

DSDD SHUGART SA850/851

JUMPER SETTINGS

- A. Use the following assembly numbers found on the PC board of the drive to determine the necessary jumpers for 2200 or VS. This encompasses the latest drives.

\*\*\*\*\*For 2200 LVP/SVP\*\*\*\*\* ! \*\*\*\*\*For VS-AWS\*\*\*\*\*  
 Assembly No. 25189-2 ! 25201-2 ! 25216-0 ! 25189-2 ! 25201-2 ! 25216-0  
 25190-2 ! 25202-3 ! ! 25190-2 ! 25202-3 !

Jumpers (X=Installed)							
850	X	X	X	!	X	X	X
IW	X	X	X	!	X	X	X
2S	X	X	X	!	X	X	X
DC	X	X	X	!	X	X	X
C TO HI	X	X	X	!	X	X	X
S2	X	X	X	!	X	X	X
IT	X	X	X	!	X	X	X
FM			X	!			X
MFM			X	!			X
RS	X	X	X	!	X	X	X
M	X	X	X	!	X	X	X
AF	*	X		!	*	X	
In position				!			
4F cut				!			
shunt at				!			
positions	2/4	2/4	2/4	!	2/4	2/4	2/4

\*Install jumper from "F" to pin 11 on IC located at position 8D. IC at location 8D also needs pin 3 and 11 jumpered together.

- B. Unique Jumpers:  
 Jumper TS/FS

*****For 2200 LVP/SVP*****		*****For VS-AWS*****	
FS	ON!	TS	ON
DS2 (R drive of any 2 disk LVP/SVP)	!	DS2	ON
DS1 (IF only drive or for F drive)	!		
Remove terminator block at location 5E.	!	Insert terminator block at location 5E.	
Remove wire from jumper 851 to pin 1 of IC-3F	!	Solder jumper wire from jumper 851 to pin 1 of the IC-3F	
Insure etch in place between pin 8 of IC-3E and pin 1 of IC-3F.	!	The etch on the non-componet side of the board between pin 8 of IC-3E and pin 1 of IC-3F must be cut.	

- C. Drive Configuration:

SA 850/851 configured for LVP/SVP, the WLN is 278-4015 (60 Hz).  
 SA 850/851 configured for LVP/SVP, the WLN is 279-4015-1 (50 Hz).  
 SA 850/851 configured for VS-AWS, the WLN is 278-4021 (60 Hz).  
 SA 850/851 configured for VS-AWS, the WLN is 278-4021-1 (50 Hz).

- D. 278-4015 and 278-4021 can be interchanged providing the proper jumpers on table A & B get implemented.

VS 25/45

## Jumper settings for floppy

JUMPERS	PCB E-REV'S		
	25189-2/ 25190-2	25201-3/ 25202-3	25216-0
Y	X	X	X
850	X	X	X
IW	X	X	X
2S	X	X	X
DC	X	X	X
C to HI	X	X	X
S2	X	X	X
IT	X	X	X
FM			X
MFM			X
RS	X	X	X
M	X	X	X
AF	*	X	
In position 4F cut shunt at position	1/2/4	1/2/4	1/2/4
FS	X	X	X
DSI	X	X	X
Terminator at location 5E	In	In	In
Jumper from 851 to PIN 1 of IC 3F	Cut	Cut.	Cut

Must have short between pin 8 of IC 3E and Pin 1 of IC 3F.

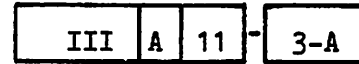
X = Insert jumpers

\* = Install jumper from F to pin 11 on IC located at position 8D. IC at location 8D also needs pins 3 and 11 jumpered together.

The 278-4015 (2200 configured), the 278-4021 (VS-AWS configured), and the 278-4028 (VS 25/45 configured) DSDD floppy drives are interchangeable by correcting the jumper settings. See newsletter 18 for 2200/VS AWS jumper settings. The last item in Table B of that newsletter should read pin 8 of IC 3E and not pin 2.

# PRODUCT SERVICE NOTICE

DATE : 06/10/81



CLASSIFICATION PERIPHERALS

CATEGORY DISK DRIVES

PRODUCT/APPL. SHUGART SA850/851 DSDD DISKETTE

SEQUENCE # 3-A

TITLE:

2200LVP/SVP AND VS ARCHIVING WORKSTATION APPLICATIONS:  
CIRCUIT BOARD PART NUMBERS AND JUMPER CONFIGURATIONS

NOTE

This PSN updates information originally presented in PSN III.A.11-3

The table below provides Shugart part numbers of the different circuit boards for the SA850/851 DSDD Diskette Drive. Except for the Wang jumper configurations detailed in this PSN, the various boards are compatible and interchangeable.

NOTE

The Shugart assembly number is stamped in black on the component side of the board; the fabrication (artwork) number is etched on the non-component side of the board.

<u>BOARD NOMENCLATURE</u>	<u>ASSEMBLY NO.</u>	<u>FABRICATION NO.</u>
MLC 10	25189-2	25188-0
MLC 10	25190-2	25188-0
MLC 11	25201-2	25200-1
MLC 11	25202-2	25200-1
MLC 12	25202-3	N/A

The following is a list of circuit board jumpers that must be connected to allow an SA850/851 DSDD Diskette Drive to operate with a Wang system.



LABORATORIES, INC.

ONE INDUSTRIAL AVENUE, LOWELL, MASSACHUSETTS 01851, TEL. (617) 459-5000, TWX 710 343-6769, TELEX 94-7421

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729-0917-A

Presently there are two different jumper configurations - one for LVP/SVP systems and one for VS-AWS's. The jumpers that are the same for both versions of the board are given first and the system dependent jumpers follow. Also refer to Figures 1, 2, 3, and 4 for jumper locations and positions. The part number for the jumper plugs is 350-4506.

The two Wang versions of the board have different part numbers--726-1913 for LVP/SVP use and 726-1913-M for VS-AWS use.

2200LVP/SVP & VS-AWS JUMPERS

850  
IW (not connected to ground bus)  
2S  
DC  
C to HI  
S2  
IT  
RM to RS  
M  
AF (Only on boards MLC 11 and higher--located at board coordinates 7D)

2200LVP/SVP JUMPERS

FS  
DS1 or DS2 (See following)

VS-AWS JUMPERS

TS (FS / Eco 22752)  
DS2

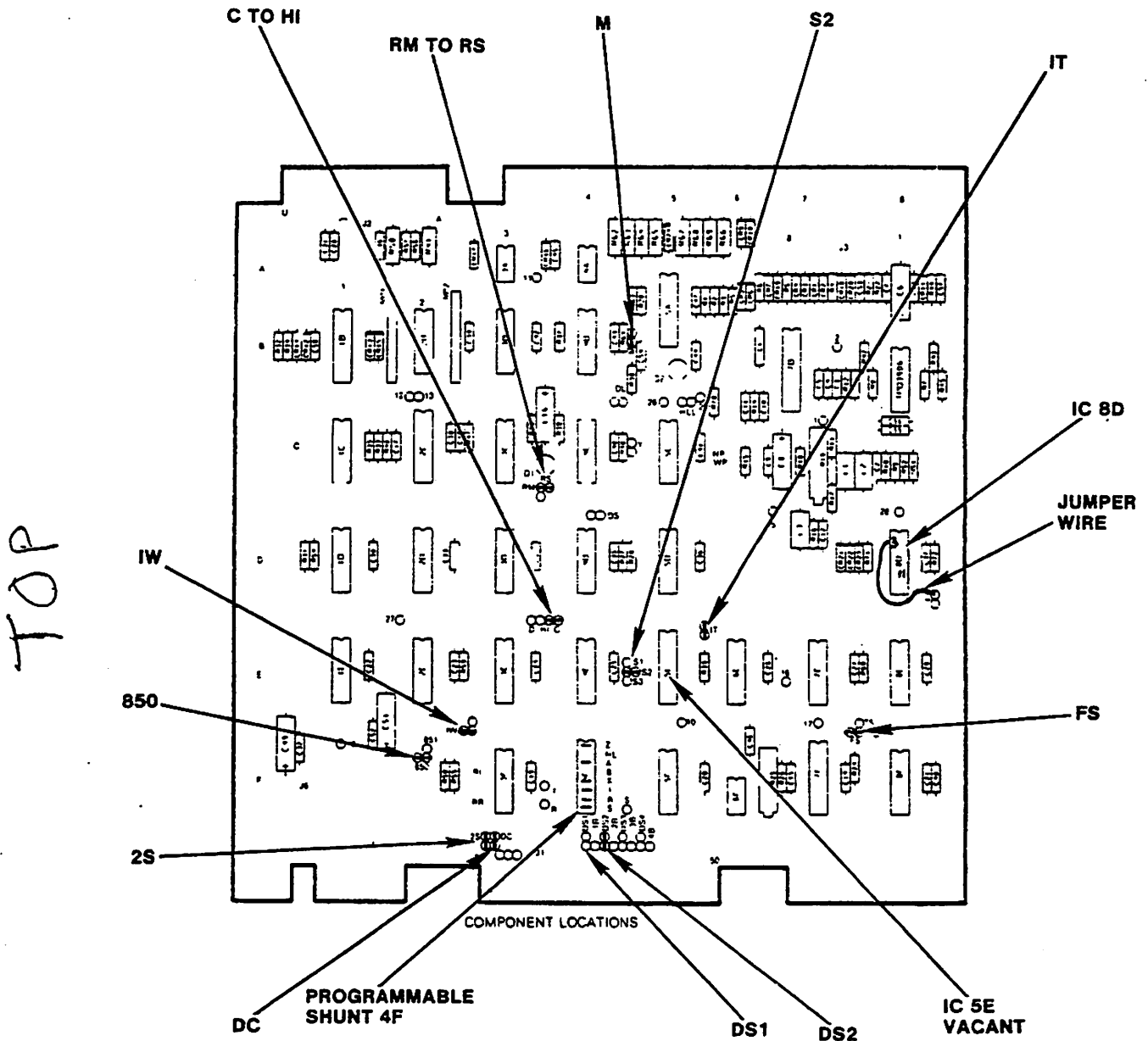
If an LVP/SVP system includes both a diskette drive and a Winchester drive, DS2 must be jumpered. If the system has only a diskette drive, DS1 must be jumpered. If the system is an SVP containing two diskette drives, the "Fixed" (left) drive must have DS1 jumpered, and the "Removable" (right) drive must have DS2 jumpered.

The terminator block at location 5E must be installed for VS-AWS operation and removed for LVP/SVP operation.

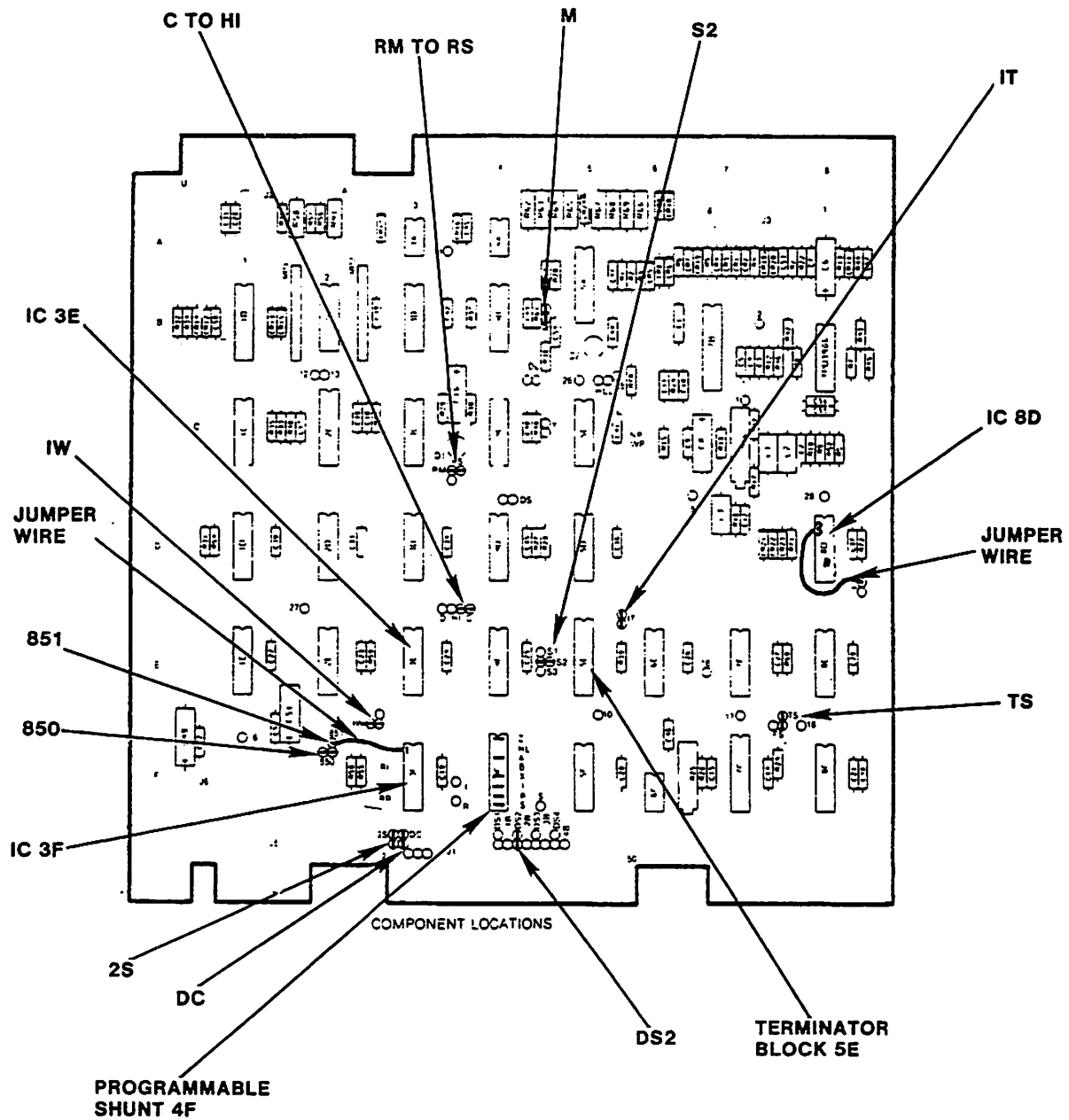
For VS-AWS operation only, the etch on the non-component side of the board between pin 8 of IC 3E and pin 1 of IC 3F must be cut and a jumper wire connected from pin 851 to pin 1 of 3F (see Figures 2 and 4).

