

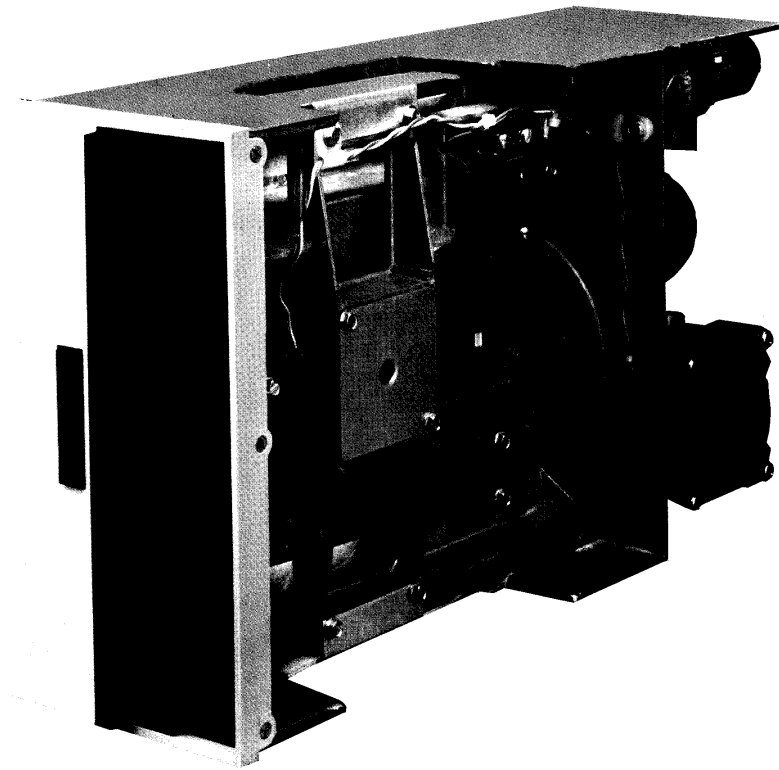
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**Figure 1.** SA800/801 Diskette Storage Drive

## 1.0 INTRODUCTION

### 1.1 General Description

The SA800/801 are enhanced versions of the successful SA900/901 Diskette Storage Drive. The SA800/801 provides the customer with a mature and reliable product, manufactured to the same high standard of excellence as the 900/901, but with additional features.

The SA800 Diskette Storage Drive can read and write diskettes for interchange with other SA800's, the SA900, IBM 3741, 3742 or 3540 and with the IBM System 32.

The SA801 provides the same features as the SA800 with additional flexibility for those requirements which preclude IBM compatibility.

The SA800/801 Diskette Storage Drives have as standard features: a patented diskette clamping/registration design which eliminates the possibility of damage to the diskette due to misregistration and guarantees over 30,000 interchanges with each diskette; single and double density capability on the same drive for the same price; a proprietary ceramic R/W head designed and manufactured by Shugart Associates to provide media life exceeding 3.5 million passes/track and head life exceeding 15,000 hours; an activity light which indicates drive in use; and ribbon cable or twisted pair connector for ease of packaging. All of these features and more are available with the SA800/801.

SA800/801 Diskette Storage Drive provide the system designer solutions to his applications requirements with greater performance and reliability than cassette or cartridge drives, and lower cost with increased function over I/O and reel-to-reel tape drives.

Applications for the SA800/801 Diskette Storage Drive are key entry systems, point of sale recording systems, batch terminal data storage microprogram load and error logging, minicomputer program and auxiliary data storage, word processing systems and data storage for small business systems.

The SA100 Diskette, IBM Diskette or equivalent, can be read and written interchangeably between any SA800 and IBM 3741/42, 3747 and 3540. The SA101 Diskette can be read or written interchangeably on any SA801. The SA102 and SA103 are used for double density applications.

*As a product enhancement, to improve reliability and serviceability, Shugart is incorporating into the SA800 serves drives a PCB Large Scale Integration (LSI) components. These components are:*

- Control Chip
- Write Channel
- Read Channel

*The LSI Control chip performs the following functions:*

- TRK 00 detector
- Index detector
- Stepper logic
- FM clock/data separator and data window
- Sector separator
- Write Protect detector
- Door open/close detector
- Disk change circuit
- Ready signal

*The functions listed above are either detected from the drive mechanics or from the Host Interface. As a result, the proper logic generated by the LSI chip either will be used within the drive electronic circuit to perform stepping, read/write operations or will be fed back to the Host Interface.*

*Also, an internal FM data separator is incorporated inside the chip. A jumper option will allow the user to select the data separator to perform as its predecessor SA800 (jumper FS) or to select the separator to be compatible with the IBM System 3740 data separator (jumper TS). Thus IBM compatibility will allow direct interfacing with LSI single chip floppy disk controllers.*

## 1.2 Specification Summary

### 1.2.1 Performance Specifications

	Single Density	Double Density
Capacity		
Unformatted		
Per Disk	3.2 megabits	6.4 megabits
Per Track	41.7 kilobits	83.4 kilobits
IBM Format		
Per Disk	2.0 megabits	n/a
Per Track	26.6 kilobits	n/a
Transfer Rate	250 kilobits/sec.	500 kilobits/sec
Latency (average)	83 ms	83 ms
Access Time		
Track to Track	8 ms	8 ms
Average	260 ms	260 ms
Settling Time	8 ms	8 ms
Head Load Time	35 ms	35 ms

### 1.2.2 Functional Specifications

	Single Density	Double Density
Rotational Speed	360 rpm	360 rpm
Recording Density		
(in inside track)	3200 bpi	6400 bpi
Flux Density	6400 fci	6400 fci
Track Density	48 tpi	48 tpi
Tracks	77	77
Physical Sectors		
SA800	0	0
SA801	32/16/8	32/16/8
Index	1	1
Encoding Method	FM	MFM/M <sup>2</sup> FM
Media Requirements		
SA800	SA100/IBM Diskette	SA102/IBM Diskette
SA801	SA101	SA103

### 1.2.3 Physical Specifications

Environmental Limits	Operating	Shipping	Storage
Ambient Temperature	= 40°F to 115°F (4.4° to 46.1°C)	-40°F to 144°F	-8°F to 117°F
Relative Humidity	= 20% to 80%	1 to 95%	1 to 95%
Maximum Wet Bulb	= 78°F (25°C)	No Condensation	No Condensation
AC Power Requirements			
50/60 Hz ± 0.5 Hz			
100/115 VAC Installations	= 85 to 127V @ .3A typical		
200/230 VAC Installations	= 170 to 253V @ .18A typical		
DC Voltage Requirements			
+ 24 VDC ± 5% 1.3A typical			
+ 5 VDC ± 5% 0.8A typical			
-5 VDC ± 5% .05A typical (option -7 to -16 VDC)			
Mechanical Dimensions (Reference Figures 18 and 20)			
Width	= 4 5/8 in. (11.75 cm)		
Height	= 9 1/2 in. (24.13 cm)		
Depth	= 14 1/4 in. (36.20 cm)		
Weight	= 13.0 lbs. (5.91 kg)		
Heat Dissipation	= 271 BTU/hr. typical (80 Watts)		

#### 1.2.4 Reliability Specifications

MTBF:	5000 POH under heavy usage 8000 POH under typical usage
PM:	Every 5000 POH under heavy usage Every 15,000 under typical usage
MTTR:	30 minutes
Component Life:	15,000 POH
Error Rates:	
Soft Read Errors:	1 per $10^9$ bits read
Hard Read Errors:	1 per $10^{12}$ bits read
Seek Errors:	1 per $10^6$ seeks.
Media Life:	
Passes Per Track	$3.5 \times 10^6$
Insertions:	30,000 +

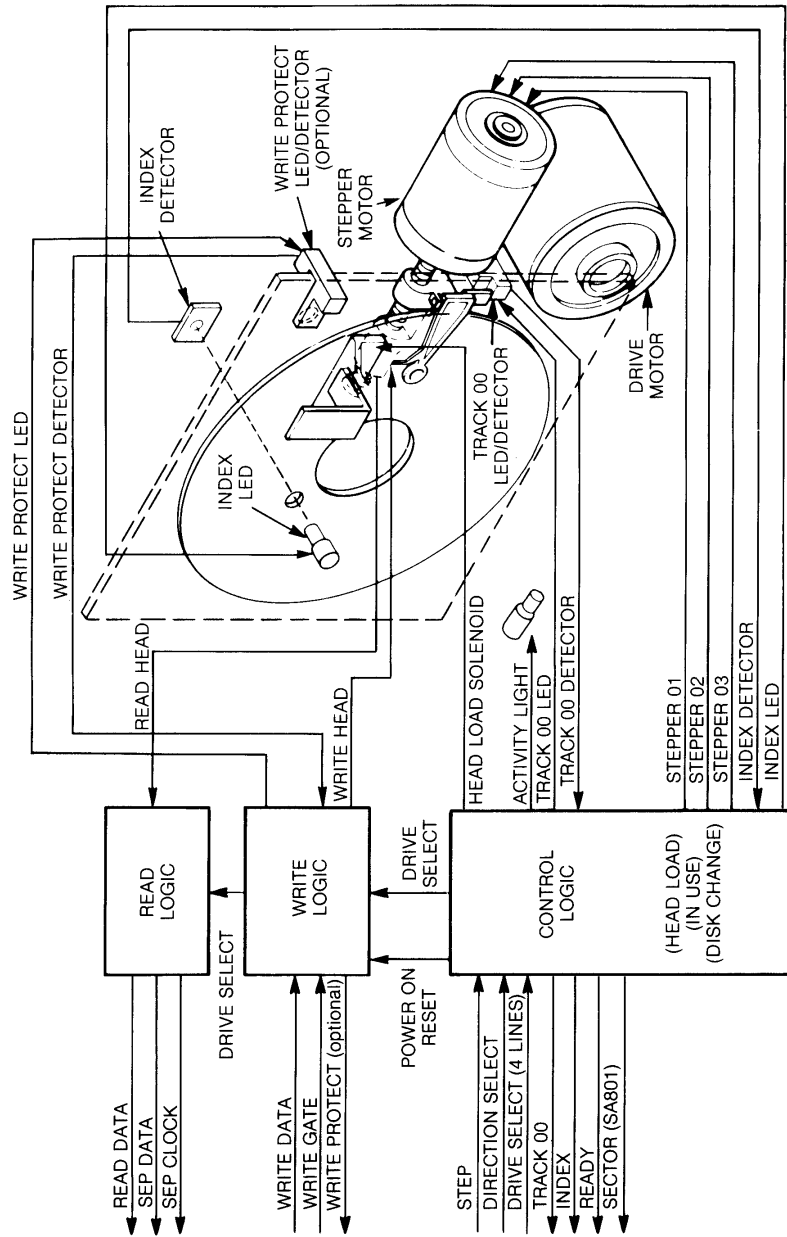


Figure 2. SA800/801 Functional Diagram



## **2.0 FUNCTIONAL CHARACTERISTICS**

### **2.1 General Operation**

The SA800/801 Diskette Storage Drive consists of read/write and controls electronics, drive mechanism, read/write head, track positioning mechanism, and the removable diskette. These components perform the following functions:

- Interpret and generate control signals.
- Move read/write head to the selected track.
- Read and write data.

The relationship and interface signals for the internal functions of the SA800/801 are shown in Figure 2.

The Head Positioning Actuator positions the read/write head to the desired track on the diskette. The Head Load Actuator loads the diskette against the read/write head and data may then be recorded or read from the diskette.

### **2.2 Read/Write and Control Electronics**

The electronics are packaged on one PCB. The PCB contains:

1. Index Detector Circuits. (Sector/Index for 801).
2. Head Position Actuator Driver.
3. Head Load Actuator Driver.
4. Read/Write Amplifier and Transition Detector.
5. Data/Clock Separation Circuits.
6. Write Protect.
7. Drive Ready Detector Circuit.
8. Drive Select Circuits.

### **2.3 Drive Mechanism**

The Diskette drive motor rotates the spindle at 360 rpm through a belt-drive system. 50 or 60 Hz power is accommodated by changing the drive pulley and belt. A registration hub, centered on the face of the spindle, positions the Diskette. A clamp that moves in conjunction with the cartridge guide fixes the Diskette to the registration hub.

### **2.4 Positioning Mechanism**

An electrical stepping motor (Head Position Actuator) and lead screw positions the read/write head. The stepping motor rotates the lead screw clockwise or counterclockwise in 15° increments. A 15° rotation of the lead screw moves the read/write head one track position. The using system increments the stepping motor to the desired track.

### **2.5 Read/Write Head**

The SA800/801 head is a single element ceramic read/write head with straddle erase elements to provide erased areas between data tracks. Thus normal interchange tolerances between media and drives will not degrade the signal to noise ratio and insures Diskette interchangeability.

The read/write head is mounted on a carriage which is located on the Head Position Actuator lead screw. The Diskette is held in a plane perpendicular to the read/write head by a platen located on the base casting. This precise registration assures perfect compliance with the read/write head. The Diskette is loaded against the head with a load pad actuated by the head load solenoid.

The read/write head is in direct contact with the Diskette. The head surface has been designed to obtain maximum signal transfer to and from the magnetic surface of the Diskette with minimum head/Diskette wear.

## 2.6 Recording Format

The format of the data recorded on the disk is totally a function of the host system, and can be designed around the users application to best take advantage of the total available bits that can be written on any one track.

For a detailed discussion of various recording formats, the systems designer should read one of the following:

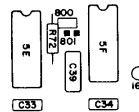
1. IBM Compatibility Manual.
2. Shugart Associates Double Density Design Guide.
3. SA801/901 Track Formats.

## 2.7 Optional Features

1. -12 to -15 Volt DC to replace -5 Volt DC requirement.
2. Dust Cover, Not available on "R" series.
3. Write Protect for SA800. Standard on SA801.
4. Door Lock. Will lock the door when drive is selected or through alternate I/O pin.
5. Horizontal mounting with door opening up.
6. SA800/801 "R" Series. Allows two drives to be horizontally installed in a standard 19" Rack. Reference figure 20.

## 2.8 Model Differences

- 800-1 - Soft Sected with an FM (single density) data separator.
- 800-2 - Soft Sected without data separator.
- 800-4 - Mechanics only (No PCB).
- 801 - Hard Sected with an FM (single density) data separator and sector separator.



### NOTE:

To convert a 801 to a 800 move the shorting plug from the 801 position to the 800 position. A 800 cannot be converted to a 801.

## **3.0 FUNCTIONAL OPERATIONS**

### **3.1 Power Sequencing**

Applying AC and DC power to the SA800/801 can be done in any sequence, however, once AC power has been applied, a 2 second delay must be introduced before any Read or Write operation is attempted. This delay is for stabilization of the Diskette rotational speed. Also, after application of DC power, a 90 millisecond delay must be introduced before a Read, Write, or Seek operation or before the control output signals are valid. After powering on, initial position of the R/W head with respect to data tracks is indeterminant. In order to assure proper positioning of the R/W head prior to any read/write operation after powering on, a Step Out operation should be performed until the Track 00 indicator becomes active.

### **3.2 Drive Selection**

Drive selection occurs when a drive's Drive Select line is activated. Only the drive with this line active will respond to input lines or gate output lines. Under normal operation, the Drive Select line will load the R/W head, apply power to the stepper motor, enable the input lines, activate the output lines and light the Activity LED on the front of the drive. Optional modes of operation are available. Reference section 7 for these user installable features.

### **3.3 Track Accessing**

Seeking the R/W head from one track to another is accomplished by:

- a. Activating Drive Select line.
- b. Selecting desired direction utilizing Direction Select line.
- c. Write Gate is being inactive.
- d. Pulsing the Step line.

Multiple track accessing is accomplished by repeated pulsing of the Step line until the desired track has been reached. Each pulse on the Step line will cause the R/W head to move one track either in or out depending on the Direction Select line. Head movement is initiated on the trailing edge of the Step Pulse.

#### **3.3.1 Step Out**

With the Direction Select line at a plus logic level (2.5V to 5.25V) a pulse on the Step line will cause the R/W head to move one track away from the center of the disk. The pulse(s) applied to the Step line and Direction Select line must have the timing characteristics shown in Figure 3.

#### **3.3.2 Step In**

With the Direction Select line at a minus logic level (0V to .4V), a pulse on the Step line will cause the R/W head to move one track closer to the center of the disk. The pulse(s) applied to the Step line must have the timing characteristics shown in Figure 3.

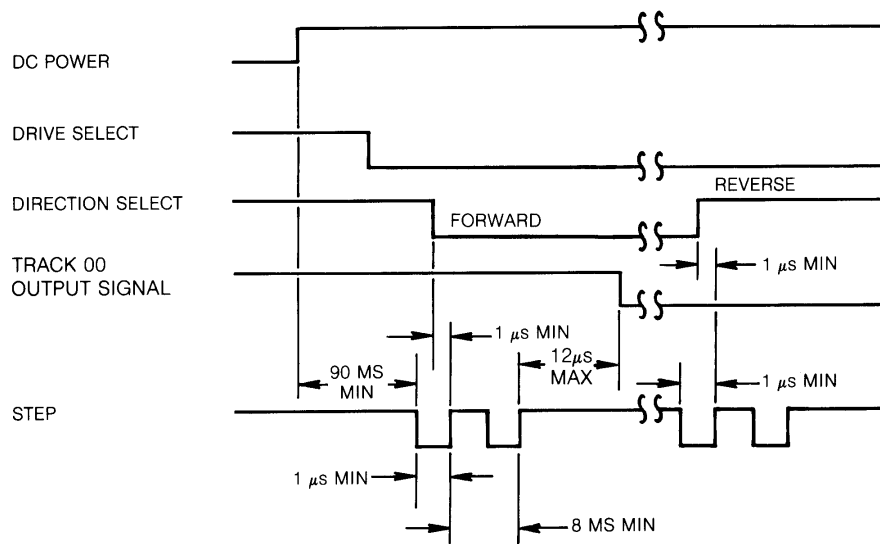
### **3.4 Read Operation**

Reading data from the SA800/801 Diskette Storage drive is accomplished by:

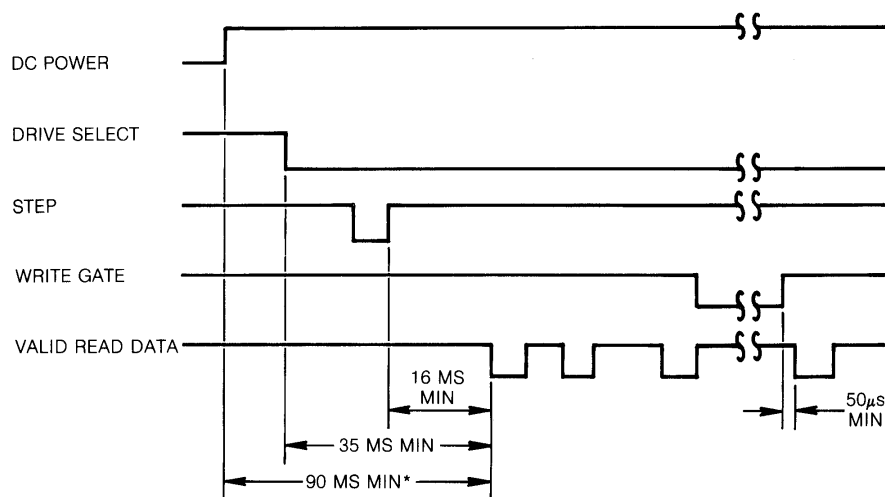
- a. Activating Drive Select line.
- b. Write Gate being inactive.

The timing relationships required to initiate a read sequence are shown in Figure 4. These timing specifications are required in order to guarantee that the R/W head position has stabilized prior to reading.

The timing of the read signals, Read Data, Separated Data, and Separated Clock are shown in Figure 5.

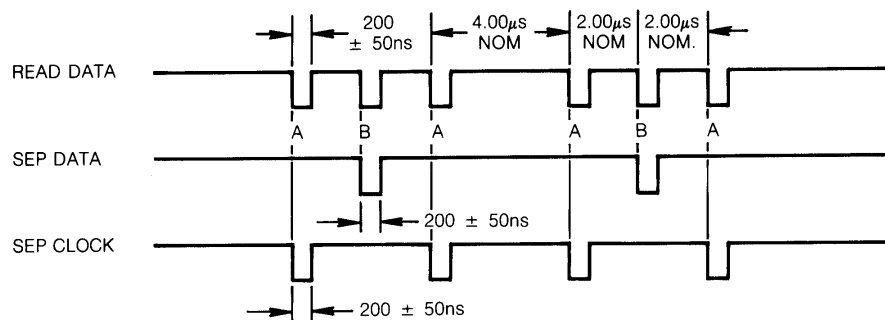


**Figure 3.** Track Access Timing



\* 2 SECONDS IF AC AND DC POWER ARE APPLIED AT SAME TIME

**Figure 4.** Read Initiate Timing



A = LEADING EDGE OF BIT MAY BE  $\pm 400\text{ ns}$  FROM ITS NOMINAL POSITION.  
 B = LEADING EDGE OF BIT MAY BE  $\pm 200\text{ ns}$  FROM ITS NOMINAL POSITION.

**Figure 5. Read Signal Timing**

### 3.5 Write Operation

Writing data to the SA800/801 is accomplished by:

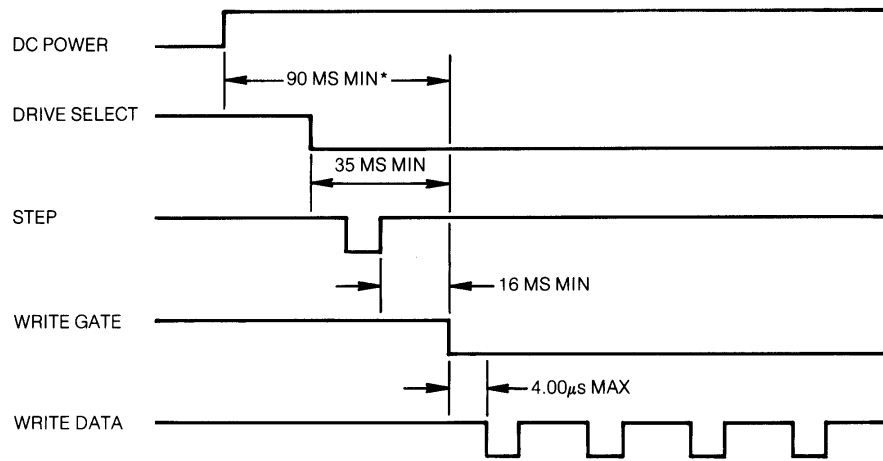
- Activating the Drive Select line.
- Activating the Write Gate line.
- Pulsing the Write Data line with the data to be written.

The timing relationships required to initiate a write data sequence are shown in Figure 6. These timing specifications are required in order to guarantee that the R/W head position has stabilized prior to writing.

The timing specifications for the Write Data pulses are shown in Figure 7.

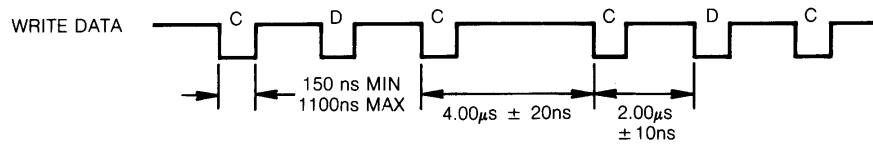
### 3.6 Sequence of Events

The timing diagram shown in Figure 8 shows the necessary sequence of events with associated timing restrictions for proper operation.

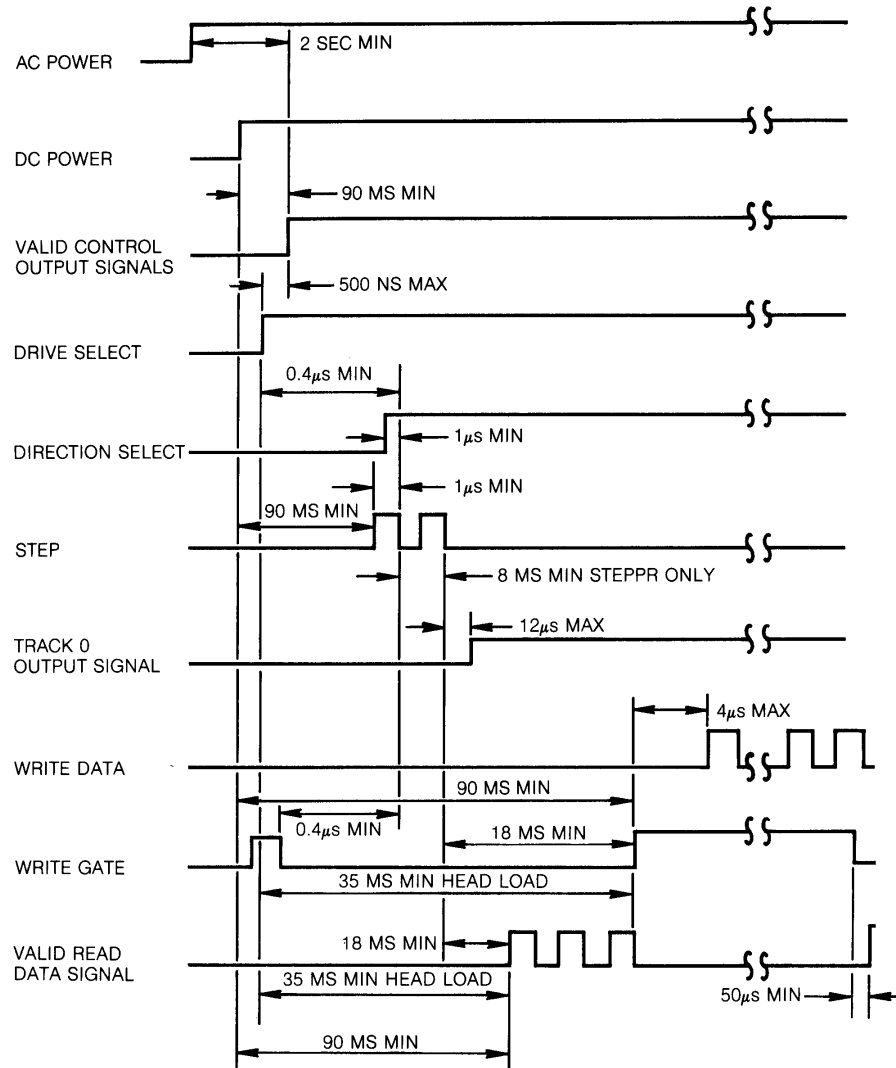


\* 2 SECONDS IF AC AND DC POWER ARE APPLIED AT SAME TIME.

**Figure 6.** Write Initiate Timing



**Figure 7.** Write Data Timing



NOTE 1: 35ms minimum delay must be introduced after Drive Select to allow for proper head load settling. If stepper power is to be applied independent of Head Load, then an 8ms minimum delay must be introduced to allow for stepper settling. See Section 7 on optional customer installable features.

**Figure 8.** General Control and Data Timing Requirements





## C

- 2



- C



#### 4.1.1 Input Line Termination

The SA800/801 has been provided with the capability of terminating the four input lines, which are meant to be multiplexed, by jumpering traces. The four lines and their respective jumpering traces are:

1. Direction Select ..... Trace "T3"
2. Step ..... Trace "T4"
3. Write Data ..... Trace "T5"
4. Write Gate ..... Trace "T6"

In order for the drive to function properly, the last drive on the interface must have these four lines terminated. Termination of these four lines can be accomplished by either of two methods.

1. As shipped from the factory, jumpers are installed on the terminator posts T3, T4, T5, and T6. Remove these shorting plugs from all drives except the last one on the Interface.
2. External termination may be used provided the terminator is beyond the last drive. Each of the four lines should be terminated by using a 150 ohm, 1/4 watt resistor, pulled up to +5 VDC.

#### 4.1.1.2 Drive Select 1-4

Drive Select when activated to a logical zero level, activates the multiplexed I/O lines and loads the R/W head. In this mode of operation only the drive with this line active will respond to the input lines and gate the output lines.

Four separate input lines, Drive Select 1, Drive Select 2, Drive Select 3, and Drive Select 4, are provided so that up to four drives may be multiplexed together in a system and have separate Drive Select lines. Traces 'DS1', 'DS2', 'DS3', and 'DS4' have been provided to select which Drive Select line will activate the interface signals for a unique drive. As shipped from the factory, a shorting plug is installed on 'DS1'. To select another Drive Select line, this plug should be moved to the appropriate 'DS' pin. For additional methods of selecting drives, see section 7.1.

#### 4.1.1.3 Direction Select

This interface line is a control signal which defines direction of motion the R/W head will take when the Step line is pulsed. An open circuit or logical one defines the direction as "out" and if a pulse is applied to the Step line the R/W head will move away from the center of the disk. Conversely, if this input is shorted to ground or a logical zero level, the direction of motion is defined as "in" and if a pulse is applied to the step line, the R/W head will move towards the center of the disk.

#### 4.1.1.4 Step

This interface line is a control signal which causes the R/W head to move with the direction of motion as defined by the Direction Select line.

The access motion is initiated on each logical zero to logical one transition, or the trailing edge of the signal pulse. Any change in the Direction Select line must be made at least 1  $\mu$ s before the trailing edge of the Step pulse. The read/write head may be prevented from stepping past track 00 by using the "NFO" trace option on LSI PCB. Refer to Figure 3 for these timings. **Note:** When going from a reverse seek to a forward seek or vice versa and additional 8 ms delay must be induced before changing direction.

#### 4.1.1.5 Write Gate

The active state of this signal, or logical zero, enables Write Data to be written on the diskette. The inactive state, or logical one, enables the read data logic (Separated Data, Separated Clock, and Read Data) and stepper logic. Refer to Figure 6 for timings.

#### 4.1.1.6 Write Data

This interface line provides the data to be written on the diskette. Each transition from a logical one level to a logical zero level, will cause the current through the R/W head to be reversed thereby writing a data bit. This line is enabled by Write Gate being active. Refer to Figure 7 for timings.

#### 4.1.1.7 Head Load (Alternate Input)

This customer installable option, when enabled by jumpering Trace 'C' and activated to a logical zero level and the diskette access door is closed, will load the R/W head load against the diskette. Refer to section 7 for uses and method of installation.

#### 4.1.1.8 In Use (Alternate Input)

This customer installable option, when enabled by jumpering Trace 'D' and activated to a logical zero level will turn on the Activity LED in the door push button. This signal is an "OR" function with Drive Select. Refer to section 7.8 for uses and method of installation.

#### 4.1.2 Output Lines

There are six standard and one optional output lines from the SA800, and eight output lines from the SA801. Also, there is one Alternate Output available from the drive. The output signals are driven with an open collector output stage capable of sinking a maximum of 40 ma at a logical level or true state with a maximum voltage of 0.4V measured at the driver. When the line driver is off and the collector current is a maximum of 250 microamperes.

Refer to Figure 10 for the recommended circuit.

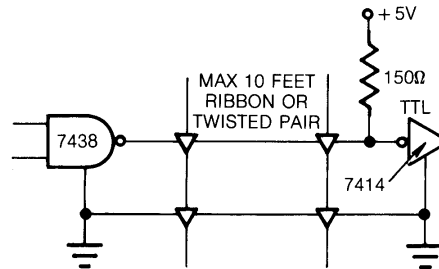


Figure 10. Interface Signal Driver/Receiver

#### 4.1.2.1 Track 00

The active state of this signal, or a logical zero indicates when the drives R/W head is positioned at track zero (the outermost track) and the access circuitry is driving current through phase one of the stepper motor. This signal is at a logical one level, or false state, when the selected drives R/W head is not at track 00.

