

July 4, 1976

MODEL TU-907

ULTRASONIC WEDGE BONDER

Mech-El Industries, Inc.
73 Pine Street
Woburn, Massachusetts
01801

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UNPACKING

1. Remove aluminum "L" shaped shipping bracket connected to the upper weight rod and top of the damper at the back of the machine. (See Figure #4)
2. Remove the foam from the Z lever at the front of the machine.
3. Remove tubing from under gross motion positioning plate.
4. Remove cover on top rear of the machine. Remove tagged nylon shipping wedge from head pivot. (See Figure #4).
5. Remove two cap packing screws that secure the positioner plate.

SETUP

1. Assemble microscope and lights. Mount to one inch black hollow rod at the top of the machine. Tighten two 10-32 set screws to secure microscope to rod.
2. Plug in machine.
3. Main power "on". See Figure #1.
4. Generator "on". See Figure #1.
5. Place workstation on gross motion plate.

OPTIONAL-WITH VACUUM LOCKDOWN

1. Connect vacuum (20 in. Hg. vacuum) to fitting at the left rear of the machine marked "vacuum". See Figure #2. Turn on vacuum.
2. Vacuum lockdown switch for workstation is located at the lower left front of the machine. See Figure #1.

CHECKOUT

1. Cycle light "off" (located on head behind workstation). See Figure #1.
2. Set Channel 1 and 2 power and time to "3". Set Hi-Lo power switch on "Lo". See Figure #1.
3. Press Cycle button. See Figure #1.
 - (a) Generator meter should deflect (firing first bond). Cycle light "on".
 - (b) Clamps open.
 - (c) Loop height adjust coil, Figure #1, will now be energized.
4. Release cycle button.
 - (a) Clamp motion arm moves up.
5. Press Cycle in again and hold.
 - (a) Generator meter should deflect (second bond fires).
 - (b) Clamp should close and then pull back terminating wire at heel of second bond.
 - (c) Loop height coil "off".
 - (d) Cycle light "out".
6. Release cycle button.
 - (a) Clamps return to reset position feeding a tail through the hole in the wedge.
7. Place appropriate wedge for wire size to be bonded in transducer using tool height gauge supplied with bonder. See Figure #2.
8. Check transducer position. Center of transducer to be in line with bottom of black arm. See Figure #5.

9. Place wire on spoolholder and thread. Wire is fed off the bottom of the 1/2" spool through the hole in the transducer, through wire clamps over wire guide at rear of clamps and through the hole in the wedge. See Figure #8 for 60 degree feeding.
10. Tune generator for null by turning adjust rod between fuses in the rear of the machine. For proper nulling procedure, see UTI manual enclosed.
11. Loosen set screw on side of workstation, See Figure #5. Adjust set screw located at the bottom of the pedestal, turning screw in will raise the workstation, turning screw out will lower the workstation (1 turn is 1/32"). Adjust to 2.50" from the bottom of the workstation to bonding surface. See Figure #5.
12. Set weight of bonding head using a gram gauge (.001" wire approximately 28g). Main power "off". Lower Z lever all the way down with workstation in place. Adjust weight with wedge touching the work. Measure the force necessary to pick up wedge. Adjust by using sliding counterweight, Figure #2. Turn main power switch "on".
13. With machine in reset position, check position of tail adjust screw and clamp motion limit screw. See Figure #6.
14. For machine with heated workstage (Figure #7), turn on heat switch. Check calibrate temperature of heated workstation with pyrometer. Workstation should equal 1/2 digital temperature readout (500 on dial = 250^o on workstation).
 - (a) To calibrate workstation, remove stainless steel cover (See Figure 1). The heat card is the PCB located behind the generator. The calibration pot is the trimpot located in front of the I.C. Calibrate the dial to correspond with the pyrometer by turning the trimpot screw. The light should be on the threshold when the dial is two times the work temperature.

BONDING

1. Lower Z lever (Figure #1) down to its bottom stop. Make first bond.
2. Raise Z lever--set loop height to desired level (approximately 1/2 the length of loops) with nylon "looping" screw. See Figure #5.
3. Move x-y positioner and bring down Z lever again to make a second bond. Bonding sequence is controlled by a photocell (Figure #2) when the Z lever is lowered. No search. No buttons required to make the bonds.
 - (a) If machine does not cycle with Z lever, photocell flag in rear of machine is too high.
 - (b) If machine does not cycle with cycle push button, photocell flag is too low.
4. Raise Z lever all the way up to reset position.
5. Clamp Set-up. Turn pot on logic card for maximum force on clamp coil (See Figure #3). Cycle machine with push button and hold in reset position. If clamps do not close, screw in clamp adjust screw opposite coil slug just enough to close. (See Figure #5). Turn down pot on logic card so force on clamp is approximately 80 to 100g. After adjusting clamp, tighten nylon set screw to lock adjust screw. Nylon tip set screw is located on top of right clamp arm.
6. Adjust ultrasonic power for first and second bond for optimum strength. To test strength, use Mech-El Bond Tester, Model BT-202.

