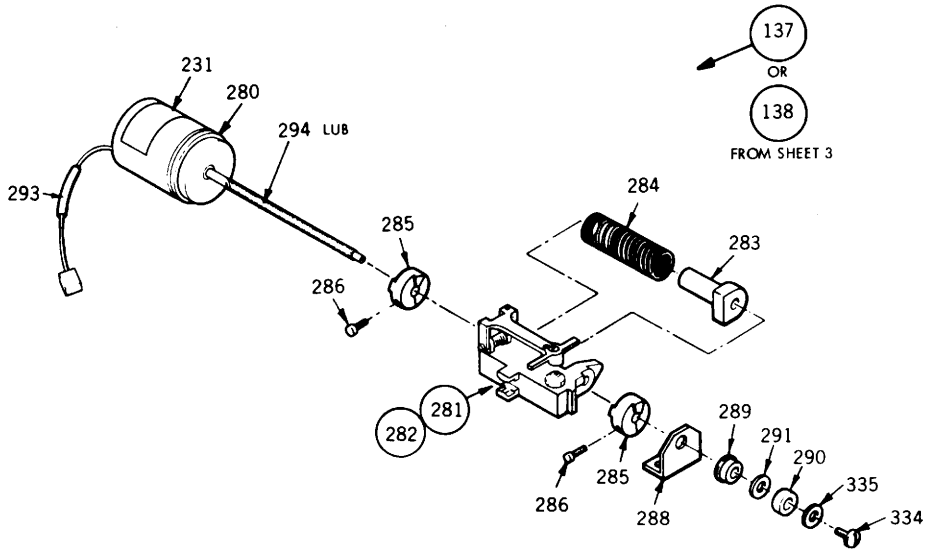
Figure 8-2. FDD Common Parts (Sheet 1 of 2)



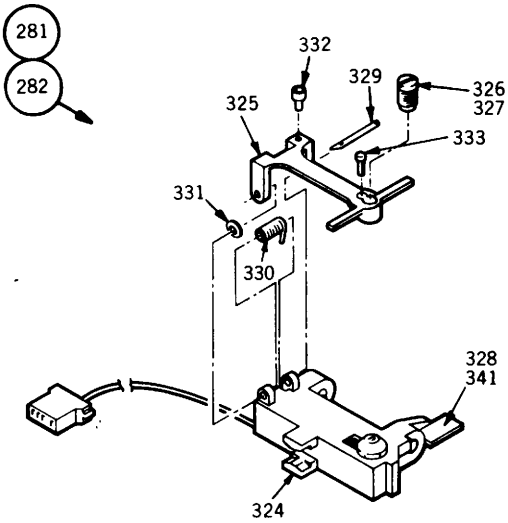
ITEM	IDENT NO	DESCRIPTION	WHERE USED
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA
154	10125603-0	WASHERS PLAIN 4	101
164	83401000-1	CAP-PUSH ROD	101
168	75012021-6	SUPPORT-ASSEMBLED	101
169	83402800-3	ARM-DISK LOAD	101
170	75273000-2	PIN DISK LOAD ARM	101
171	83402101-6	CONE ASM	101
172	75273200-8	BUSHING	101
173	75747202-2	SOLENOID	101
174	77832444-2	EXTENSION ARMATURE	101
175	77832443-4	BAIL ARMATURE	101
176	75813300-3	ROD-PUSH	101
177	75813401-9	PLUNGER, PUSH ROD MOL	101
178	10125801-0	WASHERS SPR LOCK	101
179	77830732-2	FOAM PAD	101
181	75292609-7	SPRING-COMPRESSION	101
182	75292610-5	SPRING-COMPRESSION	101
185	83427000-1	SCREW-HEXAGON HEAD	101
189	93564002-9	WASHER, NYLON	101
191	92073022-3	BEARING FLANGED	171
193	92033037-0	RING RETAINING	101

ITEM	IDENT NO	DESCRIPTION	WHERE USED
194	92033038-8	RETAINING RING	101 171
197	09000005-0	SCREW BIND HEAD	101
198	09000202-3	SCREW BIND HEAD	101
200	09000504-2	SCREW BIND HEAD	101
201	10126218-6	SCR HEX SOC HD CAP	101
206	83413403-3	SCREW-SELF LOCKING	101
207	83411202-1	BUMPER DOOR	101
235	77830308-1	LEAF ACTUATOR	101
310	75790800-9	SHAFT	171
311	83426400-4	EXPANDER-CONE	171
312	77830481-6	CONE-DISK LOAD	171
313	83402200-6	SPRING CONE	171
314	92033029-7	RETAINING RING	171
315	83409701-6	SPRING-GARTER	171
316	94047069-3	WASHER	171
317	94047070-1	SPACER	171
320	75812011-7	SUPPORT DIE CAST MACHINED	168
321	75292807-7	BEARING-CYLINDRICAL	168
322	75813201-3	BUSHING, PUSH ROD MOLDED	168
323	75813202-1	BUSHING, PUSH ROD MOLDED	168

Figure 8-2. FDD Common Parts (Sheet 2 of 2)



ITEM	IDENT NO	DESCRIPTION	WHERE USED
137	75791506-1	ACTUATOR ASM	TMA
138	75791507-9	ACTUATOR ASM	TMA
231	75790000-6	CAUTION LABEL	137 138
280	75747801-1	STEPPER MOTOR ASM	137 138
281	77830484-0	CARRIAGE ASM	137
282	77830485-7	CARRIAGE ASM	138
283	83427301-3	NUT-CARRIAGE, INJ MOL	137 138
284	83401600-8	SPRING-CARRIAGE	137 138
285	77603500-8	STOP-CARRIAGE DIE CA	137 138
286	10126209-5	SCR-SOC HP CAP	137 138
288	75813000-9	RETAINER-BEARING	137 138
289	92073020-7	BEARING FLANGED	137 138
290	94217207-3	BRG BALL-EXT INNER R	137 138
291	93529001-5	WASHER-SPRING WAVE	137 138
293	93154120-5	TUBING HEAT SHRINKABLE	137 138
294	95016100-0	LUBRICANT PASTE	137 138
324	83426202-4	CARRIAGE READ ASSY	281 282
325	77603100-7	ARM-HEAD LOAD	281 282
326	77830482-4	HOLDER-PAD ASSY	281 282
327	83460701-2	PAD-HEAD LOAD	326
328	77595600-6	TAB-OPTICAL ACTUATE	282
329	77830998-9	PIN CARRIAGE	281 282
330	77830999-7	SPRING TORSION	281 282
331	94047068-5	ASHER, SPECIAL	282
332	10126209-5	SCREW SET SOC HD	281 282
333	10127310-0	SCREW SLOTTED	281 282
334	10125001-7	SCREW HEX HD	137 138
335	94047000-8	WASHER	137 138
341	83465601-9	ADHESIVE	282