#### 4.1.2.2 Index

This interface signal is provided by the drive once each revolution of the diskette (166.67 ms) to indicate the beginning of the track. Normally this signal is a logical one and makes the transition to the logical zero level for a period of 1.7 ms (0.4 ms on SA801) once each revolution. The timing for this signal is shown in Figure 11.

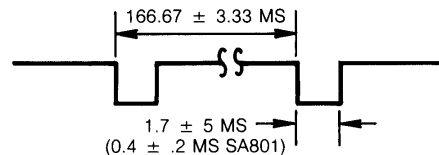


Figure 11. Index Timing

To correctly detect Index at the Host Index should be false at Drive Select time, that is, the Host should see the transition from false to true after the drive has been selected.

For additional methods of detecting Index, refer to section 7.6.

#### 4.1.2.3 Sector (SA801 only)

This interface signal is provided by the drive 32 times each revolution. Normally, this signal is a logical one and makes the transition to a logical zero for a period of 0.4 ms each time a sector hole on the Diskette is detected. Figure 12 shows the timing of this signal and its relationship to the Index pulse.

For additional methods of detecting Sector refer to section 7.7.

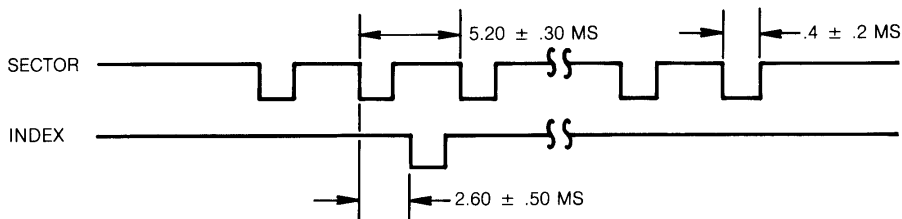


Figure 12. Sector Timing

#### 4.1.2.4 Ready

This interface signal indicates that two index holes have been sensed after properly inserting a diskette and closing the door, or that two index holes have been sensed following the application of +5V power to the drive.

For additional methods of using the Ready line, refer to section 7.5.

#### 4.1.2.5 Read Data

This interface line provides the "raw data" (clock and data together) as detected by the drive electronics. Normally, this signal is a logical one level and becomes a logical zero level for the active state. Reference Figure 5 for the timing and bit shift tolerance within normal media variations.

#### 4.1.2.6 Sep Data

This interface line furnishes the data bits as separated from the "raw data" by use of the internal data separator. Normally, this signal is a logical one level and becomes a logical zero level for the active state. Reference Figure 5 for the timing. This line is available on the SA801 and 800 Model 1.

#### 4.1.2.7 Sep Clock

This interface line furnishes the clock bits as separated from the "raw data" by use of the internal data separator. Normally, this signal is a logical one level and becomes a logical zero level for the active state. Reference Figure 5 for the timing. This line is available on the SA801 and 800 Model 1 and PCB 25136.

**NOTE:** True separation internally inserting up to three missing clock bits to maintain synchronization, is available on the LSI PCB by using trace option "TS".

#### 4.1.2.8 Write Protect (Optional on SA800)

This interface signal is provided by the drive to give the user an indication when a Write Protected Diskette is installed. The signal is logical zero level when it is protected. Under normal operation, the drive will inhibit writing with a protected diskette installed in addition of notifying the interface.

For other methods of using Write Protect, refer to section 7.9.

#### 4.1.2.9 Disk Change (Alternate Output)

Reference section 7.10.

#### 4.1.3 Alternate I/O Pins

These interface pins have been provided for use with customer installable options. Refer to section 7 for methods of use.

#### 4.2 Power Interface

The SA800/801 Diskette Storage Drive requires both AC and DC power for operation. The AC power is used for the spindle drive motor and the DC power is used for the electronics and the stepper motor.

##### 4.2.1 AC Power

The AC power to the drive is via the connector P4/J4 located to the rear of the drive and below the AC motor capacitor. The P4/J4 pin designations are outlined below for standard as well as optional AC power.

P4 PIN	60 Hz		50 Hz	
	115 V (Standard)	208/230 V	110V	220V
1	85-127 VAC	170-253 VAC	85-127 VAC	170-253 VAC
2	Frame Gnd	Frame Gnd	Frame Gnd	Frame Gnd
3	85-127 V Rtn	170-253 V Rtn	85-127 V Rtn	170-253 V Rtn
MAX CURRENT	0.35 Amps	0.23 Amps	0.35 Amps	0.23 Amps
FREQ TOLERANCE	$\pm 0.5$ Hz		$\pm 0.5$ Hz	

#### 4.2.2 DC Power

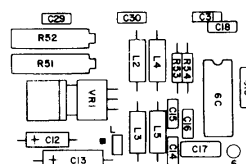
DC power to the drive is via connector P5/J5 located on non-component side of PCB near the P4 connector. The three DC voltages and their specifications along with their P5/J5 pin designators, are outlined below.

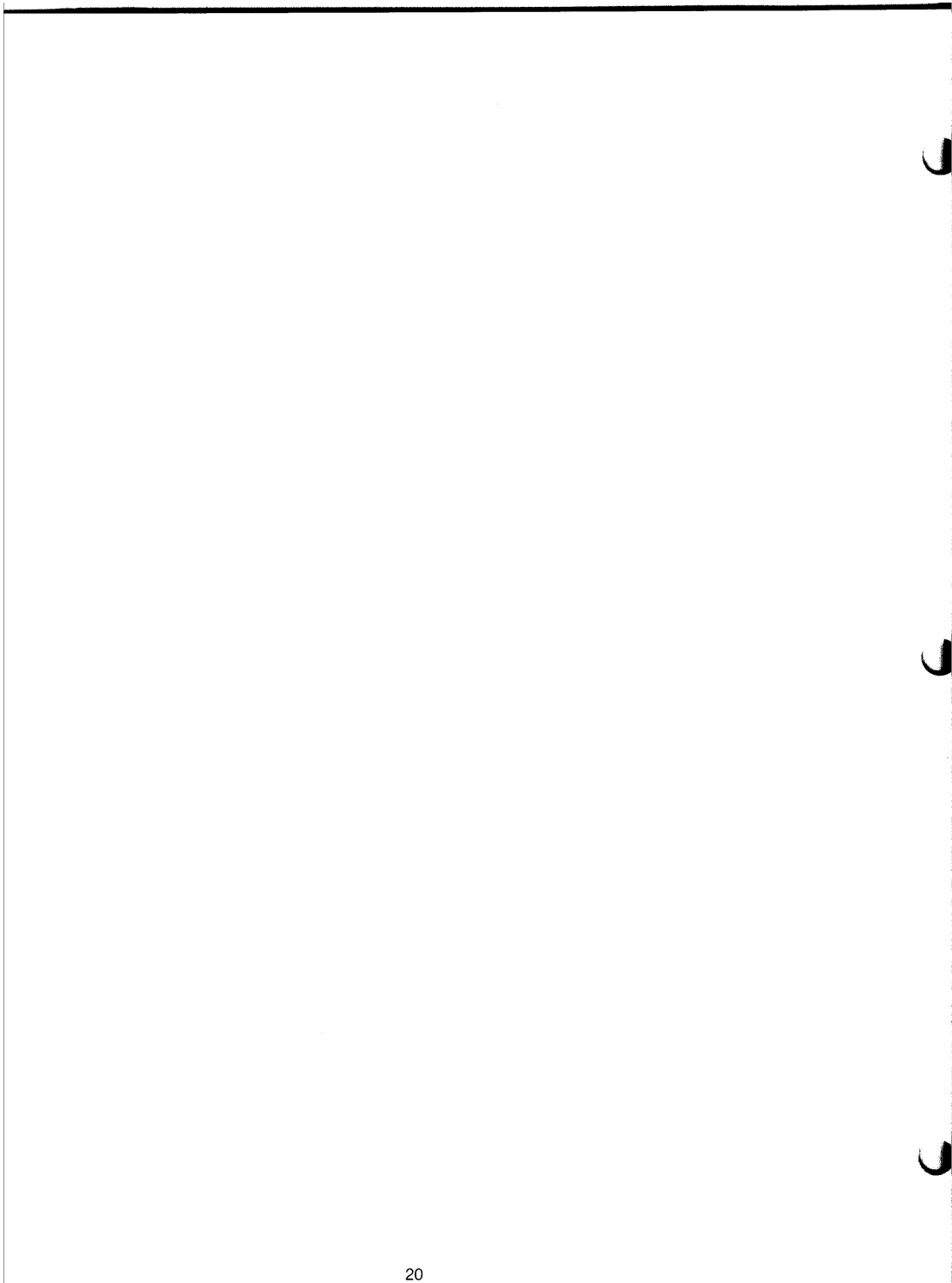
P5 PIN	DC VOLTAGE	TOLERANCE	CURRENT	MAX RIPPLE (p to p)
1	+ 24 VDC	$\pm 1.2$ VDC	1.7 A Max** 1.3 A Typ	100 mv
2	+ 24 V Return*			
3	- 5 V Return			
4	- 5 VDC	$\pm 0.25$ VDC	0.07 A Max 0.05 A Typ	50 mv
	Optional -7 to -16 VDC (trace 'L')***	NA	0.10 A Max 0.07 A Typ	NA
5	+ 5 VDC	$\pm 0.25$ VDC	1.0 A Max 0.8 A Typ	50 mv
6	+ 5 V Return			

\*The + 24 VDC power requires a separate ground return line. It, and all other DC grounds must be connected together at the power supply. One line from this common DC connection must go to one common Frame Ground connection near the power supply.

\*\*If either customer installable option described in sections 7.2 and 7.4 are used, the current requirement for the + 24 VDC is a multiple of the maximum of + 24V current times the number of drives on the line.

\*\*\*If the shorting plug is in the vertical position the -7 to -16 VDC option can be used. If the shorting plug is in the horizontal position, -5 VDC must be used.







## 5.0 PHYSICAL INTERFACE

The electrical interface between the SA800/801 and the host system is via three connectors. The first connector, J1, provides the signal interface; the second connector, J5, provides the DC power; and the third connector, J4, provides the AC power and frame ground.

This section describes the physical connectors used on the drive and the recommended connectors to be used with them. Refer to Figure 16 for connector locations.

### 5.1 J1/P1 Connector

Connection to J1 is through a 50 pin PCB edge card connector. The dimensions for this connector are shown in Figure 13. The pins are numbered 1 through 50 with the even numbered pins on the component side of the PCB and the odd numbered pins on the non-component side. Pin 2 is located on the end of the PCB connector closest to the AC motor capacitor and is labeled 2. A key slot is provided between pins 4 and 6 for optional connector keying.

The recommended connectors for P1 are tabulated below.

TYPE OF CABLE	MANUFACTURER	CONNECTOR P/N	CONTACT P/N
Twisted Pair, #26 (crimp or solder)	AMP	1-583717-1	583616-5 (crimp) 58354-3 (solder)
Twisted Pair, #26 (solder term.)	VIKING	3VH25/1JN-5	NA
Flat Cable	3M "Scotchflex"	3415-0001	NA

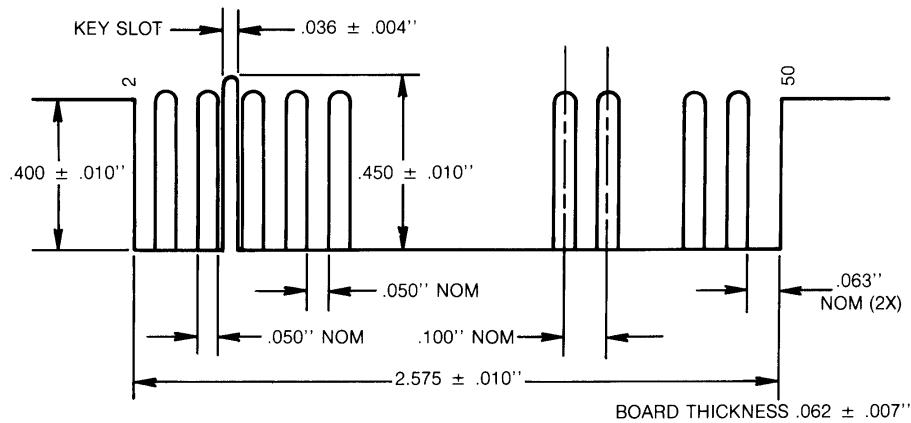


Figure 13. J1 Connector Dimensions

### 5.2 J5/P5 Connector

The DC power connector, J5, is mounted on the non-component side of the PCB and is located below the AC motor capacitor. J5 is a 6 pin AMP Mate-N-Lok connector P/N 1-380999-0. The recommended mating connector (P5) is AMP P/N 1-480270-0 utilizing AMP pins P/N 60619-1. J5 pins are labeled on the component side of the PCB with pin 5 located nearest J1/P1. Figure 14 illustrates J5 connector as seen on the drive PCB from non-component side.

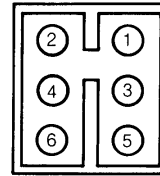


Figure 14. J5 Connector

### 5.3 J4/P4 Connector

The AC power connector, J4 is mounted on the AC motor capacitor bracket and is located just below the capacitor. J4 connector is a 3 pin connector AMP P/N 1-480305-0 with pins P/N 60620-1. The recommended mating connector (P4) is AMP P/N 1-480303-0 or 1-480304-0 both utilizing pins P/N 60619-1. Figure 15 illustrates J4 connector as seen from the rear of the drive.

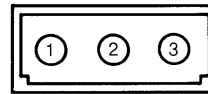


Figure 15. J4 Connector

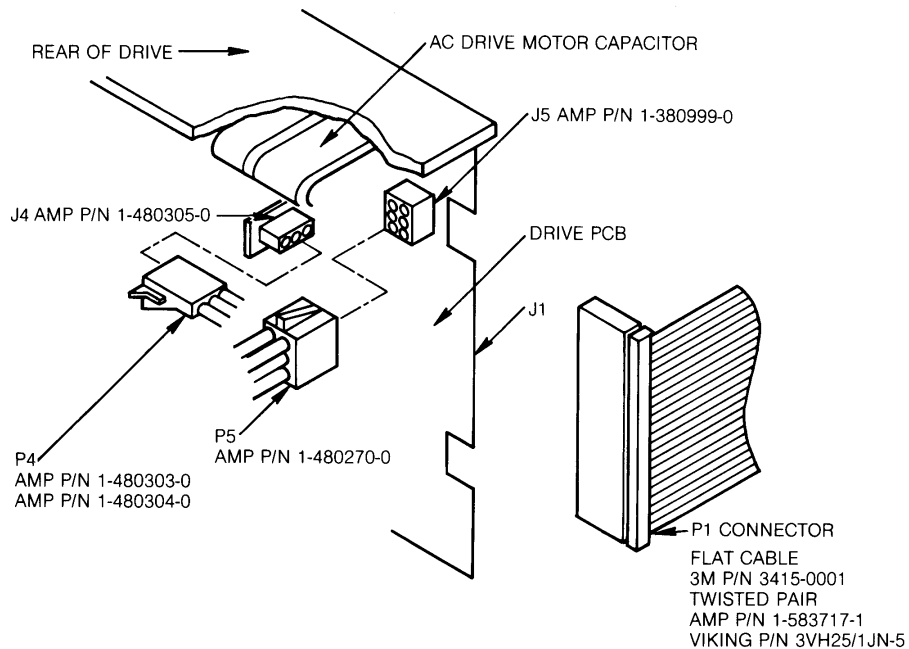


Figure 16. Interface Connectors - Physical Location Diagram

## 6.0 DRIVE PHYSICAL SPECIFICATIONS

This section describes the mechanical dimensions and mounting recommendations for the SA800/801.

### 6.1 Drive Dimensions

Reference Figure 18 for dimensions of the SA800/801.

### 6.2 Mounting Recommendations

The SA800/801 is capable of being mounted in one of the following positions:

1. Vertical-Door opening to the left or right.
2. Horizontal-Door opening up or down.
3. Upright-Door opening towards the front or rear.

#### 6.2.1 Vertical Mounting

The drive, as shipped from the factory, is ready to be mounted in the vertical position, door opening left or right, without any adjustments.

#### Horizontal Mounting

If the drive is to be mounted horizontally with the door opening down (PCB up), the head load actuator return spring must be repositioned to compensate for gravity. Reference Figure 17 for the proper spring position on the actuator.

If the door is to open up (PCB down), it must be specified when ordering. This feature provides a heavier door opening spring. In addition, the head load actuator return spring will be repositioned to compensate for gravity. Reference Figure 17 for the proper position for the spring on the actuator.

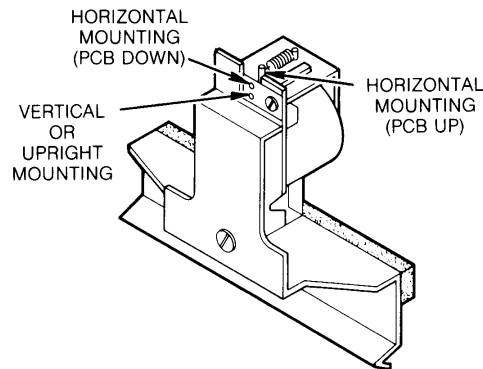
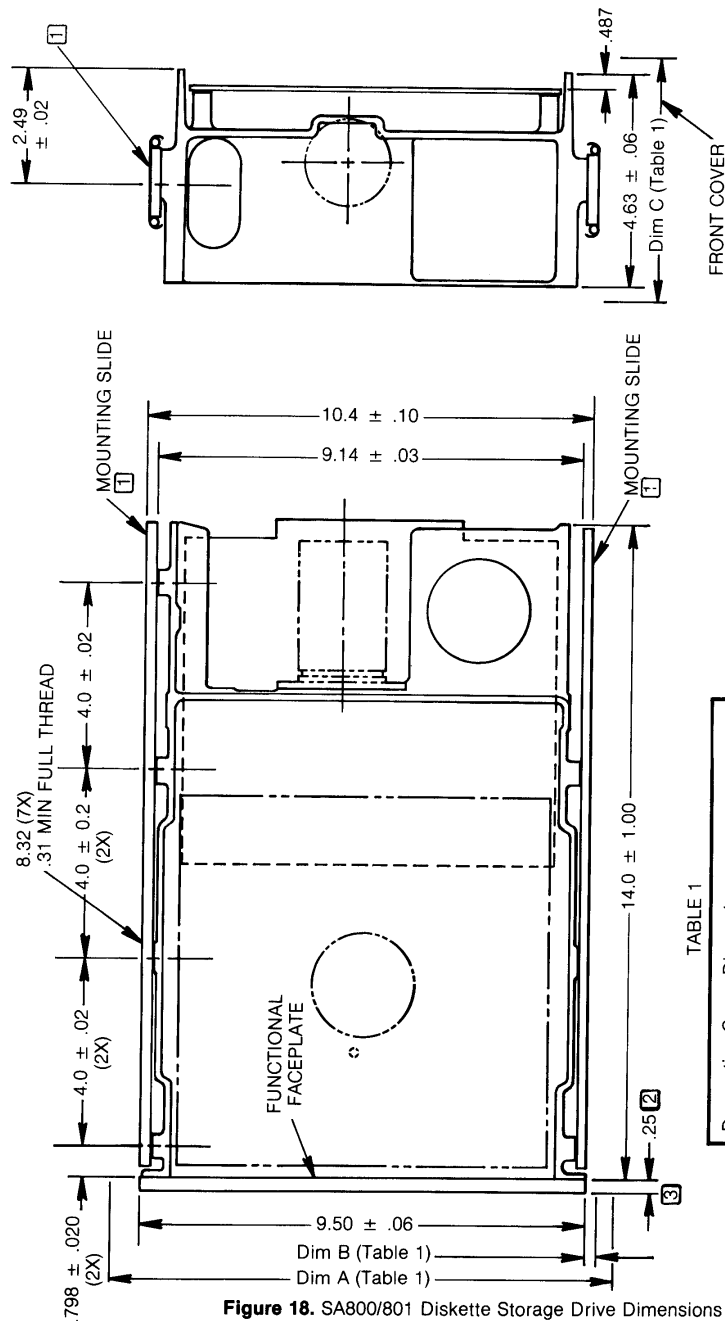


Figure 17. Head Load Actuator Mounting Prerequisites

#### 6.2.3 Upright Mounting

If the Drive is to be mounted in the upright position (IBM 3740 fashion), the spring hook attached to the eject mechanism must be removed and then attach the eject spring to the place the hook was on.



- 1 If file is mounted on slides, file will extend 14 inches from operating position for servicing.
- 2 With decorative cover this dimension is .38.
- 3 Handle extends .375 beyond faceplate.
- 4 All dimensions are in inches.

TABLE 1

Decorative Cover Dimensions			
Cover Size	Dim A	Dim B	Dim C
4-5/8 X 10-1/2	10.50	.240	4.62
5-1/4 X 10	10.00	.240	5.25
5-1/4 X 11	11.00	.740	5.25
Tolerance	± .03	± .030	± .03

Figure 18. SA800/801 Diskette Storage Drive Dimensions

### 6.3 Chassis Slide

Available as an optional accessory is a chassis slide kit P/N 50239. This kit contains two slides, one locking and one non-locking, and seven screws. Dimensions of the slide are shown in Figure 19. For use on the standard casting only.

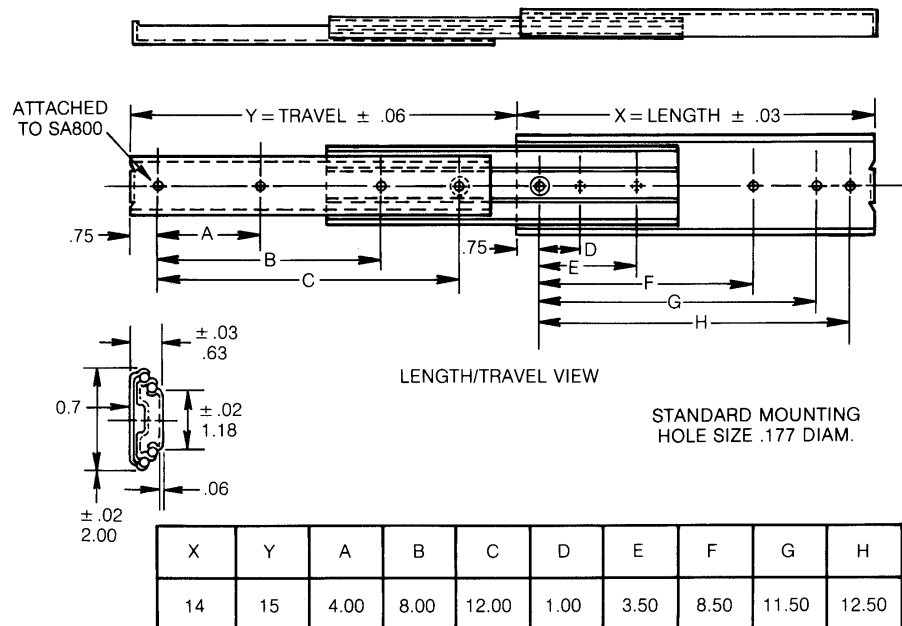


Figure 19. Slide Mounting Dimensions

### 6.4 Decorative Face Plate

The SA800/801 may be ordered with one of the following decorative face plates:

SIZE	COLOR	PART NO.
4 5/8 × 10 1/2	Tan	50264
4 5/8 × 10 1/2	White	50263
5 1/4 × 10	Tan	50261
5 1/4 × 10	White	50260
5 1/4 × 11	Tan	50258
5 1/4 × 11	White	50257
"R" Series-4 5/8 × 8 11/16	Tan	50675

If another color is required to match the system's color scheme, the face plate may be painted. The following information should be utilized to avoid potential problems in the painting process.

1. The front cover is made from GE's LEXAN. Dimensional stability of LEXAN exists from -60°F + 250°F. If the type paint used requires baking, the temperature should not exceed + 250°F, including any hot spots which can contact the cover.
2. LEXAN is a polycarbonate. Any paint to be used should be investigated to insure that it does not contain chemicals that are solvents to polycarbonates.

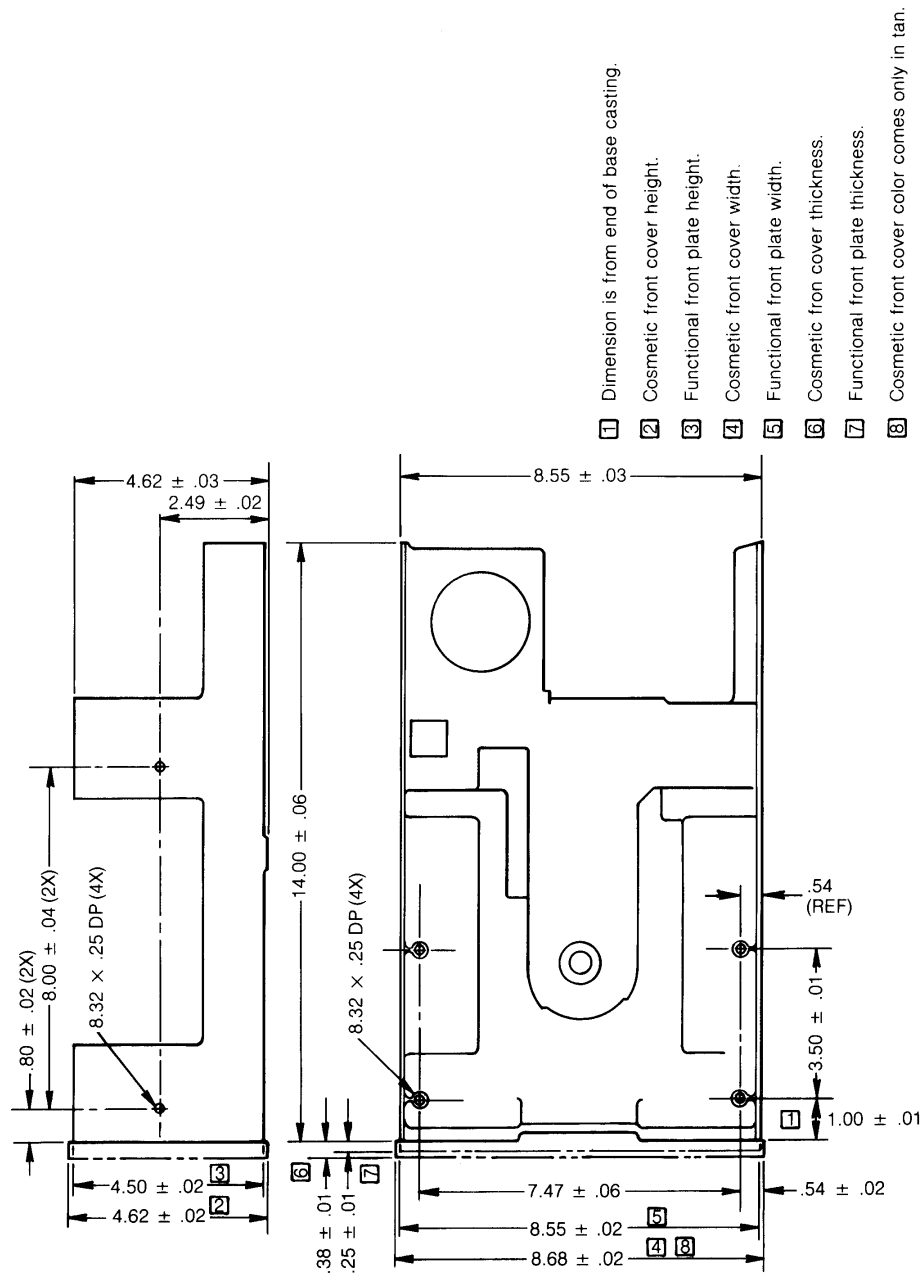


Figure 20. SA800/801R Dimensions

## 7.0 CUSTOMER INSTALLABLE OPTIONS

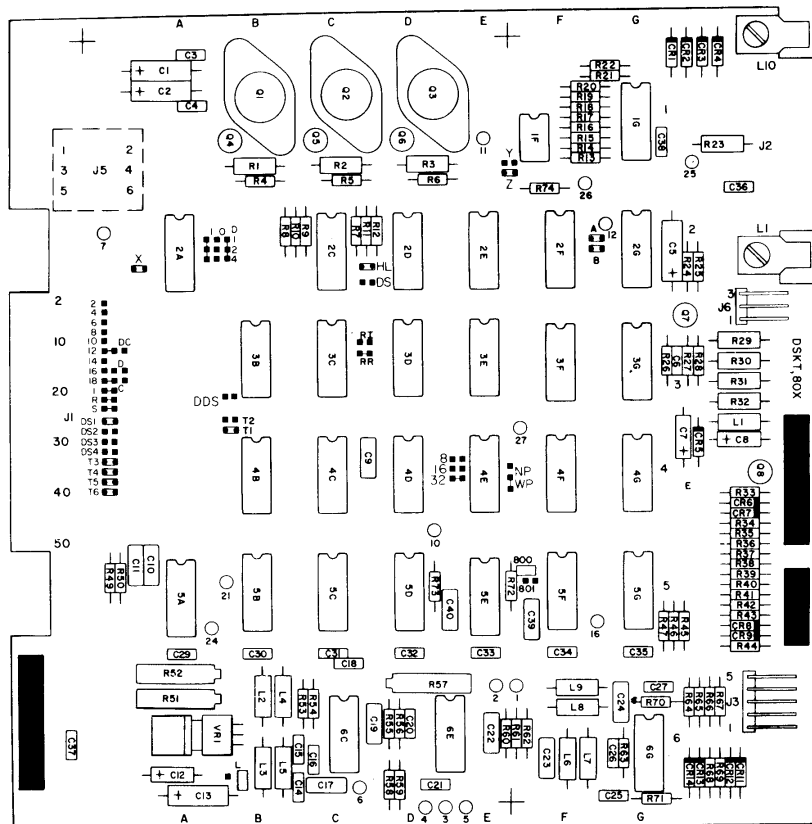
The SA800/801 can be modified by the user to function differently than the standard method as outlined in sections 3 and 4. These modifications can be implemented by adding or deleting traces and by use of the Alternate I/O pins. Some traces are capable of being connected by use of a shorting plug, Shugart P/N 15648 or AMP P/N 530153-2. This section will discuss a few examples of modifications and how to install them. The examples are:

1. Drive Select one to eight drives.
2. Select drive without loading head or enabling stepper.
3. Select drive and enable stepper without loading the head.
4. Load head without selecting drive or enabling stepper.
5. Radial Ready.
6. Radial Index/Sector.
7. Eight, 16, or 32 Sector option.
8. In Use (Activity L.E.D.) optional input.
9. Write Protect options.

Tabulated below are the trace options with the condition of the trace as it is shipped from the factory. Figure 21 shows the location of these traces on the PCB.