For both LVP/SVP and VS-AWS operation, the programmable shunt at location 4F must have HL and B open; all other jumpers in the shunt must be closed.

Board MLC 10 must have pins 3 and 11 of IC 8D jumpered together. (Pin 11 is connected to one end of jumper location F. See Figures 1 and 2.) This modification is required for both LVP/SVP and VS-AWS operation. On boards MLC 11 and higher, Shugart has provided a jumper (AF) and a NOR gate (5D) to eliminate the need for this jumper wire.



**FIGURE 1 2200LVP/SVP JUMPER CONFIGURATION (MLC10)**



**FIGURE 2 VS-AWS JUMPER CONFIGURATION (MLC10)**

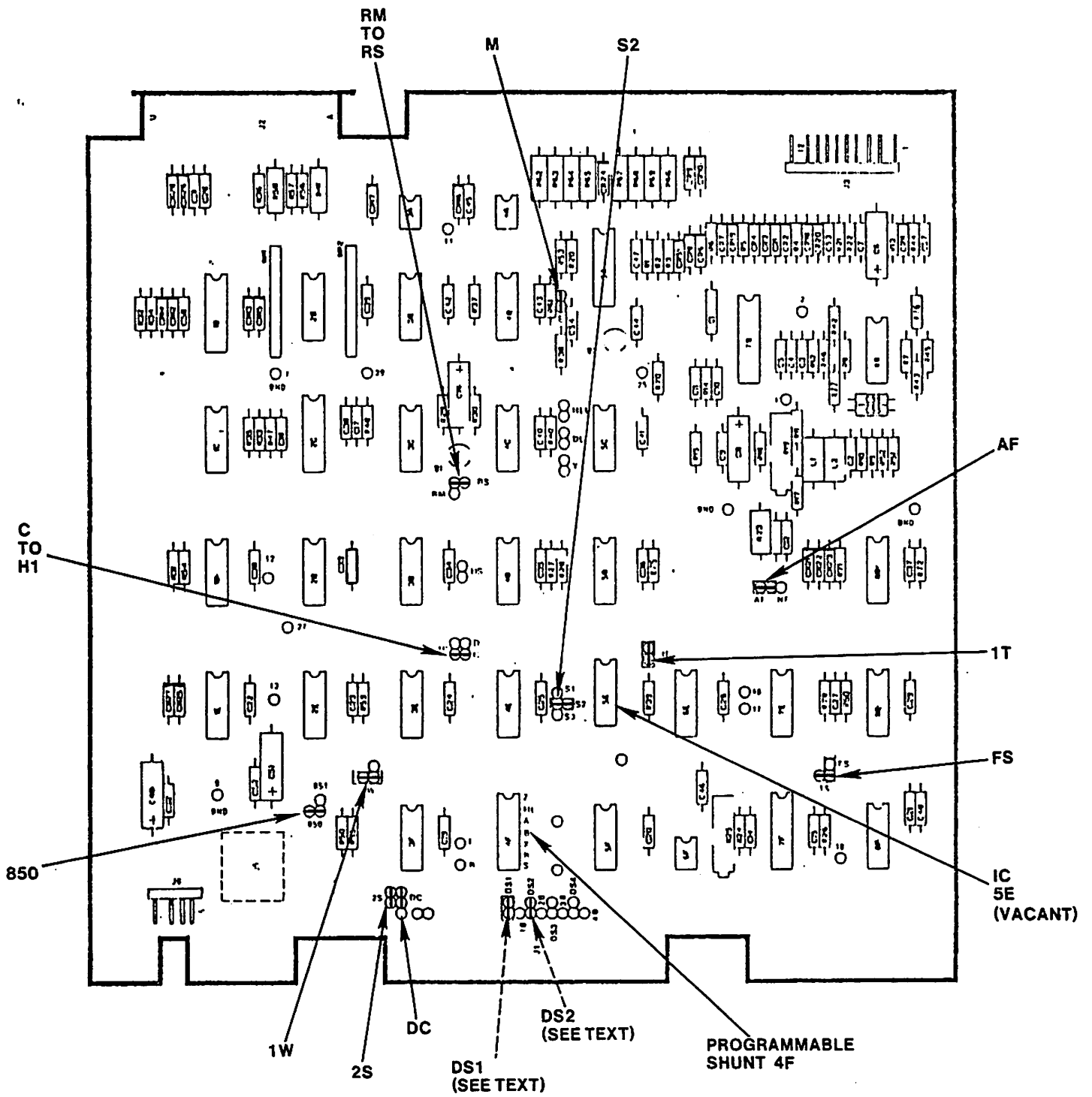


FIGURE 3 2200LVP/SVP JUMPER CONFIGURATION (MLC11)

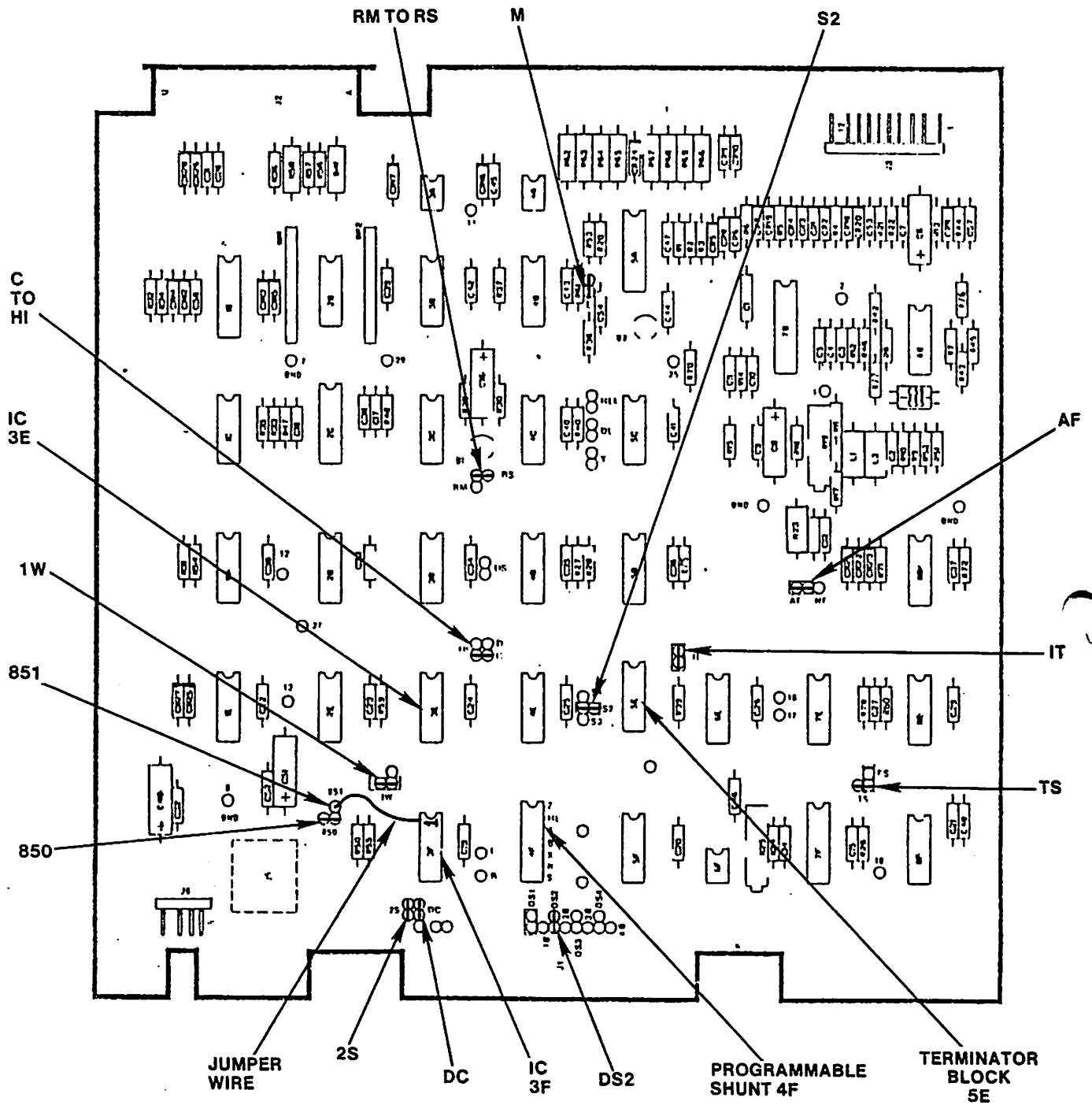


FIGURE 4 VS-AWS JUMPER CONFIGURATION (MLC11)



CUSTOMER ENGINEERING  
 TECHNICAL ASSISTANCE CENTER  
 NEWSLETTER

#40327

3101

PERIPHERALS-DISK DRIVES-SHUGART SA400/800/901/1000/4000

TOPIC: CORRECTION TO TAC NEWSLETTER 30208, CATEGORY III.A.II

This new jumper table covers the LVP/SVP/VS-25,45/VS-AWS Systems. Delete article in the TAC Newsletter 30208.

Note: Observe correction on the FS/TS jumper configuration.

A. Jumper table for the SA 850/851 in the LVP/SVP.

JUMPERS	PCB E-REV'S		
	25189-2/ 25190-2	25201-3/ 25202-3	25216-0
Y			
850	X	X	X
IW	X	X	X
2S	X	X	X
DC	X	X	X
C to HI	X	X	X
S2	X	X	X
IT	X	X	X
FM			X
MFM			X
RS	X	X	X
M	X	X	X
AF	*	X	
In position 4F: cut shunt at position	2/4	2/4	2/4
FS	X	X	X
DS1 (or DS2 if unit has two drives	X	X	X
Terminator at location SE	Out	Out	Out

X = Insert jumpers

\* = Install jumper from F to pin 11 on IC located at position 8D. IC at location 8D also needs pins 3 and 11 jumpered together.

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PERIPHERALS-DISK DRIVES-SHUGART SA400/800/901/1000/4000

TOPIC: CORRECTION TO TAC NEWSLETTER 30208, CATEGORY III.A.II  
(continued)

B. Jumper table for the SA 850/851 in the VS-25/45

JUMPERS	PCB E-REV'S		
	25189-2/	25201-3/	
	25190-2	25202-3	25216-0
Y	X	X	X
850	X	X	X
IW	X	X	X
2S	X	X	X
DC	X	X	X
C to HI	X	X	X
S2	X	X	X
IT	X	X	X
FM			X
MFM			X
RS	X	X	X
M	X	X	X
AF	*	X	
In position 4F: cut shunt at position	1/2/4	1/2/4	1/2/4
FS	X	X	X
DSI	X	X	X
Terminator at location 5E	In	In	In

X = Insert jumpers

\* = Install jumper from F to pin 11 on IC located at position 8D. IC at location 8D also needs pins 3 and 11 jumpered together.

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PERIPHERALS-DISK DRIVES-SHUGART SA400/800/901/1000/4000

TOPIC: CORRECTION TO TAC NEWSLETTER 30208, CATEGORY III.A.II  
(continued)

C. Jumper table for the SA 850/851 in the VS-AWS

JUMPERS	PCB E-REV'S		
	25189-2/ 25190-2	25201-3/ 25202-3	25216-0
Y			
850	X	X	X
IW	X	X	X
2S	X	X	X
DC	X	X	X
C to HI	X	X	X
S2	X	X	X
IT	X	X	X
FM			X
MFM			X
RS	X	X	X
M	X	X	X
AF	*	X	
In position 4F cut shunt at position	2/4	2/4	2/4
TS	X	X	X
DS2	X	X	X
Terminator at location 5E	In	In	In
Solder jumper wire from 851 to pin 1 of the IC 3F	X	X	X
The etch on the non- component side of the board between pin 8 of the IC 3E and pin 1 of IC 3F must be cut	Cut	Cut	Cut

X = Insert jumpers

\* = Install jumper from F to pin 11 on IC located at position 8D. IC at location 8D also needs pins 3 and 11 jumpered together.

CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
NEWSLETTER

#40327

3101

PERIPHERALS-DISK DRIVES-SHUGART SA400/800/901/1000/4000

TOPIC: CORRECTION TO TAC NEWSLETTER 30208, CATEGORY III.A.II  
(continued)

D. Drive Configuration:

SA 850/851 configured for LVP/SVP, WLN is 278-4015 (60 Hz)  
SA 850/851 configured for LVP/SVP, WLN is 278-4015-1 (50 Hz)  
SA 850/851 configured for VS-AWS, WLN is 278-4021 (60 Hz)  
SA 850/851 configured for VS-AWS, WLN is 278-4021-1 (50 Hz)  
SA 850/851 configured for VS-25/45, WLN is 278-4028 (60 Hz)  
SA 850/851 configured for VS-25/45, WLN is 278-4028-1 (50 Hz)

The drives 278-4015, 278-4021, and 278-4028 can be interchanged providing the proper jumpers on Tables A, B, and C are implemented.

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NEWSLETTER

#30614

3101

PERIPHERALS-DISK DRIVES-SHUGART SA400/800/901/1000/4000

TOPIC: POSSIBLE WRITE FAULT CAUSED BY MULTIPLE HEADS SELECTED

Description of Change: The head select circuitry is susceptible to +24 volts noise. Capacitor C3 has been changed to 47uf, 35V in order to reduce the +24V noise level. The previous value of C3 was 4.7uf, 35V. Affects PCB 26073-5 and lower revision.