TROUBLESHOOTING

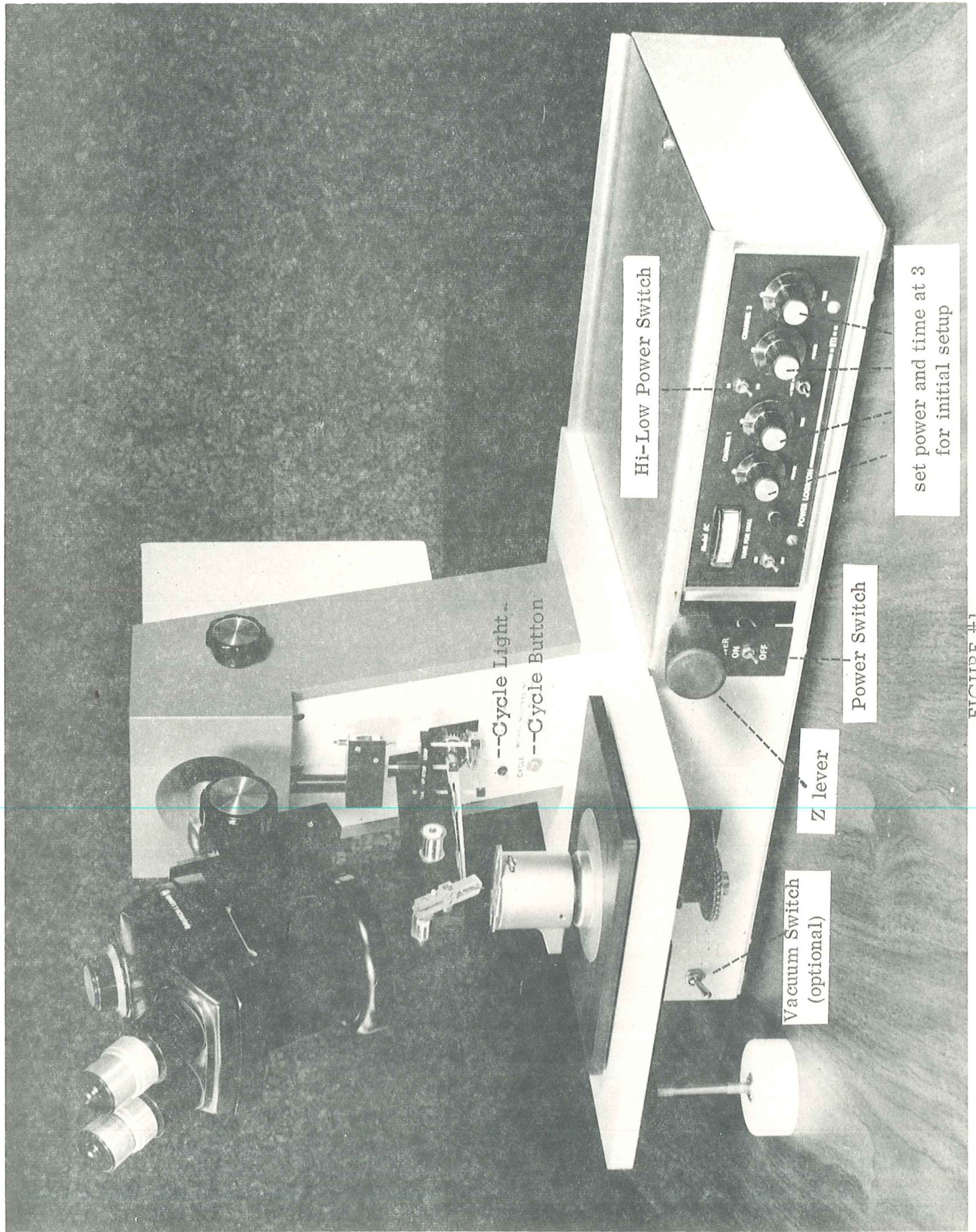
- | | | | | |
|-------------------------------|----|---------------------------------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tail too short | 1) | Tail adjust screw incorrect | 1) | Turn tail adjust screw clockwise (down). |
| Tail too long | 1) | Tail adjust screw incorrect | 1) | Turn tail adjust screw counter-clockwise (up). |
| Tail not centered under wedge | 1) | Transducer not aligned properly | 1) | Loosen transducer clamp screw (See #A.I. 42 - 290-0278) and align center of tool to center of clamp opening. Align transducer so tool is perpendicular, center of transducer to be in line with bottom of black arm (See Figure #5). |
| Inconsistent Tail | 1) | Clamp pressure not adjusted properly. | 1) | Adjust clamp pressure pot (See Figure #3) for approximately 80-100g of pressure at clamps. |
| | 2) | Too much power on second bond | 2) | Decrease second bond power-time setting, if second bond deformation appears to be excessive (over 2 wire diameters). |
| | 3) | No cotton in transducer | 3) | Insert a small piece of cotton into hole of transducer so as to apply a slight amount of drag on the wire. |

- | | | | |
|---------------------------------------------------------------------------|--------------------------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4) | Clamp motion screw not adjusted properly | 4) | At loop position clearance between bottom of clamp motion nylon screw and rubber bumper should be approximately 1/32" (See Figure #6). |
| 5) | Wire feeding while wedge is on the work | 5) | After second bond has been made, if the Z lever is returned to its reset position in a brisk manner, the wire will not feed on the work. |
| 6) | Wire fed back through wedge before second bond is made | 6) | Set loop height so the wire does not feed through the wedge from loop to second bond. |
| Tail does not feed | | 1) | Decrease tension on spring (See Figure #2). |
| 2) | Wedge plugged | 2) | Unplug wedge. |
| 3) | Tail adjust screw not properly set | 3) | After first bond, clamp arm should pivot up. If it does not, tail adjust screw may be too high. |
| Tail does not pull | | 1) | Increase tension of clamp motion spring. |
| 2) | Clamp motion limit screw down too far. | 2) | Turn screw up. See Figure #6 for proper set up procedure. |
| Machine cycles properly with cycle button but does not cycle with Z lever | Rear photocell flag too high | 1) | Adjust flag, loosen flag adjust screw (Figure #2) and slowly lower flag until cycle light in front of the machine turns "on", push flag up 1/32" from this position. Tighten lock screw. |

- | | | |
|--------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2) Workstage does not heat up (for machines with heated workstage) | 2) Workstage too low | 2) Adjust workstage height to 2.5" from base of bonding surface, (See Figure #5). |
| Workstage does not heat up (for machines with heated workstage) | 1) Heat switch not "on" | 1) Check heat on off switch. |
| 2) Thermocouple open | 2) Thermocouple open | 2) Check thermocouple for an open with ohm meter, Pins C and H on workstation plug. |
| 3) Heater open | 3) Heater open | 3) Check heaters for open with ohm meter, Pins A-E on workstation plug. |
| 4) Workstage not plugged in | 4) Workstage not plugged in | 4) Check workstation plug. |
| 5) Fuse blown | 5) Fuse blown | 5) Check fuse in rear of machine. |
| 6) Heat card out of connector (under stainless steel cover) | 6) Heat card out of connector (under stainless steel cover) | 6) Remove plug from outlet, remove stainless steel cover from right side of machine. Make sure heat card in rear of generator is firmly seated into its connector. |
| Workstage not calibrated (for machines with heated workstage) | 1) Calibration potentiometer on heat card set wrong | 1) To calibrate workstage, adjust potentiometer on heat control card so the controller reads twice the temperature of the stage. 500 on dial = 250°C. |
| Workstage runs away (for machines with heated workstage) | 1) Thermocouple shorted | 1) Check for shorted thermocouple. |
| 2) Defective card | 2) Defective card | 2) Consult factory. |

BONDING TROUBLESHOOTING

First bond does not stick	1)	Power or time too low	1) Adjust time and power settings "A" Channel.
	2)	Weight too low	2) Adjust bond weight to approximately 28g for .001" wire. <i>25.4</i>
	3)	Work loose	3) Check piece being bonded, make sure it is tight. <i>00.2</i>
	4)	Poor bonding surface	4) Try a known good substrate on unit. <i>0.004</i>
	5)	Generator not tuned	5) Tune generator. See UTI manual. <i>5.1</i>
Too much deformation on first bond	1)	Power or time too high	1) Decrease power and/or time on "A" Channel.
	2)	Weight too high	2) Check and adjust, if necessary.
	3)	Loop height too low	3) Check loop height. After first bond is made, release Z lever. Adjust loop adjustment so wedge is approximately .010" above substrate.
Second bond does not stick	1)	Not enough power, time or weight	1) Adjust time and power "B" channel. Adjust weight for approximately 28g for .001" wire.
	2)	Generator not tuned	2) Check and tune, if necessary. See UTI manual for tuning procedure.
	3)	Poor bonding surface	3) Try a known good substrate on unit.