CUSTOMER CUT/ADD TRACE OPTIONS

TRACE DESIGNATOR	DESCRIPTION	SHIPPED FROM FACTORY	
		OPEN	SHORT
T3,T4,T5,T6	Terminations for Multiplexed Inputs		Plugged
T1	Terminator for Drive Select		Plugged
T2	Spare Terminator for Radial Head Load	X	
DS1,DS2,DS3,DS4	Drive Select Input Pins	X	DS1 is Plugged
RR	Radial Ready		X
RI	Radial Index and Sector		X
R,I,S	Ready, Index, Sector Alternate Output Pads		X
HL	Stepper Power From Head Load		Plugged
DS	Stepper Power From Drive Select	X	
WP	Inhibit Write When Write Protected		X
NP	Allow Write When Write Protected	X	
8,16,32	8, 16, 32 Sectors (SA801 Only)	8 & 16	32
D	Alternate Input-In Use	X	
2,4,6,8,10,12,14,16,18	Nine Alternate I/O Pins	X	
D1,D2,D4,DDS	Customer Installable Decode Drive Select Option	X	
A,B,X	Radial Head Load		Plugged
C	Alternate Input-Head Load	X	
Z	In Use from Drive Select		Plugged
Y	In Use from HD LD	X	
DC	Alternate Output-Disk Change	X	
NFO	Non Force Out	X	
TS	True FM Data Separation	X	



- Jumper Plug Installed as Shipped
- Test Point

Figure 21. Component Locations Standard PCB



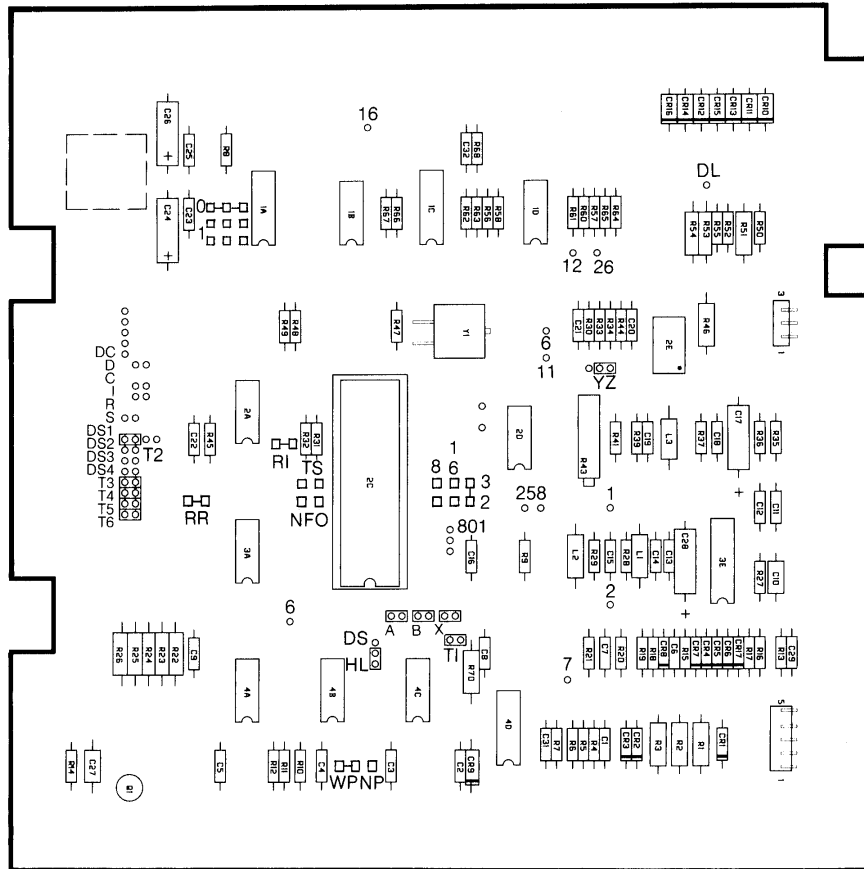


Figure 22. Component Locations LSI PCB

### 7.1 Drive Select - One to Eight Drives

Customer installed option allows up to eight drives to be multiplexed together. This method of drive selection uses a binary address to select a drive.

To install this feature on a standard drive, the following traces should be added or deleted:

1. Add a 74L85, 4 bit comparator (Motorola P/N MC 14585, National Semiconductor P/N MM 74c85) into position 2B on PCB, (1A on PCB 25136).
2. Connect trace 'DDS'.
3. Insure traces 'DS1' - 'DS4' are plugged.
4. Jumper traces 'D1', 'D2', and 'D4' according to table below for address of each drive.

The four Drive Select lines are to be used for addressing the drives. Pin 26 is used as Drive Select enable and pins 28 (binary 1), 30 (binary 2), and 32 (binary 4), are the address lines. Figure 23 illustrates the circuitry. The table below shows the logical state each line must be at to select each of the drives.

Figure 23 illustrates the circuitry.

ADDRESS	TRACE		
	D1	D2	D4
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

DRIVE	INTERFACE PIN			
	26	28	30	32
0	0	1	1	1
1	0	0	1	1
2	0	1	0	1
3	0	0	0	1
4	0	1	1	0
5	0	0	1	0
6	0	0	1	0
7	0	0	0	0

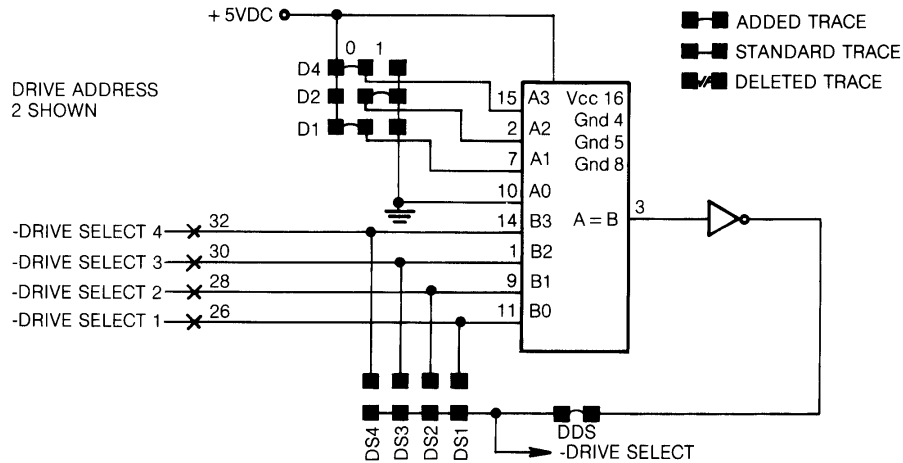


Figure 23. Drive Select Circuitry

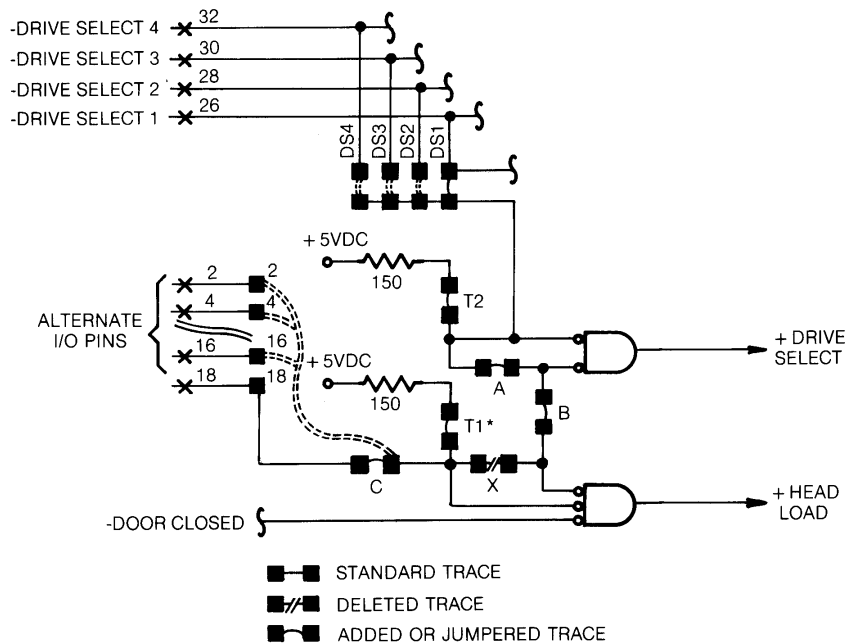
## 7.2 Select Drive Without Loading Head Or Enabling Stepper Motor

This option would be advantageous to the user who requires a drive to be selected at all times. Normally, when a drive is selected, its head is loaded and the stepper motor is energized. The advantage of this option would be that the output control signals could be monitored (with the exception of Track Zero, which requires the stepper to be energized) while the head was unloaded thereby extending the head and media life. When the system requires the drive to perform a Read, Write, or Seek, the controller would activate the Head Load line (pin 18) which in turn would load the head and energize the stepper motor. After the Head Load line is activated, a 35 ms delay must be introduced before Write Gate and Write Data may be applied or before Read Data is valid.

To install this option on a standard drive, the following traces should be added or deleted:

1. Jumper trace 'T2'.
2. Remove jumper from trace 'X'.
3. Jumper trace 'C'.

Figure 24 illustrates the circuitry.



\*NOTE: If the -Head Load line is multiplexed, terminator 'T1' jumper must be removed from each drive except the last one on the line. Also, the current requirement for the +24 VDC supply should be a multiple of the maximum +24 volt current times the number of drives on the line that have Head Load active.

Figure 24. Select Drive Without Loading Head Circuit

### 7.3 Select Drive and Enable Stepper Without Loading Head

This option is useful to the user who wishes to select a drive and perform a seek operation without the head being loaded or with door open. An example use of this option is that at power on time, an automatic recalibrate (reverse seek to track zero) operation could be performed with the drive access door open. Normally for a seek to be performed, the door must be closed and the head loaded. Other advantages are those listed in section 7.2 in addition to being able to monitor Track Zero. When a Read or Write operation is to be performed, the head must be loaded (pin 18). After the Head Load line is activated, a 35 ms delay must be introduced before Write Gate and Write Data may be applied or before Read Data is valid.

To install this option on a standard drive, the following traces should be added or deleted:

1. Jumper trace 'T2'.
2. Remove jumper from trace 'B'.
3. Remove jumper from trace 'HL'.
4. Jumper trace 'DS'.
5. Jumper trace 'C'.

Figures 24 and 25 illustrate the circuitry.

### 7.4 Load Head Without Selecting Drive Or Enabling Stepper

This option is useful in disk to disk copy operations. It allows the user to keep the heads loaded on all drives thereby eliminating the 35 ms head load time. The head is kept loaded on each drive via an Alternate I/O pin. Each drive may have its own Head Load line (Radial or Simplex) or they may share the same line (Multiplexed). When the drive is selected, an 8 ms delay must be introduced before a Read or Write operation can be performed. This is to allow the R/W head to settle after the stepper motor is energized. With this option installed, a drive can only be selected with both Drive Select and Head Load active.

To install this option on standard drive, the following traces should be added or deleted:

1. Jumper trace 'T2'.
2. Remove jumper from trace 'A'.
3. Remove jumper from trace 'HL'.
4. Jumper trace 'DS'.
- \*5. Jumper trace 'C'.

\*If the -Head Load line is multiplexed, terminator 'T1' jumper must be removed from each drive except the last one on the line.

Figures 25 and 26 illustrate the circuitry.

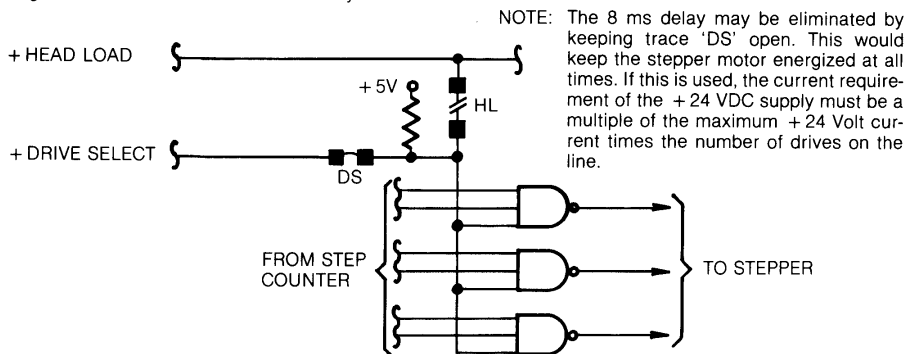
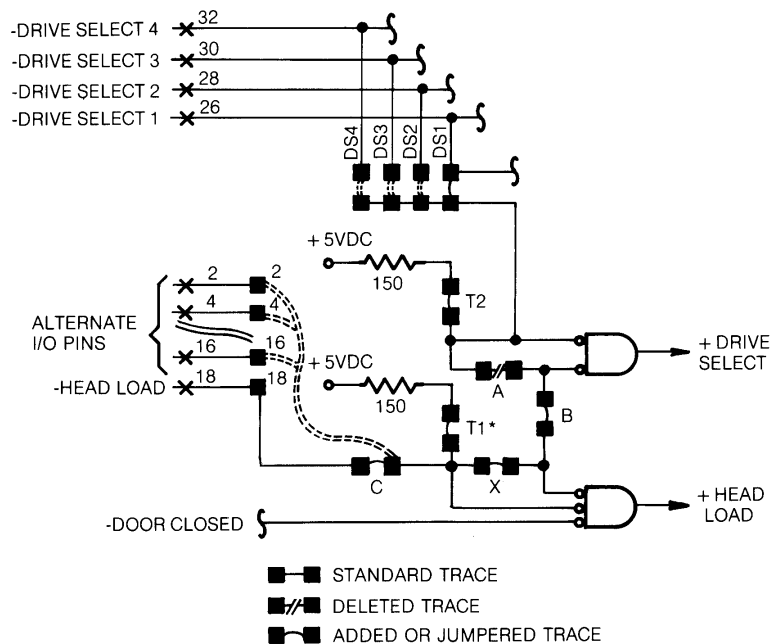


Figure 25. Stepper Motor Enable Circuit



\*IF THE -HEAD LOAD LINE IS MULTIPLEXED; TERMINATOR 'T1' JUMPER MUST BE REMOVED FROM EACH DRIVE EXCEPT THE LAST ONE ON THE LINE.

**Figure 26.** Load Head Without Selecting Drive or Enabling Stepper Circuit

### 7.5 Radial Ready

This option enables the user to monitor the Ready line of each drive on the interface. This can be useful in detecting when an operator has removed or installed a Diskette in any drive. Normally, the Ready line from a drive is only available to the interface when it is selected.

To install this option on a standard drive, the following traces should be added or deleted:

1. Cut trace 'RR'.
- \*2. Cut trace 'R'.
- \*3. Add a wire from pad 'R' to one of the Alternate I/O pins.

\*One of the drives on the interface may use pin 22 as its Ready line, therefore, steps 2 and 3 may be eliminated on this drive. All the other drives on the interface must have their own Ready line, therefore steps 2 and 3 must be incorporated.

Figure 27 illustrates the circuitry.

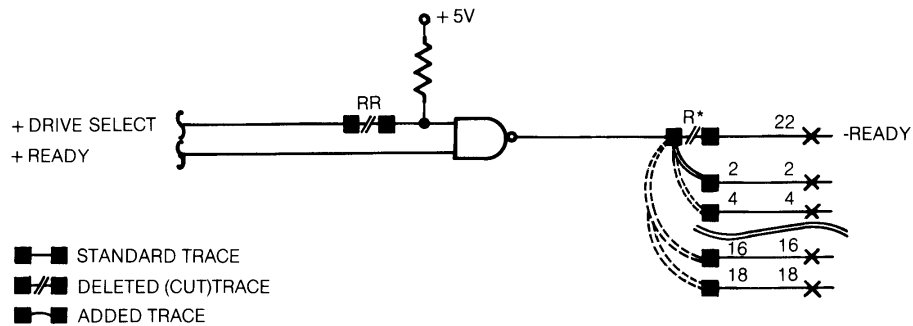


Figure 27. Radial Ready Circuit

### 7.6 Radial Index/Sector

This option enables the user to monitor the Index and Sector lines at all times so that the drive may be selected just prior to the sector that is to be processed. This option can be used to reduce average latency.

To install this option on a standard drive the following traces should be added or deleted:

1. Cut trace 'RI'.
- \*2. Cut trace 'I'.
- \*3. Cut trace 'S'.
4. Add a wire from trace 'I' to one of the Alternate I/O pins.
- \*5. Add a wire from trace 'S' to one of the Alternate I/O pins.

\*One of the drives on the interface may use pin 20 (-Index) and pin 24 (-Sector) as its Index and Sector lines, therefore, steps 2-5 may be eliminated for this drive. All other drives on the interface must have their own Index and Sector lines, therefore, steps 2-5 must be incorporated.

Figure 28 illustrates the circuitry.

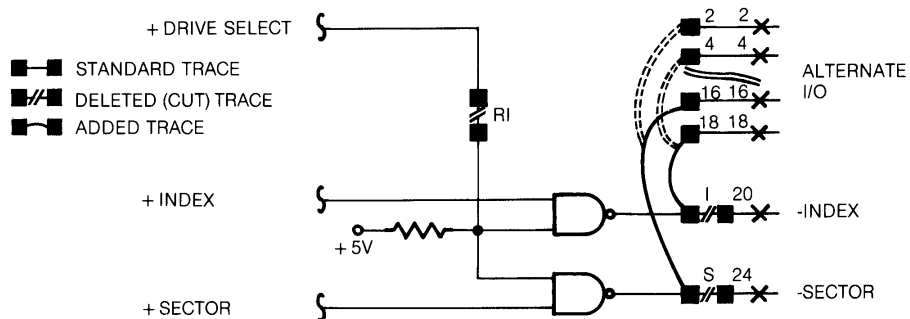


Figure 28. Radial Index/Sector Circuit

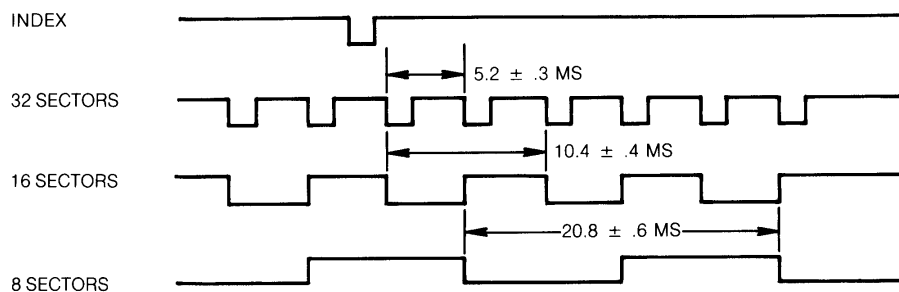
### 7.7 Eight, 16, Or 32 Sectors

The SA801, as shipped from the factory, is set up to provide 32 Sector pulses per revolution of the Diskette onto the interface. This option is provided for the user who wishes to have eight or 16 Sectors per revolution. The logic divides the Sector pulses by two or four. Reference Figure 29 for the timing relationships.

To install this option on a standard drive (SA801), the following traces should be added or deleted:

1. Cut trace '32'.
2. Connect trace '16' for 16 Sectors or connect trace '8' for eight Sectors.

Figure 30 illustrates the circuitry.



\* INDICATES BEGINNING OF SECTOR 1 IN RELATIONSHIP TO INDEX

Figure 29. Sector Timing Relationships

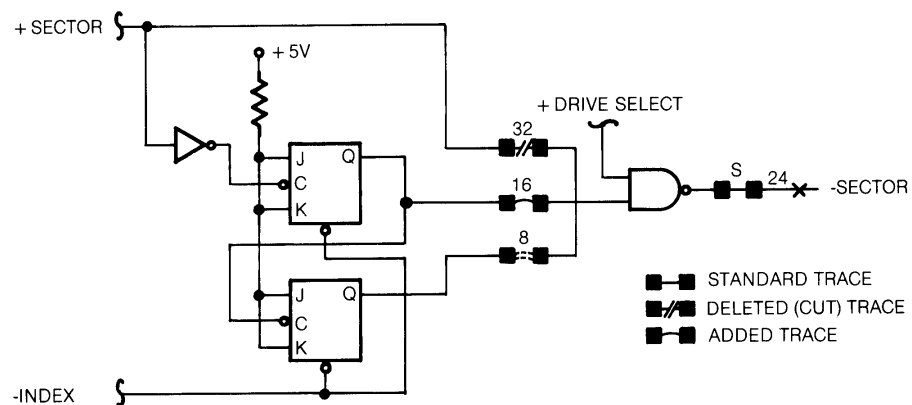


Figure 30. Sector Divide Circuit

### 7.8 In Use Alternate Input (Activity LED)

This alternate input, when activated to a logical zero level, will turn on the Activity LED mounted in the push bar on the front panel of the drive. It can be used as an indicator to the operator. Examples of some indications are:

1. Write protected Diskette is installed.
2. Drive in which the diskette is to be changed.
3. The operating system drive.
4. Drive with a special configuration.

To install this option on standard drive, jumper trace 'D' and active the interface line pin 16.

This signal is an "OR" function with Drive Select or Head Load. Figure 31 illustrates the circuitry.

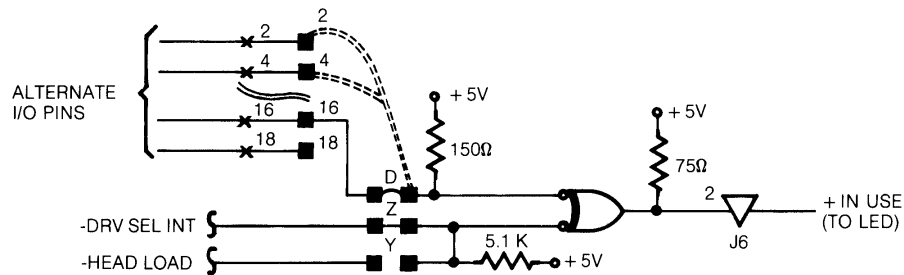


Figure 31. In Use/Activity LED Circuit

### 7.9 Write Protect Optional Use

As shipped from the factory, the optional Write Protect feature will internally inhibit writing when a Write Protected Diskette is installed. With this option installed, a Write Protected Diskette will not inhibit writing, but it will be reported to the interface. This option may be useful in identifying special use Diskettes.

To install this option on a drive with the Write Protect feature, the following traces should be added or deleted:

1. Cut trace 'WP'.
2. Connect trace 'NP'.

Figure 32 illustrates the circuitry.

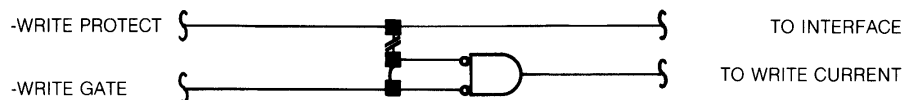


Figure 32. Write Protect Circuit



### 7.10 Disk Change (Alternate Output)

This customer installable option is enabled by jumpering trace 'DC'. It will provide a true signal (logical zero) onto the interface (pin 12) when Drive Select is activated if while deselected the drive has gone from a Ready to a Not Ready (Door Open) condition. This line is reset on the true to false transition of Drive Select if the drive has gone Ready. Timing of this line is illustrated in Figure 33. The circuitry is illustrated in Figure 34.

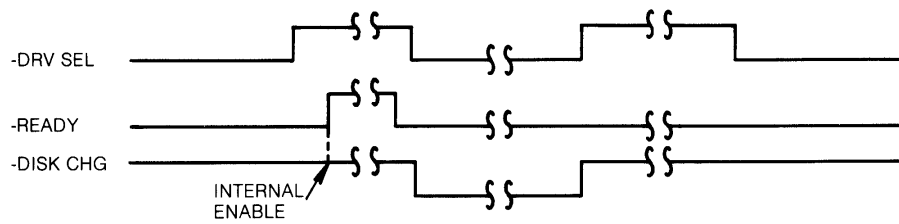


Figure 33. Disk Change Timing

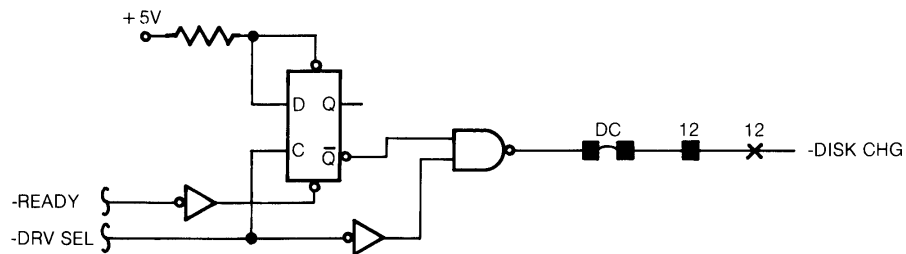


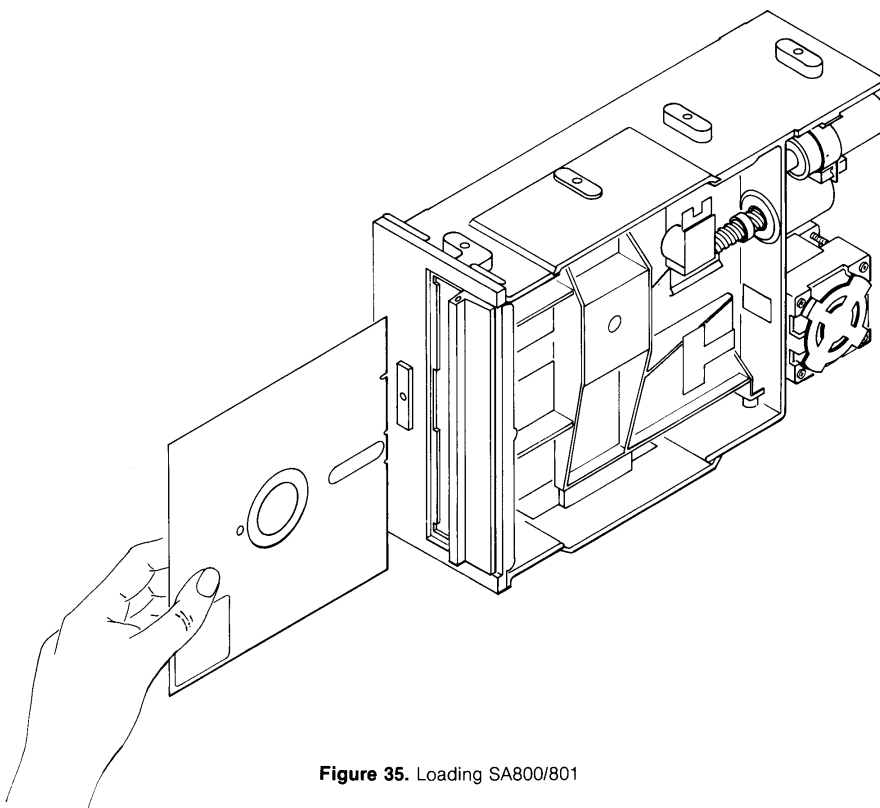
Figure 34. Disk Change Circuit

## 8.0 OPERATION PROCEDURES

The SA800/801 was designed for ease of operator use to facilitate a wide range of operator oriented applications. The following section is a guide for the handling and error recovery procedures on the diskette and diskette drive.

### 8.1 Diskette Loading and Handling

The diskette is a flexible disk enclosed in a plastic jacket. The interior of the jacket is lined with a wiping material to clean to disk of foreign material. Figure 35 shows the proper method of loading a diskette in the SA800/801 Diskette Storage Drive. To load the diskette, depress latch, insert the diskette with the label facing out. (See Figure 35). Move the latch handle to the left to lock diskette on drive spindle. The diskette can be loaded or unloaded with all power on and drive spindle rotating.



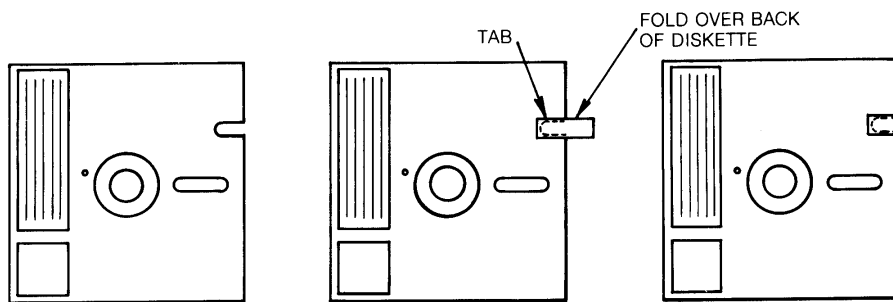
**Figure 35.** Loading SA800/801

When removed from the drive, the diskette is stored in an envelope. To protect the diskette, the same care and handling procedures specified for computer magnetic tape apply. These precautionary procedures are as follows:

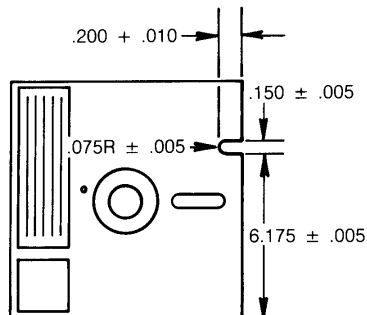
1. Return the diskette to its storage envelope.
2. Keep cartridges away from magnetic fields and from ferromagnetic materials which might become magnetized. Strong magnetic fields can distort recorded data on the disk.
3. Replace storage envelopes when they become worn, cracked or distorted. Envelopes are designed to protect the disk.
4. Do not write on the plastic jacket with a lead pencil or ball-point pen. Use a felt tip pen.
5. Heat and contamination from a carelessly dropped ash can damage the disk.
6. Do not expose diskette to heat or sunlight.
7. Do not touch or attempt to clean the disk surface. Abrasions may cause loss of stored data.

## 8.2 Write Protecting a Diskette

Shugart Media has the capability of being write protected. The write protect feature is selected by the notch in the media. When the notch is open it is protected; when covered, writing is allowed. The notch is closed by placing a tab over the front of the notch, and the tab folded over covering the rear of the notch. The Diskette can then be write protected by removing the tab. Refer to Figures 36 and 37.



**Figure 36.** Diskette Write Protected



**Figure 37.** Write Inhibit Notch Specifications

## **9.0 ERROR DETECTION AND CORRECTION**

### **9.1 Write Error**

If an error occurs during a write operation, it will be detected on the next revolution by doing a read operation, commonly called a "write check." To correct the error, another write and write check operation must be done. If the write operation is not successful after ten attempts have been made, a read operation should be attempted on another track to determine if the media or the drive is failing. If the error still persists, the disk should be considered defective and discarded.

### **9.2 Read Error**

Most errors that occur will be "soft" errors; that is, by performing an error recovery procedure the data will be recovered.

Soft errors are usually caused by:

1. Airborne contaminants that pass between the read/write head and the disk. These contaminants will generally be removed by the cartridge self-cleaning wiper.
2. Random electrical noise which usually lasts for a few  $\mu\text{sec}$ .
3. Small defects in the written data and/or track not detected during the write operation which may cause a soft error during a read.

The following procedures are recommended to recover from the above mentioned soft errors:

1. Reread the track ten times or until such time as the data is recovered.
2. If data is not recovered after using step 1, access the head to the adjacent track in the same direction previously moved, then return to the desired track.
3. Repeat step 1.
4. If data is not recovered, the error is not recoverable.