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NEWSLETTER

#30614

3101

PERIPHERALS-DISK DRIVES-SHUGART SA400/800/901/1000/4000

TOPIC: PROPER WAY TO POSITION THE HEADS BEFORE REMOVING DRIVE FROM SYSTEM

Physical Drive Interface:

- J1 - Provides control signal for the drive.
- J2 - Provides for the radial connection of Read and Write signals.
- J4 - Provides the AC power needed for the drive motor.
- J5 - Provides DC power for the electronics and the stepper motor.

If the drive needs to be replaced, turn the AC power off from the host system. On the drive disconnect J1, J2, and J5 without disconnecting the AC power (J4) from the Winchester Drive. Turn on the AC power from the host system and manually move the heads into the innermost tracks. This procedure reduces the likelihood of head bounce during shipment. Disconnect AC power and finish installing the spindle lock.

## LVE/SVE SHUGART SA 850/851 DSDD DISK DRIVE

## 1. Replacement of DSDD Shugart

If you are experiencing read errors, I93 or I96, do not replace the drive without attempting a realignment of the DPU (8694 board) using Product Service Notice IVA3-5 and diskette 732-0009. If a particular customer has had more than 2 DSDD drive replace notify your Area Director so that he may notify product support.

## 2. Jumper Configurations

It has been found that drives have been sent in for repair with the problem turning out to be improper jumper configuration.

There are three different board levels that are present at this time in the DSDD diskette drive. The assembly number is stamped on the PCB side of the drive near the serial number. The 3 different artworks are labeled either:

MLC 10  
MLC 11  
MLC 12

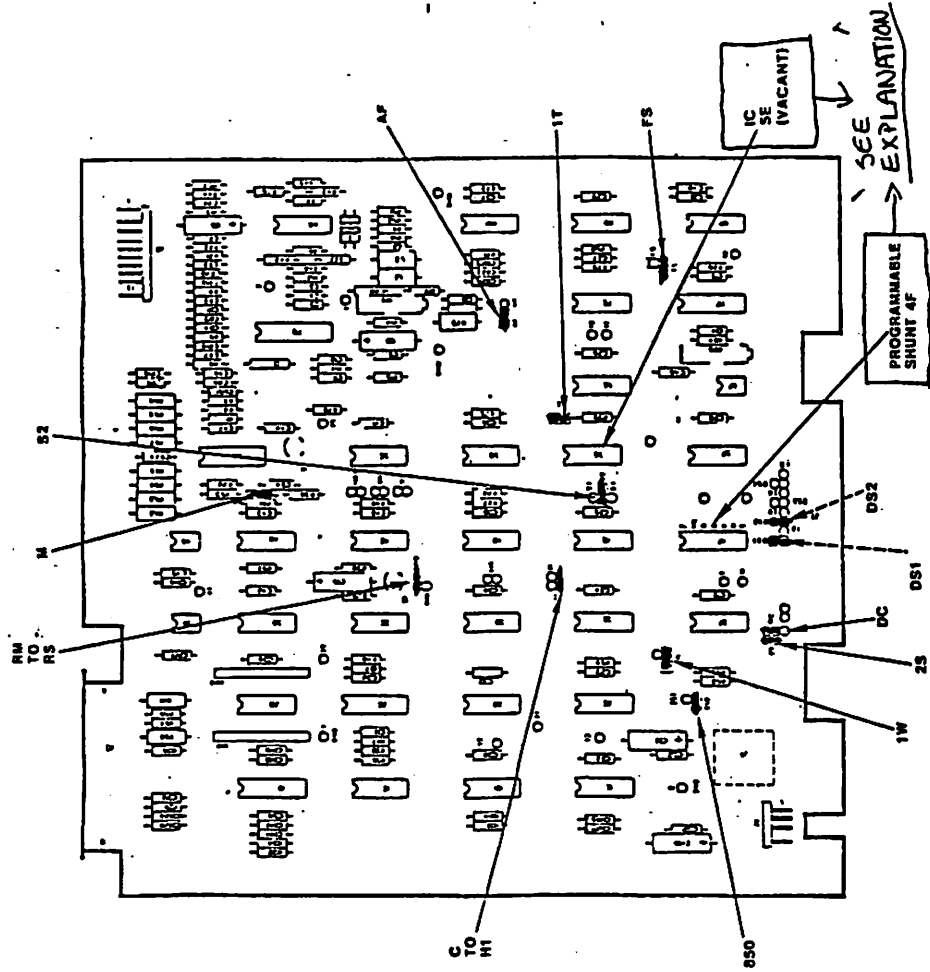
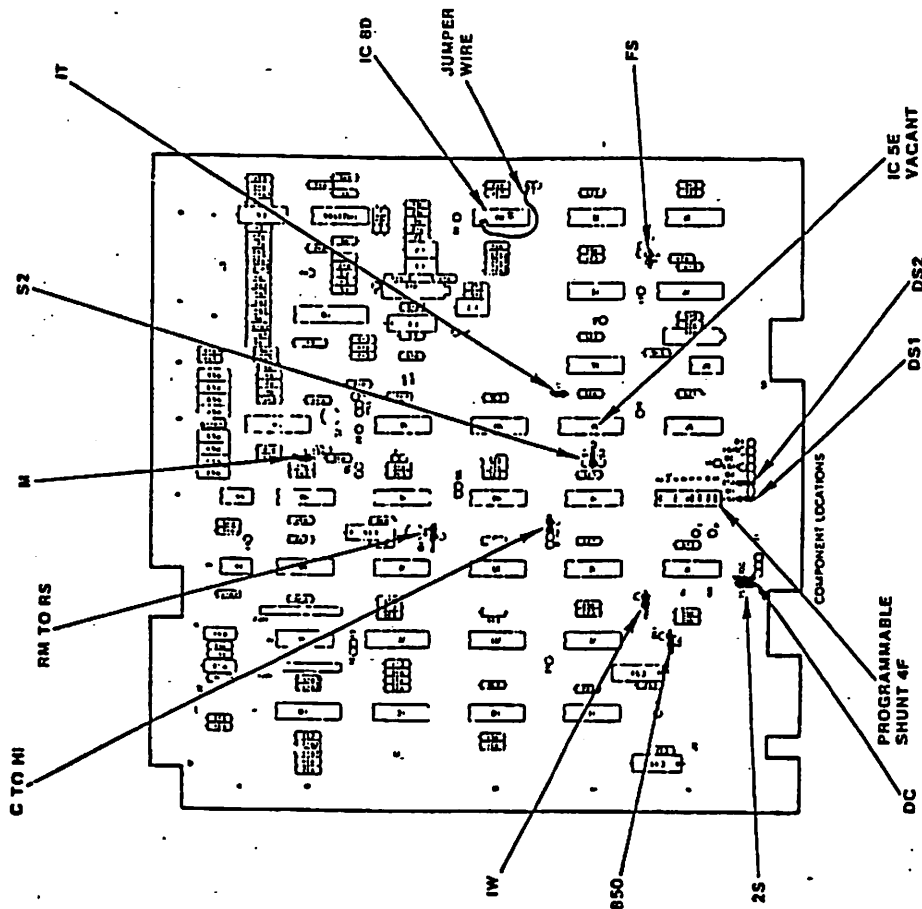
The following is a list of jumpers for each type of circuit board.  
(See accompanying picture)

## 2200LVE/SVE Jumpers

850  
IW  
2S  
DC  
C to HI  
S2  
IT  
RM to RS  
M  
AF (only on boards MLC 11 or MLC 12)  
FS  
DS1 or DS2\*\*\*\*\*

The terminator block at coordinates 5E must be removed. The programmable shunt at coordinates 4F must have HL and B open. Board MLC 10 must have pins 3 and 11 to IC 8D jumpered together.

\*\*\*\*\*If system has a Winchester Drive, then DS2 'IN', DS1 'OUT'  
\*\*\*\*\*If system has no winchester drive and 2 DSDD drives, then Drive on right (removable) has DS2 'IN DS1 'OUT'  
Drive on left (fixed) has DS2 'OUT', DS1 'IN'  
\*\*\*\*\*If system has only one drive and it is a DSDD, then DS2 'OUT', DS1 'IN'



DS1 - 'IN' IF NO WINCHESTER PRESENT  
AND IS CONSIDERED FIXED DRIVE

DS2 - 'IN' IF REMOVABLE DRIVE OR  
IF WINCHESTER IS PRESENT

MLC 11,12

MLC 10

PERIPHERALS-DISK DRIVES-SHUGART SA-800 DUAL DENSITY.

TOPIC: SHUGART DSDD 851 FLOPPY

There is a new PCB #25216-0 for the DSDD 851 and a new Jumper Configuration.

A Floppy with MCL #14 has the following jumpers installed:

278-4015

M RS MFM FM IT S2 HI-C IWI

850 2S DS2 FS

Shunt cut HL, B

278-4021

M RS MFM FM IT S2 HI-C IWI

850 DS2 2S TS

Shunt cut HL, B





LABORATORIES, INC.

KC  
ATS  
&  
DTS  
FYI  
C/K

M-E-M-O-R-A-N-D-U-M

TO: FSC MANAGERS  
FROM: JANIS WHITE  
SUBJ: DAMPER ASSEMBLIES  
DATE: AUGUST 12, 1981

The following Shugart SA1000 Fixed Disk Drives

- (1) 278-4013
- (2) 278-4013-1
- (3) 278-4014
- (4) 278-4014-1

may have to be replaced on a "Next Call" basis in a limited number of 2200 LVP units and possibly a few 2200 SVP units. These systems may contain dampers having defective seals that could result in damper fluid leakage. The attached documents provide information and instructions to indentify and replace faulty dampers.

NOTE: There will be SIXTY 726-1927 damper assemblies distributed with corresponding documentation to both the Western and Southern FSC's to be redistributed to branch level offices. The HO FSC will maintain a balance of a few hundred damper assemblies to handle the Eastern Area, the Canadian Area, and any additional Domestic requirements. If additional units are required please contact Kevin Senders at 459-5000 x6646 in Lawrence.

Janis White  
JANIS WHITE

- cc John DuPont
- Richard Boynton ✓
- Rocky Girard
- Chester Kasprzak ✓
- Ken Lech
- Roger Pool
- Greg Richmond
- Kevin Roche
- Rick Sample ✓
- Kevin Senders
- Dick Sousa
- Walt Sullivan ✓
- Charlie Wise

# PRODUCT SERVICE NOTICE

DATE: 07/24/81

III A 12 - 2

CLASSIFICATION PERIPHERALS

CATEGORY DISK DRIVES

PRODUCT/APPL. SHUGART SA1000

SEQUENCE # 2

**COPY**

TITLE:

SHUGART SA1000 FIXED DISK DRIVE DAMPER REPLACEMENT

**RECEIVED**

JUL 24 1981

C. L. WISE  
Director, Logistics

**ADVANCE**

PURPOSE

Certain Shugart SA1000 Fixed Disk Drives used in Wang Systems may contain dampers having defective seals that result in damper fluid leakage. This PSN provides instructions to identify and replace those dampers.

URGENCY

Perform the following procedures on a "next service call" basis.

DAMPER IDENTIFICATION

At present, three types of dampers are installed in Shugart SA1000 Fixed Disk Drives used in Wang system installations. Each type is identified by a specific "CAUTION" label as follows:

TRANSPARENT LABEL: This identifies a new damper (with a new design seal) that does not have to be replaced.

YELLOW LABEL WITH COLORED DOT IN CENTER: This is a remanufactured damper with the new design seal, and does not have to be replaced.

YELLOW LABEL: This damper contains the old design seal. It must be removed and replaced with a new damper having a transparent label.



LABORATORIES, INC

ONE INDUSTRIAL AVENUE LOWELL MASSACHUSETTS 01851. TEL (617) 459 5000. TWX 710 343 6769. TELEX 94-7421

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9. Gently remove old damper assembly by lifting upwards.

NOTE

KEEP THE DAMPER ASSEMBLY UPRIGHT  
AT ALL TIMES TO PREVENT FLUID LOSS

10. Make sure old seal is also removed from stepper motor shaft along with old damper. Wipe stepper shaft clean of any remaining fluid.
11. Re-install filler screw (and rubber seal) into old damper. Carefully package and return old damper to:

WANG Laboratories Inc.  
RDB 3933  
437 S. Union Street  
Lawrence, MA 01843

NEW DAMPER INSTALLATION PROCEDURE

1. Remove filler screw (and rubber seal) from new damper.
2. Insert Allen wrench through cover screw hole and loosen screw just enough to slide new damper onto stepper motor shaft.
3. Place damper spacing tool (or 0.01-inch feeler gage) between damper and track 000 clamp (figure 3). Slide damper up against tool and tighten Allen screw.
4. Reinstall filler screw (and rubber seal).
5. Remove spacing tool and wipe damper clean.
6. Turn off ac power and re-install printed circuit board.