Hi-Low Power Switch

set power and time at 3
for initial setup

Power Switch

Z lever

Vacuum Switch
(optional)

---Cycle Light---
---Cycle Button---

FIGURE #1

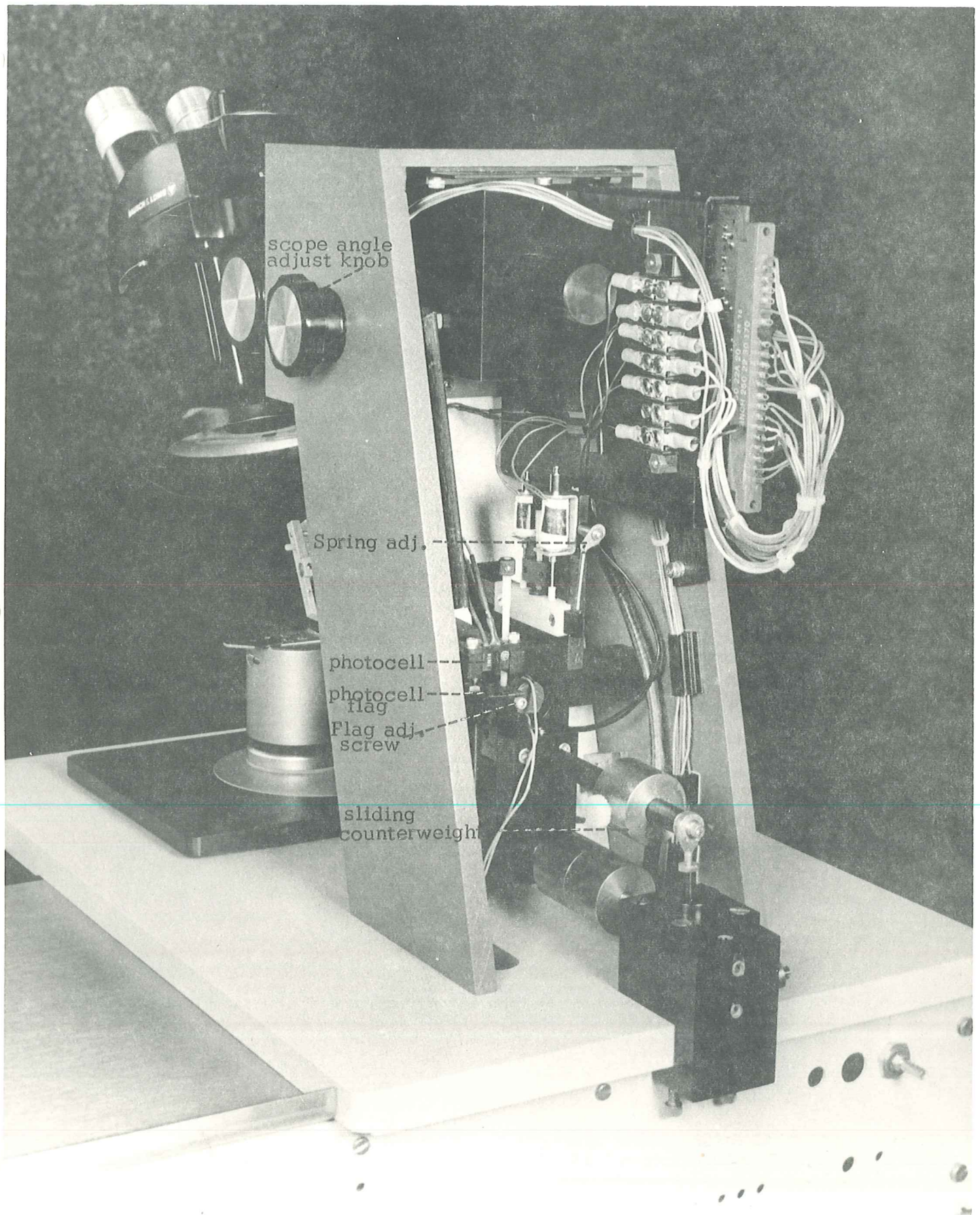
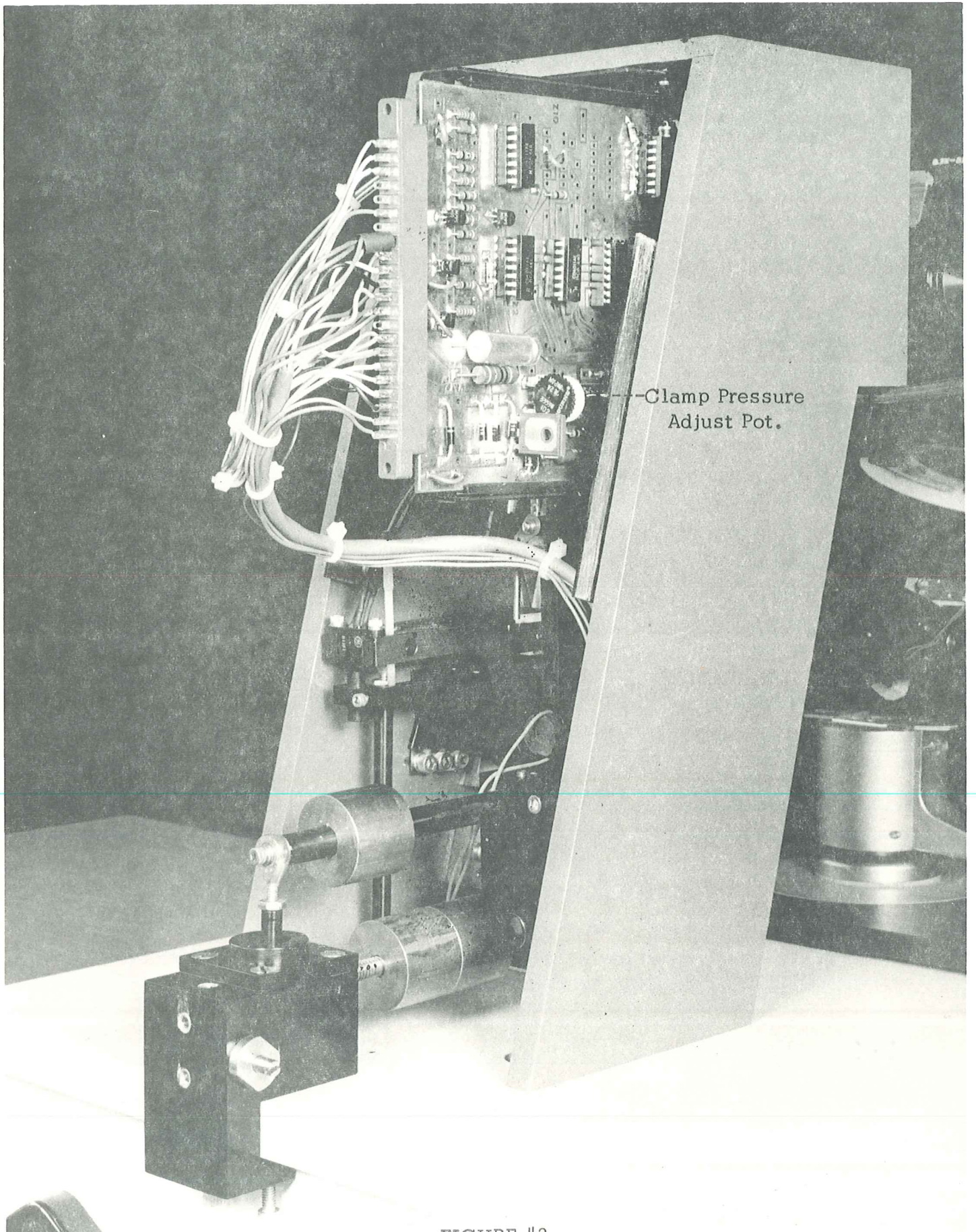