## APPENDIX A - MODELS AND FEATURES

### MODEL DIFFERENCES

- 800-1 - Soft Sector'd with an FM (single density) data separator.
- 800-2 - Soft Sector'd without data separator.
- 801 - Hard Sector'd with an FM (single density) data separator and sector separator.

NOTE: To convert a 801 to a 800 move the shorting plug from the 801 position to the 800 position. A 800 cannot be converted to a 801.

DRIVE MODEL	MEDIA	
	SINGLE DENSITY	DOUBLE DENSITY
800-1	SA100	SA102
800-2	SA100	SA102
801	SA101	SA103

### MEDIA DESCRIPTION

DISKETTE MODEL	PART NUMBER	DESCRIPTION
SA100	50417	IBM 3740 Compatible, Single Density
SA101	50418	32 Sector, Single Density
SA102	50646	Double Density M <sup>2</sup> FM
SA103	50708	32 Sector, Double Density

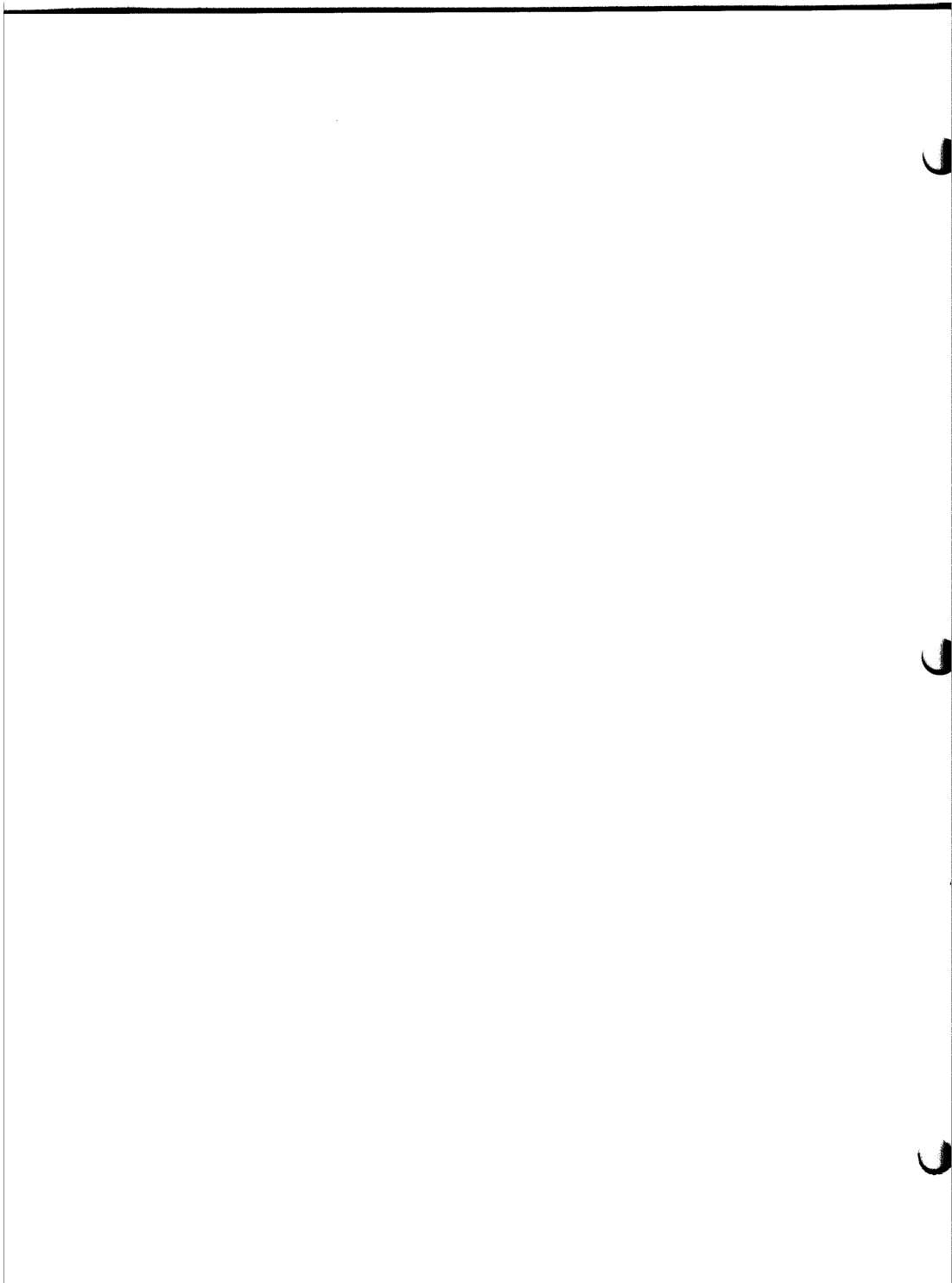
### AC VOLTAGE/FREQUENCY CONVERSION

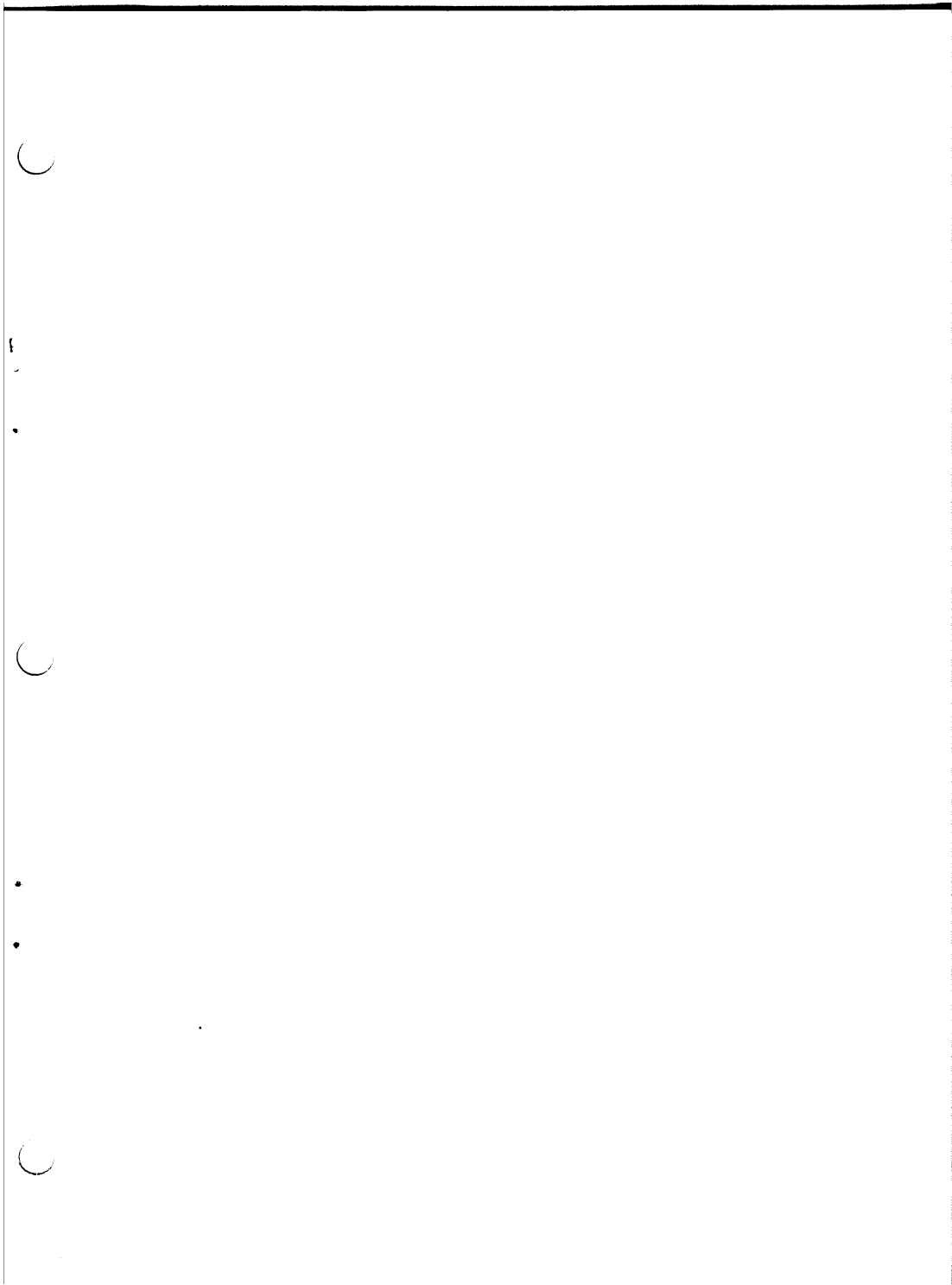
PRIMARY	PART NUMBERS		
VOLTAGE AND FREQUENCY	MOTOR ASM*	MOTOR PULLEY	BELT
115VAC,60HZ	50443	50358	50356
115VAC,50HZ	50443	50357	50355
230VAC,60HZ	50444	50358	50356
230VAC,50HZ	50444	50357	50355

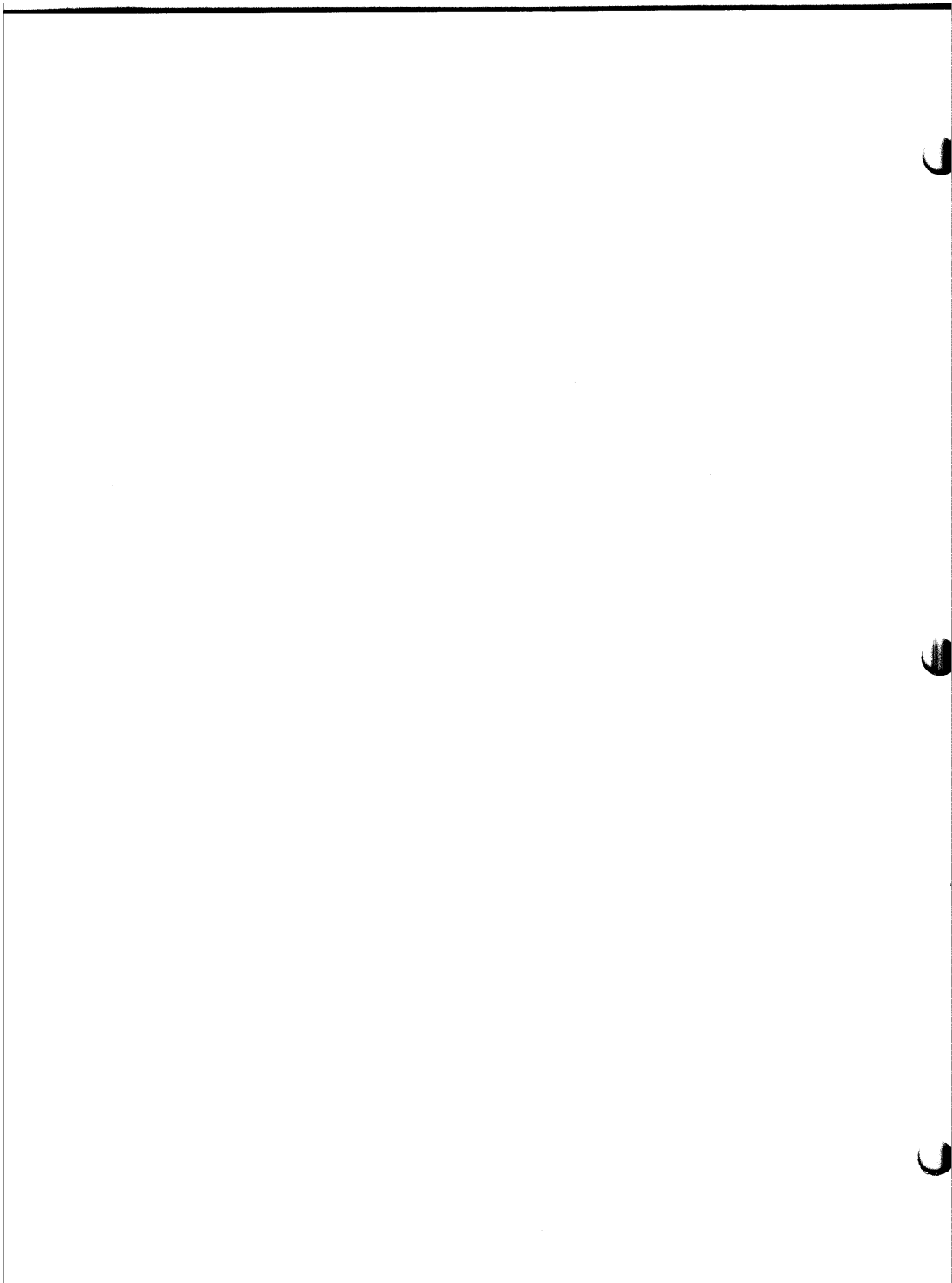
\*Motor assemblies include - motor, capacitor and connector.

### DECORATIVE FACEPLATES

Size	Color	Part Numbers
4-5/8 x 10-1/2	Tan	50264
4-5/8 x 10-1/2	White	50263
5-1/4 x 10	Tan	50261
5-1/4 x 10	White	50260
5-1/4 x 11	Tan	50258
5-1/4 x 11	White	50257
Rack Mount 4-5/8 x 8-11/16	Tan	50675



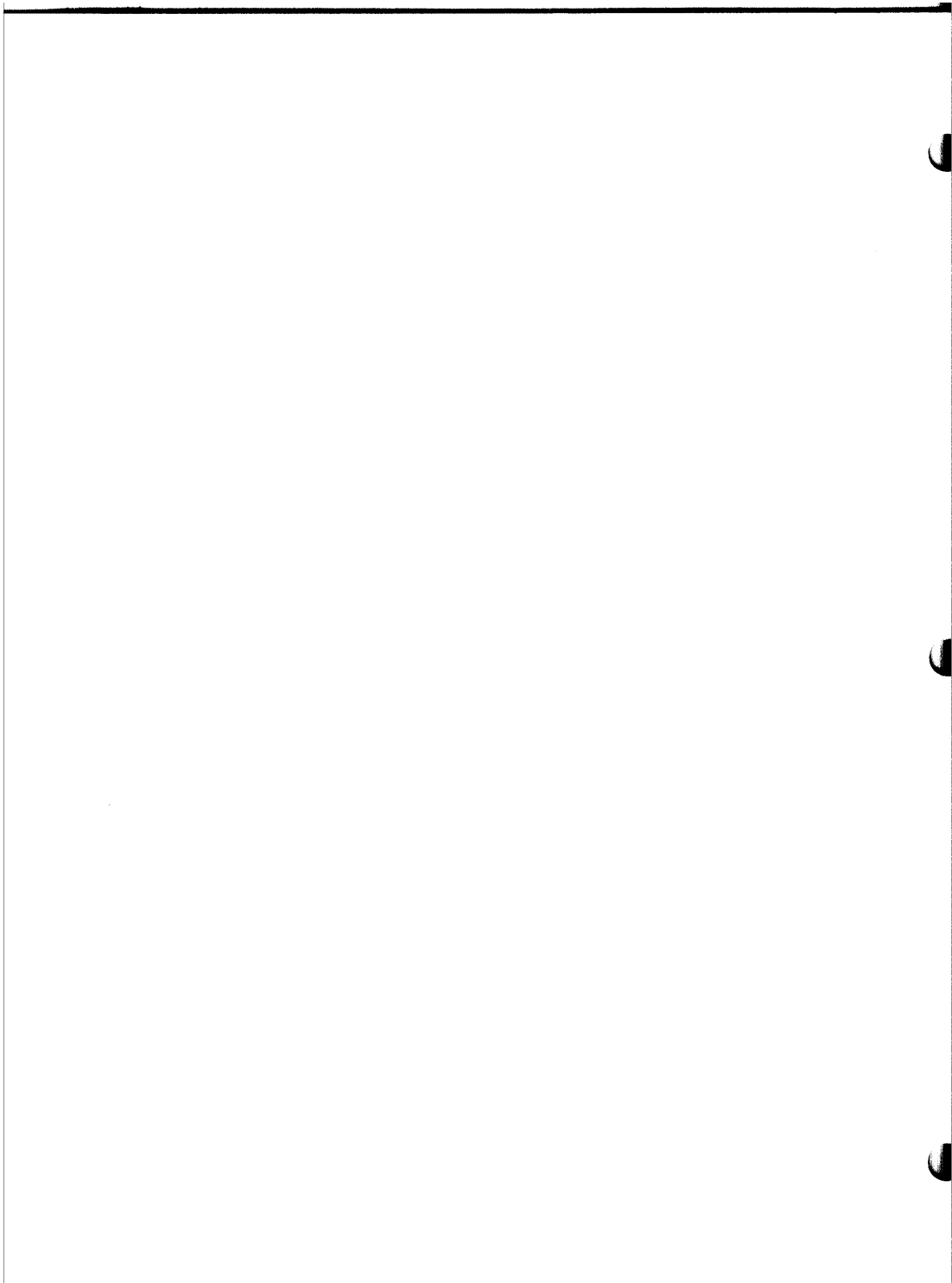






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## 1.0 MAINTENANCE FEATURES

### 1.1 Alignment Diskette

The SA120 Alignment Diskette is used for alignment of the SA800/801. The following adjustments can be made using the SA120.

1. R/W Head radial alignment using track 38.
2. R/W Head azimuth alignment using track 76.
3. Index Photo-Detector Adjustment using tracks 01 and 76.
4. Track 00 is recorded with standard IBM 3740 format.
5. TK 75 has 1f + 2f signal for load pad adjustment.

Caution should be exercised in using the SA120 Alignment Diskette. Tracks 00, 01, 36, 37, 38, 39, 40, 75, and 76 should not be written on. To do so will destroy pre-recorded tracks.

### 1.2 SA809 Exerciser

The SA809 Exerciser is built on a PCB whose dimensions are 8" x 8". The Exerciser PCB can be used in a stand alone mode or it can be built into a test station or used in a tester for field service.

The Exerciser is designed to enable the user to make all adjustments and check outs required on the SA800/801 drives, when used with the SA120 alignment diskette.

The exerciser has no intelligent data handling capabilities but can write both 1f and 2f frequencies. The exerciser can enable read in the drive to allow checking of read back signals.

Refer to Section 6 for illustration.

### 1.3 Special Tools

The following special tools are available for performing maintenance on the SA800/801.

Description	Part Number
Alignment Diskette	SA120-1
Cartridge Guide Adj. Tool	50377-1
Head Penetration Gauge	50380-0
Load Bail Gauge	50391-0
Exerciser	50619-0
Spanner Wrench	50752-0



## **2.0 DIAGNOSTIC TECHNIQUES**

### **2.1 Introduction**

Incorrect operating procedures, faulty programming, damaged diskettes, and "soft errors" created by airborne contaminants, random electrical noise, and other external causes can produce errors falsely attributed to drive failure or misadjustment.

Unless visual inspection of the drive discloses an obvious misalignment or broken part, attempt to repeat the fault with the original diskette, then attempt to duplicate fault on second diskette.

### **2.2 "Soft Error" Detection and Correction**

Soft errors are usually caused by:

1. Airborne contaminants that pass between the read/write head and the disk. Usually these contaminants can be removed by the cartridge self-cleaning wiper.
2. Random electrical noise that usually lasts for a few  $\mu$  sec.
3. Small defects in the written data and/or track not detected during the write operation that may cause a soft error during a read.
4. Worn or defective load pad.

The following procedures are recommended to recover from the above mentioned soft errors:

1. Reread the track ten (10) times or until such time as the data is recovered.
2. If data is not recovered after using step 1, access the head to the adjacent track in the same direction previously moved, then return to the desired track.
3. Repeat step 1.
4. If data is not recovered, the error is not recoverable.

### **2.3 Write Error**

If an error occurs during a write operation, it will be detected on the next revolution by doing a read operation, commonly called a "write check." To correct the error, another write and write check operation must be done. If the write operation is not successful after ten (10) attempts have been made, a read operation should be attempted on another track to determine if the media or the drive is failing. If the error still persists the diskette

should be replaced and the above procedure repeated. If the failure still exists, consider the drive defective. If the failure disappears, consider the original diskette defective and discard it.

#### 2.4 Read Error

Most errors that occur will be "soft" errors. In these cases, performing an error recovery procedure will recover the data.

#### 2.5 Seek Error

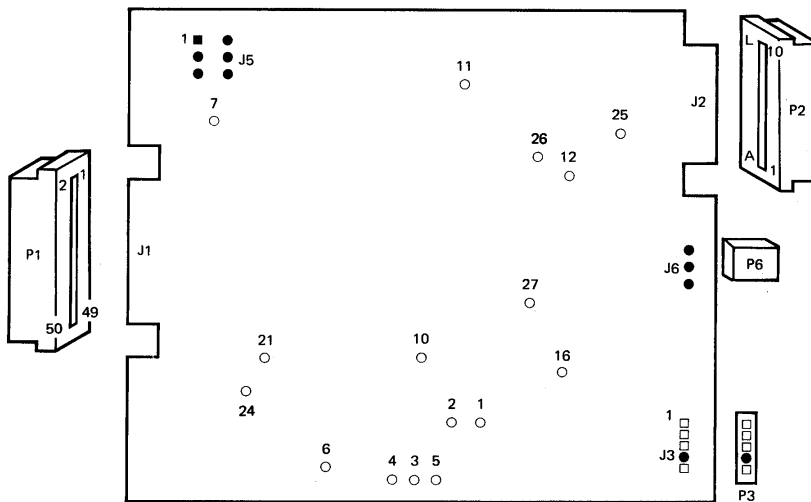
1. Stepper malfunction.
2. Improper carriage torque.

To recover from a seek error recalibrate to track 00 and perform another seek to the original track.

#### 2.6 Test Points--800/801

TP	1	Read Data Signal
	2	Read Data Signal
	3	Read Data (Differentiated)
	4	Read Data (Differentiated)
	5	Signal Ground
	6	Signal Ground
	7	Signal Ground
	10	- Index
	11	+ Head Load
	12	- Index and 801 Sector Pulses
	16	+ Read Data
	21	- Data Separator Time + 1
	24	- Data Separator Time + 2
	25	+ Write Protect
	26	+ Detect Track 00.
	27	+ Gated Step Pulses

2.7 Test Point Locations



### 3.0 PREVENTIVE MAINTENANCE

#### 3.1 Introduction

The prime objective of any preventive maintenance activity is to provide maximum machine availability to the user. Every preventive maintenance operation should assist in realizing this objective. Unless a preventive maintenance operation cuts machine downtime, it is unnecessary.

Visual inspection is the first step in every scheduled maintenance operation. Always look for corrosion, dirt, wear, binds, and loose connections. Noticing these items during PM may save downtime later.

Remember, do not do more than recommended preventive maintenance on equipment that is operating satisfactorily.

#### 3.2 Preventive Maintenance Procedures

Details of preventive maintenance operations are listed in Figure 1. During normal preventive maintenance, perform only those operations listed on the chart for that preventive maintenance period. Details on adjustments and service checks can be found in the maintenance manual. Observe all safety procedures.

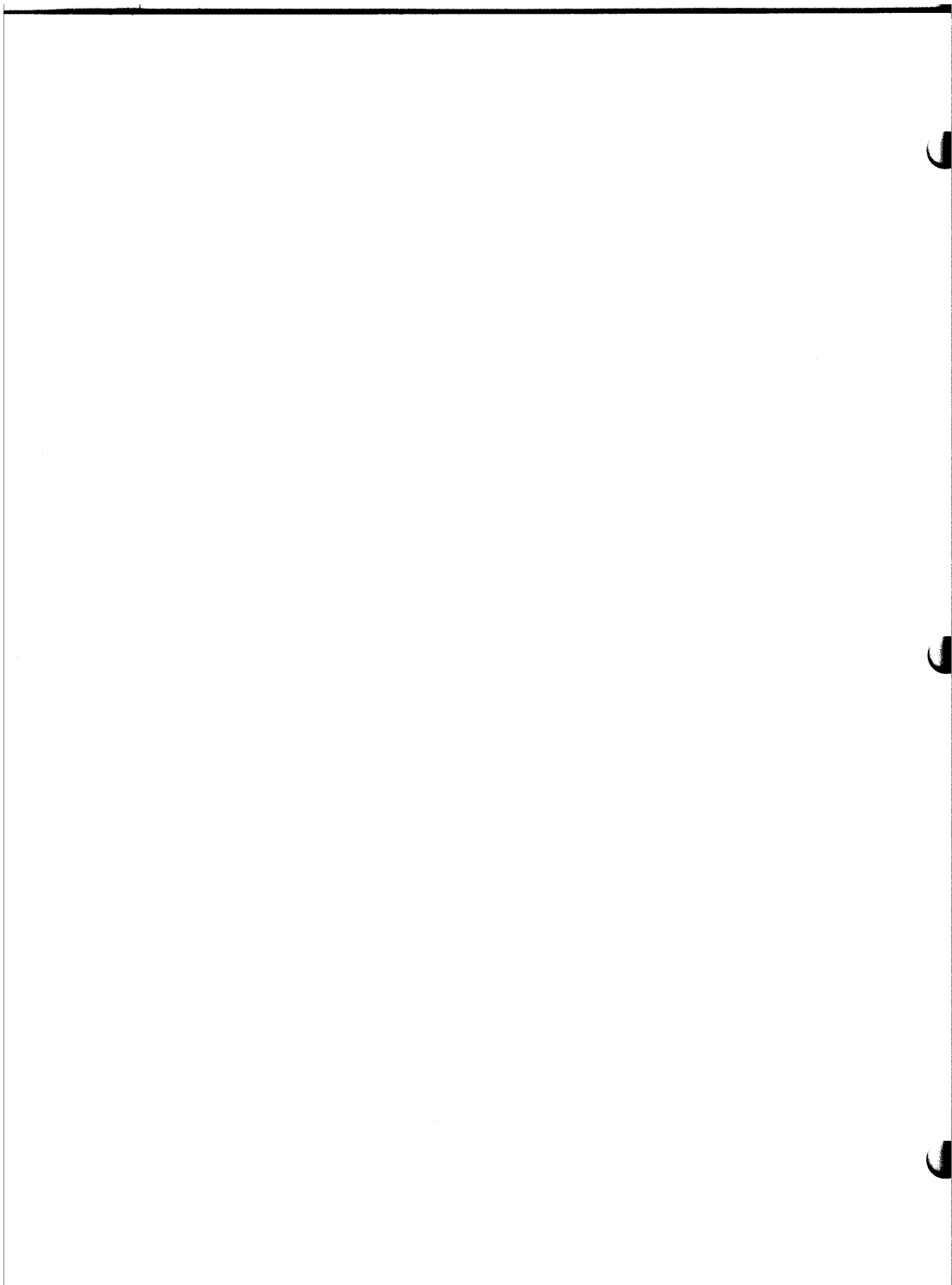
#### 3.3 Cleanliness

Cleanliness cannot be overemphasized in maintaining the SA800/801. Do not lubricate the SA800/801; oil will allow dust and dirt to accumulate. The read/write head should be cleaned only when signs of oxide build up are present.

UNIT	FREQ MONTHS	CLEAN	OBSERVE
Read/Write Head	12	Clean Read/Write Head ONLY IF NECESSARY	Oxide build up
R/W Head Load Button	12*	Replace	
Stepper Motor and Lead Screw	12	Clean off all oil, dust, and dirt	Inspect for nicks and burrs
Belt	12		Frayed or weakened areas
Base	12	Clean base	Inspect for loose screws, connectors, and switches
Read/Write Head	12		Check for proper alignment

\*Assumes normal usage

Figure 1 PM Procedures





## **4.0 REMOVALS, ADJUSTMENTS**

For parts location, see Section 5.

### **4.1 Motor Drive**

#### **4.1.1 Drive Motor Assembly: Removal and Installation**

- a. Extract 3 contacts to disconnect motor from AC connector.
- b. Loosen two screws holding capacitor clamp to the base. Remove rubber boot and disconnect motor leads from capacitor.
- c. Remove connectors from PCB and remove PCB.
- d. Remove belt from drive pulley.
- e. Remove 4 screws holding the motor to the base casting and remove motor.
- f. Reverse the procedure for installation.

Note: Insure ground lead is installed between capacitor clamp and base.

#### **4.1.2 Motor Drive Pulley**

- a. Loosen set screw and remove pulley.
- b. Reverse procedure for installation.

Note: When installing a new pulley, the drive pulley must be aligned with the spindle pulley so that the belt tracks correctly.

### **4.2 Side Cover: Removal**

- a. Retract screw from upper casting wall sufficiently to allow the side cover to be rocked out.
- b. Lift cover off screw in lower casting wall.

### **4.3 Cartridge Guide Access**

- a. Remove side cover (Section 4.2).
- b. Position head to approximate center of head load bail (to prevent load arm damage).
- c. Loosen 2 screws holding cartridge guide to door latch plate.
- d. Swing cartridge guide out.
- e. When the guide is swung in, it must be adjusted as per Section 4.9.2.

#### 4.4 Sector/Index LED Assembly: Removal and Installation

- Remove side cover (Section 4.2).
- Disconnect the wires to the LED terminals (solder joints).
- Remove the screw holding the LED assembly to the cartridge guide.
- Reverse the procedure for installation.
- Check index timing and readjust if necessary.

#### 4.5 Write Protect Detector: Removal and Installation

- Remove connectors from PCB and remove PCB.
- Extract wires from P2 connector, pins L3, L4, R5 (E), and R8 (S).
- Remove cable clamps.
- Remove side cover (Section 4.2).
- Remove screw holding the detector bracket and remove assembly.
- Reverse procedure for reinstalling. Connect the wires to P2 by the following: Red to '3' (L3), Grey to '4' (L4), Black to 'E' (R5) and White to 'J' (R8).

##### 4.5.1 Write Protect Detector Adjustment

- Insert SA101 diskette into drive. Write protect hole must be open.
- Set oscilloscope to AUTO sweep, 2V/div. and monitor TP25.
- Loosen screw on detector assembly and adjust until maximum amplitude is achieved. Tighten screw.

#### 4.6 Head Load Actuator

##### 4.6.1 Head Load Actuator: Removal and Installation

- Remove side cover (Section 4.2).
- Disconnect the wires to the actuator terminals (solder joints).
- Swing out the cartridge to guide assembly (Section 4.3).

- Remove screw holding the actuator to the cartridge guide.

CAUTION: Restrain the head load arm to prevent its impact with the head.

- Reverse the procedure for installation.

##### 4.6.2 Head Load Actuator Adjustment

- Remove side cover.
- Energize Head Load Coil.
- Place Head Load Actuator adjustment tool, P/N 50391, on platen.
- Adjust down stop so that the top of Head Load Bail is flush with top of tool within  $\pm .005$ " at track 76. Reference Figure 3.
- Step carriage to track 38.
- De-energize Head Load Coil.
- Place adjustment tool onto R/W Head and place load button in cup of tool.
- Adjust up stop on actuator so that bail just touches Head Load Arm or has .005" clearance or lifts Load Arm .005". Reference Figure 2.
- Energize Head Load Coil and step carriage between track 00 and 76. Insure that there is a clearance of a minimum of .010" between Head Load Bail and Head Load Arm.
- Replace side cover.