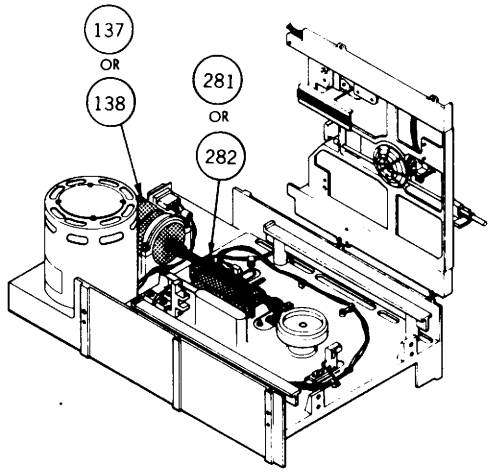
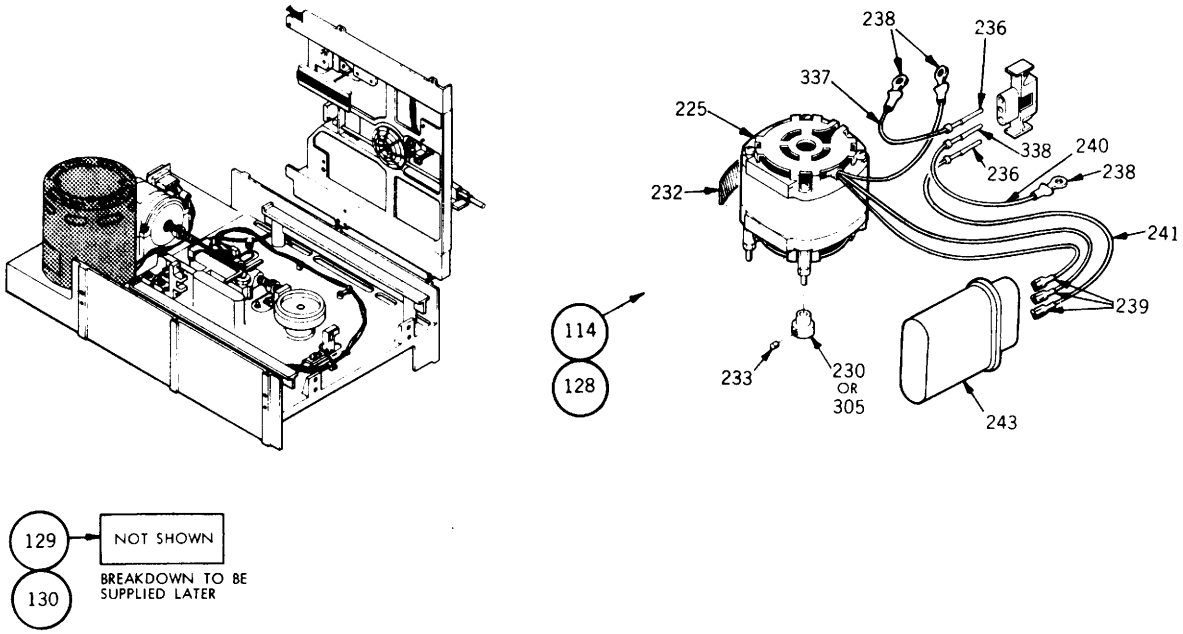
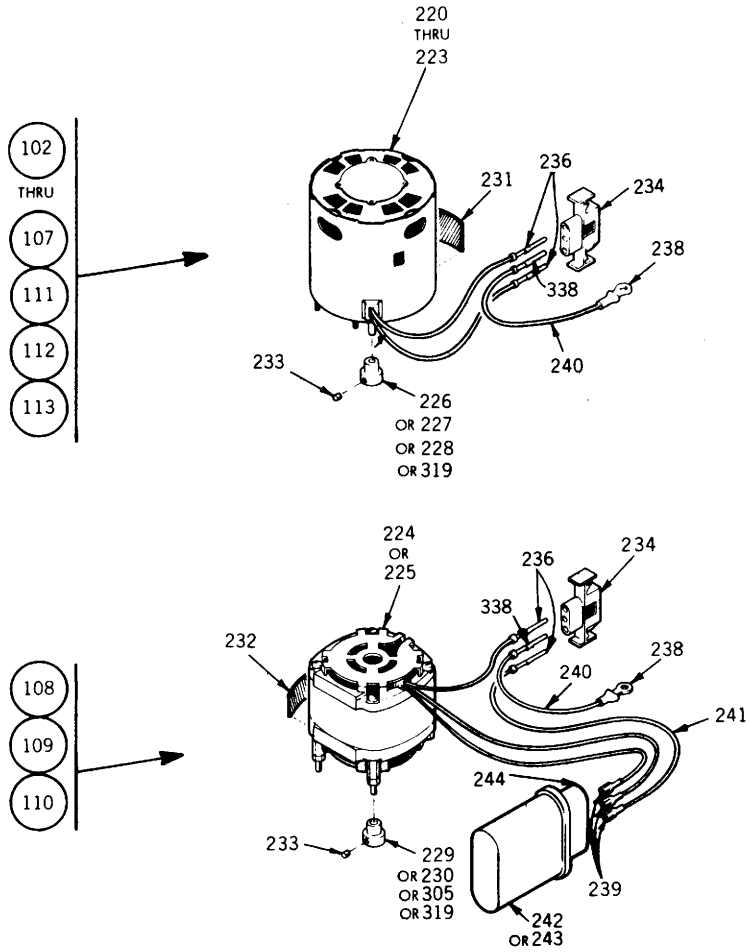