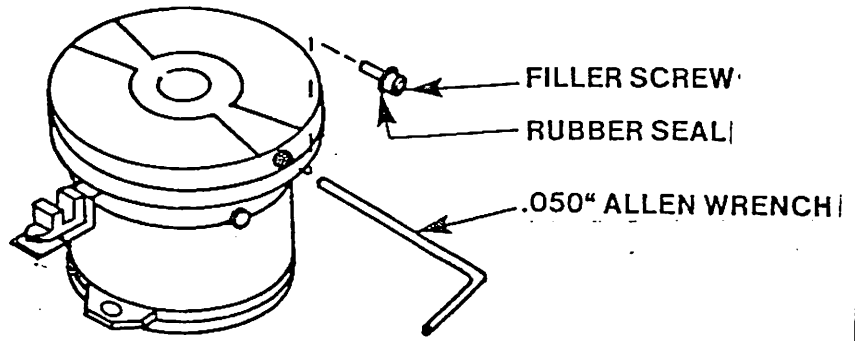


FIGURE 1. DAMPER REMOVAL

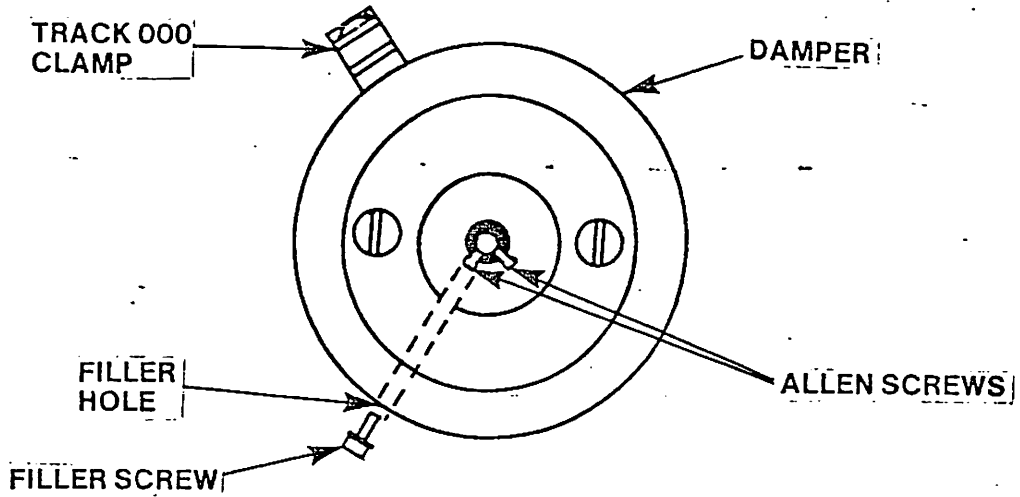


FIGURE 2 ALLEN SCREW LOCATIONS

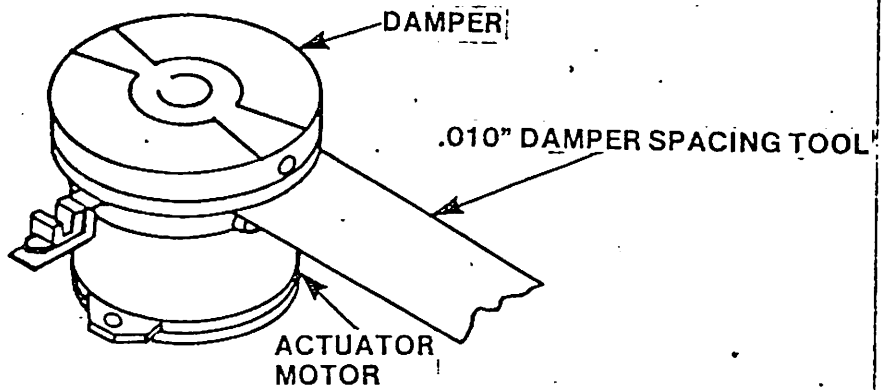


FIGURE 3. DAMPER INSTALLATION

## REMOVAL OF DISK DRIVE FOR DAMPER REPLACEMENT

Do not perform this procedure at the customer site; instead, bring the defective drive to the Wang Service Office (Branch, Area, or District). Make arrangements beforehand with the customer to schedule drive removal, installation of a "loaner" if necessary, or full swapout of the defective drive with a modified one.

### ITEMS REQUIRED

The following items are required in the performance of this procedure:

1. Damper Assembly (P/N 726-1927)
2. Allen wrench (0.05 in.)
3. Screwdriver (medium blade)
4. Wiping cloth
5. Damper Spacing Tool, 0.01-inch (P/N 726-9750) or feeler gage.

### DAMPER REMOVAL PROCEDURE

#### CAUTION

DO NOT TOUCH DAMPER OR ALLOW IT TO BE MOVED  
WITHOUT APPLICATION OF AC MOTOR POWER AND DC  
POWER TO DISK DRIVE, OTHERWISE READ/WRITE  
HEAD DAMAGE MAY RESULT.

1. Remove the three screws that secure the small printed circuit board to the disk-drive chassis. Do not disconnect the board; just move it out of the way enough to provide access to damper assembly.
2. Apply motor ac power and circuit dc power to disk drive.
3. Position damper to provide access to filler screw (figure 1). Since the motor is energized, some resistance will be felt approximately every 1/8-inch of motor rotation while turning damper.
4. Remove filler screw (and rubber seal) from damper using 0.05-inch Allen wrench.
5. Hold track 000 clamp steady and rotate damper until Allen screws are positioned as shown in figure 2.
6. Slowly turn damper until filler hole is lined up with one of the Allen screws (NOTE - old style dampers have two Allen screws).
7. Insert 0.05-inch Allen wrench through filler hole into Allen screw. Loosen Allen screw and remove wrench.
8. On old style dampers, slowly turn damper to line up second Allen screw, insert wrench, loosen screw, and remove wrench.

# SERVICE MEMO

Product: SA1000

Date: April 23, 1981

Memo #: 4

Subject: Damper Removal and Replacement

**CAUTION:** AC power must be applied before damper is removed.

## 1. DAMPER REMOVAL

- a. Remove the drive from its enclosure by releasing the three cover mounting nuts.
- b. Position the drive so that it is resting on its side with the damper facing upwards.
- c. Apply AC power to the drive before continuing with the procedure.
- d. Remove the filler screw from the side of the old damper.
- e. Insert a .050" allen wrench into the filler screw hole and loosen the allen screw inside. Rotate the damper 90° and loosen the second allen screw. Gently remove the damper assembly by applying a light upward pressure. Reference Figures 1 and 2.
- f. Reinstall the filler screw and return the damper assembly to Shugart, 1231 Midas Way, Sunnyvale, California 94068.

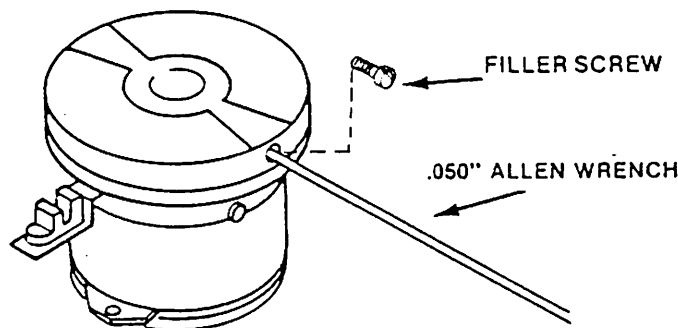


FIGURE 1.

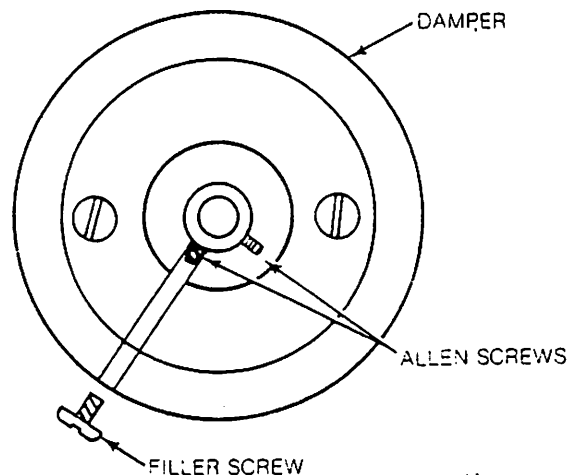


FIGURE 2.

## 2. ACTUATOR CLEANING

- a. Use a Kim Wipe and freon to remove any silicone from the actuator motor assembly.
- b. Any silicone found in the cavity of the Track 0 Flag clamp should be removed using a freon soaked cotton swab.
- c. Verify that the actuator motor assembly is completely free of silicone contamination before continuing with the procedure.

## 3. DAMPER PLUG REMOVAL

- a. Verify that one of the damper set screws is aligned with the filler hole (reference Figure 2).
- b. Using pliers, gently remove the damper plug. During removal, do not rotate the plug from side to side, as this will change the alignment of the set screws.
- c. Insure that the damper remains level, with the seal housing facing up, to prevent fluid loss (reference Figure 3).

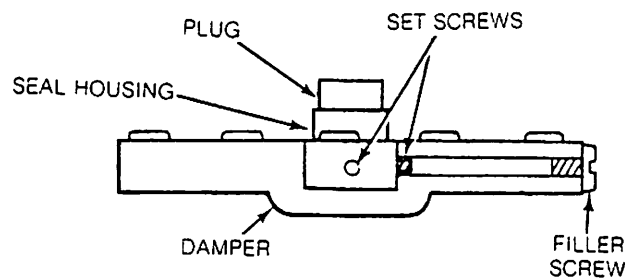


FIGURE 3.

## 4. NEW DAMPER INSTALLATION

- a. With AC power still applied, remove the filler screw from the side of the damper.
- b. Place the damper on the shaft and press down until the motor shaft protrudes from above the disc approximately .005" (reference Figure 4).

**CAUTION:** Under no circumstance must the actuator shaft be allowed to contact the damper housing. During this operation, keep the filler screw hole covered with a Kim Wipe, to prevent fluid loss.

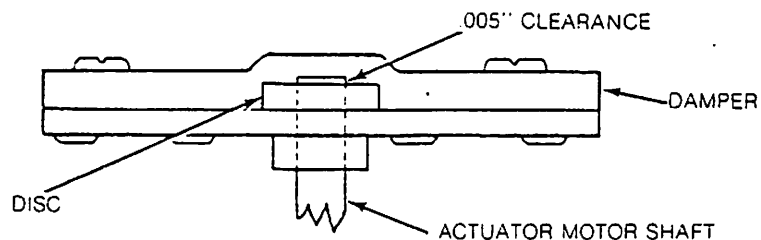


FIGURE 4.

- c. Using a .050" allen wrench, tighten the set screw aligned with the filler hole (reference Figure 2). Rotate the damper and tighten the remaining set screw.
- d. Replace the filler screw in the damper housing.
- e. Wipe off any excess silicone from the assembly.
- f. Remove AC power from the drive.
- g. Reinstall the drive enclosure.

# PRODUCT SERVICE NOTICE

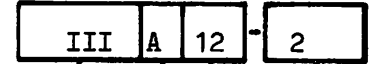
DATE : 07/24/81

CLASSIFICATION PERIPHERALS

CATEGORY DISK DRIVES

PRODUCT/APPL. SHUGART SA1000

SEQUENCE # 2



TITLE:

SHUGART SA1000 FIXED DISK DRIVE DAMPER REPLACEMENT

## PURPOSE

Certain Shugart SA1000 Fixed Disk Drives used in Wang Systems may contain dampers having defective seals that result in damper fluid leakage. This PSN provides instructions to identify and replace those dampers.

## URGENCY

Perform the following procedures on a "next service call" basis.

## DAMPER IDENTIFICATION

At present, three types of dampers are installed in Shugart SA1000 Fixed Disk Drives used in Wang system installations. Each type is identified by a specific "CAUTION" label as follows:

TRANSPARENT LABEL: This identifies a new damper (with a new design seal) that does not have to be replaced.

YELLOW LABEL WITH COLORED DOT IN CENTER: This is a remanufactured damper with the new design seal, and does not have to be replaced.

YELLOW LABEL: This damper contains the old design seal. It must be removed and replaced with a new damper having a transparent label.



LABORATORIES, INC.

ONE INDUSTRIAL AVENUE, LOWELL, MASSACHUSETTS 01851, TEL. (617) 459-5000, TWX 710 343-6769, TELEX 94-7421

PRINTED IN U.S.A.  
REORDER NO.  
**729-0992**



## REMOVAL OF DISK DRIVE FOR DAMPER REPLACEMENT

Do not perform this procedure at the customer site; instead, bring the defective drive to the Wang Service Office (Branch, Area, or District). Make arrangements beforehand with the customer to schedule drive removal, installation of a "loaner" if necessary, or full swapout of the defective drive with a modified one.

### ITEMS REQUIRED

The following items are required in the performance of this procedure:

1. Damper Assembly (P/N 726-1927)
2. Allen wrench (0.05 in.)
3. Screwdriver (medium blade)
4. Wiping cloth
5. Damper Spacing Tool, 0.01-inch (P/N 726-9750) or feeler gage.

### DAMPER REMOVAL PROCEDURE

#### CAUTION

DO NOT TOUCH DAMPER OR ALLOW IT TO BE MOVED  
WITHOUT APPLICATION OF AC MOTOR POWER AND DC  
POWER TO DISK DRIVE, OTHERWISE READ/WRITE  
HEAD DAMAGE MAY RESULT.

1. Remove the three screws that secure the small printed circuit board to the disk-drive chassis. Do not disconnect the board; just move it out of the way enough to provide access to damper assembly.
2. Apply motor ac power and circuit dc power to disk drive.
3. Position damper to provide access to filler screw (figure 1). Since the motor is energized, some resistance will be felt approximately every 1/8-inch of motor rotation while turning damper.
4. Remove filler screw (and rubber seal) from damper using 0.05-inch Allen wrench.
5. Hold track 000 clamp steady and rotate damper until Allen screws are positioned as shown in figure 2.
6. Slowly turn damper until filler hole is lined up with one of the Allen screws (NOTE - old style dampers have two Allen screws).
7. Insert 0.05-inch Allen wrench through filler hole into Allen screw. Loosen Allen screw and remove wrench.
8. On old style dampers, slowly turn damper to line up second Allen screw, insert wrench, loosen screw, and remove wrench.