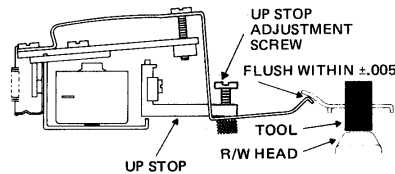


FIGURE 2 HEAD LOAD ACTUATOR UPSTOP ADJUSTMENT

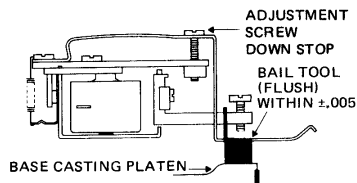


FIGURE 3 HEAD LOAD ACTUATOR DOWN STOP ADJUSTMENT

#### 4.6.3 Head Load Actuator Timing

- Insert Alignment Diskette (SA120).
- Step carriage to track 00.
- Sync oscilloscope on TP11 (+ Head Load). Set time base to 10MSEC/division.
- Connect one probe to TP1 and the other to TP2. Ground probes to the PCB. Set the inputs to add and invert one input
- Energize the Head Load solenoid and observe the read signal on the oscilloscope. The signal must be at 50% of full amplitude by 35Msec. Reference Figure 4.
- If this is not met, continue on with the procedure.
- Check adjustments outlined in paragraph 4.6.2.
- If item 'g' is ok, adjust down stop screw (Figure 6) clockwise until timing is met.

Note: Not to exceed  $\frac{1}{4}$  turn.

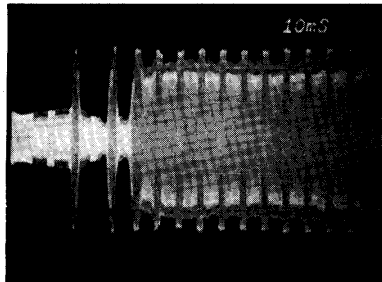


FIGURE 4 HEAD LOAD ACTUATOR TIMING

#### 4.7 Index/Sector Photo Transistor Assembly

##### 4.7.1 Index/Sector Photo Transistor Assembly: Removal and Installation

- Disconnect P2 connector from PCB.
- Remove wires from Door Closed switch and extract wires from P2 connector pin 9 (L9) Black, H (R7) Brown, 6 (L6) Red and B (R2) Orange.
- Remove cable clamp holding wires from detector.

- Remove screw holding detector to the base plate and remove assembly.
- To install reverse procedure.

##### 4.7.2 Index/Sector Photo Transistor Potentiometer Adjustment

- Insert Alignment Diskette (SA120).
- Using oscilloscope monitor TP-12 (- Index), sync internal negative, DC coupled, set vertical scale to 2 V/cm.
- Adjust the potentiometer on the Sector/Index Phototransistor to obtain a pulse of 1.7 msec.  $\pm .5$  msec. duration.
- Continue adjustment in Section 4.7.3.

##### 4.7.3 Index/Sector Adjustment

- Insert Alignment Diskette (SA120).
- Step carriage to track 01.
- Sync oscilloscope, external negative, on TP 12 (- Index). Set time base to 50  $\mu$ sec/division.
- Connect one probe to TP 1 and the other to TP 2. Ground probes to the PCB. Set the inputs to AC, Add and invert one channel. Set vertical deflection to 500 MV/division.
- Observe the timing between the start of the sweep and the first data pulse. This should be  $200 \pm 100 \mu$ sec. If the timing is not within tolerance, continue on with the adjustment. Reference Figure 5.

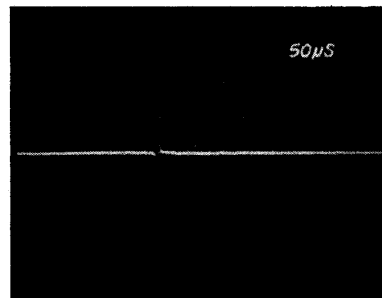


FIGURE 5 INDEX TIMING

- f. Loosen the holding screw in the Index Transducer until the transducer is just able to be moved.
- g. Observing the timing, adjust the transducer until the timing is  $200 \pm 100 \mu\text{sec}$ . Insure that the transducer assembly is against the registration surface on the base casting.
- h. Tighten the holding screw.
- i. Recheck the timing.
- j. Seek to track 76 and reverify that the timing is  $200 \pm 100 \mu\text{sec}$ .

#### 4.8 Spindle Assembly

- a. Remove side cover (Section 4.2).
- b. Swing out cartridge guide (Section 4.3).
- c. Remove the nut and washer or 2 spring washers holding the spindle pulley. On late level drives, Spanner Wrench 50752 may be used to hold spindle.

CAUTION: The pre-loaded rear bearing may fly out when spindle pulley is removed.

- d. Withdraw spindle hub from opposite side of baseplate.
- e. Reverse the procedure for installation.
- f. Tighten nut to 20 in./lbs. If spring washers are used, insure they are compressed. Add a drop of LOCTITE® #290 to threads.

#### 4.8.1 Clamp Hub Removal

- a. Remove hub clamp plate. Reference Figure 6.
- b. Remove clamp hub and spring.
- c. To install, reverse the procedure. No adjustment necessary.

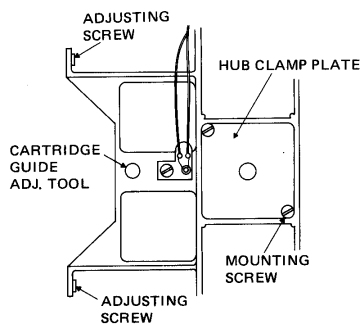


FIGURE 6 CARTRIDGE GUIDE ADJUSTMENT

#### 4.9.1 Cartridge Guide Removal

- a. Perform steps 4.3 through 4.6.1.
- b. Remove C-clip from pivot shaft. Reference Figure 7.
- c. Remove pivot shaft.
- d. Tilt the cartridge guide slightly, and remove it from the upper pivot.
- e. To install the cartridge guide, reverse the procedure.

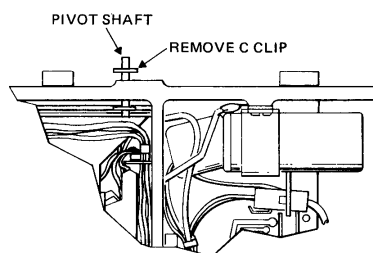


FIGURE 7 CARTRIDGE GUIDE REMOVAL

#### 4.9.2 Cartridge Guide Adjustment

- a. Insert the shoulder screw (tool P/N 50377-1) through the adjustment hole in the cartridge guide and screw completely into the base casting (hand tight). Reference Figure 6.
- b. Move the handle into the latched position and hold it lightly against the latch.
- c. Tighten two screws holding the cartridge guide to the latch plate.
- d. Remove the tool and check to determine the flange on the clamp hub clears the cartridge guide when the spindle is rotating. If the clamp hub rubs on the cartridge guide, repeat the adjustment procedure.
- e. Check index alignment per Section 4.7.3.
- f. Insert diskette, close and open door, then check for proper operation.

#### 4.10 Front Plate Assembly: Removal

- a. Remove side cover (Section 3.4.2).
- b. Swing out the cartridge guide assembly (Section 4.3).

- c. Remove 4 screws holding the front plate assembly to the base casting.
- d. To install, reverse the procedure.
- e. Check Index adjustment Section 4.7.3.

#### 4.11 Head Amplitude Check

These checks are only valid when writing and reading back as described below. If this amplitude is below the minimum specified, the load pad should be replaced and the head should be cleaned if necessary before re-writing and re-checking. Insure the diskette used for this check is not "worn" or otherwise shows evidence of damage on either the load pad or head side.

- a. Install good media.
- b. Select the drive and step to TK 76.
- c. Sync the oscilloscope on TP-12 (- Index) connect one probe on TP-2 and one on TP-1, on the drive PCB. Ground the probes to the PCB add and invert one input. Set volts per division to 50mv and time base to 20 M sec. per division.
- d. Write the entire track with 2F signal (all one's).
- e. The average minimum read back amplitude, peak to peak, should be 110 millivolts.

If the output is below minimum and a new load pad and different media is tried and the output is still low, it will be necessary to install a new head and carriage assembly.

##### 4.11.1 Stepper/Carriage Assembly; Removal and Installation

- a. Remove cable clamp holding R/W head cable on PCB side of drive.
- b. Remove side cover (Section 4.2).
- c. Extract stepper cable contacts from P2 connector. Black 10 (L10), Red 2 (L2), Brown 5 (L5), and Orange 8 (8).

Note: This step is only necessary if the stepper motor is to be replaced.

- d. Loosen (2) screws and swing clamp down to allow withdrawal of motor.

**CAUTION: DO NOT LOOSEN THREE SCREWS COATED WITH GLYPTOL.**

- e. Remove the grommet on the cable that is inserted into a slot on the Track 00 Detector bracket.
- f. Turn stepper shaft until the carriage runs off the end of the lead screw.
- g. To install stepper/carriage assembly, reverse procedure. Note steps "h" and "i".
- h. If installing a new carriage, set the pre-load nut in the #2 notch. Reference Figure 8.
- i. When threading lead screw into carriage assembly, press the pre-load nut slightly against spring in order to start thread. After threading, insure there is a gap between pre-load nut and rear of carriage.

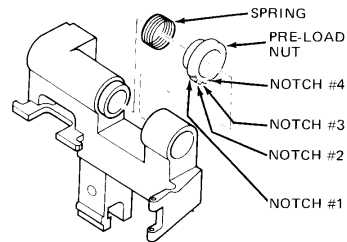


FIGURE 8 CARRIAGE ASSEMBLY

##### 4.11.2 Carriage Assembly Readjustment After Replacement

- a. Loosen Track 00 stop collar and manually move the carriage towards the stepper by rotating the lead screw until the carriage load arm tab is near the edge of the load bail. Tighten the collar set screw.
- b. Position the Track 00 flag approximately in the center of its slot and tighten the screw. Move the carriage towards the spindle by rotating the lead screw until the flag is clear of the detector.
- c. Insert the SA120 alignment diskette and load the head. Set the scope as explained in Section 4.11.3 steps c and d.
- d. Step the carriage towards track 00 until the track 00 signal is detected on the interface pin 42.

- e. Loosen the 2 stepper motor mounting screws slightly and slowly rotate the stepper motor case until a read data signal off of track 00 appears. Continue rotation until maximum amplitude is obtained. This is only a rough adjustment.

**CAUTION: DO NOT LOOSEN THREE SCREWS COATED WITH GLYPTOL.**

- f. Step the carriage to TK 38 and proceed with head radial adjustments. Refer to Section 4.11.3.
- g. Adjust Track 00 stop (Section 4.11.7).
- h. Adjust Track 00 flag (Section 4.11.8).
- i. Adjust index (Section 4.7.3).
- j. Adjust Azimuth (Section 4.11.9).

#### 4.11.3 Head Radial Alignment

Note: Head radial alignment should be checked prior to adjusting index/sector, Track 00 flag or carriage stop.

- a. Load alignment diskette (SA120).

Note: Alignment diskette should be at room conditions for at least twenty minutes before alignment.)

- b. Step the carriage to track 38.
- c. Sync the oscilloscope, external negative, on TP 12 (-CE Index). Set the time base to 20 Msec per division. This will display over one revolution.
- d. Connect one probe to TP 1 and the other to TP 2. Ground the probes on the PCB. Set the inputs to AC, Add and invert one channel. Set the vertical deflection to 100 MV/dev.
- e. The two lobes must be within 70% amplitude of each other. If the lobes do not fall within the specification, continue on with the procedure. Reference Figure 9.
- f. Loosen the two mounting screws which hold the motor clamp to the mounting plate.

**CAUTION: DO NOT LOOSEN THREE SCREWS COATED WITH GLYPTOL.**

- g. Rotate the stepper motor to radially move the head in or out. If the left lobe is less than 70% of the right, turn the stepper motor counter-clockwise as viewed from the rear. If the right lobe is less than 70% of the left lobe, turn the stepper motor clockwise as viewed from the rear.

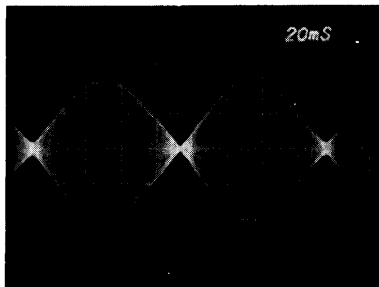


FIGURE 9 HEAD RADIAL ALIGNMENT

- h. When the lobes are of equal amplitude, tighten the motor clamp mounting screws. Reference Figure 9.
- i. Check the adjustment by stepping off track and returning. Check in both directions and readjust as required.
- j. Whenever the Head Radial Alignment has been adjusted, the Track 00 flag adjustment (Section 4.11.8), Track 00 stop (Section 4.11.7) and R/W head azimuth (Section 4.11.9) must be checked.

#### 4.11.3 Read/Write Head Load Button: Removal and Installation

- a. Remove side cover if installed.
- b. To remove the old button, hold the arm out away from head, squeeze the locking tabs together with a pair of needle nose pliers and press forward.
- c. To install load button, press the button into the arm, from the head side, and it will snap in place. Reference Figure 10.

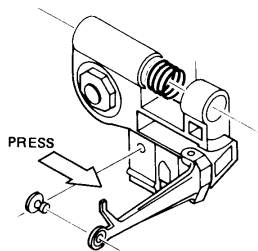


FIGURE 10

- d. Adjust according to Section 4.11.4.

Note: The load arm should never be opened over 90° from carriage assembly or while at track 00 to prevent possible damage to the torsion spring.

#### 4.11.4 Read/Write Head Load Button Adjustment

- Insert Alignment Diskette (SA120).
- Connect oscilloscope to TP 1 and 2, added differentially and sync negative external on TP 12 (- INDEX).
- Step carriage to track 75.

- d. Observing read signal on oscilloscope, rotate the load button counter-clockwise in small increments (10°) until maximum amplitude is obtained.

#### 4.11.5 Head Penetration Adjustment

Note: This adjustment is not normally done in the field. The only time that this adjustment need be done is when the stepper mounting plate has been loosened or removed.

- Place the penetration tool (P/N 50380) on the gauge block and insure that the gauge reads .030 (3 on the small hand) and zero the dial for the large hand. This results in a reading of .030".

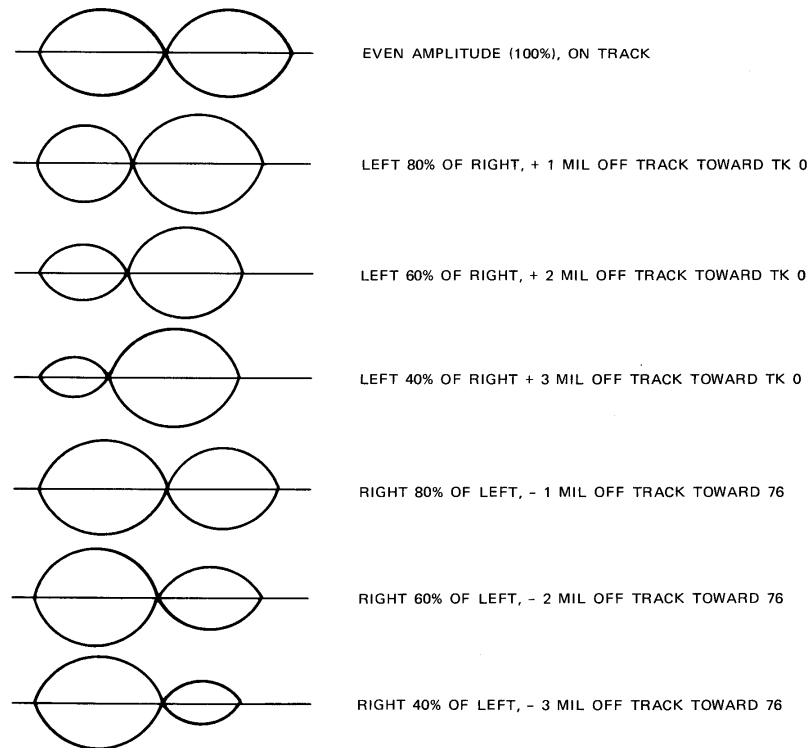


Figure 11 R/W Head Radial Alignment

- b. Swing open the cartridge as per Section 4.3.
- c. Place the penetration tool on the base assembly with the short leg on the platen, the long leg on the carriage guide bar, and the plastic tip in the center of the R/W head.
- d. The head penetration should be  $.030'' \pm .003''$  read on the gauge.
- e. If the head does not meet this adjustment, move the stepper plate laterally until the gauge reads  $.030''$ .
- f. Tighten the screws and recheck the adjustment.
- g. Return cartridge guide and adjust as per Section 4.9.2.
- h. Adjust Azimuth (Section 4.11.9).
- d. If clearances are not within tolerance, continue on with adjustment procedure.
- e. Turn DC power ON.
- f. Step carriage to track 02.
- g. Loosen Track 00 stop collar.
- h. Grasp end of lead screw, in back of stepper motor, with a pair of pliers and manually turn lead screw clockwise to the track -01 position. (Next detent position on stepper motor.)
- i. Position the stop collar axially along the lead screw so there is  $.020'' \pm .010''$  between collar and carriage. Rotate the collar toward inside until the stop on the collar contacts the carriage stop surface. Tighten screw.
- j. Turn DC Power OFF and back ON. Carriage should move to track 00. Verify that there is data at track 00.
- k. Step carriage between track 00 and 76 and check for any binding or interference between the carriage, lead screw, stop and head cable.

#### 4.11.6 Track 00 Detector: Removal and Installation

- a. Remove side cover (Section 4.2).
- b. Swing cartridge guide open (Section 4.3).
- c. Manually rotate stepper shaft and move carriage all the way in.
- d. Remove 2 screws holding bracket to base casting and remove bracket and detector.
- e. Remove PCB connector and remove PCB.
- f. Extract cable from P2 connector; Brown, A (R1); Black, C (R3); Red, F (R6); and Orange K (R9).
- g. Remove cable clamps and remove Detector assembly.
- h. To install, reverse the procedure.
- i. Adjust according to Section 4.11.8.

#### 4.11.7 Track 00 Stop Adjustment

- a. Remove side cover (Section 4.2).
- b. Step carriage to track 00. Verify that carriage is at 00 by checking P1 pin 42 is minus (ground).
- c. Check that stop is  $.040'' \pm .020''$  between collar and carriage. Turn DC power OFF, and manually rotate lead screw clockwise until carriage stops. Check that stop is  $.020'' \pm .010''$  between collar and carriage.

#### 4.11.8 Track 00 Flag Adjustment

- a. Remove side cover (Section 4.2).
- b. Check head radial alignment and adjust if necessary before making this adjustment.
- c. Connect oscilloscope probe to TP 26. Set vertical deflection to 1 v/division and sweep to continuous.
- d. Step carriage to track 01. TP 26 should be high (+5 volts).
- e. If TP 26 is not high, loosen screw holding Track 00 flag and move flag towards stepper until TP 26 just goes high.
- f. Step carriage to track 2. TP 26 should go low. Adjust flag towards spindle if not low.
- g. Check adjustment by stepping carriage between tracks 00 and 02, observing that TP 26 is low at track 02 and high at tracks 01 and 00.
- h. Replace side cover.



#### 4.11.9 R/W Head Azimuth Alignment

This adjustment can only be made on SA800/801's at MLC 3 or higher with a new style stepper plate which has 50112-4 stamped on it. This adjustment is only necessary when the stepper or carriage assembly has been replaced or if the stepper plate has been loosened.

- If stepper plate has been loosened or replaced adjust head penetration, Section 4.11.5.
- Align R/W head, 4.11.3.
- Install C.E. alignment diskette SA 120-1. Select the drive and step to track 76.
- Sync the scope external negative on TP 12, set time base to .5 MSec per DIV.
- Connect one probe to TP 1 and the other to TP 2. Invert one channel and ground the probes to TP 5 & 6. Set the inputs to AC, ADD and 50 MV per division.
- Compare the wave form to Figure 13. If not within the range shown the head Azimuth will require adjustment. If required, proceed to next step.
- Slightly loosen the 2 R.H. stepper plate mounting screws only. Reference Figure 12. Do not loosen the L.H. screw as this will effect the head penetration adjustment.

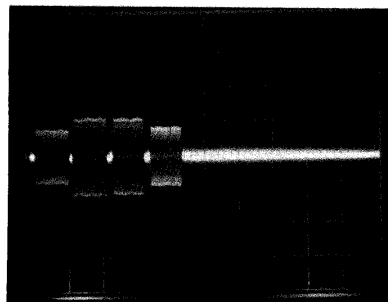


FIGURE 13

- Push the stepper down towards the A.C. drive motor until the 1st sector is larger than the 2nd sector.
- Pry the R.H. side of the stepper plate up with a medium screw driver until the 1st and 4th sectors have equal to or less amplitude than the middle 2 sectors. Reference Figure 13.

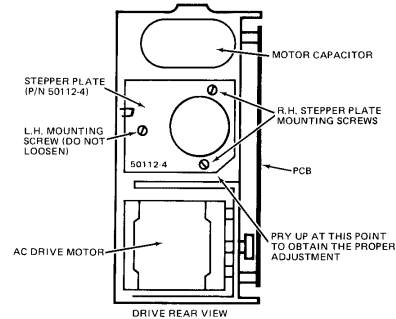


FIGURE 12

- Re-tighten the 2 R.H. screws. If either of the outside 2 sectors increase in amplitude greater than the inside 2 after re-tightening the screws, perform the adjustment again.
- Check and re-adjust the index timing and head radial adjustment if required.

#### 4.11.10 Stepper Plate Removal and Adjustment

- Remove PCB.
- Remove head and carriage assembly from stepper lead screw, section 4.11.1.
- Pull the stepper motor out thru the stepper plate until the lead screw is completely clear of the plate.
- Remove the 3 stepper plate mounting screws.
- Reinstall the stepper plate.

NOTE: If the stepper plate is P/N 50112-4, there must be a nylon bushing in the L.H. hole and all 3 screws must have a flat washer and a black spring washer.

- Reinstall head and carriage and stepper motor assemblies.
- Adjust penetration, Section 4.11.5. If the stepper plate is P/N 50112-4, there will remain a gap between the bottom of the stepper plate and the machined surface on the casting. All other style stepper plates must remain flush with machined surface.
- Readjust carriage assembly, Section 4.11.2.
- Check and adjust Azimuth alignment, Section 4.11.10.

#### 4.12 Activity Light Removal and Installation (Standard)

- Remove P6 connector from PCB.
- Remove cable clamp holding the cable and remove cable from clamp.
- Remove the 2 screws holding the push button.
- Remove push button and activity light from the front as an entire assembly.
- Install the light and push button assembly by reversing the removal procedure.
- No special orientation is required when installing P6 onto the PCB. No adjustments are required to the push button assembly.

c. Remove front plate (Section 4.10).

b. Remove two screws holding assembly to front plate.

c. Remove two allen head screws holding assembly to push button.

d. Grasp both ends of push button and bow outwards to remove LED.

e. Reverse procedure to assemble.

f. Adjustment of the door lock should not be necessary. If it has to be, the gap between the armature tab and the latch should be  $.015 \pm .010$ . This adjustment can be made by loosening the two screws on the armature.

#### 4.13 Door Lock

- Disconnect P6 connector.
- Disconnect red wire near IC 2G.

#### 4.14 Activity Light (with Door Lock Option)

- Follow procedure for door lock (4.13).

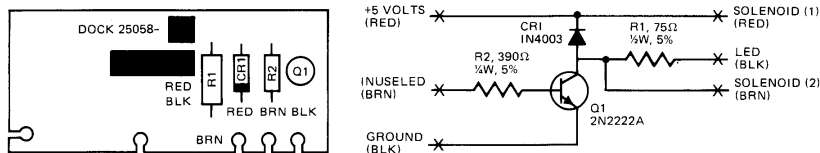
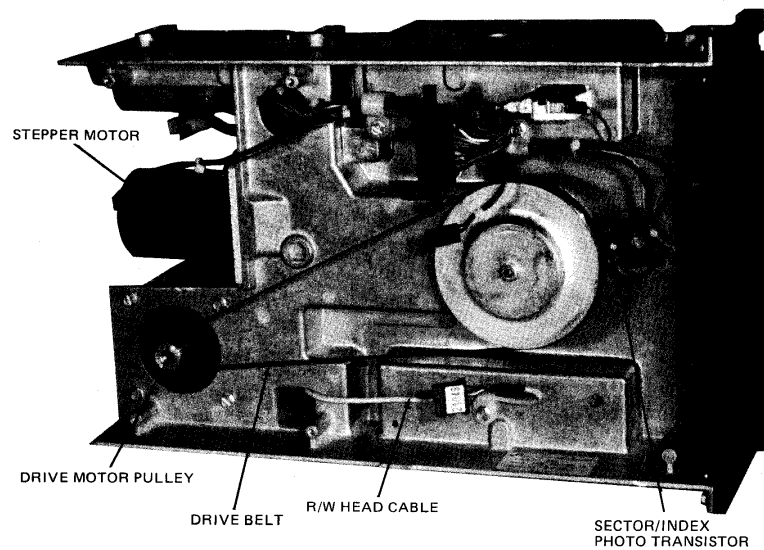
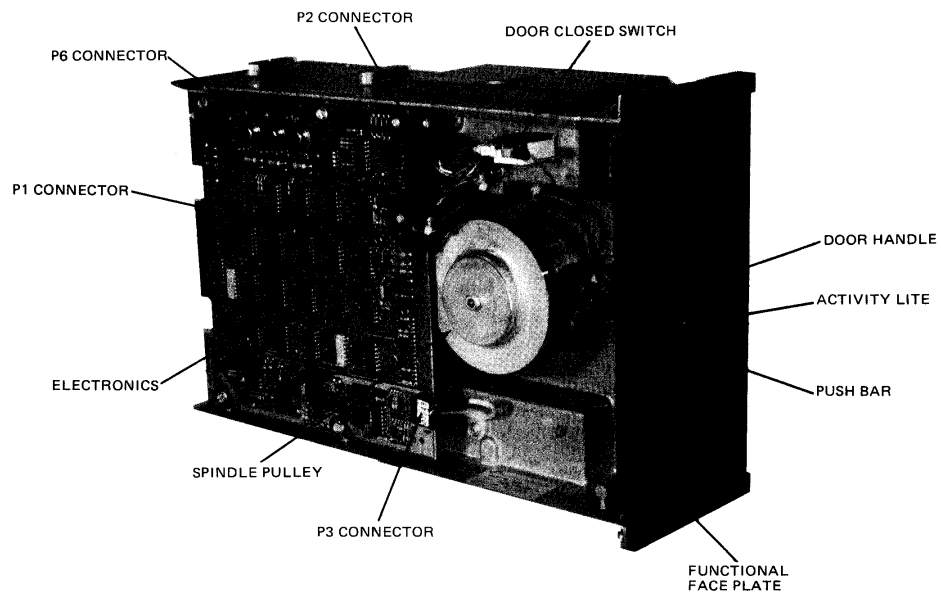
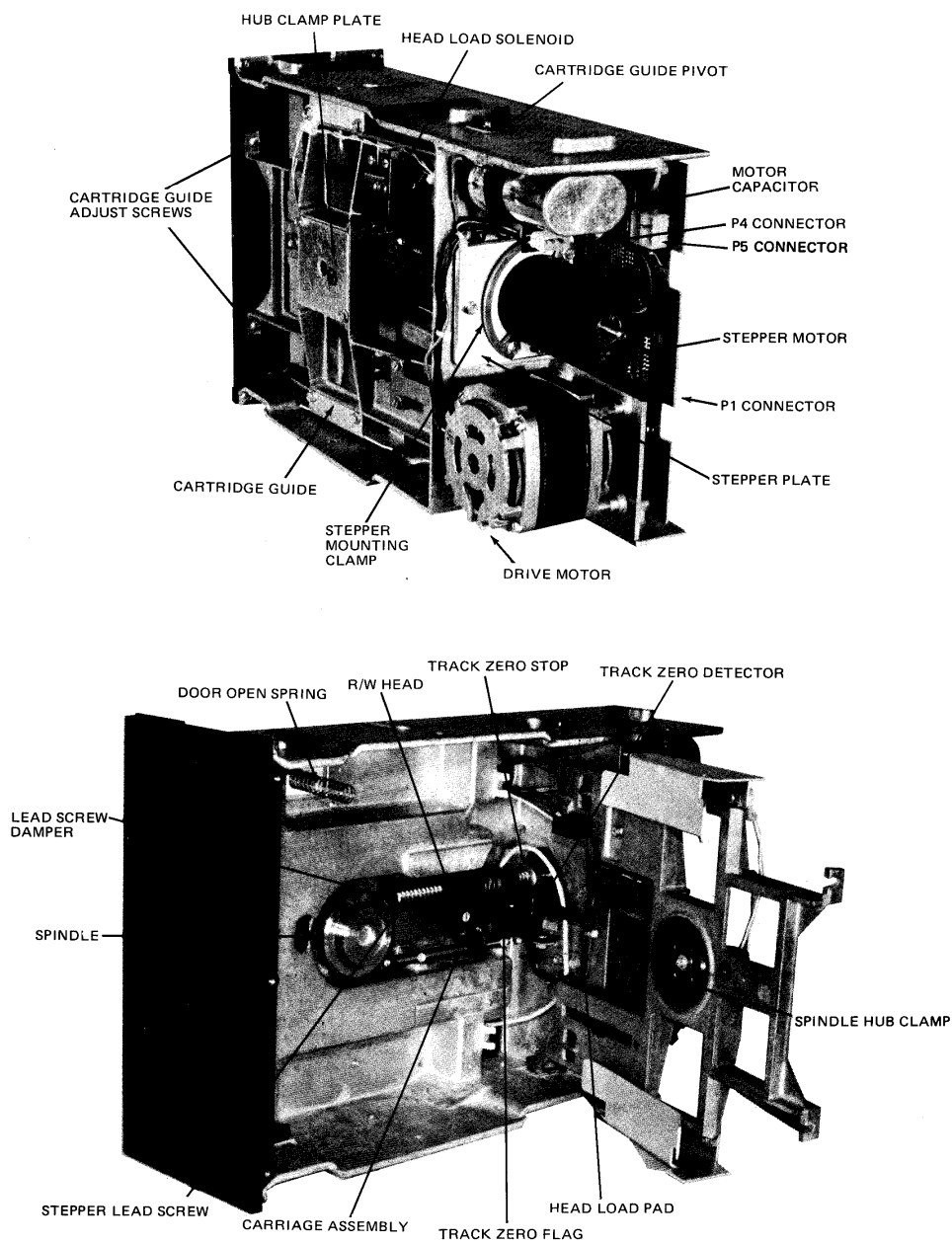
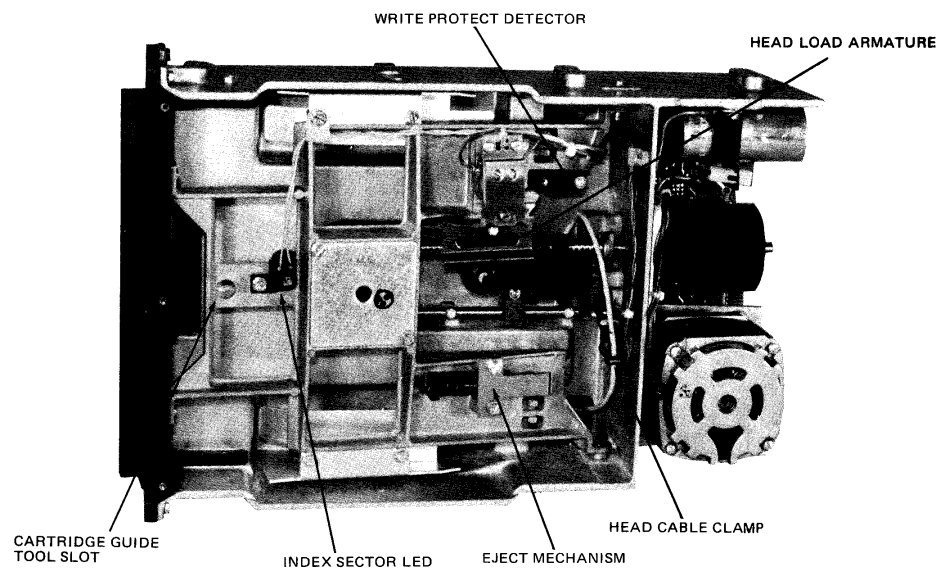