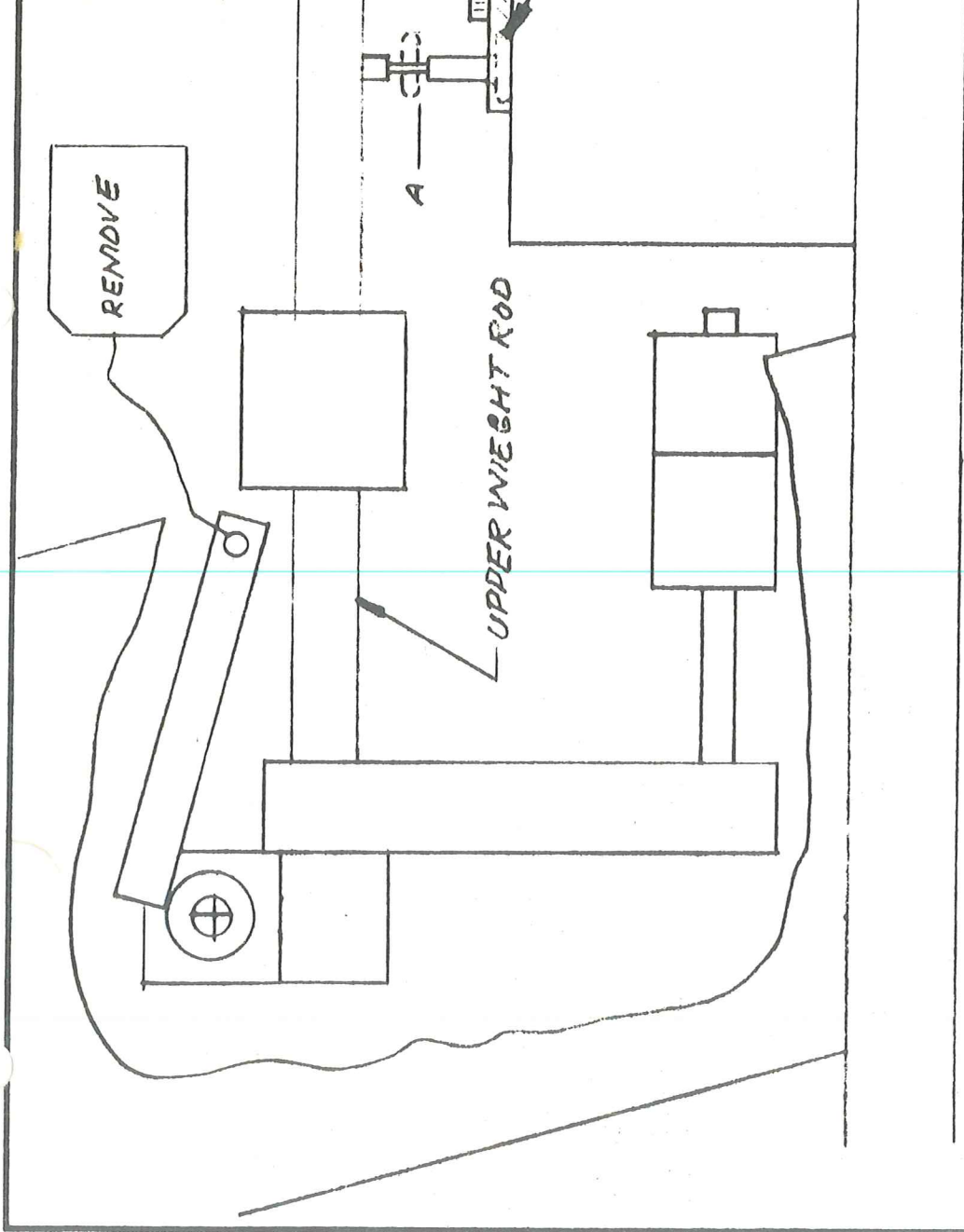
FIGURE #2



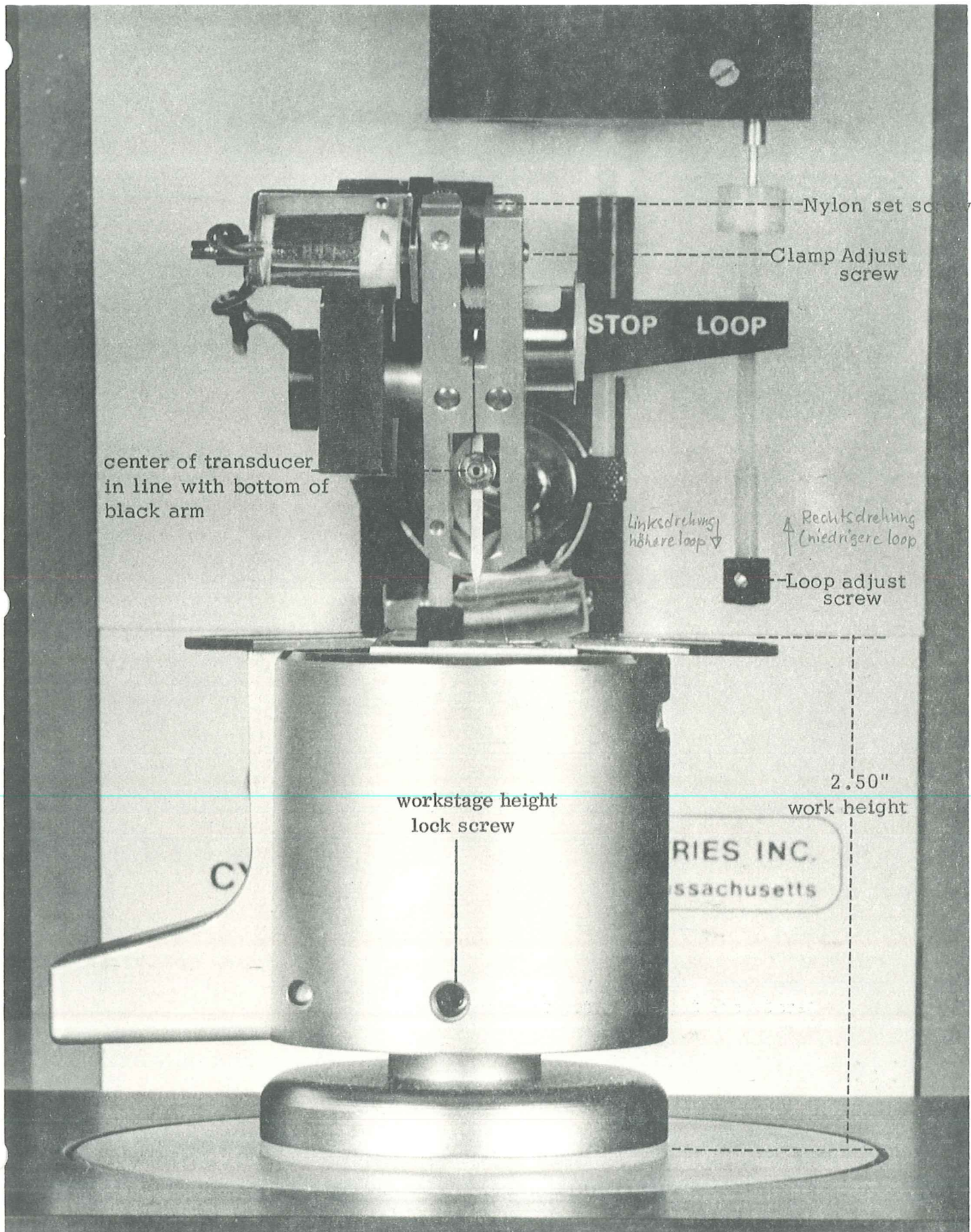
Clamp Pressure
Adjust Pot.

