

# SA809 Drive Exerciser

Instruction Manual

 Shugart Associates

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## 1.0 GENERAL DESCRIPTION

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 on the Shugart drives when used with the SA120 alignment diskette for 800 and 900 Series, or the SA124 alignment diskette on the SA400 minifloppy.

Exerciser P/N	Drive
50619	SA800-801
50620	SA900, 901-902
54157	SA400

The exerciser has no intelligent data handling capabilities, but can write the frequencies required for head output checks. The exerciser can enable read in the drive to allow the checking of read back signals.

## 2.0 SA400 MINIFLOPPY OPERATION

The SA801 Exerciser will operate the SA400 minifloppy without modification to the exerciser or drive. One additional voltage +12 is required.

The only function not performed is writing 1F frequency (62.5 KHz) which is not required for check out or making any adjustments. To write 2F for head amplitude check switch 3 position 3 must be depressed to the 1F position. This writes 125.0 KHz which is 2F (all one's) in the SA400.

Switch 1 position 4 which is labeled drive address 4 will start the spindle drive motor.

Set the step rate potentiometer for a maximum step rate of 40 milliseconds per step.

Other differences are:

1. The SA400 has no ready line.
2. The index interface line is on the sector input to the exerciser.

Cables required in addition to the D.C. cable to the exerciser.

P/N 54156	809 to 400 signal cable
P/N 54158	400 D.C. cable

The SA400 Exerciser Assembly P/N 54157 comes with all of the necessary cables.

### 3.0 SWITCHES

Depressing the switch down (towards ON) is in most cases the inactive position. Depressing up towards OFF is the active position.

#### 3.1 S1 Drive Address

This is a 4 position switch used as a combination head load and drive select.

If the drive being tested is a SA800/801 or SA400 that utilizes the multiplex option, whichever switch is in the active position, it will select the drive that has the matching address. If the drive is a SA900 or does not have the multiplex option, switch position one will select the drive and load the head. On Dual SA902's drive 1 is selected by depressing switch position 1 and drive 2 by depressing position 2. Depressing switch position 4 will start the diskette drive motor on the SA400.

#### 3.2 S2 is a 4 Position Switch Which Has the Following Functions:

##### 3.2.1 AUTO and STEP (Position 1)

###### AUTO

In this position the exerciser automatically generates step pulses at a repetition rate as set by the step rate pot. Max step rate is 8 ms. For the SA400 set the pot for a maximum step rate of 40 ms. The drive will seek between the two tracks set in switches S4 and S5.

###### STEP

In this position, the drive will single step each time the "STEP/SING" switch position is switched from the SING to STEP.

##### 3.2.2 RECAL TO 00 (Position 2)

Activating this switch causes the drive to seek out until it reaches track zero, if AUTO is depressed or by using the STEP/SING switch.

##### 3.2.3 STEP/SING (Position 3)

See paragraph 2.1.3

##### 3.2.4 FORCE OUT (Position 4)

This will cause the drive to step from track zero to -1 when put into the force out position with an address of 1 in S4 and S5 and with the AUTO switch activated. This is used to adjust the track zero stop in 800 and 900 Series drives.

### 3.3 Switch 3

This is a 4 position switch with the following functions:

#### 3.3.1 WRT/CONT (Position 1)

When switched to the WRT position will cause the drive to continuously write either 1F or 2F signal for the entire track until switched back to the Cont Position.

#### 3.3.2 RESET INOP (Position 2)

When switched to the reset position it will reset a file inop condition on the drive--(applicable to SA900 series drives only).

#### 3.3.3 1F/2F (Position 3)

When Wrt/Rd switch in on Wrt or Wrt Cont activated, the drive will either write 1F, 125 KHz, or 2F, 250 KHz.

#### 3.3.4 WRT/RD (Position 4)

##### RD

The drive will read what is on the diskette as long as the drive is selected and the head is loaded.

##### WRT

In this position the drive will write a 1F or 2F signal, every other revolution of the diskette and read alternately.

Before reading and writing on the SA400 the spindle motor must be started.

#### 3.4.0 S4 Address 2 and S5 Address 1

The drive will alternately seek between the binary positions set on in S4 and S5. If the same value is set in both switches the drive will seek to this track and stop.

#### 3.5.0 Step Rate Potentiometer (Varies the Rate of Stepping)

Max step rate is 8 ms per track on 800, 10 ms on 900 series and 40 ms on SA400.

### 4.0 INDICATORS

#### 4.1 D.C. On

This indicates that +5 Volts is on to the card.

#### 4.2 File Inop (900 Series Only)

Being on is an indication that the drive was in an Inop condition when write was tried. Refer to the 900 OEM manual for Inop conditions.