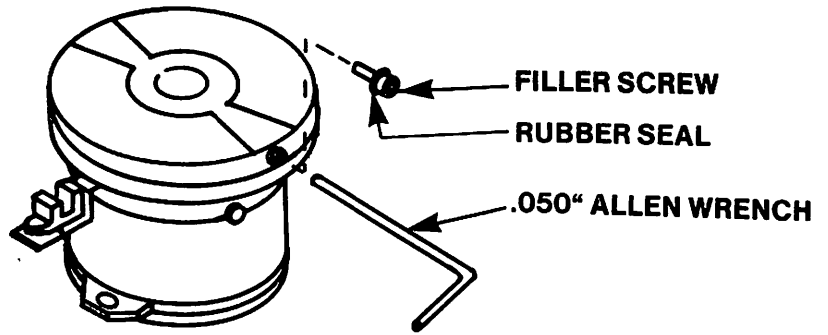


FIGURE 1. DAMPER REMOVAL

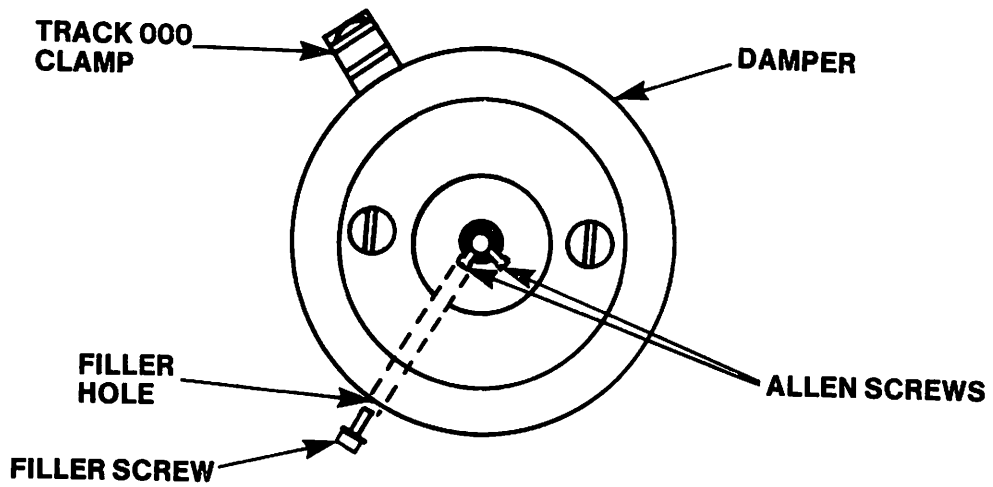


FIGURE 2 ALLEN SCREW LOCATIONS

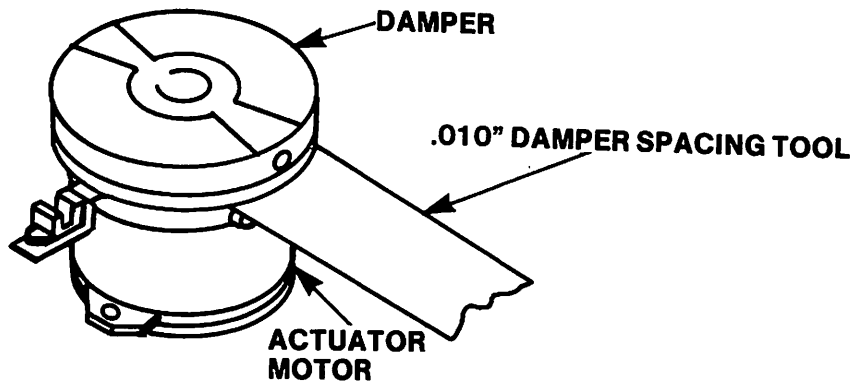


FIGURE 3. DAMPER INSTALLATION

9. Gently remove old damper assembly by lifting upwards.

NOTE

KEEP THE DAMPER ASSEMBLY UPRIGHT  
AT ALL TIMES TO PREVENT FLUID LOSS

10. Make sure old seal is also removed from stepper motor shaft along with old damper. Wipe stepper shaft clean of any remaining fluid.
11. Re-install filler screw (and rubber seal) into old damper. Carefully package and return old damper to:

WANG Laboratories Inc.  
RDB 3933  
437 S. Union Street  
Lawrence, MA 01843

NEW DAMPER INSTALLATION PROCEDURE

1. Remove filler screw (and rubber seal) from new damper.
2. Insert Allen wrench through cover screw hole and loosen screw just enough to slide new damper onto stepper motor shaft.
3. Place damper spacing tool (or 0.01-inch feeler gage) between damper and track 000 clamp (figure 3). Slide damper up against tool and tighten Allen screw.
4. Reinstall filler screw (and rubber seal).
5. Remove spacing tool and wipe damper clean.
6. Turn off ac power and re-install printed circuit board.

# PRODUCT SERVICE NOTICE

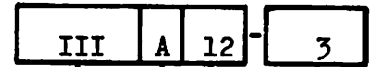
DATE : 1/14/82

CLASSIFICATION PERHIPERALS

CATEGORY DISK DRIVES

PRODUCT/APPL. SHUGART SA1000 WINCHESTER DRIVES

SEQUENCE # 3



TITLE:

SHUGART SA1000 DISK DRIVE OPTIONS JUMPERS

Some SA1000 "Winchester" disk drives are being received at the Lawrence stock room from Shugart Associates with the options jumpers installed incorrectly. These jumpers are on the 26051 Control PCB (WLI #726-1907). It is vital that these options jumpers be verified when a replacement drive is installed in the field. Remove or install the jumpers as described below. Refer to Figure 1 for jumper locations.

1. Fault - When removed, enables the Fault Detection logic. This jumper should be REMOVED.
2. Ready - When removed, enables the Ready signal at the interface. This jumper should be REMOVED.
3. Drive Selection - Selects the disk drive number 1 through 4. INSTALL this jumper for the correct drive number as shown in figure 2.
4. Interface Voltage Selection - Selects the correct interface voltage. INSTALL this jumper for the -5 Volt dc configuration for Wang systems as shown in figure 3.

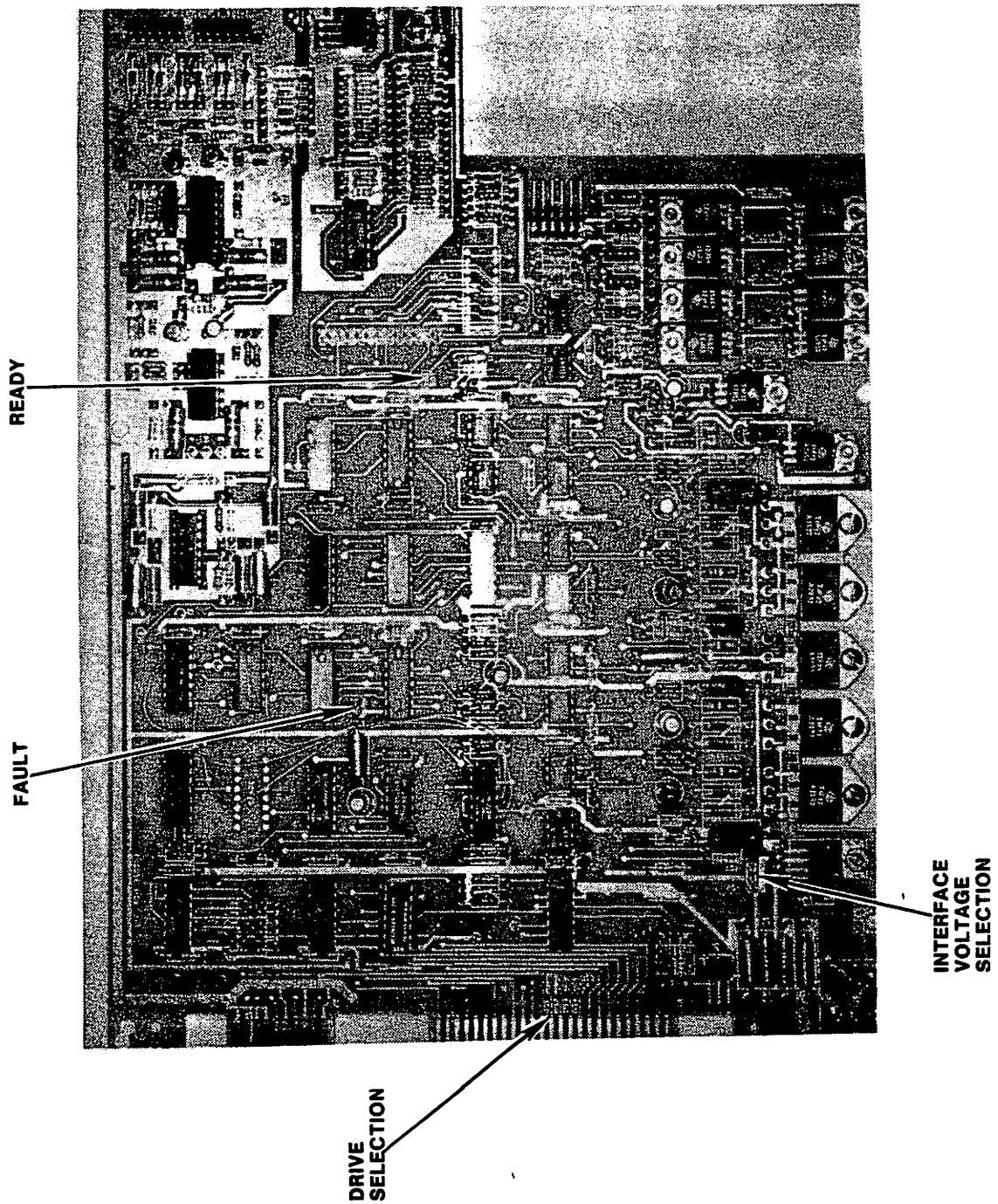


FIGURE 1  
26051 CONTROL BOARD

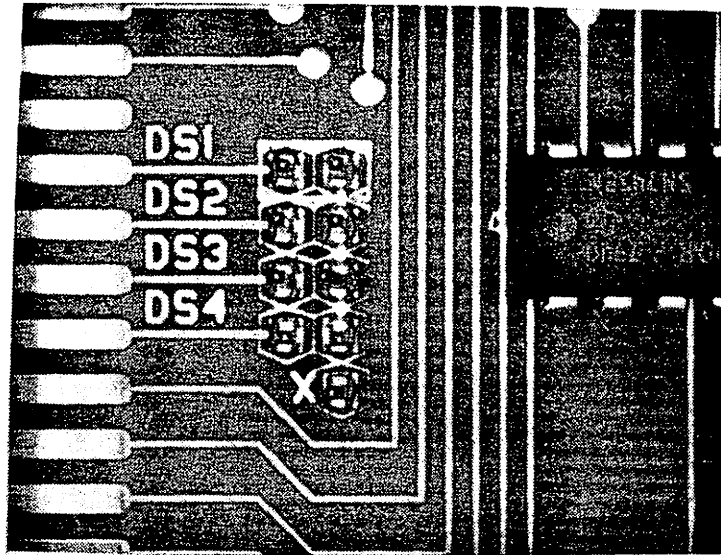


FIGURE 2  
DRIVE SELECTION (DS1-4)

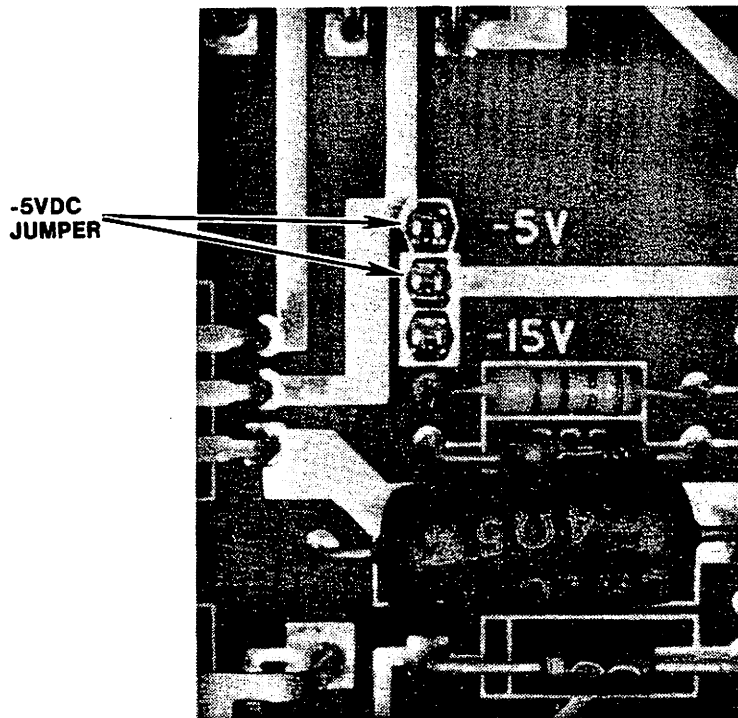


FIGURE 3  
-5 VOLT INTERFACE VOLTAGE SELECTION

# WANG FIELD CHANGE ORDER

FCO NO.  
1007

Equipment Affected 2200 SVP/LVP (SINGLE BOARD WINCHESTER)

Class NEXT CALL FCO Kit # 728-0017 Page 1 of 7

Org. Code III.A.12 FCO Doc. # 729-1128 Approval Date:

Est. Install. Time 45 MINUTES Ref. ECO # SHUGART 3385 AUG 12 1982

NOTE: IN ORDER TO RECEIVE COMPENSATION FROM SHUGART FOR INSTALLATION OF THIS CHANGE, PLEASE DETACH PAGE# 7, FILL OUT THE INFORMATION REQUIRED, AND MAIL. (ADDRESS IS CONVENIENTLY PRINTED ON REVERSE SIDE OF PAGE# 7)

1. REASON FOR CHANGE

To provide a valid "SEEK COMPLETE" signal to the controller.

2. DESCRIPTION OF CHANGE

This change incorporates eight jumpers and two etch cuts (PCB# 26073-5) in order to perform AND operation on "SEEK COMPLETE" and "TRK00" signals.