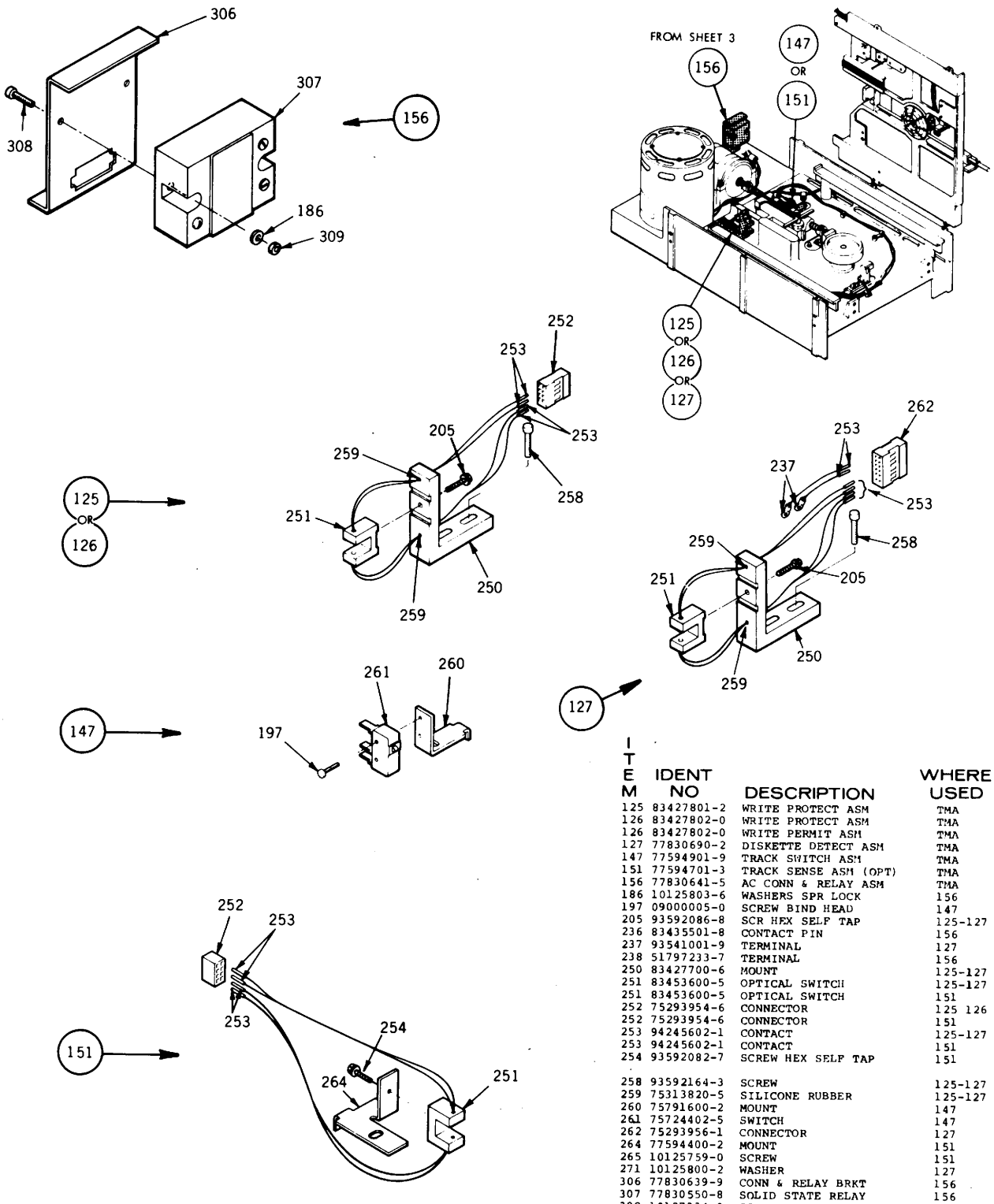
Figure 8-3. Actuator Assembly





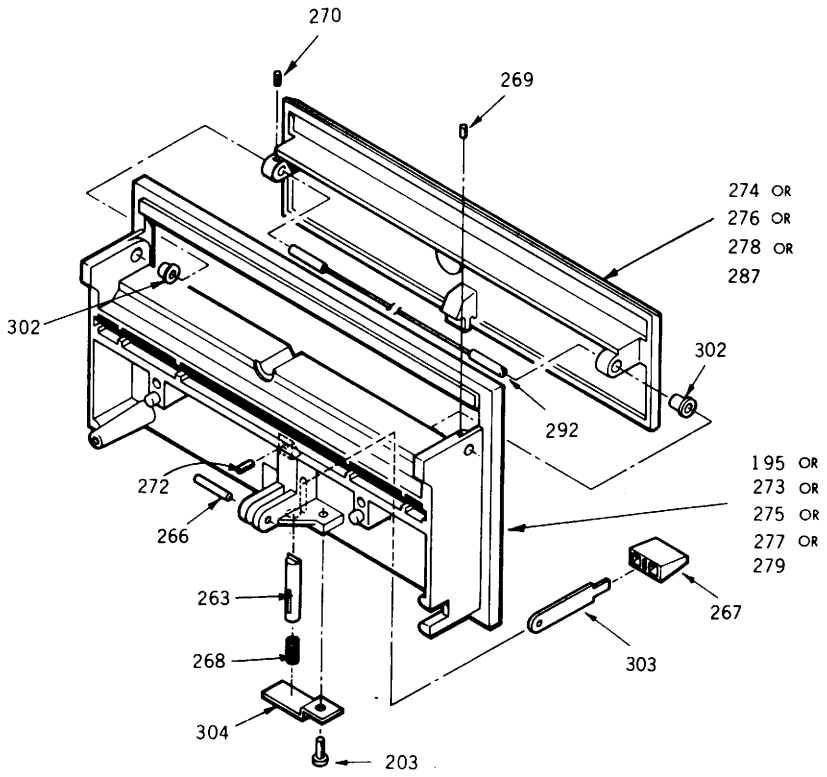
ITEM	IDENT NO	DESCRIPTION	WHERE USED
102	75291920-9	DRIVE MOTOR ASM	TMA
103	75291923-3	DRIVE MOTOR ASM	TMA
104	75291926-6	DRIVE MOTOR ASM	TMA
105	75291927-5	DRIVE MOTOR ASM	TMA
106	75291928-2	DRIVE MOTOR ASM	TMA
107	75291925-8	DRIVE MOTOR ASM	TMA
108	75747904-3	DRIVE MOTOR ASM	TMA
109	75747903-5	DRIVE MOTOR ASM	TMA
110	75747905-0	DRIVE MOTOR ASM	TMA
111	75291921-7	DRIVE MOTOR ASM	TMA
112	75291922-5	DRIVE MOTOR ASM	TMA
113	75291924-1	DRIVE MOTOR ASM	TMA
114	77830681-1	DRIVE MOTOR ASM	TMA
128	77830680-3	DRIVE MOTOR ASM	TMA
129	77834213-9	DRIVE MOTOR ASM	TMA
130	77834214-7	DRIVE MOTOR ASM	TMA
220	75727511-0	MOTOR	102
221	75727512-8	MOTOR	103 107
222	75727513-6	MOTOR	104 105
223	75727514-4	MOTOR	106
224	75726902-2	MOTOR	108
225	75726901-4	MOTOR	109 110
225	75726901-4	MOTOR	114 128
226	75747705-4	DRIVE PULLEY	102
227	75747706-2	DRIVE PULLEY	103 106
228	83461301-0	DRIVE PULLEY	104 105
229	75747702-1	DRIVE PULLEY	108
230	75747701-3	DRIVE PULLEY	109 114
231	75790000-6	CAUTION LABEL	102-107
232	24547525-6	CAUTION LABEL	108-110
232	24547525-6	CAUTION LABEL	114 128
233	83413405-8	SET SCREW	102-128
234	83435402-9	CONNECTOR	102-110
234	83435402-9	CONNECTOR	114 128
236	83435501-8	CONTACT PIN	102-128
238	51797233-7	TERMINAL	102-128
239	62121108-5	TERMINAL	108-110
239	62121108-5	TERMINAL	114 128
240	15003254-8	WIRE (YELLOW)	102-128
241	15003309-0	WIRE	108-110
241	15003309-0	WIRE	114 128
242	75738478-9	CAPACITOR	108
242	75738478-9	CAPACITOR	110 114
243	75738421-9	CAPACITOR	109
243	75738421-9	CAPACITOR	114 128
244	75772500-7	CAPACITOR BOOT	108-110
244	75772500-7	CAPACITOR BOOT	114 128
305	83461303-6	DRIVE PULLEY	110 128
319	83461307-7	DRIVE PULLEY	107 113
337	93464000-4	WIRE BLACK	114 128
338	83435511-7	CONTACT PIN	102-128