FIGURE #3

DATE	SYM	REVISION RECORD	AUTH	DR.	CK.



TOLERANCES (EXCEPT AS NOTED)		MECH-EL INDUSTRIES INC	
DECIMAL	±	SCALE	DRAWN BY T8
FRACTIONAL	±		APPROVED BY
ANGULAR	±	TITLE	
		SHIPPING BRACKET REMOVAL	
		DATE	DRAWING NUMBER
		6-10-76	AI 35



center of transducer
in line with bottom of
black arm

Nylon set screw

Clamp Adjust
screw

STOP LOOP

Linksdrehung
höhere loop

Rechtsdrehung
(niedrigere loop)

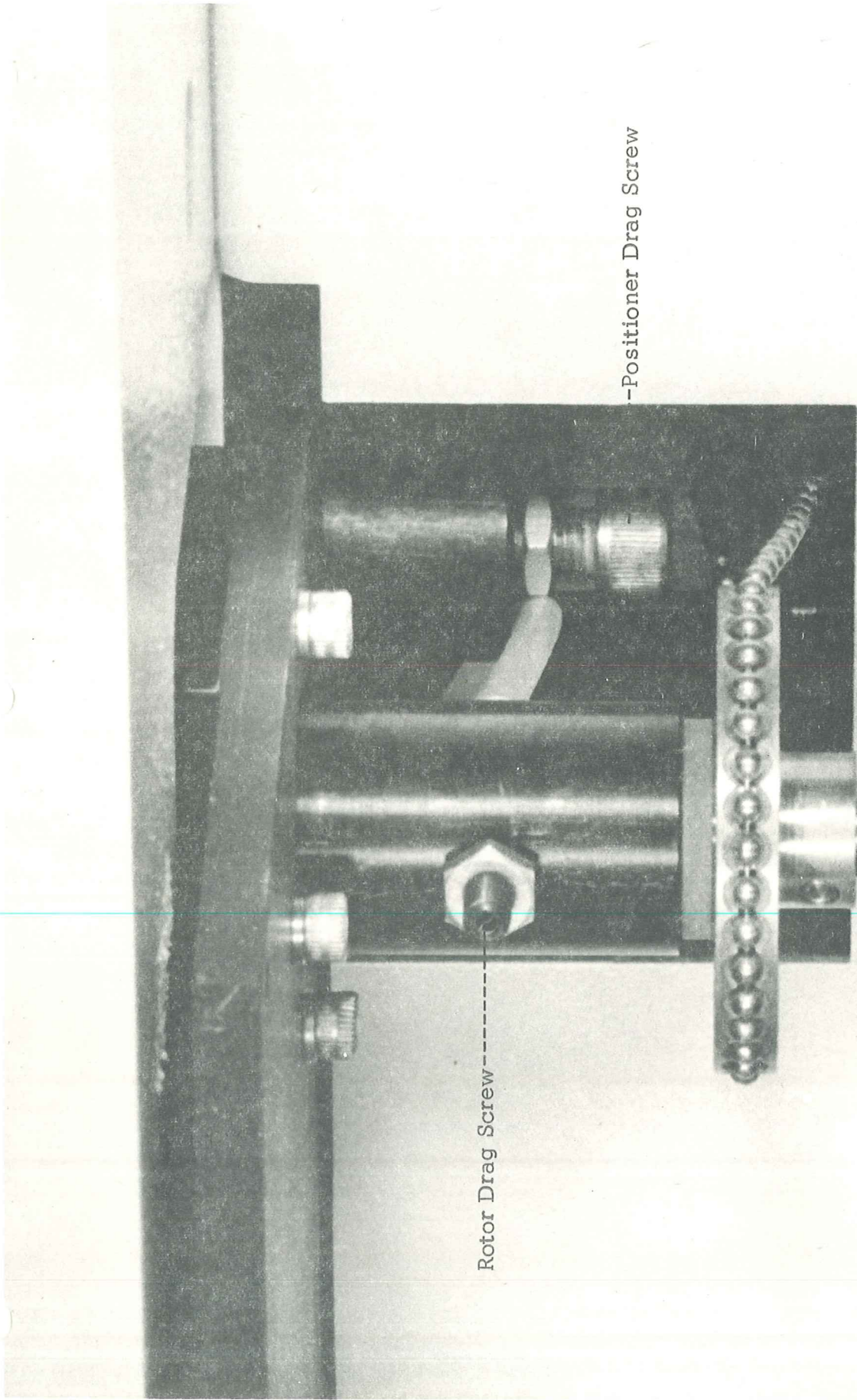
Loop adjust
screw

workstage height
lock screw

2.50"
work height