FIGURE 14 DOOR LOCK SCHEMATIC

## 5 PHYSICAL LOCATIONS

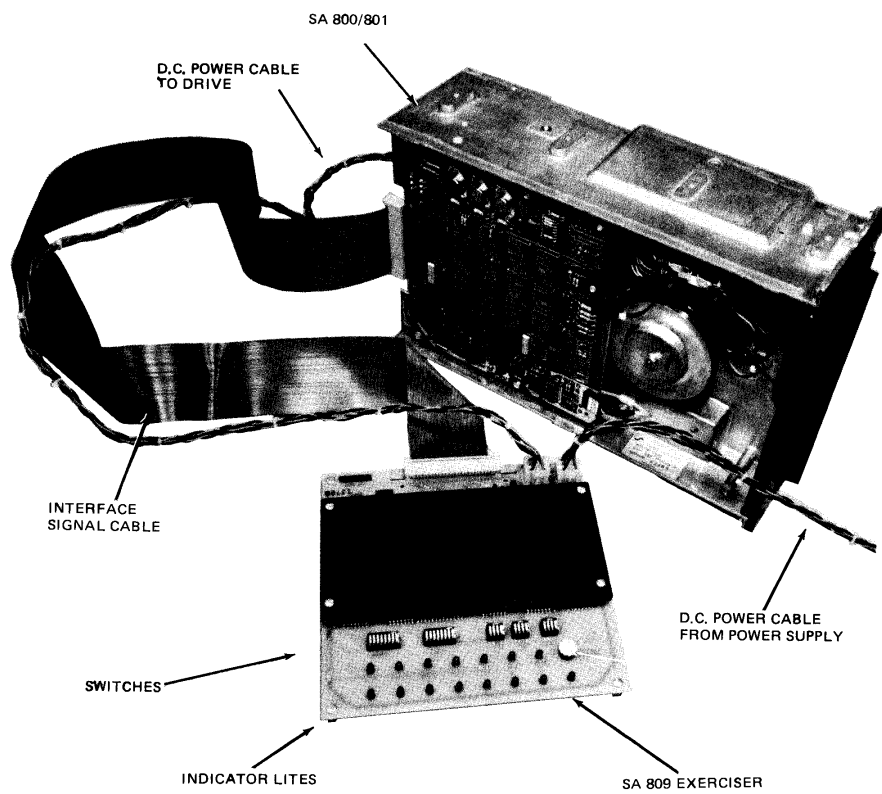


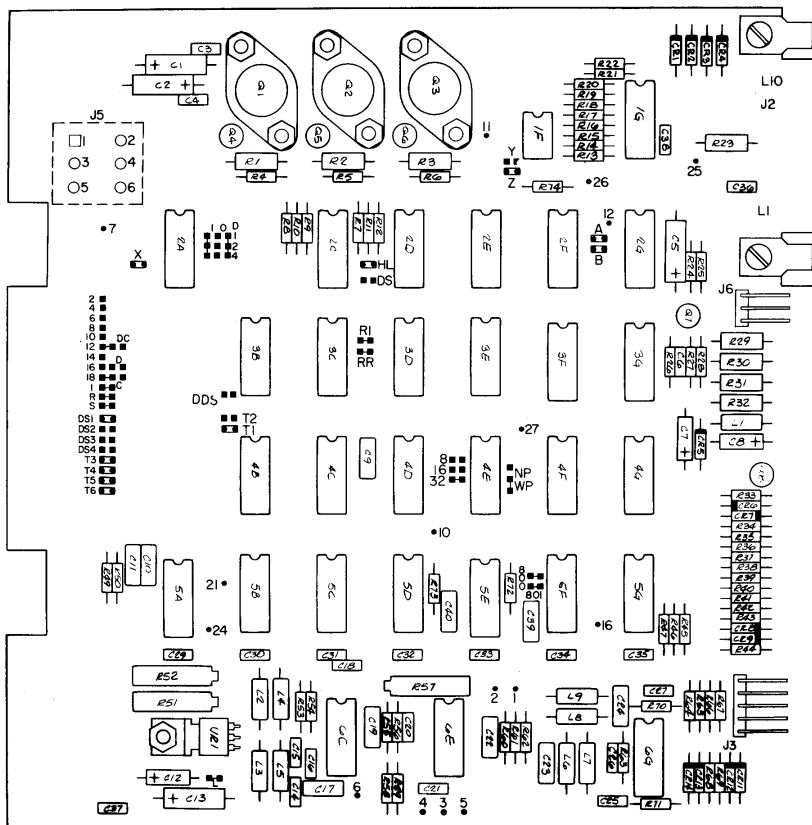






## 6 SA809 EXERCISER CONNECTION





- ▣ Jumper Plug Installed as Shipped
- Test Point

SA800/801 PCB Component Location



SA800/801 LOGIC MANUAL



LOGIC MANUAL DRIVE SN \_\_\_\_\_

INDEX

- AA001 INDEX  
AB010 PCB TRACE AND TEST POINT LOCATIONS  
DA010 READ/WRITE/INDEX/SECTOR  
DA020 STEPPER CONTROL  
DA030 DETECTORS  
DA040 MOTORS SOLENOID SWITCH

TABLE III  
CUSTOMER CUT TRACE OPTIONS

DESIGNATOR	DESCRIPTION	SHIPPED FROM FACTORY OPEN SHORT
T3,T4,T5 & T6	TERMINATIONS FOR MULTIPLEXED INPUTS	<input type="checkbox"/> X
T2	SPARE TERMINATOR FOR RADIAL HEAD LOAD	X
T1	TERMINATION FOR DRIVE SELECT	<input type="checkbox"/> X
DSI	DRIVE SELECT INPUT - ALTERNATE PINS:DS2,DS3,DS4	<input type="checkbox"/> X
RR	RADIAL READY	X
RI	RADIAL INDEX AND SECTOR	X
R,I,S	READY, INDEX, SECTOR ALTERNATE OUTPUT PROVISION	X
A,B,X	RADIAL HEAD LOAD	<input type="checkbox"/> X
HL	STEPPER POWER FROM HD LD	<input type="checkbox"/> X
DS	STEPPER POWER FROM DRIVE SELECT	X
WP	INHIBIT WRITE WHEN WRITE PROTECTED	X
NP	ALLOW WRITE WHEN WRITE PROTECTED	X
8,16,32	8,16 OR 32 SECTORS	X
D	ALTERNATE INPUT - IN USE	X
2,4,6,8,10,12,14,16,18	NINE ALTERNATE I/O PINS	X
D1,D2,D4,D05	CUSTOMER INSTALLABLE DECODE DRIVE SELECT OPTION	X
C	ALTERNATE INPUT - HEAD LOAD	X
Z	INUSE LED FROM DRIVE SELECT	<input type="checkbox"/> X
Y	INUSE LED FROM HD LD	X
DC	ALTERNATE OUTPUT - DISK CHANGE	X

FACTORY CUT TRACE OPTIONS AND HISTORY CHART	
L	-5 OR -7 TO -16V SEE TABLE II
800	INDEX ONLY (800) SEE TABLE II
801	INDEX AND SECTOR(801) SEE TABLE II

☐ OPEN TRACE WITH SHORTING PLUG INSTALLED.

TABLE I  
OPTIONAL  
FEATURES

PCB ASM NO.	OPTIONAL FEATURES		
	-5V	-7 TO -16V	DATA SEP
25102	X		
25103		X	
25104	X		X
25105		X	X
25106	X		X
25107		X	X

WRITE PROTECT CAN BE ORDERED WITH  
ANY OF THE ABOVE

TABLE II

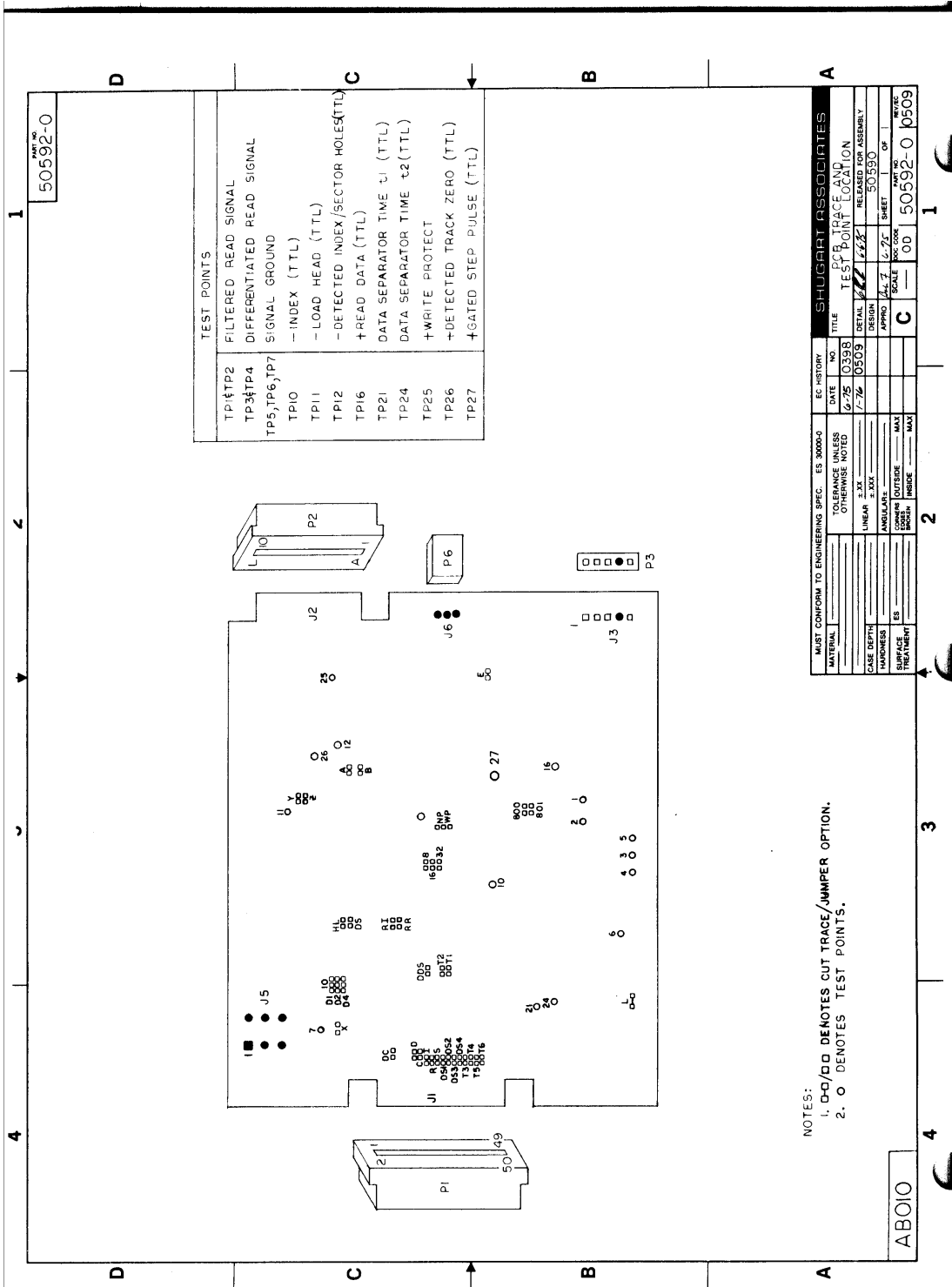
FACTORY CUT TRACE OPTIONS

PCB NO.	TRACE "L"		TRACE "801"		TRACE "800"	
	SHORTED	OPEN	SHORTED	OPEN	SHORTED	OPEN
25102		X		X		X
25103	X		X		X	
25104	SHORTED	OPEN	SHORTED	OPEN	SHORTED	OPEN
25105	OPEN	SHORTED	OPEN	SHORTED	OPEN	SHORTED
25106	SHORTED	OPEN	SHORTED	OPEN	SHORTED	OPEN
25107	OPEN	SHORTED	OPEN	SHORTED	OPEN	SHORTED

LOGIC MANUAL P/N 50590 - I

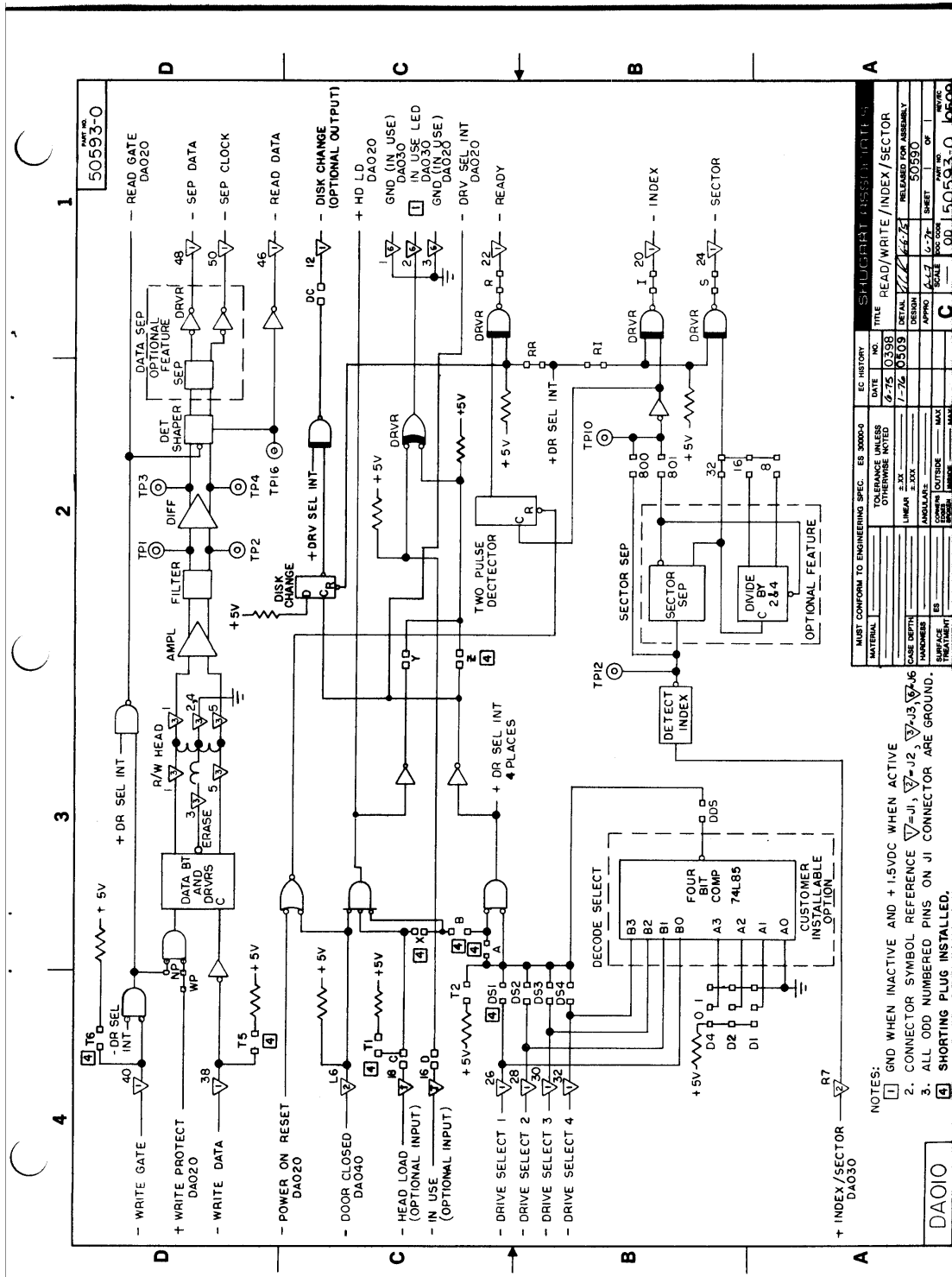
50591-0

MUST CONFORM TO ENGINEERING SPEC: ES 3000-2		EC HISTORY	DATE	NO.	SHUGART ASSOCIATES	
TOLERANCE UNLESS OTHERWISE NOTED		6-75	0398		INDEX	
LINEAR ± .01		7-76	0509		DETAIL	RELEASED FOR ASSEMBLY
ANGULAR ± .01					DESIGN	50590
SURFACE TREATMENT					APPRO	6-75
					DATE	SHEET
						OF
						1
						50591-0
						5059



NOTES:  
 1. DD/DD DENOTES CUT TRACE/JUMPER OPTION.  
 2. O DENOTES TEST POINTS.

SHUGART ASSOCIATES	
MATERIAL	PCB TRACE AND TEST POINT LOCATION
DATE	7-75
NO	0398
DESIGN	442
APPRO	50590
SCALE	1/4" = 1"
SHEET	1 OF 1
WORK	50592-0
MAX	MAX
OUTSIDE	MAX
INSIDE	MAX



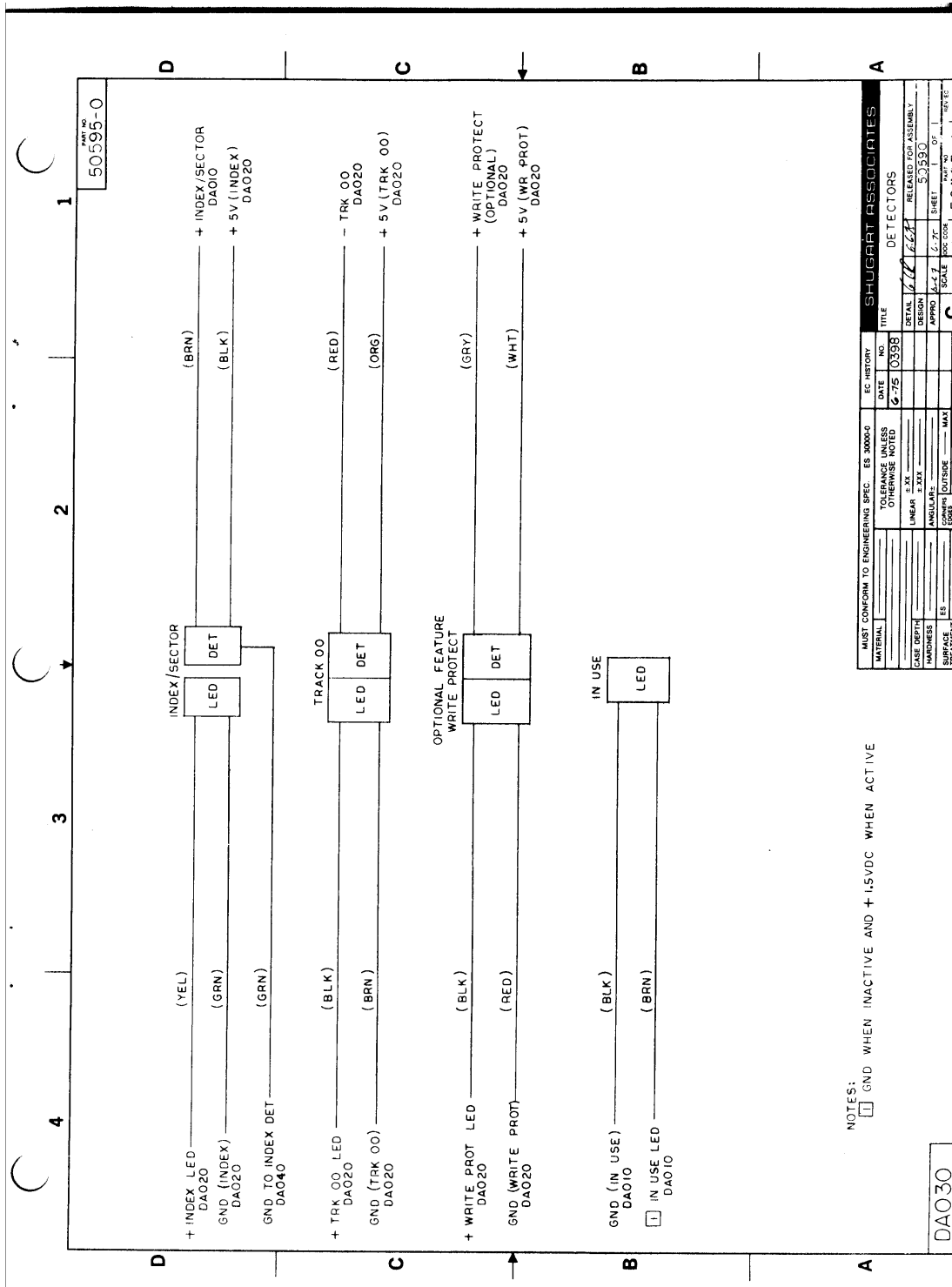
# NOTES:

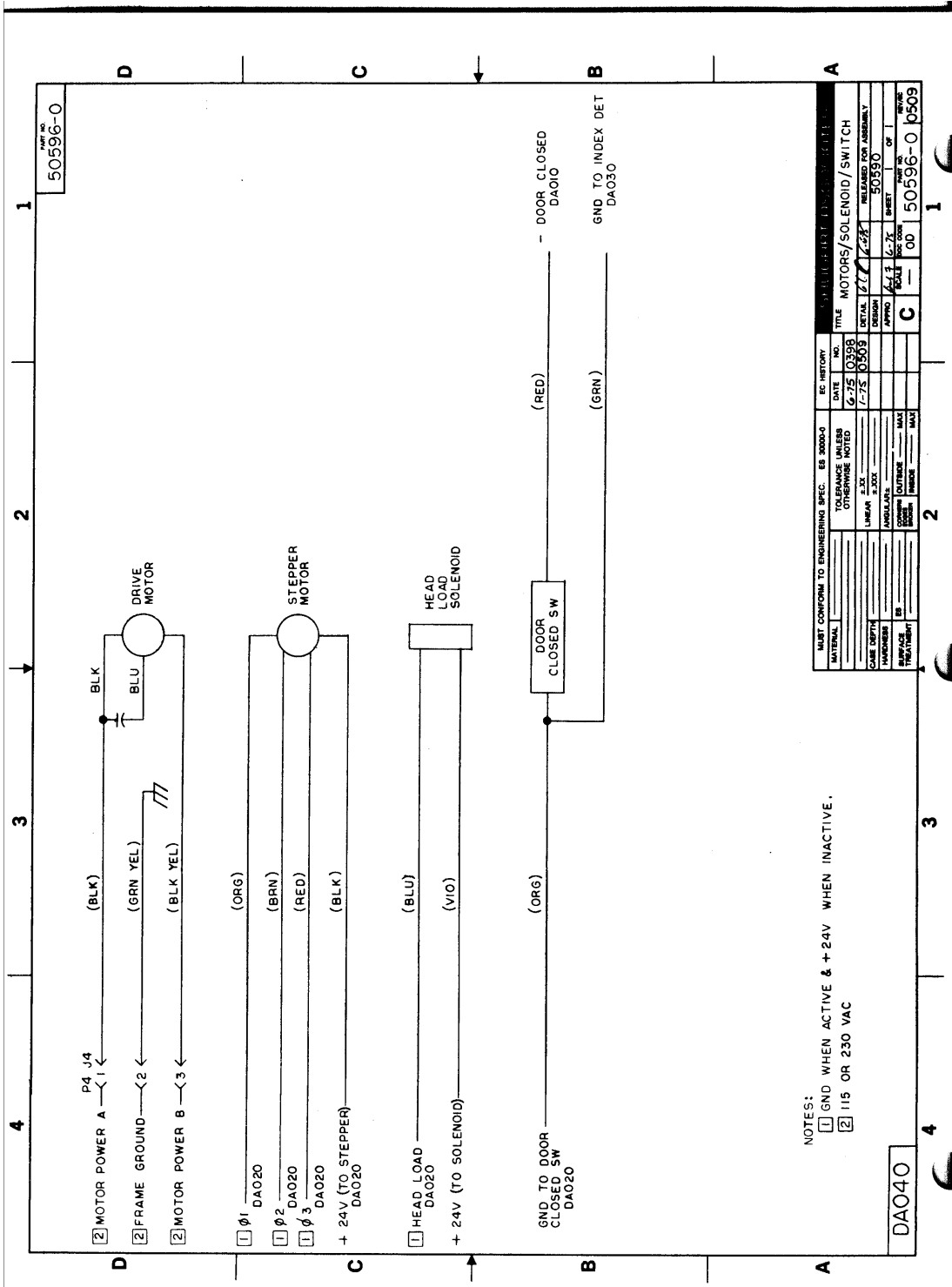
- [1] GND WHEN INACTIVE AND +1.5VDC WHEN ACTIVE
- CONNECTOR SYMBOL REFERENCE  $\nabla$ -J1,  $\nabla$ -J2,  $\nabla$ -J3,  $\nabla$ -J6
- ALL ODD NUMBERED PINS ON J1 CONNECTOR ARE GROUND.
- [4] SHORTING PLUG INSTALLED.

MUST CONFORM TO ENGINEERING SPEC. ES 3000-0-0			
MATERIAL	TO SERVICE PARTS	DATE	NO.
	OTHERWISE NOTED	8-76	0388
		1-76	0509
		4-76	0550
		6-76	0550
		8-76	0550
		10-76	0550
		12-76	0550
		2-77	0550
		4-77	0550
		6-77	0550
		8-77	0550
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		6-00	0550
		8-00	0550
		10-00	0550
		12-00	0550