3. DOCUMENTATION AFFECTED

N/A

4. PREREQUISITE (S)

Shugart Single Board Winchester Disk Drives in the 2200 SVP/LVP are the only units which require this change (WL# 278-4013/14 with PCB# 26073-5). Units that require the change will have a LSI (Large Scale Integration) chip in location 3C. (See Illustration C)

5. INSTALLATION PROCEDURE

- A. Remove top cover of 2200 LVP/SVP unit.
- B. Remove the two bolts which attach the drive to the chassis frame, and save.
- C. Disconnect the two ribbon cables and two power cables from the drive.
- D. Remove the Winchester Disk Drive from system.

Product Support <i>Charlotte Haggerty</i> 8-12-82	Logistics <i>Kevin Sanders</i> 8/12/82	Originator <i>Blaine Donnell</i> 8-12-82	FCO Coordinator <i>John Brooks</i> 8/12/82
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ILLUSTRATION "A"

NON-COMPONENT SIDE

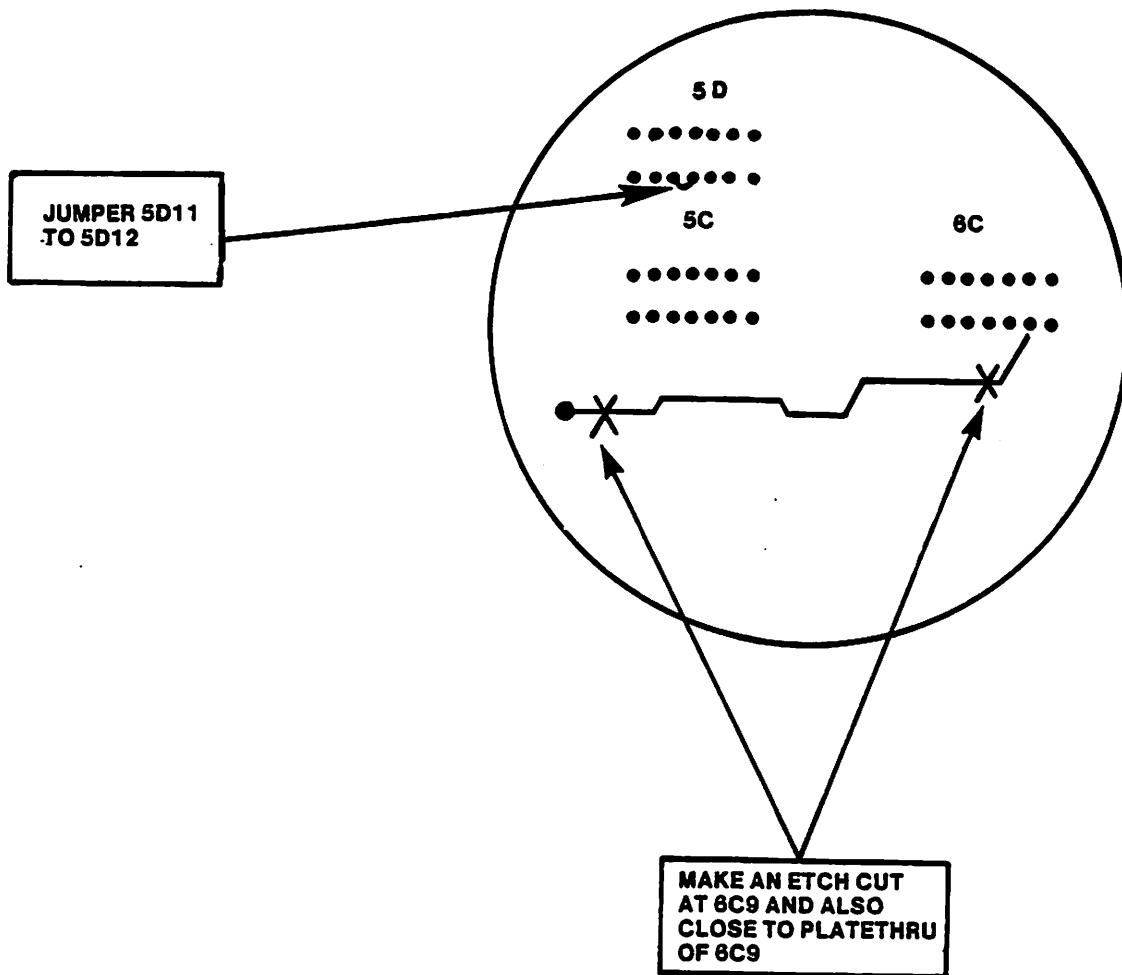




ILLUSTRATION "B"

COMPONENT SIDE

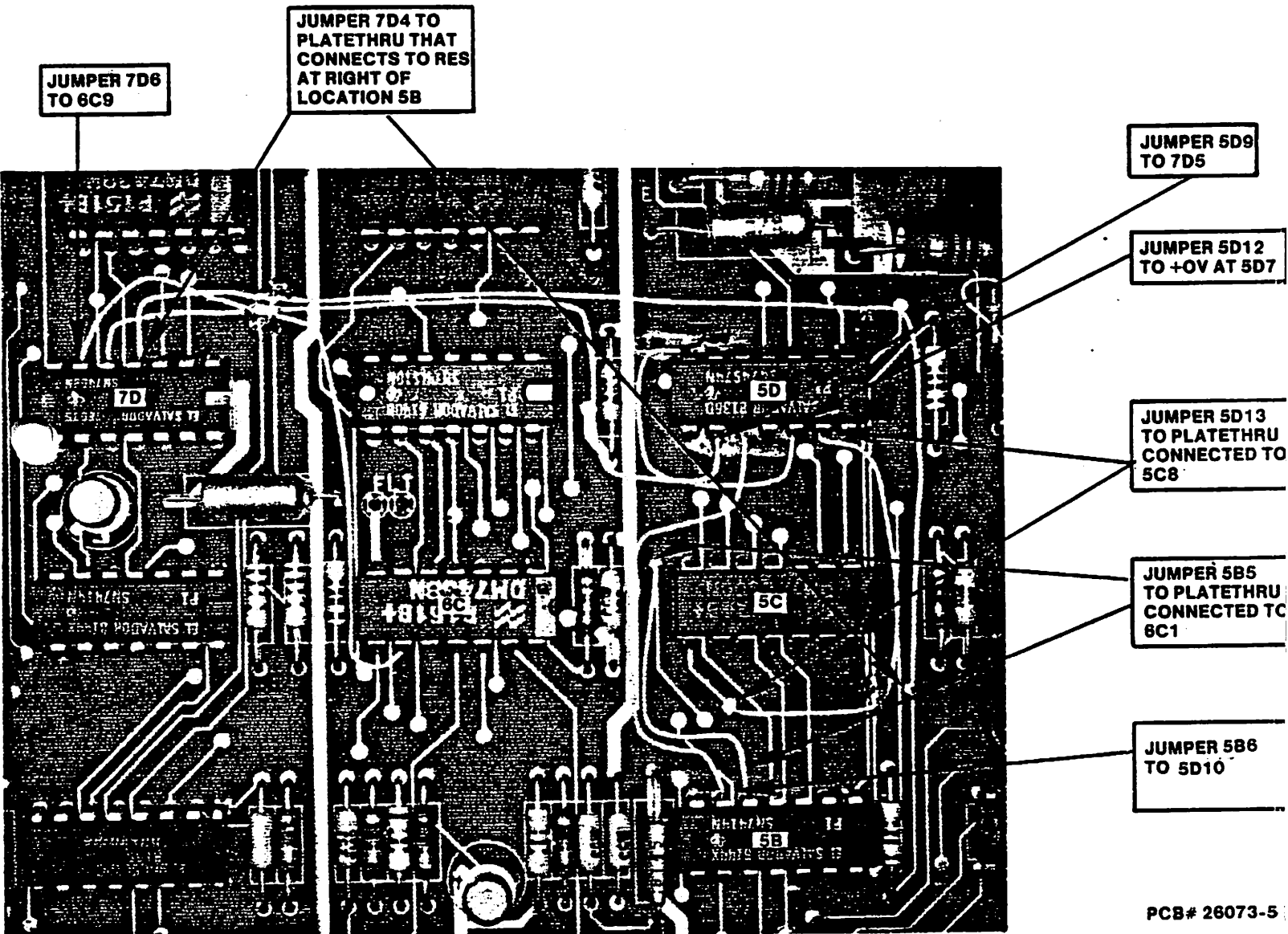
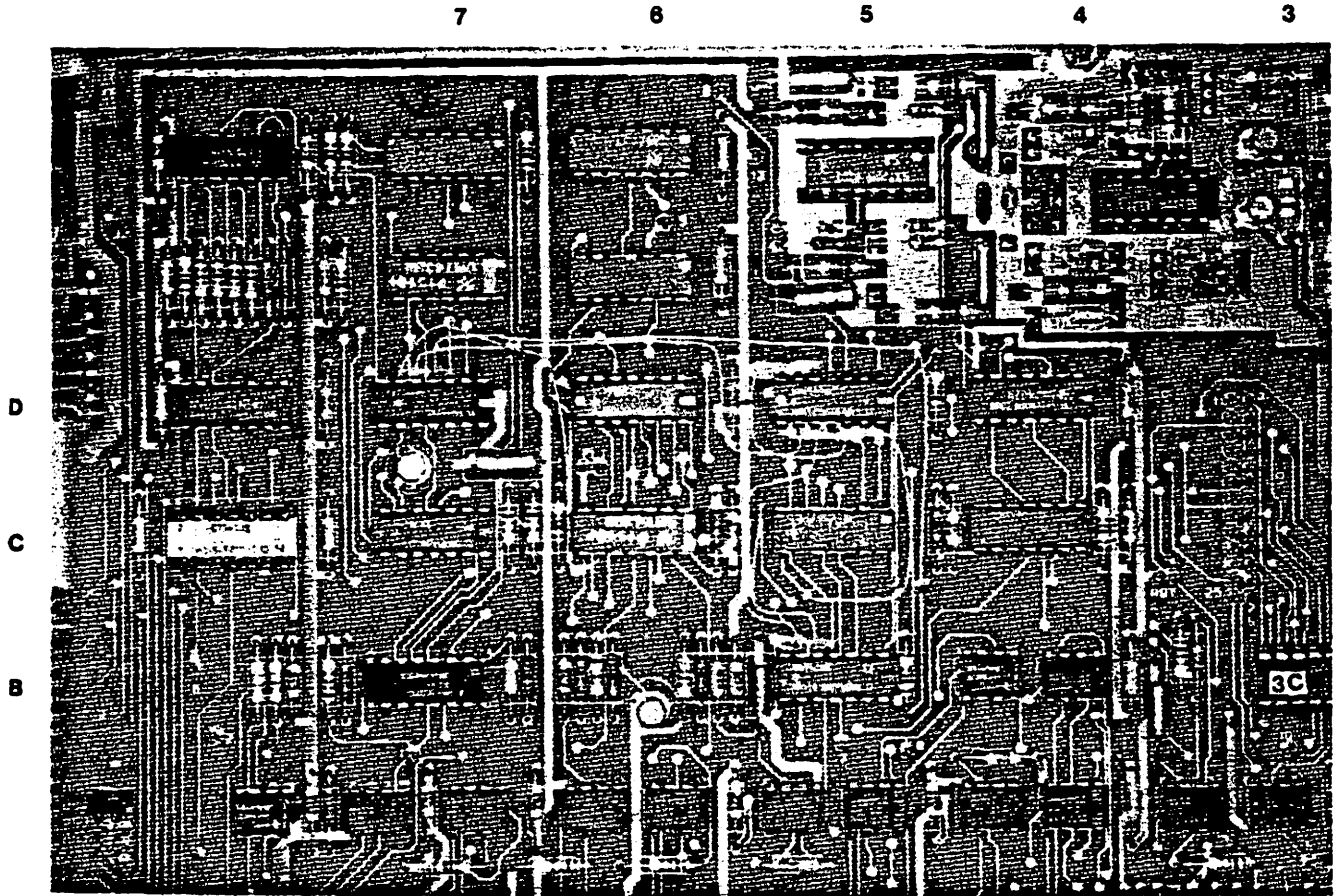


ILLUSTRATION "C"



## 5. INSTALLATION PROCEDURE (CONT.)

- E. In order to gain access to the non-component side of the 26073-5 board, remove the screw that attaches it to the drive, and save. Rotate the nylon locking devices to a vertical position. Detach board. Disconnect index sensor cable, positioning motor cable and read/write head cable.

### NON-COMPONENT SIDE

- F. Make an etch cut at 6C9 and also cut the same etch close to platethru of 6C9. (See Illustration A)
- G. Jumper 5D11 to 5D12. (See Illustration A)

### COMPONENT SIDE

NOTE: Keep wires as close as possible to PCB. Use Illustration B except where specified.

- H. Jumper 5B5 to platethru connected to 6C1.
- I. Jumper 5B6 to 5D10.
- J. Jumper 5D9 to 7D5.
- K. Jumper 5D12 to +0V at 5D7.
- L. Jumper 5D13 to platethru connected to 5C8.
- M. Jumper 7D4 to platethru that connects to the resistor at the right of location 5B.
- N. Jumper 7D6 to 6C9.
- O. After installation of this change, cross out the previous ECO# stamped on the bottom left corner of the PCB and mark the board with ECO# 3385.
- P. Remount board to drive with screw saved from Step E. Turn nylon locking devices to horizontal positions and reconnect cables as described in Step E.
- Q. Secure drive to chassis frame using the two bolts saved from Step B.
- R. Turn on power.
- S. After testing system integrity, turn off power and reinstall the top cover.

6. CHECK-OUT PROCEDURE

The "power up" diagnostics for the 2200 SVP/LVP system (Step R of Installation procedure) will be sufficient to test system integrity following the installation of this change.