RIES INC.
Massachusetts

FIGURE #5

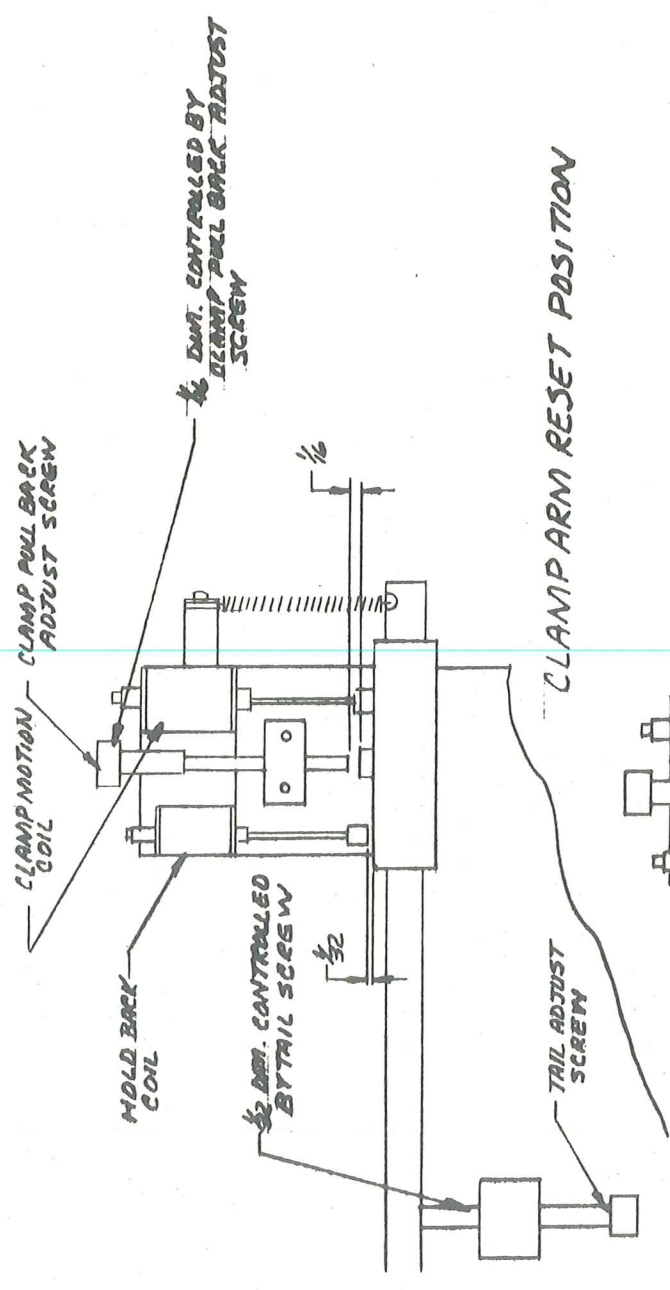


Rotor Drag Screw

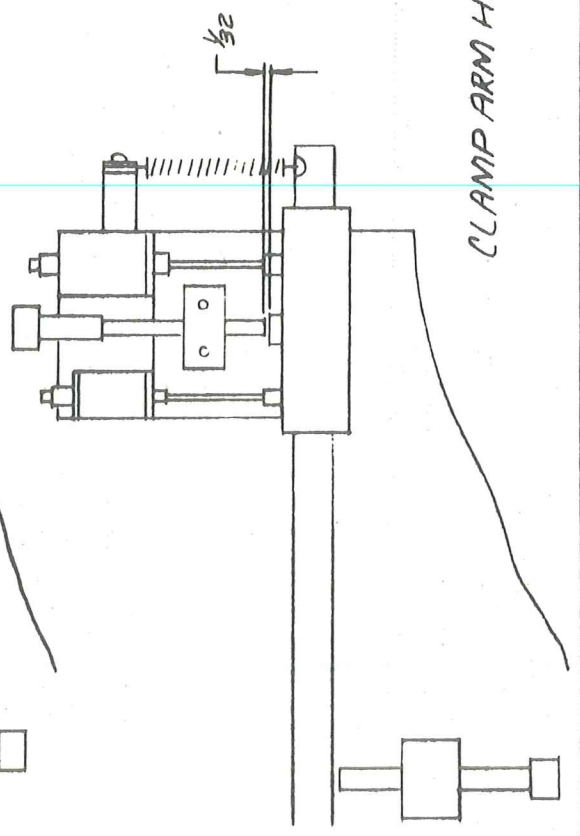
--Positioner Drag Screw

FIGURE #6

DATE	REVISION	RECORD	APPROVED	CEL



CLAMP ARM RESET POSITION

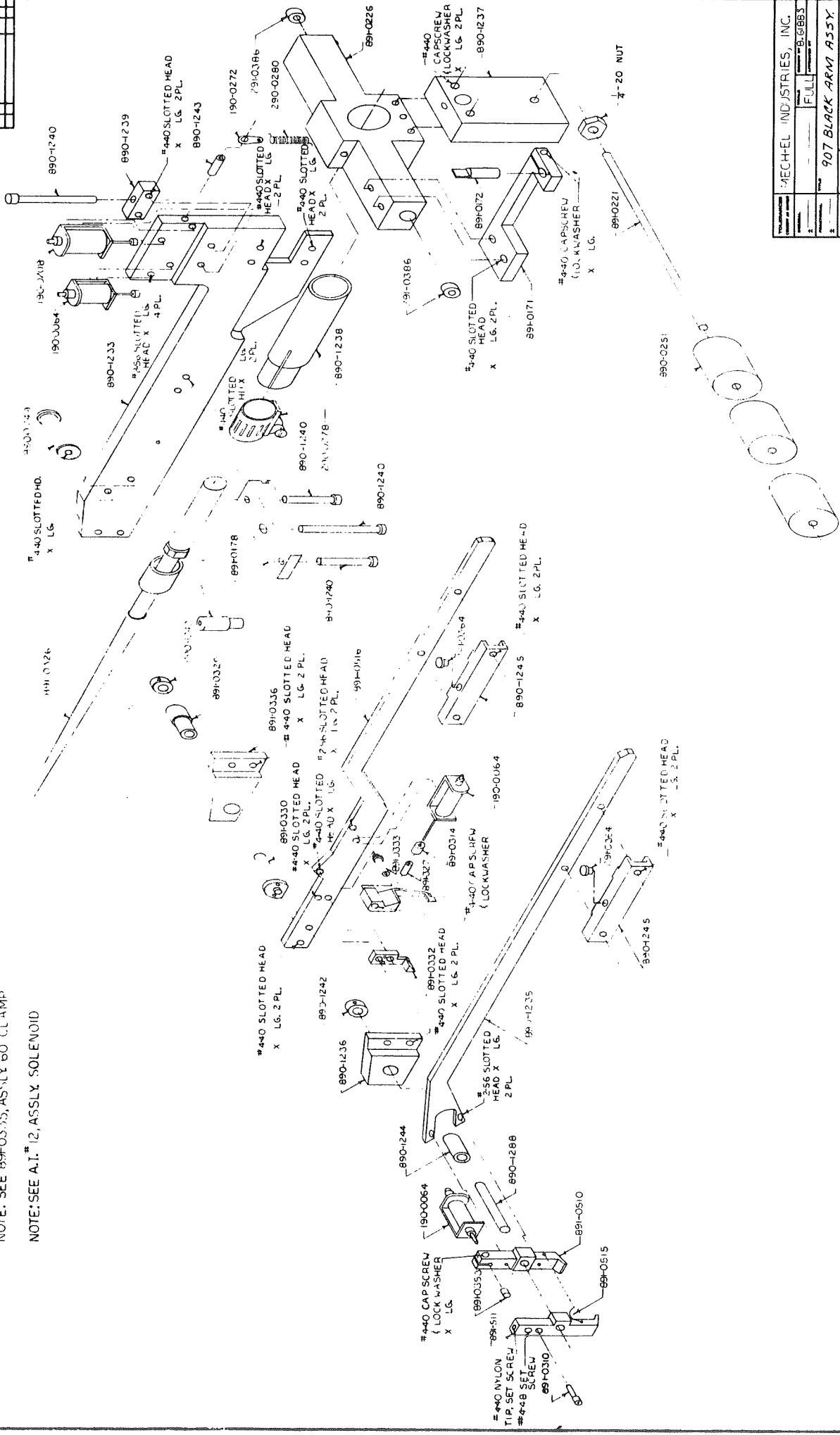


CLAMP ARM HOLD BACK POSITION

TOLERANCES (UNLESS OTHERWISE SPECIFIED)	MECH-EL INDUSTRIES INC	
GENERAL	SCALE	DRAWN BY T.B.
±	—	APPROVED BY
FUNCTIONAL	TITLE	
±	RESET POSITION OF CLAMP ARM	
ANGULAR	DATE	DRAWING NUMBER
±	6-10-76	A.I. 36