50593-0

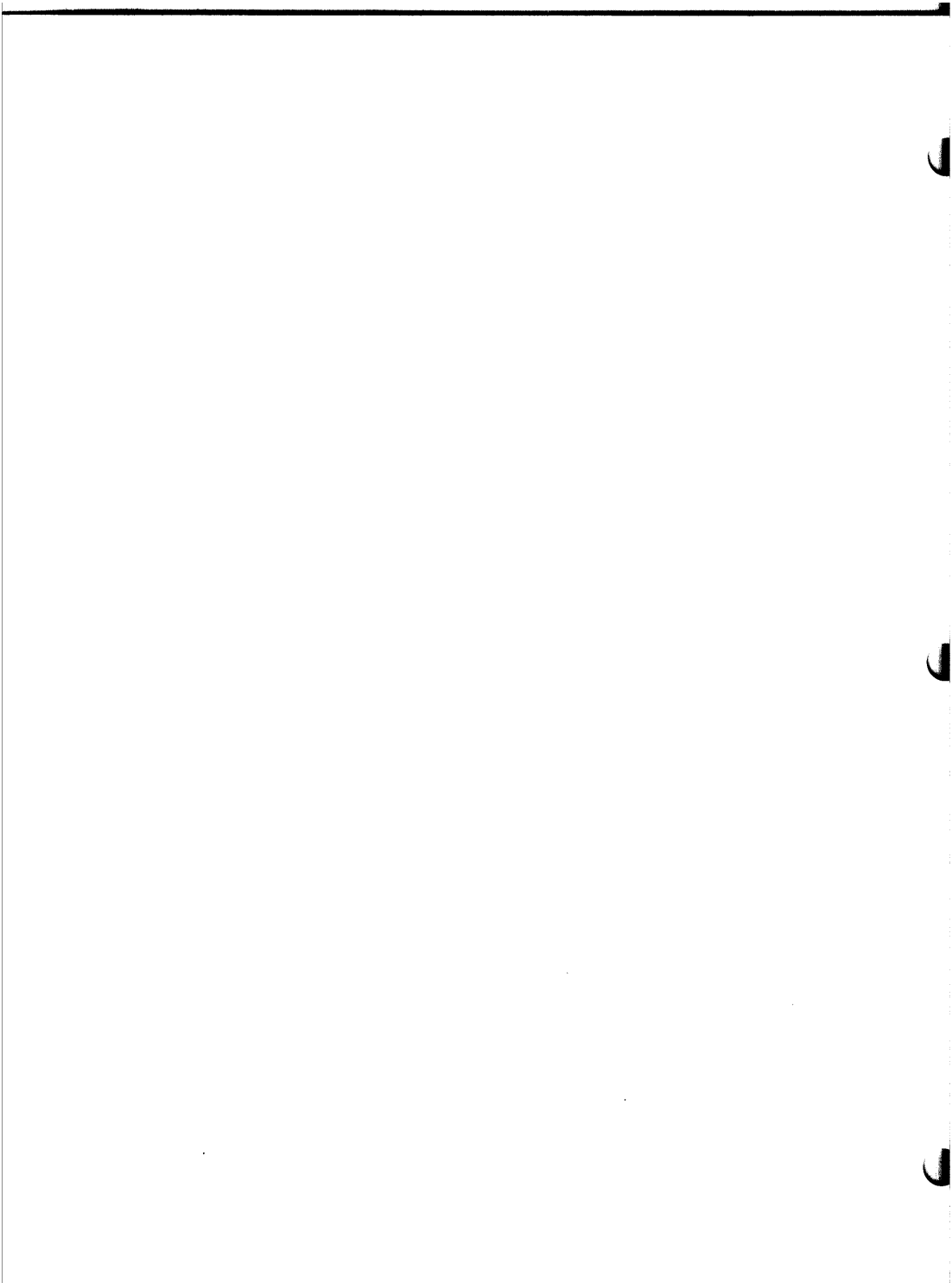


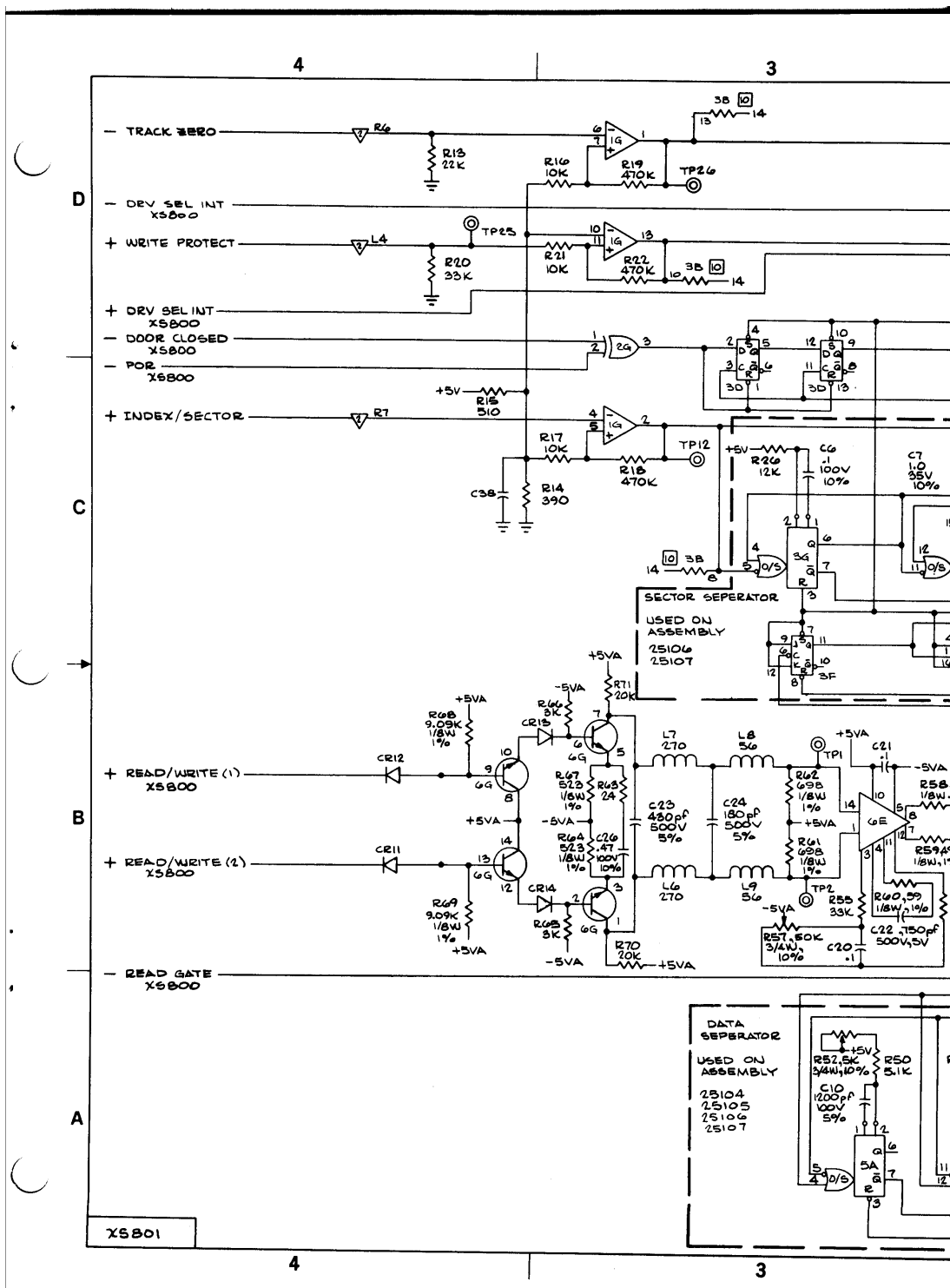


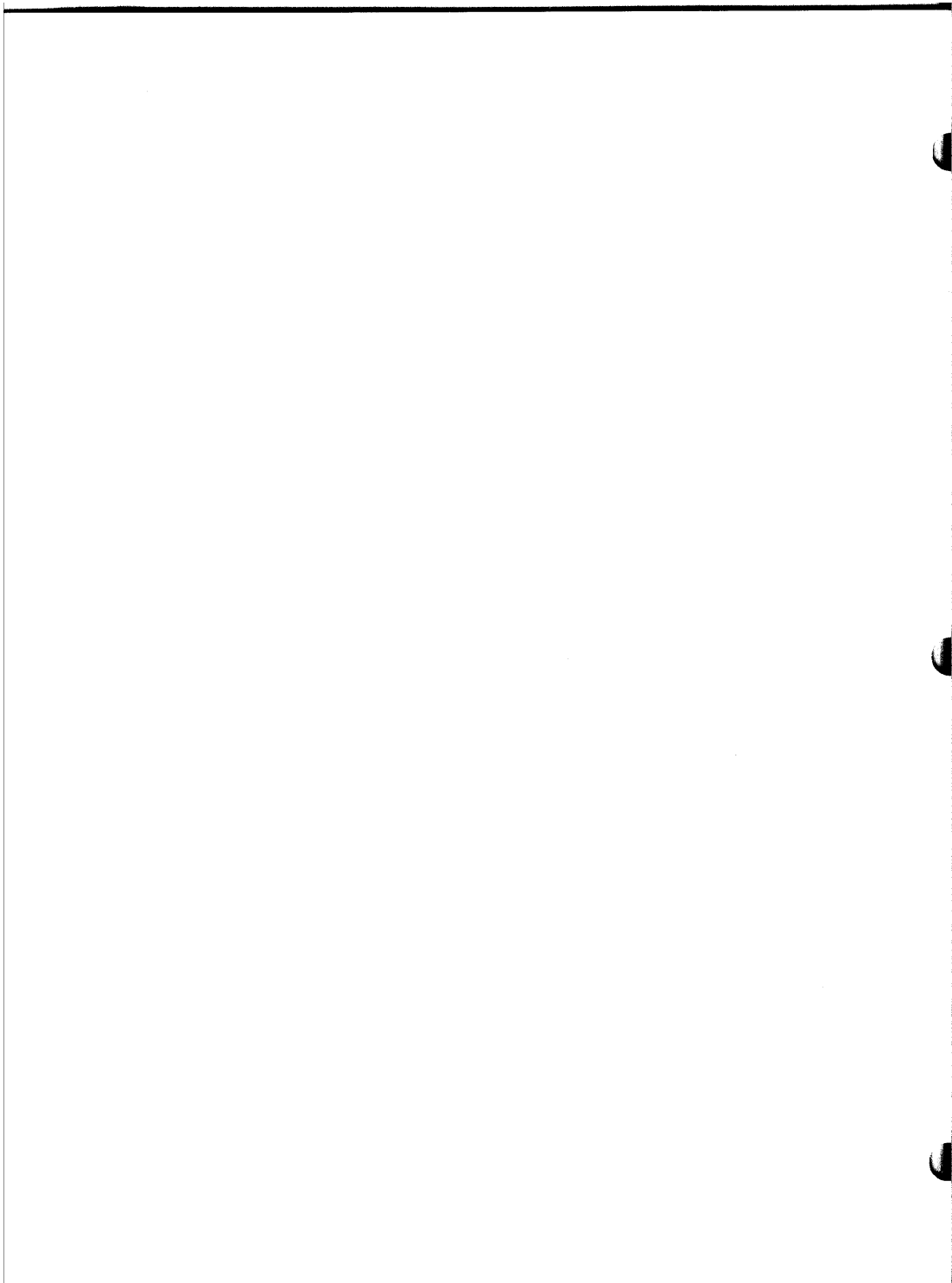


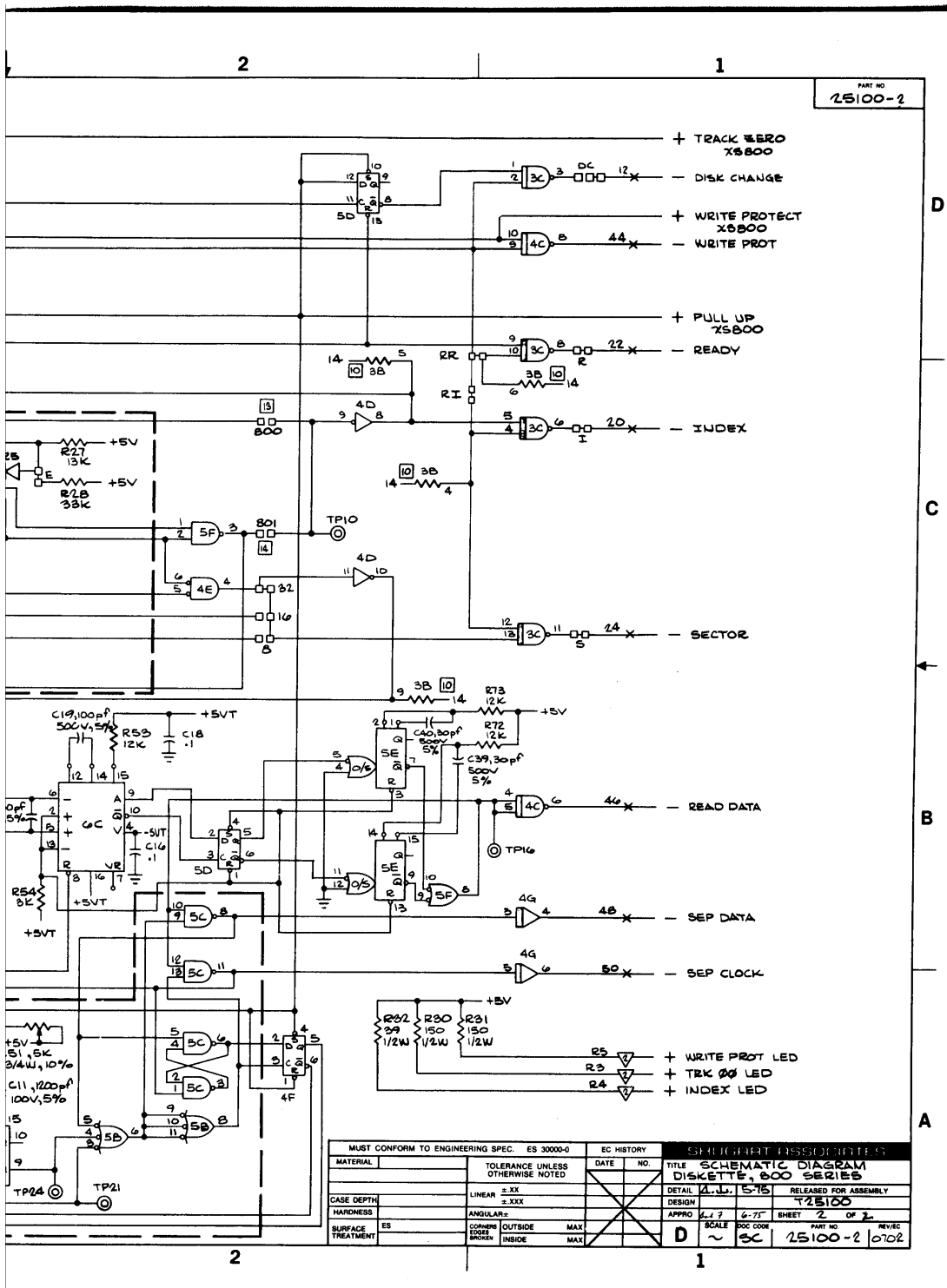


**SA800/801 SCHEMATIC DIAGRAMS**

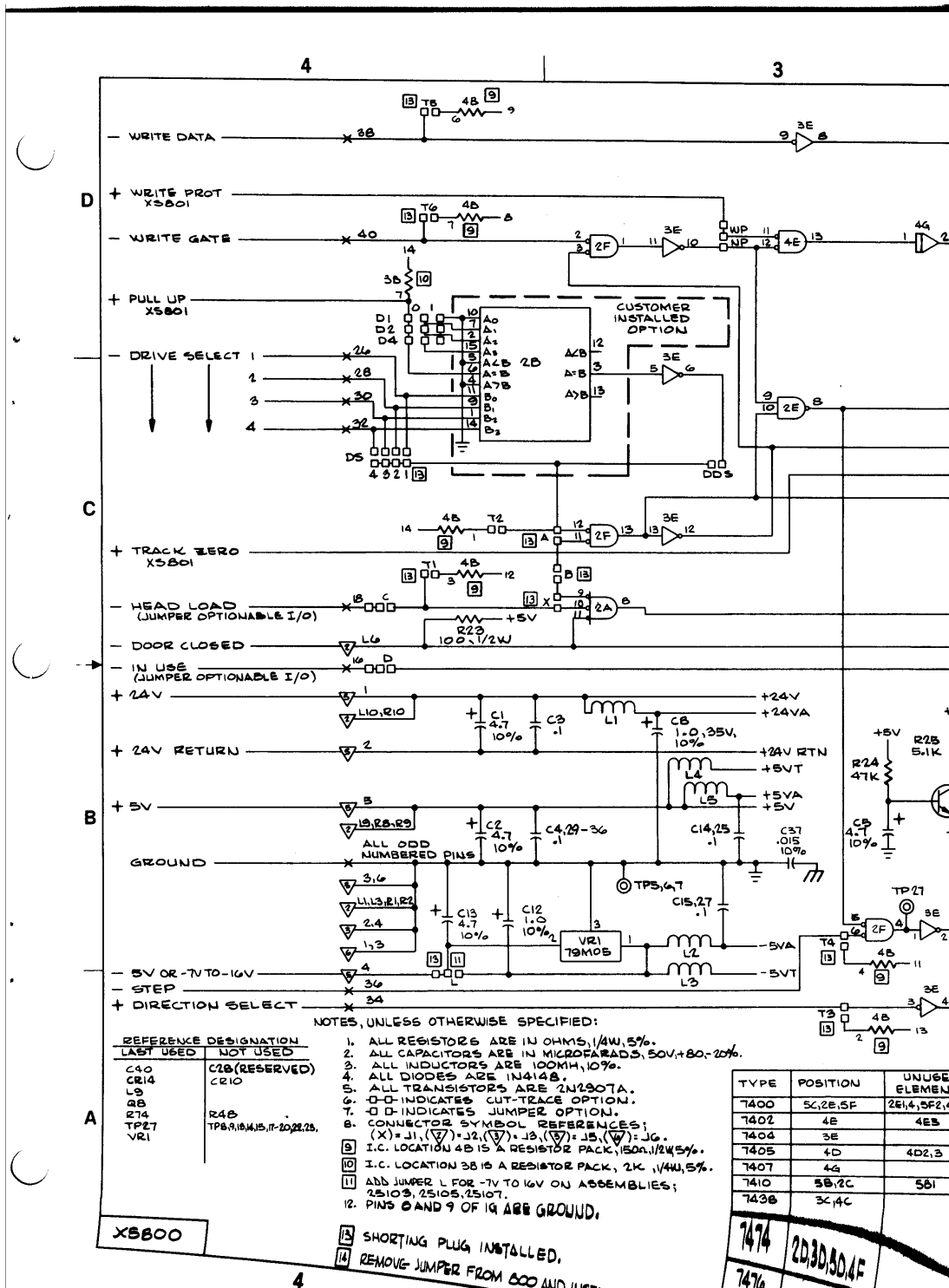


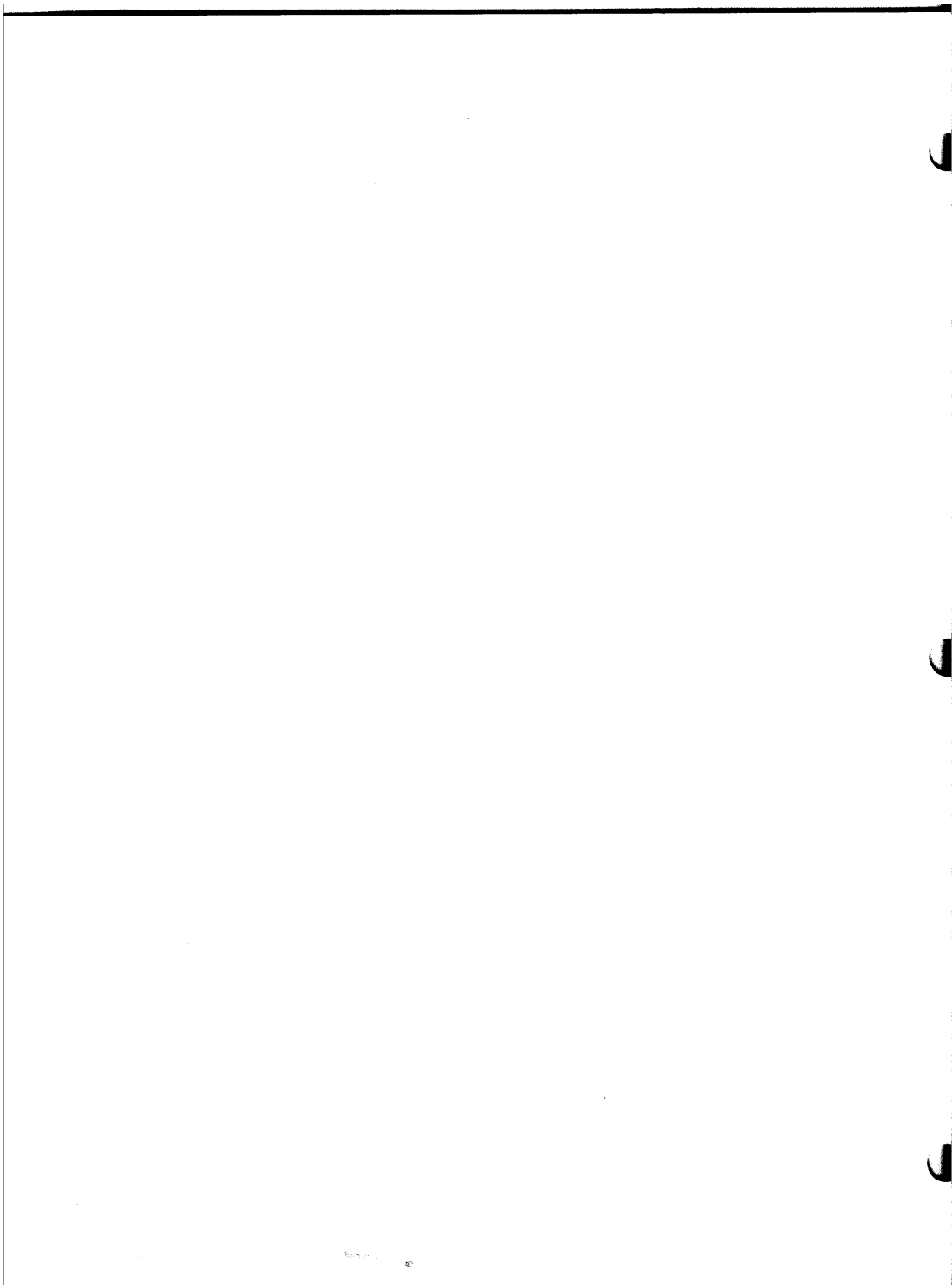














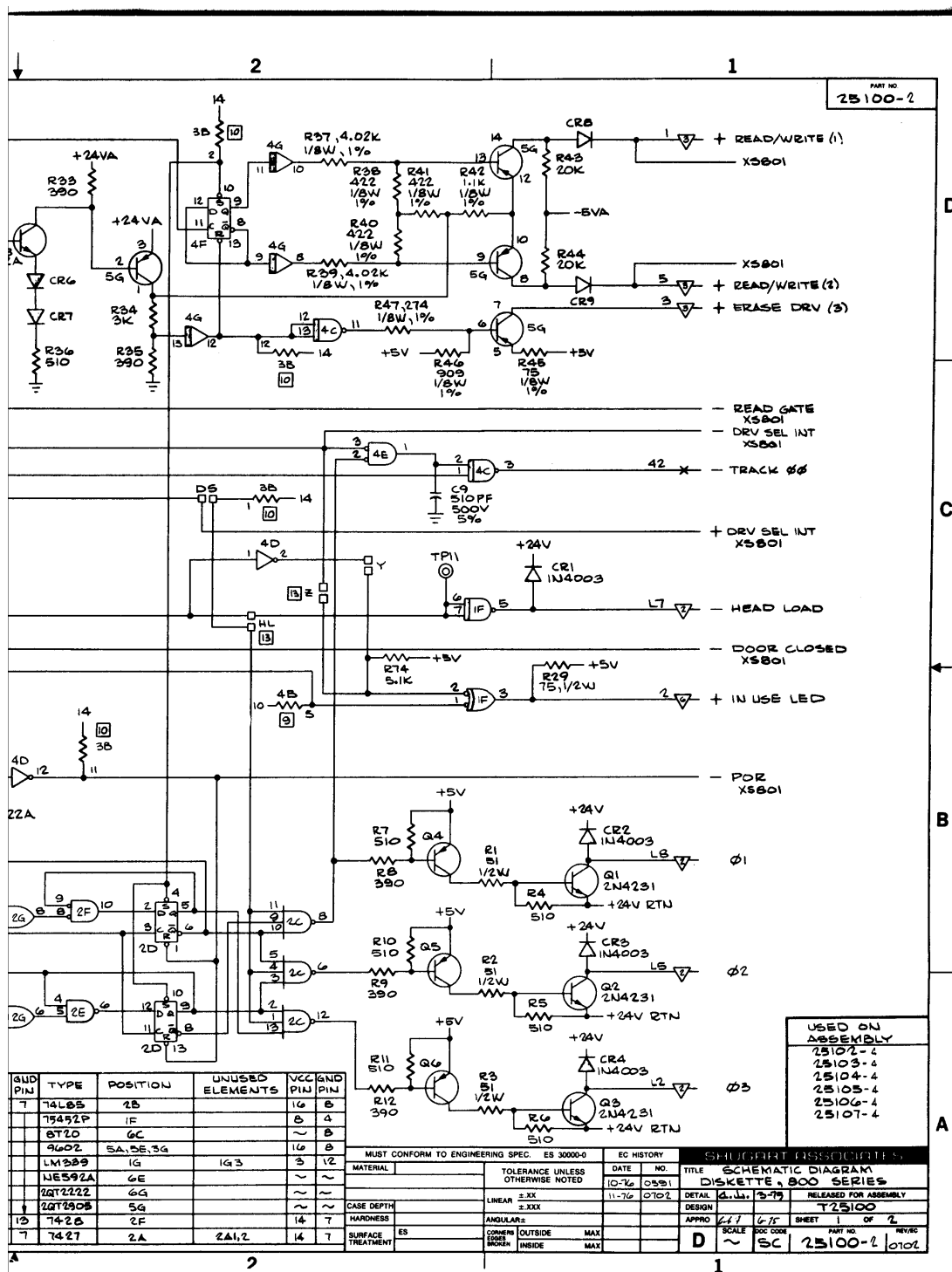
TPB, 9, 10, 14, 15, 17-20, 22, 23,

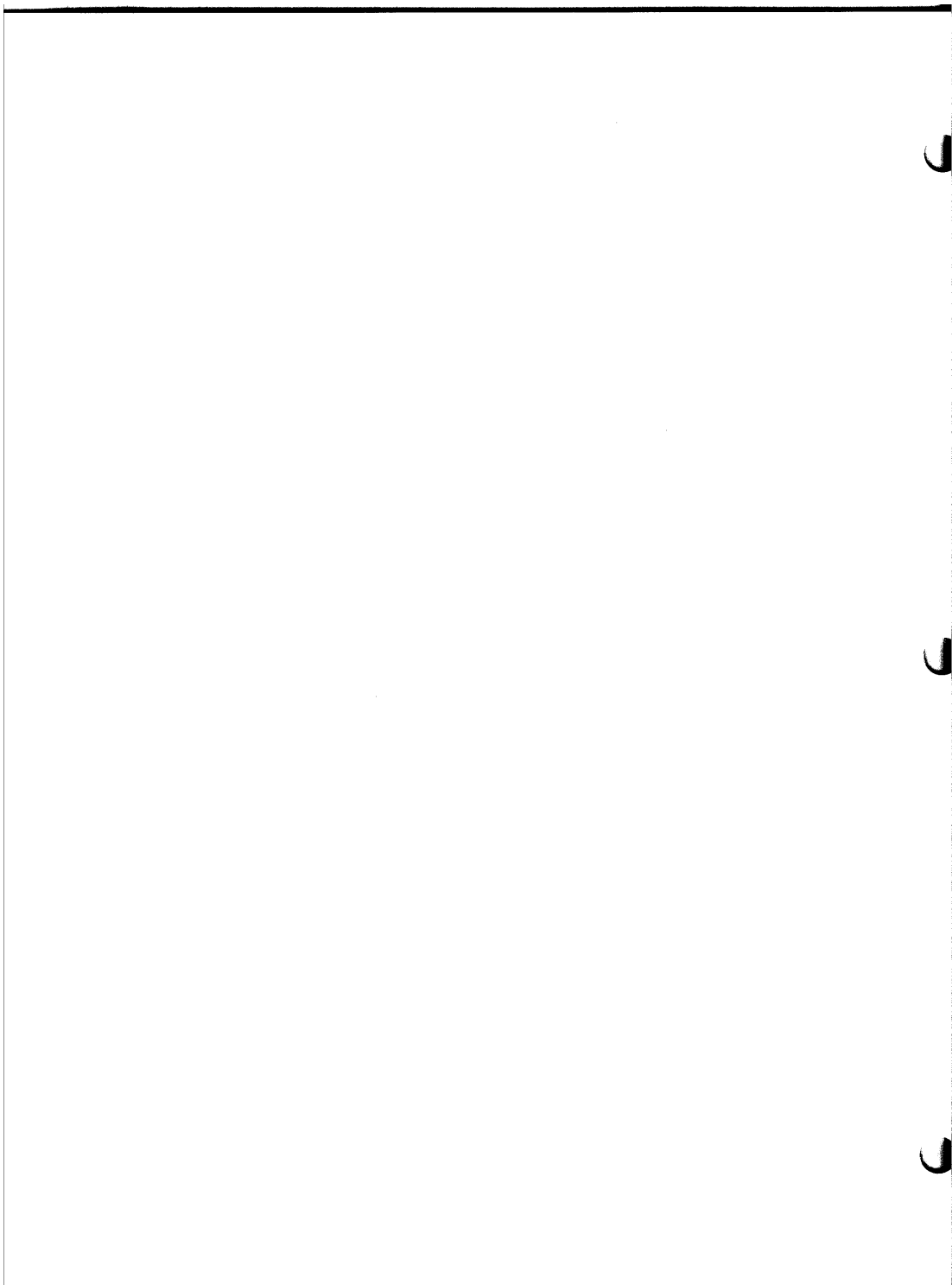
13 SHORTING PLUG INSTALLED.  
14 REMOVE JUMPER FROM 600 AND INSTALL IN 801.

4

3

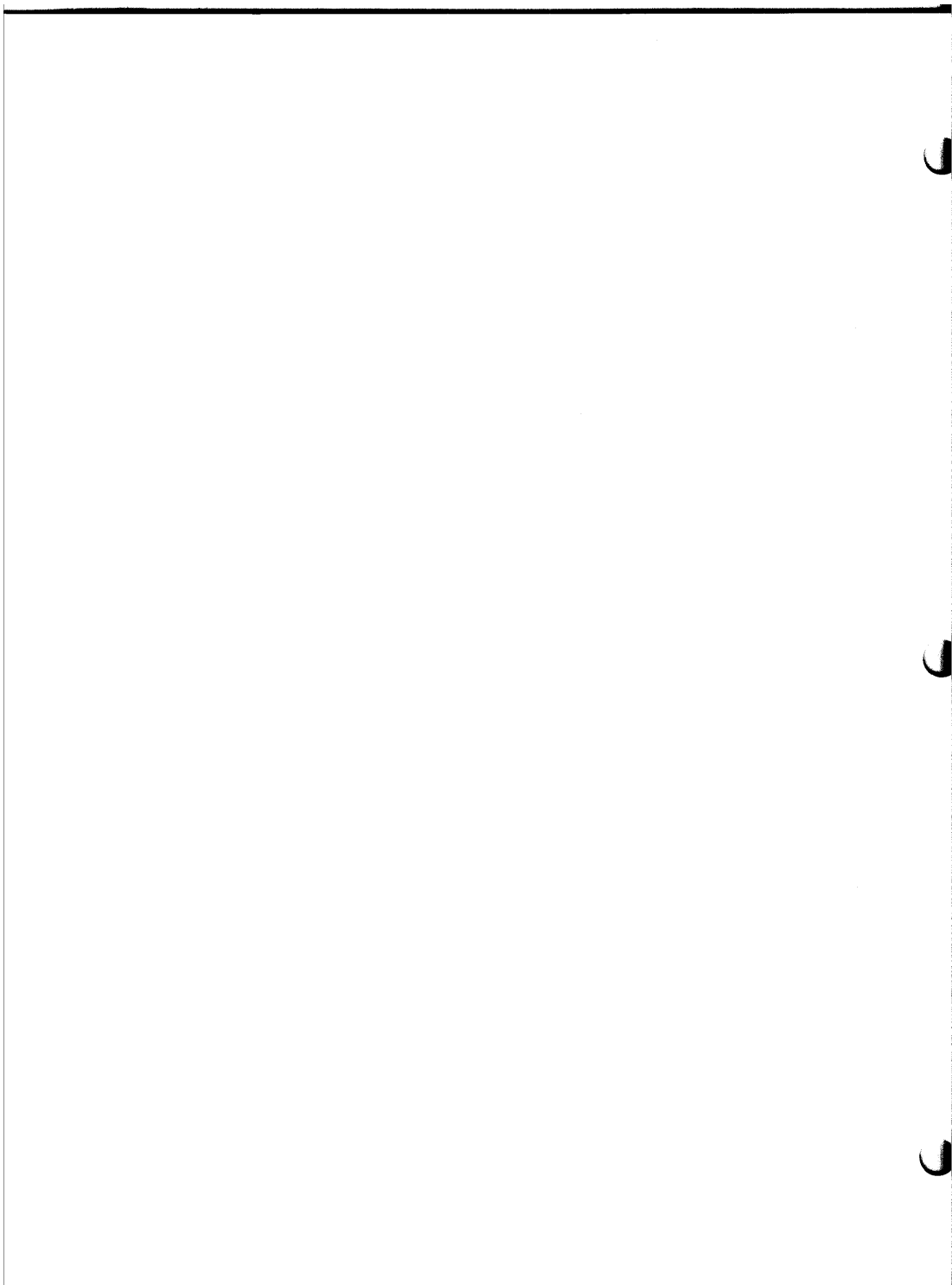






# Illustrated Parts Catalog

## SA800/801



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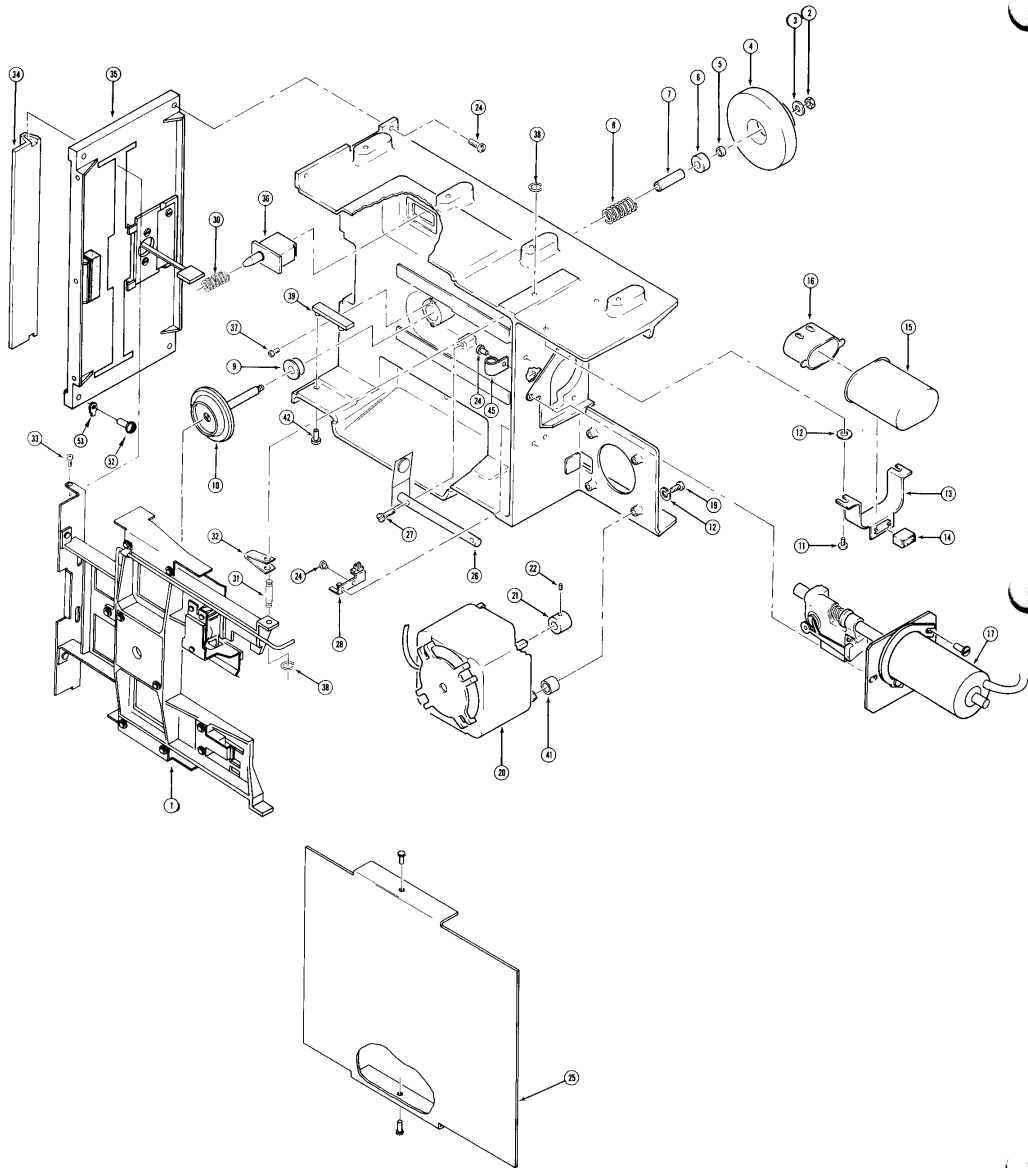


Figure 1 (1 of 2)



## **DESCRIPTION**

### **General**

The Illustrated Parts Catalog is arranged so that the figures will always precede the parts listings and when possible be on the opposite page.