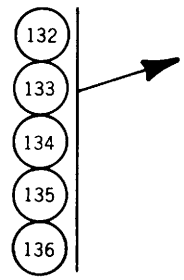
Figure 8-4. Drive Motor Assembly



ITEM	IDENT NO	DESCRIPTION	WHERE USED
125	83427801-2	WRITE PROTECT ASM	TMA
126	83427802-0	WRITE PROTECT ASM	TMA
126	83427802-0	WRITE PERMIT ASM	TMA
127	77830690-2	DISKETTE DETECT ASM	TMA
147	77594901-9	TRACK SWITCH ASM	TMA
151	77594701-3	TRACK SENSE ASM (OPT)	TMA
156	77830641-5	AC CONN & RELAY ASM	TMA
186	10125803-6	WASHERS SPR LOCK	156
197	09000005-0	SCREW BIND HEAD	147
205	93592086-8	SCR HEX SELF TAP	125-127
236	83435501-8	CONTACT PIN	156
237	93541001-9	TERMINAL	127
238	51797233-7	TERMINAL	156
250	83427700-6	MOUNT	125-127
251	83453600-5	OPTICAL SWITCH	125-127
251	83453600-5	OPTICAL SWITCH	151
252	75293954-6	CONNECTOR	125 126
252	75293954-6	CONNECTOR	151
253	94245602-1	CONTACT	125-127
253	94245602-1	CONTACT	151
254	93592082-7	SCREW HEX SELF TAP	151
258	93592164-3	SCREW	125-127
259	75313820-5	SILICONE RUBBER	125-127
260	75791600-2	MOUNT	147
261	75724402-5	SWITCH	147
262	75293956-1	CONNECTOR	127
264	77594400-2	MOUNT	151
265	10125759-0	SCREW	151
271	10125800-2	WASHER	127
306	77830639-9	CONN & RELAY BRKT	156
307	77830550-8	SOLID STATE RELAY	156
308	10127334-0	SCREW	156
309	10125105	NUT	156
318	93464000-4	WIRE	156

Figure 8-5. Miscellaneous Sub-Assemblies





FROM SHEET 3

ITEM	IDENT NO	DESCRIPTION	WHERE USED
132	83401801-2	FRONT PANEL ASM	TMA
133	83401802-0	FRONT PANEL ASM	TMA
134	83401803-8	FRONT PANEL ASM	TMA
135	83401804-6	FRONT PANEL ASM	TMA
136	83401805-3	FRONT PANEL ASM	TMA
195	83426624-9	PANEL FRONT FIN BLK	132
203	93592162-7	SCR HX WASHER SLF TA	132-136
263	83402300-4	LATCH-DOOR INJEC MOL	132-136
266	92096099-4	PIN-GROOVED	132-136
267	75292700-4	KNOB-LEVER	132-136
268	83401200-7	SPRING-LATCH	132-136
269	83413406-6	SCR SET SOC HD 6-32	132-136
270	83413407-4	SCREW SET SOC HD 4-4	132-136
272	83413404-1	SCREW-SELF LOCKING	132-136
273	83426621-5	PANEL FRONT, BLACK HW	133
274	75812121-4	DOOR, FINISHED, PA-BLK	133
275	83426622-3	PANEL FRONT, WHITE HW	134
276	75812122-2	DOOR, FINISHED, PA-WHT	134
277	83426623-1	PANEL FRONT, FIN BLUE	135
278	75812123-0	DOOR, FINISHED, PA-BLU	135
279	83461110-5	FRONT PANEL FINISHED	136
287	75812124-8	DOOR FINISHED BLACK	132 136
292	83403202-1	BAR TORSION DOOR	132-136
302	83401500-0	BUSHING-DOOR INJECT	132-136
303	75746000-1	LEVER-DOOR	132-136
304	75746800-4	BRACKET LATCH	132-136

Figure 8-6. Front Panel Assembly

8.6 PARTS LIST INSTRUCTIONS

8.6.1 ILLUSTRATION PARTS LISTS

The parts list for each illustration is an extract from the Top-Down Assembly/ Component Parts list and contains only those parts depicted. Refer to paragraph 8.6.2 for explanation of parts list.

8.6.2 TOP-DOWN ASSEMBLY/COMPONENT PARTS LIST

a. Starts at TMA level and lists all parts in Item Number sequence.
b. Correlates Item numbers with part Identification numbers and the Description of each.
c. Identifies where each part is used (where used column) within the device by listing the item number(s) of the next higher assembly.

NOTE

Where used data for Figure 8-1 is labeled TMA. Refer to Table 8-1 for correct application of parts (refer to paragraph 8.4).

d. Defines the location of each part by listing the sheet number(s) where depicted.

NOTE

The same part may be used in any number of assemblies or sheet locations.