NOTE: SEE 89H-03.75, ASSEMBLY SOLENOID CLAMP

NOTE: SEE A.I. #12, ASSEMBLY SOLENOID

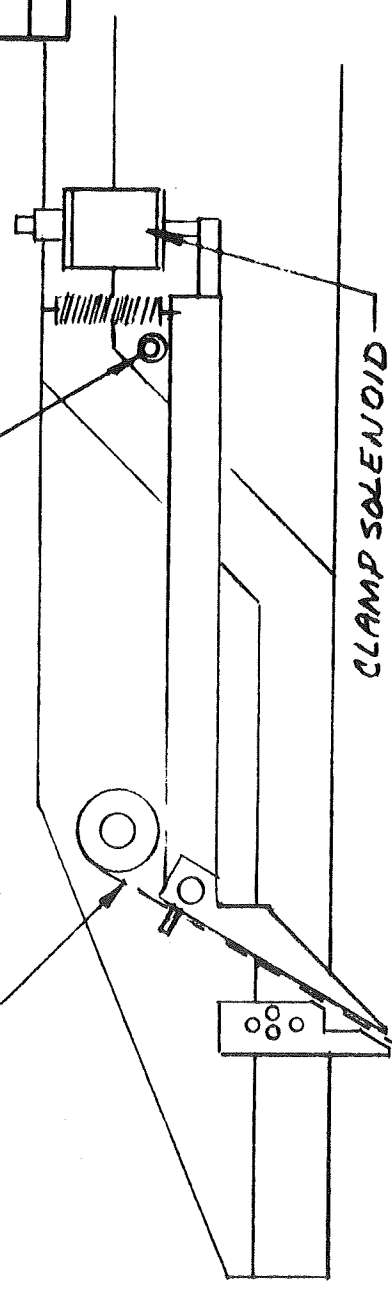


MECHEL INDUSTRIES, INC.	
Part No.	89H-03.75
Rev.	1
Quantity	1
Material	STAINLESS STEEL
Finish	POLISHED
Notes	SEE A.I. #12, ASSEMBLY SOLENOID
Drawn By	J. J. GIBBS
Checked By	
Approved By	
Project No.	907 BLACK ARM ASSY.
Sheet No.	A.I. 42

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.

CLAMP OPENING
ADJ.

WIRE

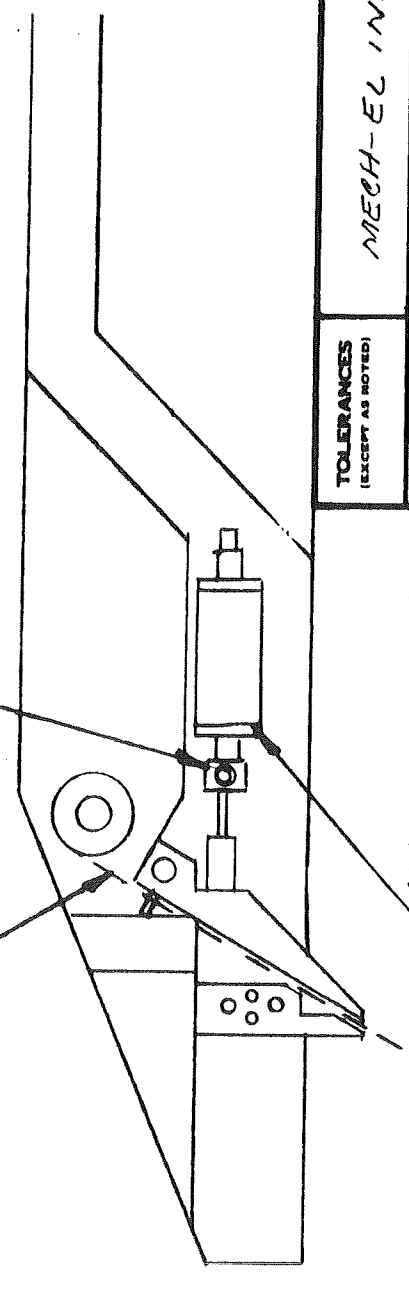


CLAMP SOLENOID

HEAVY RIBBON 60°

WIRE

CLAMP OPENING ADJ.

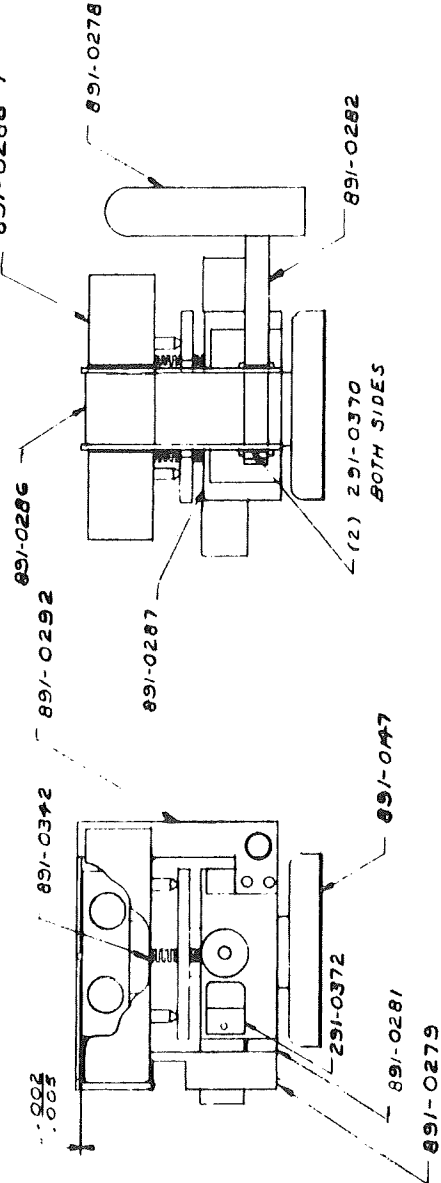
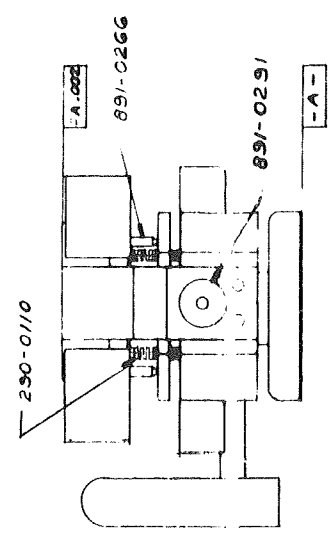
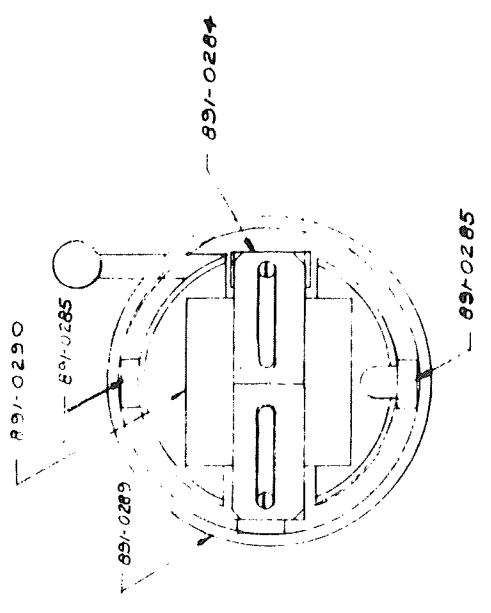


CLAMP SOLENOID

STANDARD RIBBON 60°

TOLERANCES (EXCEPT AS NOTED)		MECH-EL INDUSTRIES INC.	
DECIMAL	±	SCALE	—
FRACTIONAL	±	DRAWN BY	TBEATKE
ANGULAR	±	APPROVED BY	
		TITLE	
		60° FEED	
		DATE	DRAWING NUMBER
		6-11-76	A.I. 37