### 4.3 Write Protect

If the drive has the write protect feature and a write protected diskette is installed, the indicator will come on. All SA400's have the write protect feature.

### 4.4 Ready

The on condition means the drive is in a Ready condition. Refer to the 800, 900 OEM manual for an explanation of Ready. The SA400 does not have a Ready line.

### 4.5 Trk 00

This indicator lites when the drives R/W head is positioned at Track 00.

### 4.6 Index

This indicator will lite if there are Index pulses being generated. It will not lite with SA400 drivers.

### 4.7 Sector

This indicator will lite if there are Sector pulses being generated by the drive (for hard sectored drives). On SA400 drives, the Index pulse goes to the Sector input on the exerciser PCB. If soft sector media is used the sector lite will blink. If hard sector media the sector lite will stay on.

### 4.8 Present Address

Eight indicators that indicate, in binary, the address where the drives R/W head is presently positioned.

## 5.0 CONNECTORS

### 5.1 J1 and J2

Is the D.C. power connector. It is a 6 pin AMP Mate-N-Lock connector. J1 and J2 are wired in parallel. It is used for bringing D.C. power to the exerciser card and out to the drive on 800 and 900 drives. Power to the SA400 must be on a separate cable. See Figure 1 for voltage connectors.

PIN 1 +24 VOLTS DC  
PIN 2 +24 VOLTS RETURN  
PIN 3 -5 VOLT GROUND  
PIN 4 -5 VOLTS OR -7 TO -16 VOLTS  
PIN 5 +5 VOLTS *BRN*  
PIN 6 +5 VOLT GROUND *BLU*  
*+12 VDC*

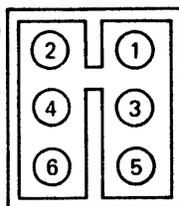


FIGURE 1

### 5.2 J-3

Connection to J3 is thru a 50 pin PCB edge connector. Use the 800 interface cable for 800 series drives and a 900 cable for 900 series drives and the 800 to 400 signal cable for the SA400 drive.

## 6.0 TERMINATORS

Termination is provided for the input lines to the drive. These are selected by jumpers. Any input line that is not terminated on the drive should have the appropriate jumper installed on the exerciser PCB.

### TERMINATOR POSITIONS

Position	Signal
1	File Inop Reset
2	Direction
3	Step
4	Write Data
5	Write Gate

## 7.0 TEST POINTS

### 7.1 Index TP 1

Can be used as a sync point on 801-901 drives using hard sector media.

### 7.2 TP-2 Write Oscillator

Put the exerciser in write and adjust R-15 for a 2  $\mu$ sec pulse repetition rate as measured at TP-2. (R-15 is located between Chip 2E and 3E.)

### 7.3 TP-3

With the drive stepping and the step rate pot set in the full counterclockwise position, adjust R-11 until the step pulse repetition rate is 8 m sec. R-11 is located between Chip 1-D and 1E.

### 7.4 TP-4

Not used.

### 7.5 TP-5 and TP-6

D.C. Ground.

## 8.0 D.C. Power Requirements

PCB +5.00  $\pm$  0.25V D.C. @ 1.0 amp max 50 mv P-P ripple.

This does not include the power requirements for the drives. Refer to the appropriate OEM manual for these requirements.

## 9.0 PHYSICAL CHARACTERISTICS

### 9.1 Dimensions

8" x 8" x 1"

## 10.0 ADJUSTMENT PROCEDURES

### 10.1 Set Up

- A. Connect the drive, install proper cables, power and terminations.
- B. Position all switches down (towards the on side. This is the inactive position).
- C. Insert alignment diskette and select the drive as per section 3.1.

### 10.2 Head Radial Alignment

- A. Refer to the appropriate maintenance manual sections for adjustment procedures and scope set up.
- B. Install the alignment diskette.
- C. Depress RECAL and AUTO the drive should recal and the Tk 00 indicator should come on.
- D. Verify on the scope that you are reading Tk zero which has data written on it.
- E. Return RECAL switch down. Set 38 in S4 and S5. Depress AUTO. The drive should step to Tk 38 and stop. Set 16 in the switches for the SA400 drive.
- F. Perform radial adjustments per the appropriate drive M.M section on head alignment.
- G. You can step on and off track to verify the radial adjustments by changing the address in either S4 or S5 to a different setting and then back to the alignment track address.

### 10.3 Track Zero Flag Adjustment SA800 and SA900 Series or Track Zero Switch for the SA400

- A. Refer to the appropriate M.M. sections for adjustment procedures.
- B. Set S4 and S5 to zero with AUTO on, drive should step to Tk zero, verify data is on TP1 and TP2 with the alignment diskette installed. TP26 should be high on 800 and 900 drives. TP8 should be low on SA400's.
- C. Set an address of 1 in S4 and S5 depress AUTO. TP 26 should be high on 800 and 900 drives. TP 8 should remain low on the SA400.