8.6.3 CROSS REFERENCE INDEX

a. Lists all parts in numeric sequence (by Identification Number).
b. In conjunction with the referenced sheet number (third column) and illustrations defines the physical location of each item identified.

8.6.4 SHEET NUMBER REFERENCING

Sheet number references on Parts Lists and Illustrations refers to sheet locations in this section. Example: Sheet reference 3 represents sheet 8-3, sheet 4 represents sheet 8-4, etc.

Top-Down Assembly/Component Parts List

ITEM	IDENT NO	DESCRIPTION	WHERE USED	SH
001	75744001	TOP MECHANICAL ASM		
002	75744002	TOP MECHANICAL ASM		
003	75744003	TOP MECHANICAL ASM		
004	75744004	TOP MECHANICAL ASM		
005	75744005	TOP MECHANICAL ASM		
006	75744006	TOP MECHANICAL ASM		
007	75744007	TOP MECHANICAL ASM		
008	75744008	TOP MECHANICAL ASM		
009	75744009	TOP MECHANICAL ASM		
010	75744010	TOP MECHANICAL ASM		
011	75744011	TOP MECHANICAL ASM		
012	75744012	TOP MECHANICAL ASM		
013	75744013	TOP MECHANICAL ASM		
014	75744014	TOP MECHANICAL ASM		
015	75744015	TOP MECHANICAL ASM		
016	75744016	TOP MECHANICAL ASM		
017	75744017	TOP MECHANICAL ASM		
018	75744018	TOP MECHANICAL ASM		
019	75744019	TOP MECHANICAL ASM		
020	75744020	TOP MECHANICAL ASM		
021	75744021	TOP MECHANICAL ASM		
022	75744022	TOP MECHANICAL ASM		
023	75744023	TOP MECHANICAL ASM		
024	75744024	TOP MECHANICAL ASM		
025	75744025	TOP MECHANICAL ASM		
026	75744026	TOP MECHANICAL ASM		
027	75744027	TOP MECHANICAL ASM		
028	75744028	TOP MECHANICAL ASM		
029	75744029	TOP MECHANICAL ASM		
030	75744030	TOP MECHANICAL ASM		
031	75744031	TOP MECHANICAL ASM		
032	75744032	TOP MECHANICAL ASM		
033	75744033	TOP MECHANICAL ASM		
034	75744034	TOP MECHANICAL ASM		
035	75744035	TOP MECHANICAL ASM		
036	75744036	TOP MECHANICAL ASM		
037	75744037	TOP MECHANICAL ASM		
038	75744038	TOP MECHANICAL ASM		
039	75744039	TOP MECHANICAL ASM		
040	75744040	TOP MECHANICAL ASM		
041	75744041	TOP MECHANICAL ASM		
042	75744042	TOP MECHANICAL ASM		
043	75744043	TOP MECHANICAL ASM		
099	75744079	TMA-ENG EVAL UNIT		
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA	3
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA	4
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA	5
102	75291920-9	DRIVE MOTOR ASM	TMA	3
102	75291920-9	DRIVE MOTOR ASM	TMA	7
103	75291923-3	DRIVE MOTOR ASM	TMA	3
103	75291923-3	DRIVE MOTOR ASM	TMA	7
104	75291926-6	DRIVE MOTOR ASM	TMA	3
104	75291926-6	DRIVE MOTOR ASM	TMA	7
105	75291927-5	DRIVE MOTOR ASM	TMA	3
105	75291927-5	DRIVE MOTOR ASM	TMA	7
106	75291928-2	DRIVE MOTOR ASM	TMA	3
106	75291928-2	DRIVE MOTOR ASM	TMA	7
107	75291925-8	DRIVE MOTOR ASM	TMA	3
107	75291925-8	DRIVE MOTOR ASM	TMA	7
108	75747904-3	DRIVE MOTOR ASM	TMA	3
108	75747904-3	DRIVE MOTOR ASM	TMA	7
109	75747903-5	DRIVE MOTOR ASM	TMA	3
109	75747903-5	DRIVE MOTOR ASM	TMA	7
110	75747905-0	DRIVE MOTOR ASM	TMA	3
110	75747905-0	DRIVE MOTOR ASM	TMA	7
111	75291921-7	DRIVE MOTOR ASM	TMA	3
111	75291921-7	DRIVE MOTOR ASM	TMA	7
112	75291922-5	DRIVE MOTOR ASM	TMA	3
112	75291922-5	DRIVE MOTOR ASM	TMA	7
113	75291924-1	DRIVE MOTOR ASM	TMA	3
113	75291924-1	DRIVE MOTOR ASM	TMA	7
114	77830681-1	DRIVE MO OR ASM	TMA	3
114	77830681-1	DRIVE MOTOR ASM	TMA	7
115	757721XX-X	COMPONENT BOARD ASM	TMA	3
116	758672XX-X	COMPONENT BOARD ASM	TMA	3
117	758817XX-X	COMPONENT BOARD ASM	TMA	3
118	758652XX-X	COMPONENT BOARD ASM	TMA	3
119	758952XX-X	COMPONENT BOARD ASM	TMA	3
120	757721XX-X	COMPONENT BOARD ASM	TMA	3
121	778310XX-X	COMPONENT BOARD ASM	TMA	3
122	778324XX-X	COMPONENT BOARD ASM	TMA	3
123				
124				
125	83427801-2	WRITE PROTECT ASM	TMA	3
125	83427801-2	WRITE PROTECT ASM	TMA	8
126	83427802-0	WRITE PROTECT ASM	TMA	3
126	83427802-0	WRITE PROTECT ASM	TMA	8
126	83427802-0	WRITE PERMIT ASM	TMA	8
127	77830690-2	DISKETTE DETECT ASM	TMA	3
127	77830690-2	DISKETTE DETECT ASM	TMA	8
128	77830680-3	DRIVE MOTOR ASM	TMA	3
128	77830680-3	DRIVE MOTOR ASM	TMA	7
129	77834213-9	DRIVE MOTOR ASM	TMA	3
129	77834213-9	DRIVE MOTOR ASM	TMA	7