7. FCO KIT PARTS LISTING

<u>Item #</u>	<u>Item Description</u>
WL# 729-1128	FCO# 1007
WL# 600-5009	5 ft. jumper wire (30 gauge)

8. FCO KIT AVAILABILITY DATE

FCO Kit # 728-0017 will be available August 23, 1982. It can be obtained by placing a routine order through the Logistics Order Processing System.

9. REMOVED PARTS DISPOSITION

N/A

10. MISCELLANEOUS

If the Shugart Winchester Single Board Disk Drives of the OIS system are interchanged with the 2200 SVP/LVP system, this change must be incorporated in order to ensure compatibility.

FCO# 1007

Page 7 of 7

FOLD

---

DRIVE SERIAL NUMBER \_\_\_\_\_

Indicate which drive type was updated by placing an "x" in one of the locations below.

WL# 278-4013 \_\_\_\_\_

WL# 278-4014 \_\_\_\_\_

FOLD

---

PLEASE BE SURE TO FILL OUT THIS PAGE

THIS INFORMATION IS NECESSARY IN ORDER FOR WANG TO RECEIVE COMPENSATION FROM SHUGART FOR INSTALLATION OF THIS CHANGE.

FOLD ALONG DOTTED LINES AND MAIL.

ADDRESS IS CONVENIENTLY LOCATED ON REVERSE SIDE OF THIS SHEET.

WANG LABORATORIES, INC.  
437 SOUTH UNION STREET  
LAWRENCE, MASSACHUSETTS 01843

ATTN: John Proulx M/S 8236A

WANG LABS INC.  
BURLINGTON, MA  
ATTN: Branch Manager

RDB 3114  
(Qty 1)

LVE/SVE\_Winchester\_Drive

## Prevent Head/Surface Damage

To prevent damage to head and/or surface it is important that the heads be positioned at the innermost track and the spindle lock bracket attached. This can easily be done by verifying the last sector on the disk before power off.

VERIFYF (8127,8127)	2 MEG	278-4013
VERIFYF (16319,16319)	4 MEG	278-4013
VERIFYF (32639,32639)	8 MEG	278-4014

If not responsive to the VERIFY statement, after the unit has been on for 2 minutes rotate the damper assembly clockwise only to the 2 o'clock position using the track 0 detector as 6 o'clock, then power down and insert spindle lock.

JUMPERS

There are three jumpers on the Winchester drive.

DS1	Located beside I/O cable J2
5V	Located 1 1/2" up and 1 1/2" in from the bottom right corner.
Terminator	IC located at location C8

CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
NEWSLETTER

#30628

3101

PERIPHERALS-DISK DRIVES-SHUGART SA400/800/901/1000/4000

TOPIC: NEW SHUGART SA-1000 BRACKET

Wang has stopped using the Wang Manufactured Bracket, and is now using the bracket supplied by Shugart on all new SA-1000 Winchester drives. The major differences are:

- A. Wang Manufactured Bracket- protects the drive and incorporates the base plate as a mount to secure drive into the SVP/LVP and OIS system.
- B. Shugart Bracket- only protects the drive. To install the unit into the system the following parts are required.

<u>Description</u>	<u>WLN</u>
Drive Plate	452-4310
Foot Holder	449-0420
Screw	650-3120

If an exchange is required and the drive brackets do not match, replace the brackets between the units. Replacing the brackets does not take more than five minutes.

CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
NEWSLETTER

#30412

3101 (III.A.12)

PERIPHERALS-DISK DRIVES-SHUGART SA-1000 8" WINCHESTER

TOPIC: SA-1000 NEW BRACKET

Manufacturing is not using the old Wang filter bracket anymore. The new bracket is supplied by Shugart on their standard product. To do this, the old filter bracket had to be redesigned so that it could be relocated to the bottom mounting plate within the various CPU's.

<u>Description</u>	<u>WLN</u>
Old Filter (Parts and Bracket)	279-0483
New Filter (Parts and Bracket)	270-0790

Old and new filters use the same part, the only difference is that they are mounted in different brackets.



CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
NEWSLETTER

#20302

IV.A.3

2200 SYSTEMS-MAINFRAMES-VP/MVP/LVP CPU'S.

TOPIC: 210-8696 SWITCH SETTINGS

The LVP-C uses the Quantum Winchester. The switch settings for the 210-8696 PCA are:

Switch Settings	#2	#4	#8	
	1	1	1	No Fixed Drive
	1	0	1	Small Fixed-
				210-8696-B = 2-Meg Shugart
				210-8696-A = 4-Meg Shugart
	0	1	1	8-Meg Fixed Shugart
	1	1	0	16-Meg Fixed Quantum
	0	1	0	32-Meg Fixed Quantum

Switch Number

#6

1 = No Floppy installed  
0 = Floppy installed

Switch Number

#3 = OFF

All other switches should be in the 'ON' position.  
(1 = ON; 0 = OFF)

CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
NEWSLETTER

#10113

III.A.12

PERIPHERALS-DISK DRIVES-SHUGART SA-1000 8" WINCHESTER

TOPIC: ERRORS ON WINCHESTER DRIVES USED ON LVP - ECO.

If you are experiencing I-93 errors or format errors on the winchester drives, 278-4013 (-1 50 Hz), 278-4014 (-1 50 Hz) add an 820pf ceramic disk capacitor (WLI P/N 300-1620) in parallel with R83 (6.2K) on the control circuit board (larger board) between chip 7A<sub>2</sub> (LM311) and chip 8A (7438), approximate board coordinates 8A.

The capacitor should be adequately mechanically secured to the resistor lead (wrap capacitor leads around resistor leads) then solder together.

This ECO should also be done to all winchester drives in stock and drive PCB's (726-1902) before installing in systems.

The ECO should be done immediately to all winchester drives and PCB's in stock, and on a next-call basis or as required in the field.

This ECO eliminates noise on the trailing edge of the comparator output pulse, which in turn eliminates an undesired second index pulse from one shot 96LS02.

## REMOVAL OF DISK DRIVE FOR DAMPER REPLACEMENT

Do not perform this procedure at the customer site; instead, bring the defective drive to the Wang Service Office (Branch, Area, or District). Make arrangements beforehand with the customer to schedule drive removal, installation of a "loaner" if necessary, or full swapout of the defective drive with a modified one.

### ITEMS REQUIRED

The following items are required in the performance of this procedure:

1. Damper Assembly (P/N. 726-1927)
2. Allen wrench (0.05 in)
3. Screwdriver (medium blade)
4. Wiping cloth
5. Damper Spacing Tool, 0.01 inch (P/N 726-9750) or feeler gage.

### DAMPER REMOVAL PROCEDURE

#### CAUTION

DO NOT TOUCH DAMPER OR ALLOW IT TO BE MOVED  
WITHOUT APPLICATION OF AC MOTOR POWER AND DC  
POWER TO DISK DRIVE, OTHERWISE READ/WRITE  
HEAD DAMAGE MAY RESULT

1. Remove the three screws that secure the small printed circuit board to the disk drive chassis. Do not disconnect the board; just move it out the the way enough to provide access to damper assembly.
2. Apply motor AC power and circuit DC power to disk drive.
3. Position damper to provide access to filler screw. (figure 1) Since the motor is energized, some resistance will be felt approximately every 1/8 inch of motor rotation while turning damper.
4. Remove filler screw (and rubber seal) from damper using 0.05 inch Allen wrench.
5. Hold track 000 clamp steady and rotate damper until Allen screws are positioned as shown in figure 2
6. Slowly turn damper until filler hole is lined up with one of the Allen screws (NOTE-old style dampers have two Allen screws)
7. Insert 0.05 inch Allen wrench through filler hole into Allen screw. Loosen Allen screw and remove wrench.
8. On old style dampers, slowly turn damper to line up second Allen screw insert wrench, loosen screw, and remove wrench.

9. Gently remove old damper assembly by lifting upwards.

NOTE

KEEP THE DAMPER ASSEMBLY UPRIGHT  
AT ALL TIMES TO PREVENT FLUID LOSS

10. Make sure old seal is also removed from stepper motor shaft along with old damper. Wipe stepper shaft clean of any remaining fluid.
11. Re-install filler screw (and rubber seal) into old damper. Carefully package and return old damper to:

Wang Laboratories, Inc.  
RDB 3933  
437 South Union Street  
Lawrence, Mass. 01843

NEW DAMPER INSTALLATION PROCEDURE

1. Remove filler screw (and rubber seal) from new damper
2. Insert Allen wrench through cover screw hole and loosen screw just enough to slide new damper onto stepper motor shaft
3. Place damper spacing tool (or 0.01 inch feeler gage) between damper and track 000 clamp. (figure 3). Slide damper up against tool and tighten Allen screw.
4. Reinstall filler screw (and rubber seal)
5. Remove spacing tool and wipe damper clean.
6. Turn off AC power and re-install printed circuit board.

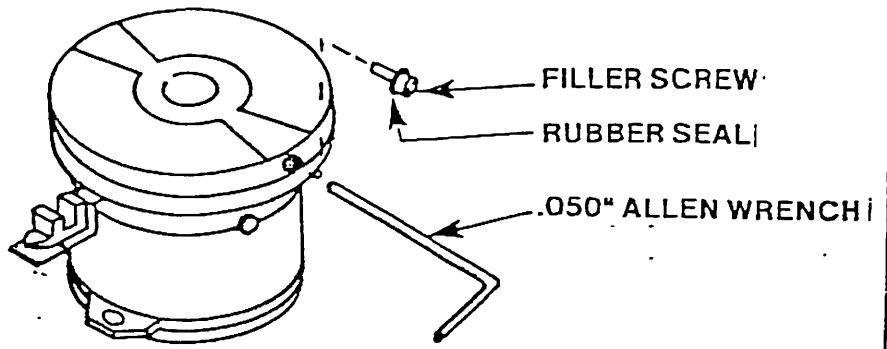


FIGURE 1. DAMPER REMOVAL

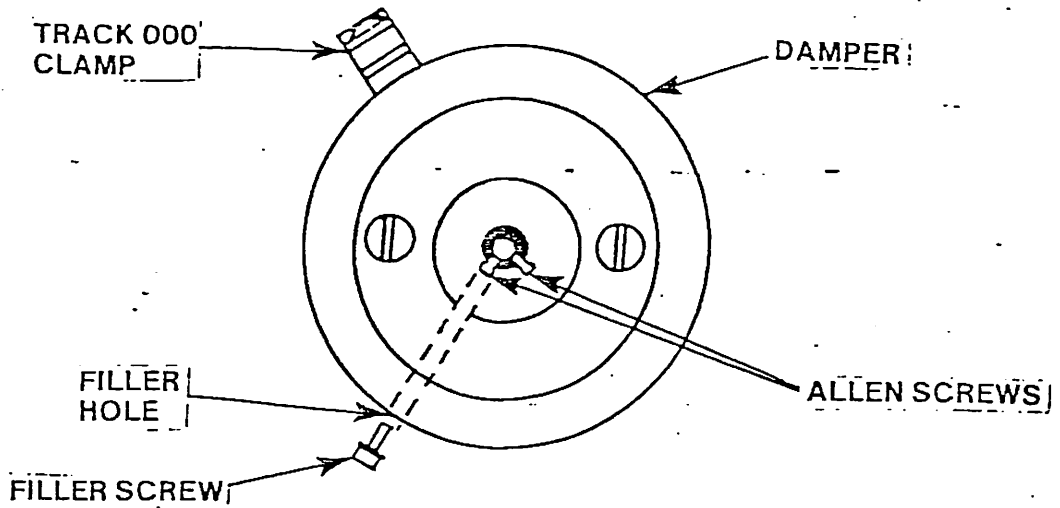


FIGURE 2 ALLEN SCREW LOCATIONS

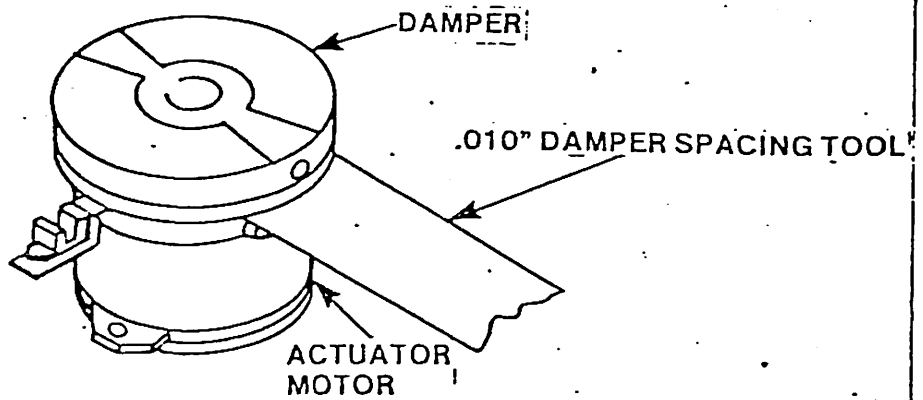


FIGURE 3. DAMPER INSTALLATION

LVP/SVP-Shugart SA1000 Fixed Disk Drives

The following SA1000 Fixed Disk Drives may have to be replaced on a "next call" basis:

278-4013	4 Megbyte winc	60Hz
278-4014	8 Megbyte winc	60Hz

These drives may have a defective damper which could result in damper fluid leakage. The suspected dampers may be identified by the caution label.

Transparent Label

Identifies new damper and does not need to be replaced. New design seal.

Yellow Label with Colored Dot in Center

Remanufactured damper and does not need to be replaced. New Design Seal.

Yellow Label

Old Design seal, damper must be replaced.

The procedure for replacing the damper follows on the next three pages.