D. Set 2 in. in S4 and S5 TP-26 should now be low on 800 and 900 drives. TP-8 should be high on SA400's.

E. Make adjustments as required.

### 10.4 Track Zero Stop (Not Applicable on the SA400)

- A. Loosen track 00 stop collar.
- B. Select the drive section 3.1.
- C. Activate the RECAL to 00 and AUTO switches. Drive should step to Tk 00.
- D. Put an address of 1 in S4 and S5.
- E. Activate force out, then restore RECAL to 00 switch. Drive will now be on track -1. Position the stop collar axially along the lead screw so there is  $.020" \pm 0.010"$  between the collar and the back of the carriage. Rotate the collar CW, as viewed from the end of the drive, until the extension on the collar contacts the carriage stop surface. Now tighten the screw.
- F. Restore the Force Out Switch and activate the 00 switch. Drive should step to Tk 00. Verify that there is Data on Tk 00 with SA120 alignment diskette installed.

### 10.5 Index and Sector Adjustments

- A. Deactivate all switches.
- B. Install the alignment diskette.
- C. Select drive refer to section 3.1.
- D. Activate the RECAL to 00 and AUTO switches, the drive will seek to Tk zero. Restore the RECAL 00 switch.
- E. Put address of 1 in S4 and S5.
- F. Activate AUTO. Drive will seek to Tk 1.
- G. Make adjustments per the appropriate M.M. sections.
- H. Set address of 76 in S4 and S5 drive will seek to Tk 76. (Not applicable on the SA400 drive.)
- I. Check Index Sector adjustment at Tk 76.

### 10.6 Head Load Actuator Timing

- A. Install the alignment diskette.
- B. Select the drive, section 3.1.

- C. Activate RECAL zero and AUTO switches to put the head on track zero.
- D. Check the timings per the appropriate maintenance manual sections. The head is unloaded and loaded by selecting the drive, refer to section 3.1.

**10.7 Head Load Bail Down Stop**

Load the head by selecting the drive. Make adjustment using the appropriate maintenance manual sections.

**10.8 Amplitude Check at TP-1 and TP-2**

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

- A. Install good media and select the drive. Section 3.1. NOTE: Do not use the alignment diskette.
- b. RECAL to zero section 3.2.2.

- C. For 800 and 900 series set an address of 76 in S4 and S5 depress AUTO the drive will now step to Tk 76. For the SA400 set an address of 34 in S4 and S5.

- D. Sync oscilloscope on TP-12\* (-Index) connect one probe to TP-2 and the other to TP-1 on the drive PCB. Ground the probes to the PCB. Set inputs to 50 MV per division and invert one input.

\*For the SA400 sync the scope on TP 7 (+ index).

- E. Depress S3, position 3 towards the 2F position SA800 and 900 series.

IMPORTANT, for the SA400 depress towards 1F. Depress S3, position 4 towards Wrt for approximately 4 revolutions of the media, then switch it back to the read position. There should now be all one's written on the entire track.

- F. Check for the following minimum amplitudes on read back.