130	77834214-7	DRIVE MOTOR ASM	TMA	3
130	77834214-7	DRIVE MOTOR ASM	TMA	7
131				
132	83401801-2	FRONT PANEL ASM	TMA	3
132	83401801-2	FRONT PANEL ASM	TMA	9
133	83401802-0	FRONT PANEL ASM	TMA	3
133	83401802-0	FRONT PANEL ASM	TMA	9
134	83401803-8	FRONT PANEL ASM	TMA	3
134	83401803-8	FRONT PANEL ASM	TMA	9
135	83401804-6	FRONT PANEL ASM	TMA	3
135	83401804-6	FRONT PANEL ASM	TMA	9
136	83401805-3	FRONT PANEL ASM	TMA	3
136	83401805-3	FRONT PANEL ASM	TMA	9
137	75791506-1	ACTUATOR ASM	TMA	3
137	75791506-1	ACTUATOR ASM	TMA	6
138	75791507-9	ACTUATOR ASM	TMA	3
138	75791507-9	ACTUATOR ASM	TMA	6
139				
140	77830685-2	UPPER HARNESS ASM	TMA	3
141	75747301-2	UPPER HARNESS ASM	TMA	3
142	83403502-4	LOWER HARNES ASM	TMA	3
143	83403503-2	LOWER HARNESS ASM	TMA	3
144	83403700-4	CONNECTOR BRACKET	TMA	3
145	75272300-7	CONNECTOR BRACKET	TMA	3
146	77830538-3	CSA LABEL	TMA	3
147	77594901-9	TRACK SWITCH ASM	TMA	3
147	77594901-9	TRACK SWITCH ASM	TMA	8
148	83460101-5	AMP CONN KIT	TMA	3
149	75746700-6	CAPACITOR BRACKET	TMA	3
150	77594800-3	BURROUGHS DECAL	TMA	3
151	77594701-3	TRACK SENSE ASM (OPT)	TMA	3
151	77594701-3	TRACK SENSE ASM (OPT)	TMA	8
152	77830976-5	ADAPTER LH SIDE	TMA	3
153	77830975-7	ADAPTER RH SIDE	TMA	3
154	10125603-0	WASHER	TMA	3
154	10125603-0	WASHERS PLAIN 4	101	4
154	10125603-0	WASHERS PLAIN 4	101	5
155	93592240-1	SCREW-WASHER	TMA	3
156	77830641-5	AC CONN & RELAY ASM	TMA	3
156	77830641-5	AC CONN & RELAY ASM	TMA	8
157	77830995-5	COVER	TMA	3
158	17901508-6	SCREW	TMA	3
159	75293801-9	STRAP-TIE	TMA	3
160	75791700-0	BASE-MECHANISM, DIE	101	4
161	83403601-4	SPINDLE	101	4
162	75747000-0	SPACER BEARING	101	4
163	75745200-8	PULLEY-SPINDLE	101	4
164	83401000-1	CAP-PUSH ROD	101	5
165	83461800-1	CLAMP, STEPPER MOTOR	101	4
166	75292400-1	GUIDE-CARRIAGE	101	4
167	83401700-6	RAIL-DISK INJEC MOLD	101	4
168	75012021-6	SUPPORT-ASSEMBLED	101	5
169	83402800-3	ARM-DISK LOAD	101	5
170	75273000-2	PIN DISK LOAD ARM	101	5
171	83402101-6	CONE ASM	101	5
172	75273200-8	BUSHING	101	5
173	75747202-2	SOLENOID	101	5
174	77832444-2	EXTENSION ARMATURE	101	5
175	77832443-4	BAIL ARMATURE	101	5
176	75813300-3	ROD-PUSH	101	5
177	75813401-9	PLUNGER, PUSH ROD MOL	101	5
178	10125801-0	WASHERS SPR LOCK	101	5
178	10125801-0	WASHERS SPR LOCK	101	4
179	77830732-2	FOAM PAD	101	5
180	75293203-8	BELT-FLAT	101	4
181	75292609-7	SPRING-COMPRESSION	101	5
182	75292610-5	SPRING-COMPRESSION	101	5
183	75774732-4	CLIP-PUSH IN	101	4
184	75774736-5	CLIP-PUSH IN	101	4
185	83427000-1	SCREW-HEXAGON HEAD	101	5
186	10125803-6	WASHERS SPR LOCK	101	4
186	10125803-6	WASHERS SPR LOCK	156	8
187	15101800-9	IDENT PLATE	101	4
188	73454511-4	PLATE IDENT	101	4
189	93564002-9	WASHER, NYLON	101	5
190	94217702-3	NUT-SELF LOCK, STL 8	101	4
191	92073022-3	BEARING FLANGED	101	4
191	92073022-3	BEARING FLANGED	171	5
192	93529005-6	WASHER-SPRING WAVE	101	4
193	92033037-0	RING RETAINING	101	5
194	92033038-8	RETAINING RING	101 171	5
195	83426624-9	PANEL FRONT FIN BLK	132	9
196	16402506-6	CLAMP CABLE	101	4
197	09000005-0	SCREW BIND HEAD	101	5
197	09000005-0	SCREW BIND HEAD	147	8
198	09000202-3	SCREW BIND HEAD	101	5
199	09000403-7	SCREW BIND HEAD	101	4
200	09000504-2	SCREW BIND HEAD	101	5
201	10126218-6	SCR HEX SOC HD CAP	101	5
202	10126222-8	SCREW HEX SOC HD	101	4
203	93592162-7	SCR HX WASHER SLF TA	132-136	9
204	77832438-4	NUT, SELFTHD	101	4
205	93592086-8	SCR HEX SELF TAP	101	4
205	93592086-8	SCR HEX SELF TAP	125-127	8
206	83413403-3	SCREW-SELF LOCKING	101	5
207	83411202-1	BUMPER DOOR	101	5
208	92602003-3	CLAMP, CABLE-NYLON	101	4
209	10126214-5	SCR HEX SOC HD CAP	101	4
210	83427900-2	PLATE-NUT	101	4
211	72959302-0	LABEL-FIELD CHANGE L	101	4
220	75727511-0	MOTOR	102	7
221	75727512-8	MOTOR	103 107	7
222	75727513-6	MOTOR	104 105	7
223	75727514-4	MOTOR	106	7
224	75726902-2	MOTOR	108	7
225	75726901-4	MOTOR	109 110	7
225	75726901-4	MOTOR	114 128	7
226	75747705-4	DRIVE PULLEY	102	7
227	75747706-2	DRIVE PULLEY	103 106	7
228	83461301-0	DRIVE PULLEY	104 105	7
229	75747702-1	DRIVE PULLEY	108	7