## WINCHESTER DISK DRIVES

### CARE AND HANDLING

1. The actuator and spindle lock should be installed whenever the drive is moved, including when shipping the finished system.
2. The damper unit should never be rotated when the drive is not operating at full rotational speed. Movement of the damper can cause the heads to skate across and damage the media.
3. The spindle should not be rotated unnecessarily. When it is rotated, it must be turned in the proper direction (clockwise when viewed from the bottom of the drive).
4. The head/actuator assembly should never move unless AC power has been applied and the disk has been spinning at full speed for at least 5 seconds.
5. After power is turned off, the drive should not be moved until the disks have stopped spinning.
6. It is recommended that a shock absorbing foam pad should always be placed on any cart or carriage used to move the drive from one location to another.
7. The unpackaged, nonoperating drive should always be handled gently. Jolts must be avoided at all times.
8. Always keep drive inside the shipping box when the unit is in stock, at the Repair Center, or in transit.

\*\* ABOVE INFORMATION APPLIES TO NEW AND DEFECTIVE DRIVES \*\*

2200 LVP / SVP  
[ OIS ]

Note: First Quantum Drive should be selected DS1

- Jumpers to Install
1. Minus (-) power selection to the -5Vdc connection
  2. Drive select (DS)
  3. Seek Complete (SC)  
(will not make any difference as if the "D" jumpers is not in.)

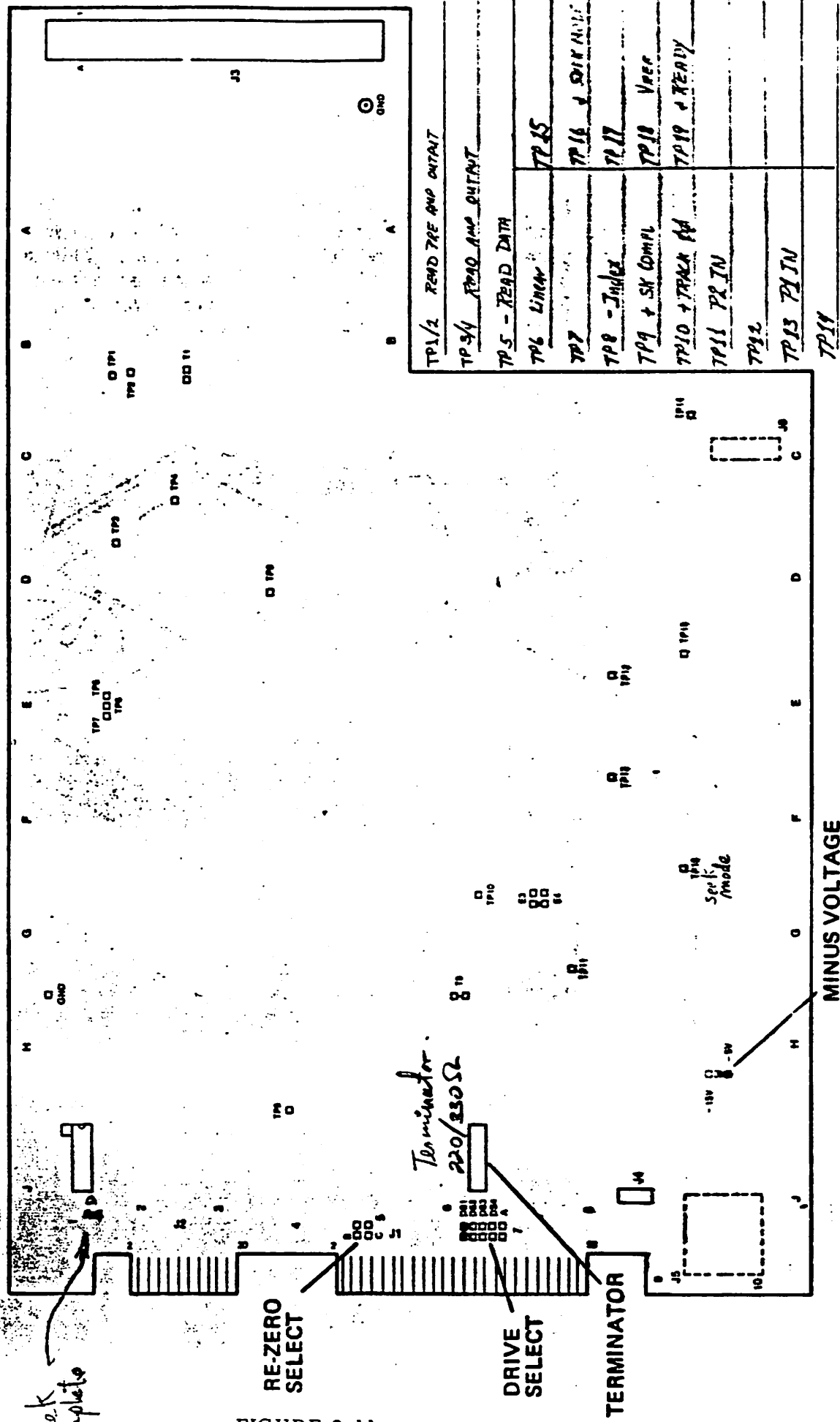


FIGURE 2-11  
SERIES 2000 JUMPER OPTIONS



Used on file: VS 25/45

78-4025-1  
278-4024-1

Notes:  
 First Quantum Drive should be selected DS1  
 Second " " " " " " DS2  
 \* If system needs two Quantum Drives remove terminator from the first Quantum Drive.

Jumper = 1/4 inch  
 1. Minus (-) power supply to the -15Vdc connector  
 2. Drive Select (DS)  
 3. Jack Complete (D)  
 4. Rezero select (C)

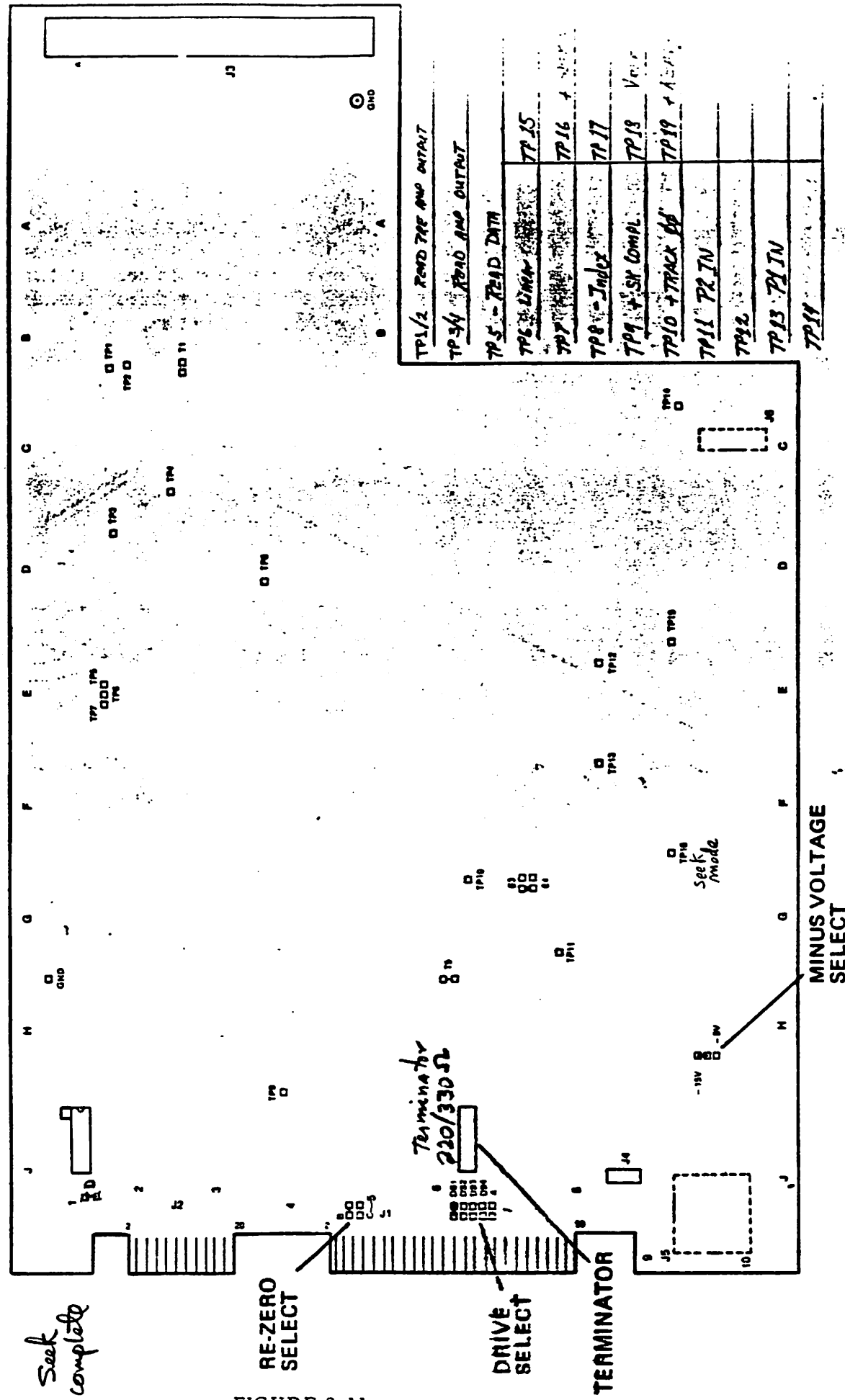


FIGURE 2-11  
 SERIES 2000 JUMPER OPTIONS

CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
NEWSLETTER

#10929

III.A.14

PERIPHERALS-DISK DRIVES-SHUGART Q2000 WINCHESTER (8 INCH).

TOPIC: QUANTUM 8 INCH MEDIA FIXED DISK DRIVE

WANG LABORATORIES WILL SOON MAKE AVAILABLE, IN SEVERAL SYSTEM MODELS, THE QUANTUM 8 INCH MEDIA FIXED DISK DRIVE.

THE QUANTUM SERIES 2000 DISK DRIVE IS A RANDOM ACCESS STORAGE DEVICE WITH ONE, TWO, THREE, OR FOUR NON-REMOVABLE 8 INCH RIGID DISKS AS STORAGE MEDIA. EACH DISK SURFACE EMPLOYS ONE MOVABLE HEAD TO ACCESS THE 512 DATA TRACKS. THE FOUR MODELS OF THE Q2000 SERIES ARE Q2010, Q2020, Q2030, AND Q2040.

	<u>PLATTERS</u>	<u>MOVEABLE HEADS</u>	<u>SORAGE</u>
Q2010	1	10.66 MEGABYTE	2
Q2020	2	21.33 "	4
Q2030	3	32.00 "	6
Q2040	4	42.66 "	8

THE Q2000 SERIES DISK DRIVE IS SUPPLIED WITH AN ACTUATOR LOCK AND A SPINDLE LOCK FOR SHIPPING PROTECTION. THESE LOCKS MUST BE REMOVED BEFORE THE SYSTEM IS POWERED UP. FOLLOW THE STEPS BELOW FOR REMOVING THE LOCKS. PLEASE NOTE THAT IN SYSTEMS SHIPPED WITH THIS MODEL DRIVE, THE DRIVE MUST BE REMOVED FROM THE SYSTEM TO PERFORM THESE STEPS.

MOTOR LOCKING CLIP:

- A) STAND DRIVE ON EDGE TO UNLOCK DRIVE MOTOR.
- B) LOOSEN 11/32 INCH HEX NUT.
- C) ROTATE LOCKING CLIP AWAY FROM PULLEY. DO NOT ROTATE PULLEY.
- D) RETIGHTEN 11/32 INCH HEX NUT.

ACTUATOR LOCK:

UNLOCK ACTUATOR BY ROTATING THE ACTUATOR LOCK CCW AS FAR AS IT WILL GO (APPROX. 1/2 TURN). DO NOT FORCE. THE ACTUATOR LOCK IS LOCATED ON THE BOTTOM OF THE DRIVE.

CUSTOMER ENGINEERING  
TECHNICAL ASSISTANCE CENTER  
MILWAUKEE

11/11/88

REPAIRMAN'S NAME: [REDACTED] ADDRESS: [REDACTED]

PROBLEM DESCRIPTION

WAS REPORTED THAT THE DRIVE WOULD NOT OPERATE AT ALL. THE MOTOR WOULD NOT START AND THE DRIVE WOULD NOT OPERATE.

THE MOTOR IS A 1/2 HP 115V AC MOTOR. THE DRIVE IS A 1/2 HP 115V AC DRIVE. THE MOTOR IS A 1/2 HP 115V AC MOTOR. THE DRIVE IS A 1/2 HP 115V AC DRIVE. THE MOTOR IS A 1/2 HP 115V AC MOTOR. THE DRIVE IS A 1/2 HP 115V AC DRIVE.

DATE	TIME	DESCRIPTION	INITIALS
11/11/88	10:00	RECEIVED	[REDACTED]
11/11/88	10:30	TESTED	[REDACTED]
11/11/88	11:00	REPAIRED	[REDACTED]
11/11/88	11:30	TESTED	[REDACTED]

THE MOTOR IS A 1/2 HP 115V AC MOTOR. THE DRIVE IS A 1/2 HP 115V AC DRIVE. THE MOTOR IS A 1/2 HP 115V AC MOTOR. THE DRIVE IS A 1/2 HP 115V AC DRIVE. THE MOTOR IS A 1/2 HP 115V AC MOTOR. THE DRIVE IS A 1/2 HP 115V AC DRIVE.

REPAIR PROCEDURE

- 1) CHECK MOTOR WINDINGS FOR SHORTS.
- 2) CHECK MOTOR WINDINGS FOR OPEN CIRCUITS.
- 3) CHECK MOTOR WINDINGS FOR GROUNDING.

REPAIR RESULTS

DRIVE OPERATES NORMALLY. MOTOR STARTS AND RUNS. DRIVE OPERATES NORMALLY. MOTOR STARTS AND RUNS. DRIVE OPERATES NORMALLY. MOTOR STARTS AND RUNS.