The first number in the list will always refer to the figure and the second number to the reference number of the part within the figure.

When an assembly is referred to within a figure and a further breakdown is shown on another figure then the reference figure will be called out.

### **Indented Level**

The parts list is indented to show the levels of assembly within a figure. The major assembly will always be level 1, all parts or assemblies that attach to that assembly will be level 2 and assemblies within level 2 will have their attaching parts level 3 and so on.

### **Quantity Per Assembly**

The quantity listed is the quantity used on the major assembly. Major Assemblies will never have a quantity listed.

### **Numerical Index**

The numerical index lists all parts in part number sequence and is cross referenced to the figure and reference number.

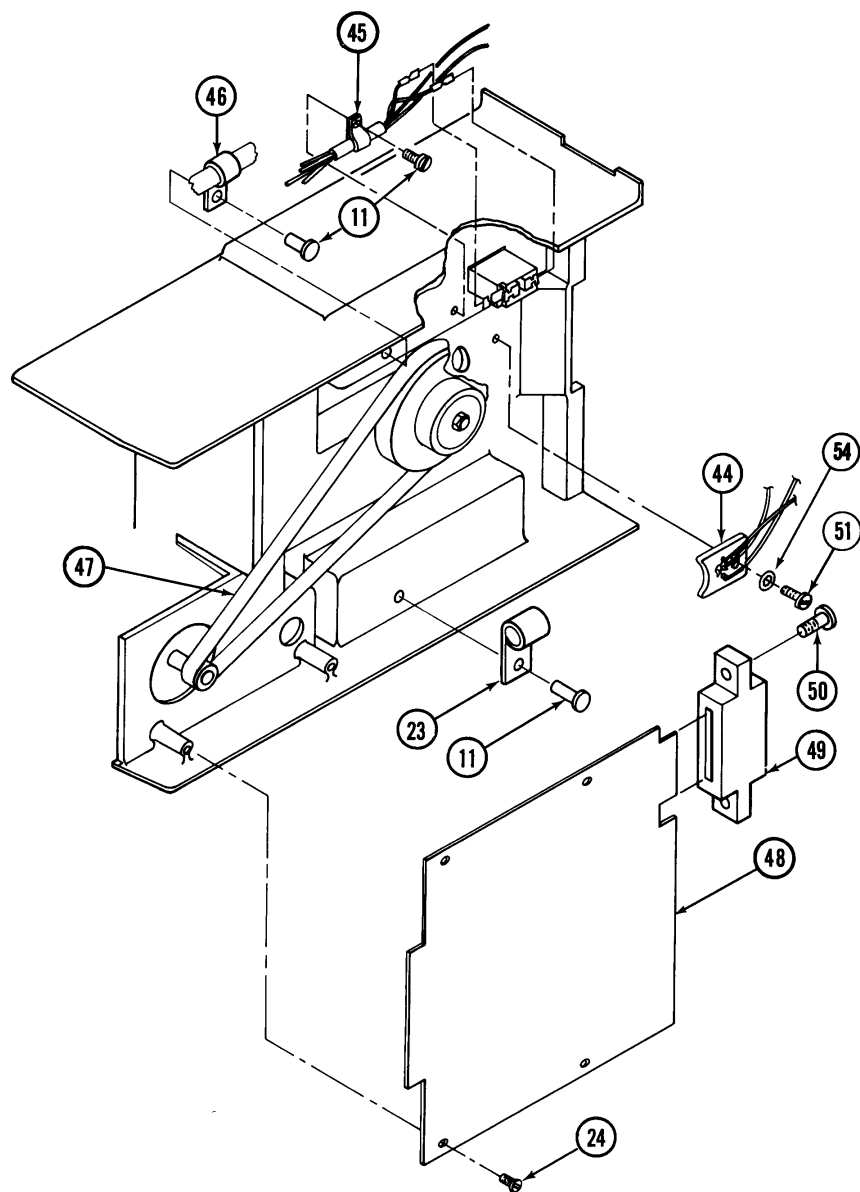


Figure 1 (2 of 2)

FIGURE & REF. NUMBER	PART NUMBER	DESCRIPTION				QTY PER ASM.
		1	2	3	4	
1		DRIVE ASSEMBLY SA800/801				
-1	50550	.	CARTRIDGE GUIDE ASSEMBLY (SEE FIG. 3)			1
-2	10025	.	NUT, 8-32			1
-3	12509	.	WASHER, SPRING			2
-4	50016	.	PULLEY ASSEMBLY, SPINDLE			1
-5	50019	.	SPACER, SPINDLE-SHORT			1
-6	10800	.	BEARING, SPINDLE			1
-7	50018	.	SPACER, SPINDLE---LONG			1
-8	50166	.	SPRING, SPINDLE			1
-9	10801	.	FLANGED BEARING, SPINDLE			1
-10	50561	.	HUB ASSEMBLY, SPINDLE			1
-11	12015	.	SCREW, 8-32x.312			5
-12	12500	.	WASHER; LOCK # 8			2
-13	50098	.	BRACKET			1
-14	10150	.	HOUSING, 3 PIN CONNECTOR			1
-15	10095	.	CAPACITOR, 110 V 50/60 HZ (BODINE MTR ONLY)			1
	15004	.	CAPACITOR, 220 V 50/60 HZ OR 110V ORIENTAL MTR			
-16	10148	.	RUBBER BOOT			1
-17		.	STEPPER/CARRIAGE ASSEMBLY (SEE FIG. 2)			1
-19	12028	.	SCREW, 8-32x.750			4
-20	50443	.	MOTOR, 110 VOLT 50/60 HZ KIT			1
	50301	.	MOTOR, 208/230/220 VOLT 50/60 HZ			
-21	50358	.	PULLEY, 60 HZ			1
	50357	.	PULLEY, 50 HZ			
-22	11904	.	SCREW, SET 6-32x.125			1
-23	10378	.	CABLE CLAMP, 1/8 INCH			1
-24	12013	.	SCREW 6-32x.312 (12014 FOR ZINC FACEPLATE)			11
	10191	.	SCREW 6-32x.438 --800R			2
-25	50440	.	DUST COVER KIT (OPTIONAL)			1
	12023	.	SCREW, THD. FORM, PAN HD.			2
	50009	.	COVER			1
-26	50522	.	SPRING/GUIDE ASM			1
-27	12012	.	SCREW, 4-40x.375			2
-28	50121	.	DETECTOR ASSEMBLY, TRACK 0			1
-30	50582	.	SPRING ASSEMBLY, DOOR OPEN (STANDARD)			1
	50583	.	SPRING ASSEMBLY, DOOR OPEN (HORZ. MNT, PCB DOWN)			
-31	50167	.	PIVOT TOP			1
	50670	.	PIVOT TOP (STANDARD) (800R)			
-32	50168	.	SPRING, BIAS			1
-33	11905	.	SCREW, B.V.			2
-34	50142	.	HANDLE			1
-35		.	FRONT PLATE ASSEMBLY (SEE FIG. 4)			1
-36	17200	.	SWITCH, DOOR OPEN			1
-37	12011	.	SCREW, 4-40x.250			2
-38	11305	.	CLIP			2
-39	50559	.	DEFLECTOR			2
-41	50602	.	SPACER			4
-42	12032	.	SCREW, #8x.50 LG TAPPING			2

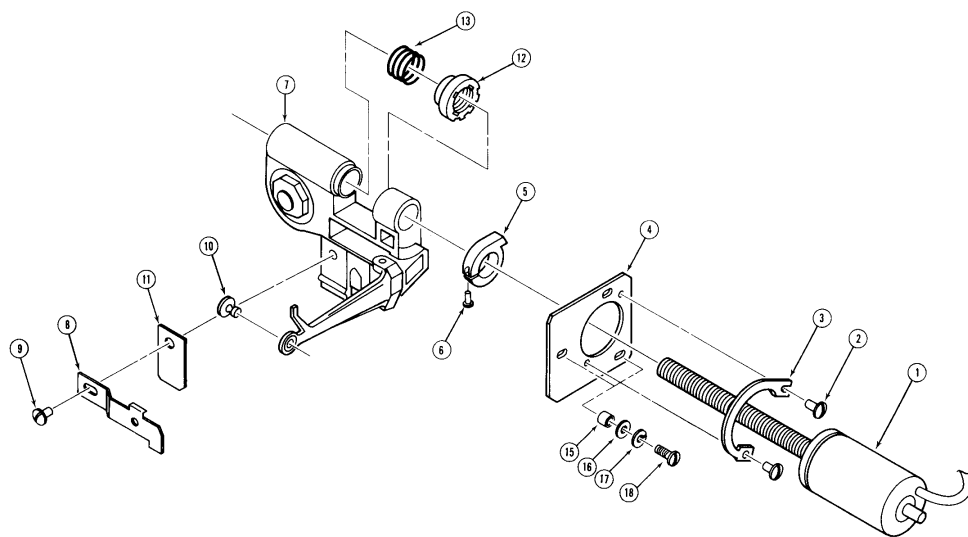


Figure 2

FIGURE & REF. NUMBER	PART NUMBER	DESCRIPTION				QTY PER ASM.
		1	2	3	4	
-44	50128	.	PHOTRANSISTOR AND CABLE ASSEMBLY			1
-45	10375	.	CABLE CLAMP, 3/16"			2
-46	10264	.	CABLE CLAMP, 3/8"			1
-47	50356	.	BELT (60 HZ)			1
	50355	.	BELT (50 HZ)			1
-48	25102	.	PCB (SA 800, -5V, NO DATA SEP)			1
	25103	.	PCB (SA 800, -12/-15V, NO DATA SEP)			
	25104	.	PCB (SA 800, -5V, WITH DATA SEP)			
	25105	.	PCB (SA 800, -12/-15V, WITH DATA SEP)			
	25106	.	PCB (SA 801, -5V)			
	25107	.	PCB (SA 801, -12/-15V)			
-49	10140	.	BLOCK, PCB CONN			1
-50	10174	.	.SCREW, 4-40			2
-51	12036	.	SCREW, 8-32x.375			1
-52	10187	.	SCREW, 6-32x.250 -800R			2
-53	50669	.	CLIP, FACE PLATE MOUNT-800R			2
-54	10014	.	WASHER			1

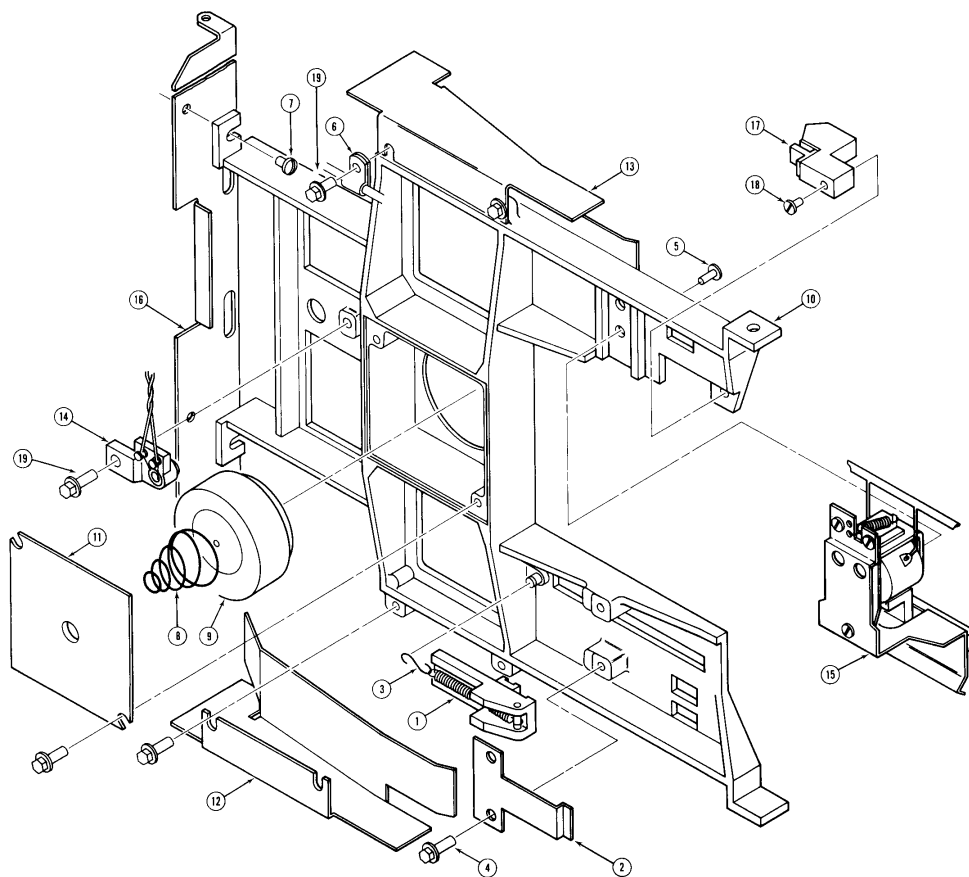


Figure 3

FIGURE & REF. NUMBER	PART NUMBER	DESCRIPTION				QTY PER ASM.
		1	2	3	4	
2-		STEPPER/CARRIAGE ASSEMBLY				
-1	50130	.	STEPPER MOTOR ASSEMBLY			1
-2	12016	.	SCREW, 8-32x.375			2
-3	50584	.	MOUNTING CLAMP			1
-4	50112-4	.	PLATE, STEPPER MOTOR			1
-5	50245	.	STOP, LIMIT - LEAD SCREW			1
-6	11903	.	SCREW, CAP 2-56x.250			1
-7	50562	.	CARRIAGE ASSEMBLY			1
-8	50529	.	.	FLAG, TRACK 0		1
-9	11910	.	.	SCREW. 4-40x.250		1
-10	50542	.	.	LOAD BUTTON		1
-11	50362	.	.	SPRING, PLATE		1
-12	50087	.	.	NUT		1
-13	50088	.	.	SPRING, PRE-LOAD		1
-14	10012	.	.	WASHER		1
-15	50707	.	SPACER			1
-16	10013	.	WASHER, #6 FLAT			3
-17	12510	.	WASHER, SPRING			3
-18	12027	.	SCREW, 6-32x.500			3

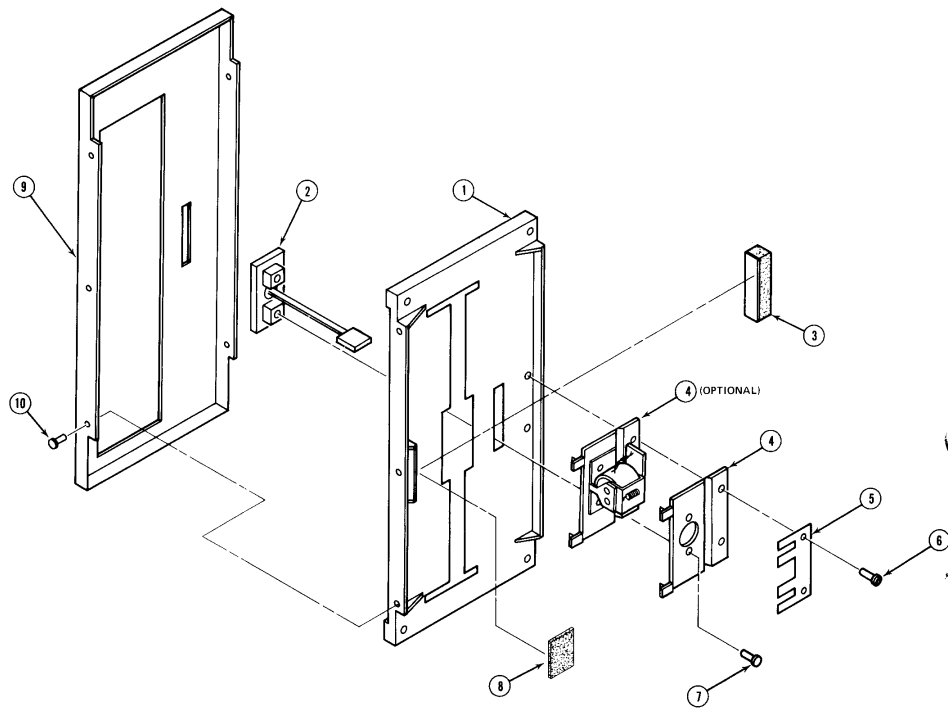


Figure 4



FIGURE & REF. NUMBER	PART NUMBER	DESCRIPTION				QTY PER ASM.
		1	2	3	4	
3-	50550	CARTRIDGE GUIDE ASSEMBLY				
1	50609	.	EJECTOR ASSEMBLY			1
2	50555	.	SPRING, CLAMP, EJECTOR			1
3	50556	.	HOOK, SPRING			1
4	12015	.	SCREW 8-32x.312			7
5	12013	.	SCREW 6-32x.312			1
6	10378	.	CLAMP, CABLE			1
7	10187	.	SCREW 6-32x.250			2
8	50031	.	SPRING, HUB CLAMP			1
9	50254	.	HUB CLAMP ASSEMBLY			1
10	50544	.	GUIDE			1
11	50546	.	PLATE, HUB CLAMP			1
12	50547	.	STRIPPER, BOTTOM			1
13	50548	.	STRIPPER, TOP			1
14	50557	.	L.E.D. ASSEMBLY			1
15	50558	.	HEAD LOAD ACTUATOR ASSEMBLY			1
16	50579	.	LATCH PLATE			1
17	50313	.	WRITE PROTECT DETECTOR ASSEMBLY			1
18	12026	.	SCREW 4-40x.625			1
19	12016	.	SCREW 8-32x.375			2

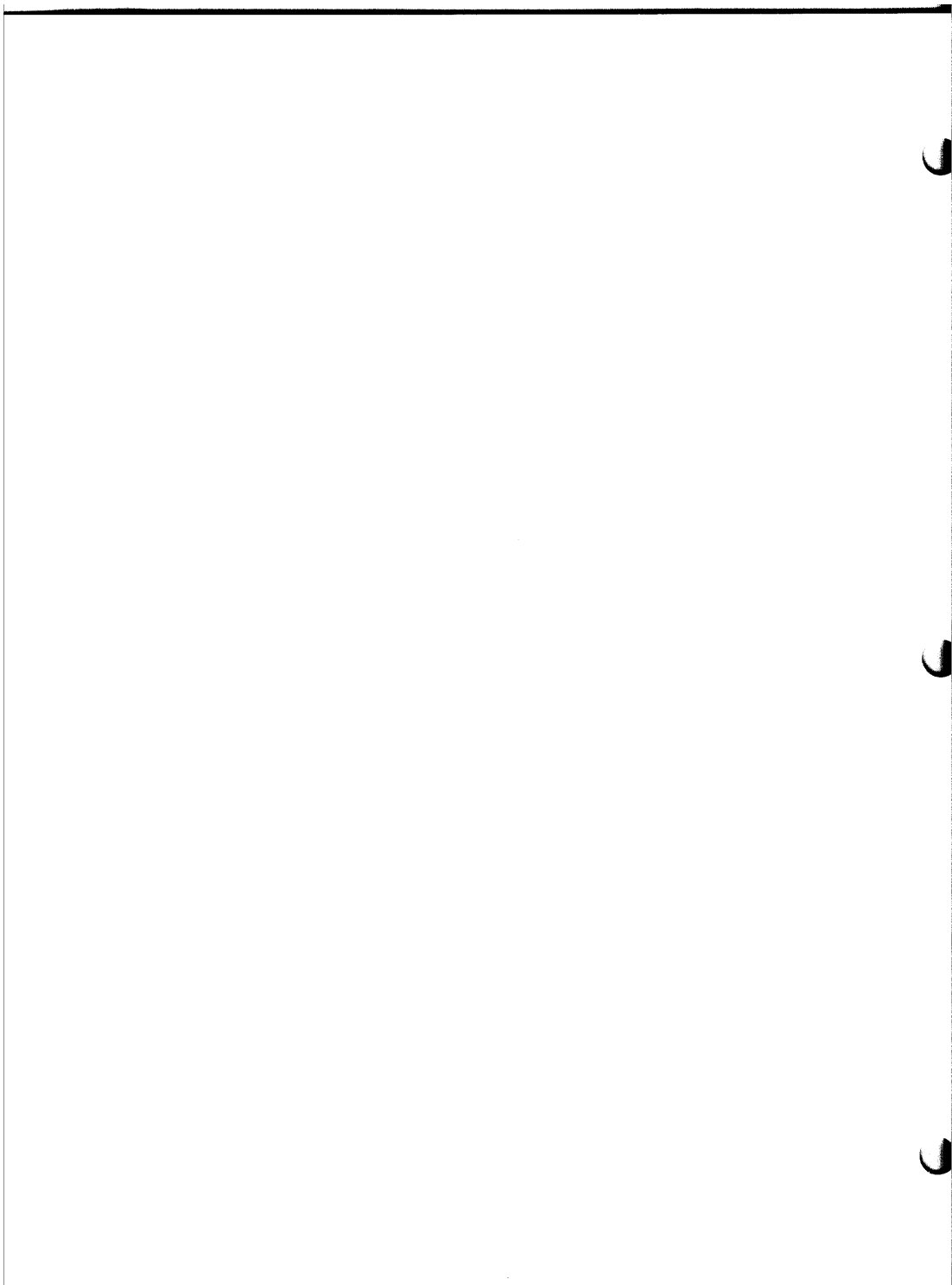
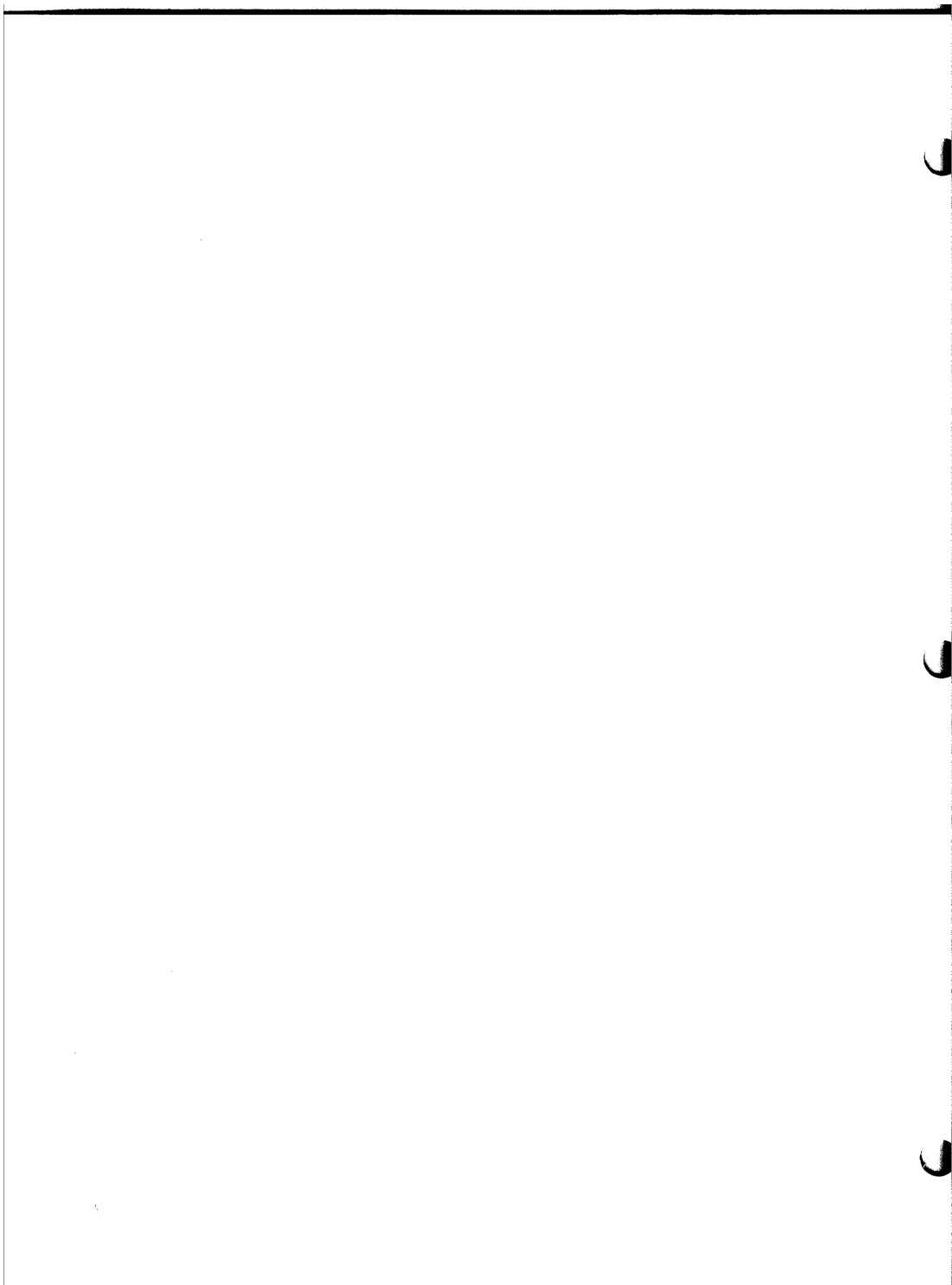


FIGURE & REF. NUMBER	PART NUMBER	DESCRIPTION				QTY PER ASM.
		1	2	3	4	
4-	50733	FRONT PLATE ASSEMBLY (WITH LITE)				
	50731	FRONT PLATE ASSEMBLY (WITHOUT LITE)				
	50735	FRONT PLATE ASM KIT (WITH DOOR LOCK)				
	50679	FRONT PLATE ASM-800R (WITHOUT LITE)				
	50680	FRONT PLATE ASM-800R (WITH LITE)				
	50724	FRONT PLATE ASM-800R (WITH DOOR LOCK)				
-1	50729	.	FRONT PLATE			1
	50667	.	FRONT PLATE-800R			1
-2	50727	.	PUSH BUTTON (WITH LITE)			1
	50726	.	PUSH BUTTON, DOOR LOCK OPTION			
-3	50728	.	PUSH BUTTON (WITHOUT LITE)			1
	50183	.	BUMPER			1
-4	50156	.	LATCH			1
	50690	.	LATCH ASM, DOOR LOCK OPTION			
-5	50691	.	SPRING PLATE			1
-6	12013	.	SCREW 6-32x.312			2
-7	12035	.	SCREW 4-40x.250			2
-8	50580	.	SNATCH			1
-9	50257	COVER, FRONT 5-1/4 x 11 WHITE				1
	50258	COVER, FRONT 5-1/4 x 11 TAN				1
	50260	COVER, FRONT 5-1/4 x 10 WHITE				1
	50261	COVER, FRONT 5-1/4 x 10 TAN				1
	50263	COVER, FRONT 4-5/8 x 10-1/2 WHITE				1
	50264	COVER, FRONT 4-5/8 x 10-1/2 TAN				1
-10	50675	COVER, FRONT-800R TAN				1
	10261	SCREW, FL. HD. 4-40x.250				5



PART NUMBER	FIG. REF.
10012	2-14
10013	2-16
10014	1-54
10025	1-2
10095	1-15
10140	1-49
10148	1-16
10150	1-14
10174	1-50
10187	3-7
	1-52
10191	1-24
10261	4-10
10264	1-46
10375	1-45
10378	1-23
	3-6
10800	1-6
10801	1-9
11305	1-38
11903	2-6
11904	1-22
11905	1-33
11910	2-9
12011	1-37
12012	1-27
12013	1-24
	3-5
	4-6
12015	1-11
	3-4
12016	
	2-2
	3-19
12023	1-25
12026	3-18
12027	2-18
12028	1-19
12032	1-42
12036	1-51
12500	1-12
12509	1-3
12510	2-17
15004	1-15
17200	1-36
25102	1-48
25103	1-48
25104	1-48
25105	1-48
25106	1-48
25107	1-48
50009	1-25
50016	1-4
50018	1-7
50019	1-5
50031	3-8

PART NUMBER	FIG. REF.
50087	2-12
50088	2-13
50098	1-18
50112-4	2-4
50121	1-28
50128	1-44
50130	2-1
50142	1-34
50156	4-4
50166	1-8
50167	1-31
50168	1-32
50183	4-3
50245	2-5
50254	3-9
50257	4-9
50258	4-9
50260	4-9
50261	4-9
50263	4-9
50264	4-9
50301	1-20
50313	3-17
50355	1-47
50356	1-47
50357	1-21
50358	1-21
50362	2-11
50440	1-25
50443	1-20
50522	1-26
50529	2-8
50542	2-10
50544	3-10
50546	3-11
50547	3-12
50548	3-13
50550	1-1
	3
50555	3-2
50556	3-3
50557	3-14
50558	3-15
50559	1-39
50561	1-10
50562	2-7
50579	3-16
50580	4-8
50582	1-30
50583	1-30
50584	2-3
50602	1-41
50609	3-1
50667	4-1
50669	1-53
50670	1-31

PART NUMBER	FIG. REF.
50675	4-9
50679	4
50680	4
50690	4-4
50691	4-5
50707	2-15
50724	4
50726	4-2
50727	4-2
50728	4-2
50729	4-1
50731	4
50733	4
50735	4