ITEM	IDENT NO	DESCRIPTION	WHERE USED	SH
230	75747701-3	DRIVE PULLEY	109 114	7
231	75790000-6	CAUTION LABEL	102-107	7
231	75790000-6	CAUTION LABEL	137 138	6
232	24547525-6	CAUTION LABEL	108-110	7
232	24547525-6	CAUTION LABEL	114 128	7
233	83413405-8	SET SCREW	102-128	7
234	83435402-9	CONNECTOR	102-110	7
234	83435402-9	CONNECTOR	114 128	7
235	77830308-1	LEAF ACTUATOR	101	5
236	83435501-8	CONTACT PIN	102-128	7
236	83435501-8	CONTACT PIN	156	8
237	93541001-9	TERMINAL	127	8
238	51797233-7	TERMINAL	102-128	7
238	51797233-7	TERMINAL	156	8
239	62121108-5	TERMINAL	108-110	7
239	62121108-5	TERMINAL	114 128	7
240	15003254-8	WIRE (YELLOW)	102-128	7
241	15003309-0	WIRE	108-110	7
241	15003309-0	WIRE	114 128	7
242	75738478-9	CAPACITOR	108	7
242	75738478-9	CAPACITOR	110 114	7
243	75738421-9	CAPACITOR	109	7
243	75738421-9	CAPACITOR	114 128	7
244	75772500-7	CAPACITOR BOOT	108-110	7
244	75772500-7	CAPACITOR BOOT	114 128	7
250	83427700-6	MOUNT	125-127	8
251	83453600-5	OPTICAL SWITCH	125-127	8
251	83453600-5	OPTICAL SWITCH	151	8
252	75293954-6	CONNECTOR	125 126	8
252	75293954-6	CONNECTOR	151	8
253	94245602-1	CONTACT	125-127	8
253	94245602-1	CONTACT	151	8
254	93592082-7	SCREW HEX SELF TAP	151	8
257	10125605-5	WASHER	101	4
258	93592164-3	SCREW	125-127	8
259	75313820-5	SILICONE RUBBER	125-127	8
260	75791600-2	MOUNT	147	8
261	75724402-5	SWITCH	147	8
262	75293956-1	CONNECTOR	127	8
263	83402300-4	LATCH-DOOR INJEC MOL	132-136	9
264	77594400-2	MOUNT	151	8
265	10125759-0	SCREW	151	8
266	92096099-4	PIN-GROOVED	132-136	9
267	75292700-4	KNOB-LEVER	132-136	9
268	83401200-7	SPRING-LATCH	132-136	9
269	83413406-6	SCR SET SOC HD 6-32	132-136	9
270	83413407-4	SCREW SET SOC HD 4-4	132-136	9
271	10125800-2	WASHER	127	8
272	83413404-1	SCREW-SELF LOCKING	132-136	9
273	83426621-5	PANEL FRONT, BLACK HW	133	9
274	75812121-4	DOOR, FINISHED, PA-BLK	133	9
275	83426622-3	PANEL FRONT, WHITE HW	134	9
276	75812122-2	DOOR, FINISHED, PA-WHT	134	9
277	83426623-1	PANEL FRONT, FIN BLUE	135	9
278	75812123-0	DOOR, FINISHED, PA-BLU	135	9
279	83461110-5	FRONT PANEL FINISHED	136	9
280	75747801-1	STEPPER MOTOR ASM	137 138	6
281	77830484-0	CARRIAGE ASM	137	6
282	77830485-7	CARRIAGE ASM	138	6
283	83427301-3	NUT-CARRIAGE, INJ MOL	137 138	6
284	83401600-8	SPRING-CARRIAGE	137 138	6
285	77603500-8	STOP-CARRIAGE DIE CA	137 138	6
286	10126209-5	SCR-SOC HP CAP	137 138	6
287	75812124-8	DOOR FINISHED BLACK	132 136	9
288	75813000-9	RETAINER-BEARING	137 138	6
289	92073020-7	BEARING FLANGED	137 138	6
290	94217207-3	BRG BALL-EXT INNER R	137 138	6
291	93529001-5	WASHER-SPRING WAVE	137 138	6
292	83403202-1	BAR TORSION DOOR	132-136	9
293	93154120-5	TUBING HEAT SHRINKABLE	137 138	6
294	95016100-0	LUBRICANT PASTE	137 138	6
301				
302	83401500-0	BUSHING-DOOR INJECT	132-136	9
303	75746000-1	LEVER-DOOR	132-136	9
304	75746800-4	BRACKET LATCH	132-136	9
305	83461303-6	DRIVE PULLEY	110 128	7
306	77830639-9	CONN & RELAY BRKT	156	8
307	77830550-8	SOLID STATE RELAY	156	8
308	10127334-0	SCREW	156	8
309	10125105	NUT	156	8
310	75790800-9	SHAFT	171	5
311	83426400-4	EXPANDER-CONE	171	5
312	77830481-6	CONE-DISK LOAD	171	5
313	83402200-6	SPRING CONE	171	5
314	92033029-7	RETAINING RING	171	5
315	83409701-6	SPRING-GARTER	171	5
316	94047069-3	WASHER	171	5
317	94047070-1	SPACER	171	5
318	93464000-4	WIRE	156	8
319	83461307-7	DRIVE PULLEY	107 113	7
320	75812011-7	SUPPORT DIE CAST MACHINED	168	5
321	75292807-7	BEARING-CYLINDRICAL	168	5
322	75813201-3	BUSHING, PUSH ROD MOLDED	168	5
323	75813202-1	BUSHING, PUSH ROD MOLDED	168	5
324	83426202-4	CARRIAGE READ ASSY	281 282	6
325	77603100-7	ARM-HEAD LOAD	281 282	6
326	77830482-4	HOLDER-PAD ASSY	281 282	6
327	83460701-2	PAD-HEAD LOAD	326	6
328	77595600-6	TAB-OPTICAL ACTUATOR	282	6
329	77830998-9	PIN CARRIAGE	281 282	6
330	77830999-7	SPRING TORSION	281 282	6

ITEM	IDENT NO	DESCRIPTION	WHERE USED	SH
331	94047068-5	ASHER, SPECIAL	282	6
332	10126209-5	SCREW SET SOC HD	281 282	6
333	10127310-0	SCREW SLOTTED	281 282	6
334	10125001-7	SCREW HEX HD	137 138	6
335	94047000-8	WASHER	137 138	6
336	93592160-1	SCREW, SELF TAP	101	4
337	93464000-4	WIRE BLACK	114 128	7
338	83435511-7	CONTACT PIN	102-128	7
339	10126401-8	STAR LOCK WASHER	101	4
340	75731302-8	LABEL, EARTHING	101	4
341	83465601-9	ADHESIVE	282	6