1.	SA800-801	110 MV min.
2.	SA900-901-902	275 MV min.
3.	SA400	80 MV min.

**11.0 PARTS LISTING**

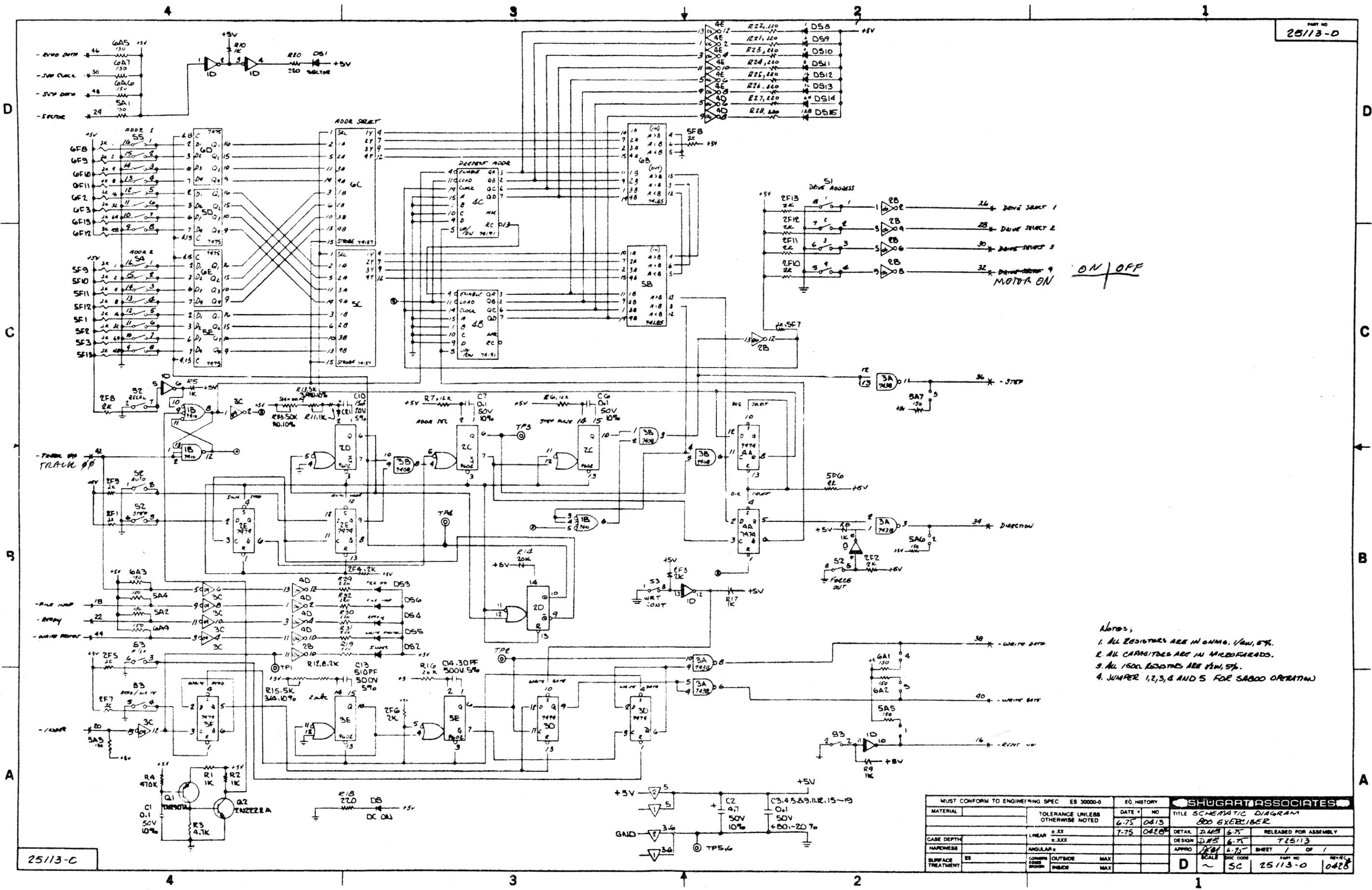
PART NUMBER	DESCRIPTION	QTY PER ASSEMBLY
10187	SCREW B.H. 6-32 x .25	16
12305	STANDOFF	8
12508	WASHER, NYLON #6	4
25114	PCB ASM	1
50607	SIGNAL CABLE 809 TO 900	1
50617	D.C. CABLE 809 TO POWER SUPPLY	1
50618	SIGNAL CABLE 809 TO 800	1
50629	COVER, BOTTOM	1
50630	COVER, TOP	1
54156	SIGNAL CABLE SA400 TO SA809	1
70322	D.C. CABLE 809 TO 800	1

**12.0 REFERENCE MATERIALS**

SHUGART ASSOCIATES' SA400 SERVICE MANUAL	P/N 54096
SHUGART ASSOCIATES' SA800/801 MAINTENANCE MANUAL	P/N 50575
SHUGART ASSOCIATES' SA900/901/902 MAINTENANCE MANUAL	P/N 50614

**13.0 SCHEMATIC DIAGRAM**

See following page 7.



- Notes:
1. ALL RESISTORS ARE IN OHMS, 1/4W, 5%.
  2. ALL CAPACITORS ARE IN MICROFARADS.
  3. ALL 150V RESISTORS ARE 1/4W, 5%.
  4. JUMPER 1,2,3,4 AND 5 FOR SABOO OPERATION

25113-C

MUST CONFORM TO ENGINEERING SPEC ES 30000-0		EQ. HISTORY		SHUGART ASSOCIATES	
MATERIAL	TOLERANCE UNLESS OTHERWISE NOTED	DATE	NO	TITLE SCHEMATIC DIAGRAM	
		6-75	0813	BOO EXERCISER	
CASE DEPTH	±.XX	7-75	0428	DESIGN	RELEASED FOR ASSEMBLY
HARDNESS	±.XXX			APPRO	72513
SURFACE TREATMENT	CONFORM TO SPEC	SCALE		SHEET	1 OF 1
	OUTSIDE MAX	DOC CODE		PART NO	NEVER
	INSIDE MAX			25113-0	0428



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