Cross Reference Index

ITEM	IDENT NO	SH
197	09000005-0	5
197	09000005-0	8
198	09000202-3	5
199	09000403-7	4
200	09000504-2	5
334	10125001-7	6
309	10125105	8
154	10125603-0	3
154	10125603-0	4
154	10125603-0	5
257	10125605-5	4
265	10125759-0	8
271	10125800-2	8
178	10125801-0	5
178	10125801-0	4
186	10125803-6	4
186	10125803-6	8
286	10126209-5	6
332	10126209-5	6
209	10126214-5	4
201	10126218-6	5
202	10126222-8	4
339	10126401-8	4
333	10127310-0	6
308	10127334-0	8
240	15003254-8	7
241	15003309-0	7
241	15003309-0	7
187	15101800-9	4
196	16402506-6	4
158	17901508-6	3
232	24547525-6	7
232	24547525-6	7
238	51797233-7	7
238	51797233-7	8
239	62121108-5	7
239	62121108-5	7
211	72959302-0	4
188	73454511-4	4
168	75012021-6	5
145	75272300-7	3
170	75273000-2	5
172	75273200-8	5
102	75291920-9	3
102	75291920-9	7
111	75291921-7	3
111	75291921-7	7
112	75291922-5	3
112	75291922-5	7
103	75291923-3	3
103	75291923-3	7
113	75291924-1	3
113	75291924-1	7
107	75291925-8	3
107	75291925-8	7
104	75291926-6	3
104	75291926-6	7
105	75291927-5	3
105	75291927-5	7
106	75291928-2	3
106	75291928-2	7
166	75292400-1	4
181	75292609-7	5
182	75292610-5	5
267	75292700-4	9
321	75292807-7	5
180	75293203-8	4
159	75293801-9	3
252	75293954-6	8
252	75293954-6	8
262	75293956-1	8
259	75313820-5	8
261	75724402-5	8
225	75726901-4	7
225	75726901-4	7
224	75726902-2	7
220	75727511-0	7
221	75727512-8	7
222	75727513-6	7
223	75727514-4	7
340	75731302-8	4
243	75738421-9	7
243	75738421-9	7
242	75738478-9	7
242	75738478-9	7
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303	75746000-1	9
149	75746700-6	3
304	75746800-4	9
162	75747000-0	4
173	75747202-2	5
141	75747301-2	3
230	75747701-3	7
229	75747702-1	7
226	75747705-4	7
227	75747706-2	7
280	75747801-1	6
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109	75747903-5	7
108	75747904-3	3
108	75747904-3	7
110	75747905-0	3
110	75747905-0	7
115	757721XX-X	3
120	757721XX-X	3
244	75772500-7	7
244	75772500-7	7
183	75774732-4	4
184	75774736-5	4
231	75790000-6	7
231	75790000-6	6
310	75790800-9	5
137	75791506-1	3
137	75791506-1	6
138	75791507-9	3
138	75791507-9	6
260	75791600-2	8
160	75791700-0	4
320	75812011-7	5
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147	77594901-9	8
328	77595600-6	6
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285	77603500-8	6
235	77830308-1	5
312	77830481-6	5
326	77830482-4	6
281	77830484-0	6
282	77830485-7	6
146	77830538-3	3
307	77830550-8	8
306	77830639-9	8
156	77830641-5	3
156	77830641-5	8
128	77830680-3	3
128	77830680-3	7
114	77830681-1	3
114	77830681-1	7
140	77830685-2	3
127	77830690-2	3
127	77830690-2	8
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152	77830976-5	3
157	77830995-5	3
329	77830998-9	6
330	77830999-7	6
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204	77832438-4	4
175	77832443-4	5
174	77832444-2	5
122	778324XX-X	3
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130	77834214-7	7
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284	83401600-8	6
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134	83401803-8	9
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135	83401804-6	9
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143	83403503-2	3
161	83403601-4	4
144	83403700-4	3
315	83409701-6	5
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233	83413405-8	7
269	83413406-6	9
270	83413407-4	9
324	83426202-4	6
311	83426400-4	5
273	83426621-5	9
275	83426622-3	9
277	83426623-1	9
195	83426624-9	9
185	83427000-1	5
283	83427301-3	6
250	83427700-6	8
125	83427801-2	3
125	83427801-2	8
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126	83427802-0	8
126	83427802-0	8
210	83427900-2	4
234	83435402-9	7
234	83435402-9	7
236	83435501-8	7
236	83435501-8	8
338	83435511-7	7
251	83453600-5	8
251	83453600-5	8
101	83458201-7	3
101	83458201-7	4
101	83458201-7	5
148	83460101-5	3
327	83460701-2	6
279	83461110-5	9
228	83461301-0	7
305	83461303-6	7
319	83461307-7	7
165	83461800-1	4
341	83465601-9	6
314	92033029-7	5
193	92033037-0	5
194	92033038-8	5
289	92073020-7	6
191	92073022-3	4
191	92073022-3	5
266	92096099-4	9
208	92602003-3	4
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337	93464000-4	7
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258	93592164-3	8
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331	94047068-5	6
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290	94217207-3	6
190	94217702-3	4
253	94245602-1	8
253	94245602-1	8
294	95016100-0	6

IX
WIRE
LISTS

9.1 INTRODUCTION

The following paragraphs contain the wire lists for the Upper Harness Assembly, Lower Harness Assembly and the Stepper Motor.

9.2 UPPER HARNESS ASSEMBLIES

Wire Color	Origin	Destination	Approximate Length Inches
Red	Solenoid-A	J5-5	11.0"
Black	Solenoid-B	J5-2	11.0"
Orange	Interlock Common	J5-6	13.5"
White	Interlock N.O.	J5-4	13.5"
Blue	Lamp-Emitter	J5-1	13.5"
Yellow	Lamp-Collector	J5-3	13.5"

9.3 LOWER HARNESS ASSEMBLY

Wire Color	Origin	Destination	Approximate Length Inches
Black	Track 0 Common	J3-5	20.0"
Red	Track 0 N.C.	J3-3	20.0"
White	Track 0 N.O.	J3-2	20.0"
Blue	Photo Cell Emitter	J3-4	9.0"
Yellow	Photo Cell Collector	J3-1	9.0"

9.4 STEPPER MOTOR

Wire Color	Origin	Destination	Approximate Length Inches
Brown	Stepper Motor	J4-1	13.0"
Red		J4-2	13.0"
Orange		J4-3	13.0"
Black		J4-4	13.0"

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