DATE	BY	REVISION



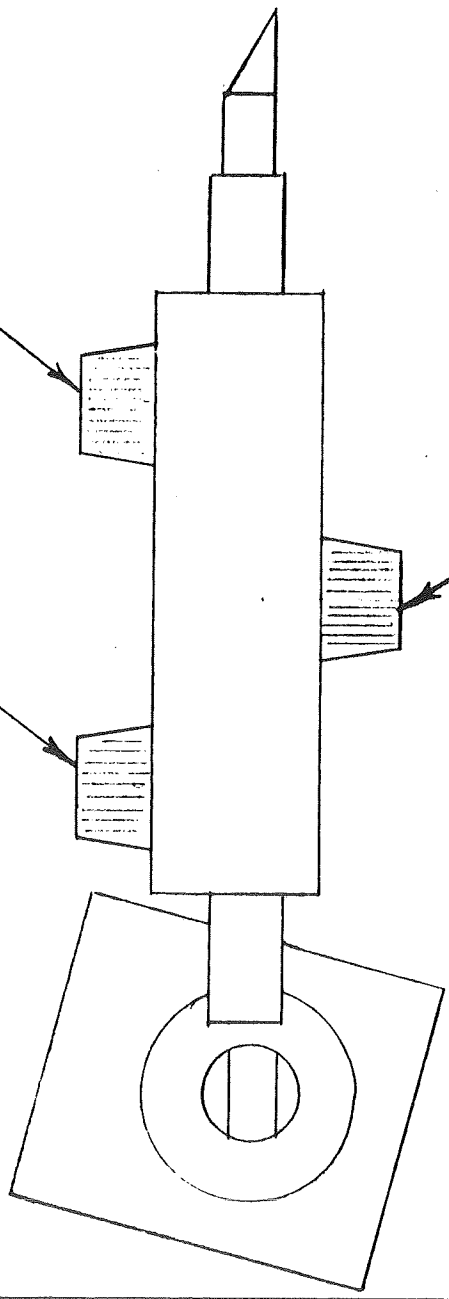
DESIGNED BY	DATE
DRAWN BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
TITLE	SCALE
PROJECT	NO.
REV.	DESCRIPTION
1	ISSUED FOR FABRICATION
2	ISSUED FOR ASSEMBLY
3	ISSUED FOR TESTING
4	ISSUED FOR SERVICE

MECRO-EL INDUSTRIES INC.
 291-0370
 ASSEMBLY CLAMP
 3-FEB-75
 AI 94

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.

FRONT TO BACK

LEFT TO RIGHT



LOCK SCREW

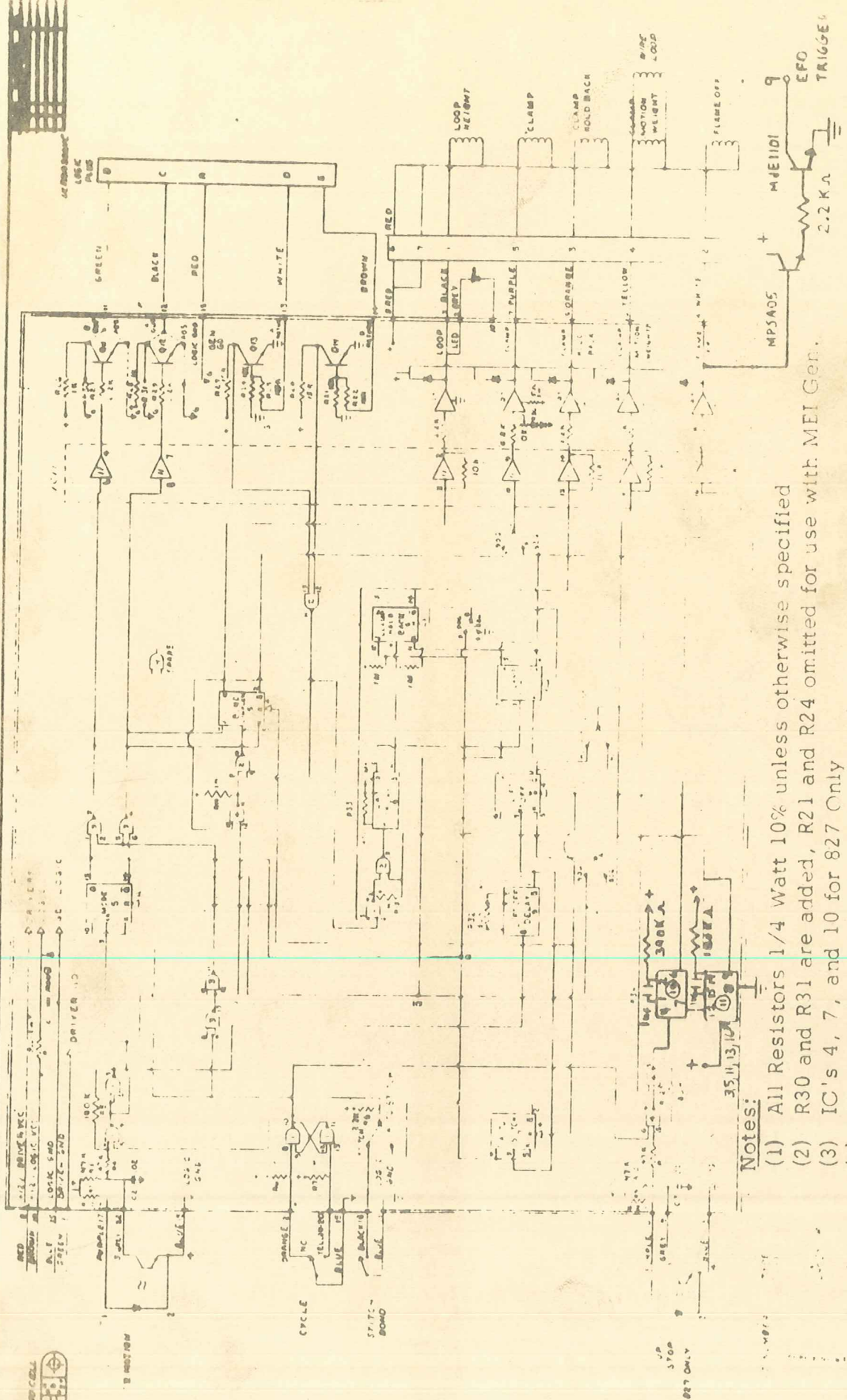
TOLERANCES (EXCEPT AS NOTED)		MECH-EL INDUSTRIES INC	
DECIMAL	±	SCALE	—
FRACTIONAL	±	DRAWN BY	TB
ANGULAR	±	APPROVED BY	
TITLE		SPOT LIGHT ADJUSTMENT	
DATE	6-11-76	DRAWING NUMBER	9I 91

SPARE PARTS LIST
TU-907

<u>Part No.</u>	<u>Description</u>	<u>Quantity</u>
190-0012	Switch	1
190-0032	3-Amp Fuse	1
190-0064	Solenoid SP-37	2
190-0089	Fluorescent Light Bulb W-31	1
190-0090	Fluorescent Light Transformer	1
190-0208	Solenoid SP-50	1
190-0229	Switchcraft Switch	1
190-0234	Photocell	1
191-0324	1/2 Amp Fuse	2
191-0326	LED	1
290-0280	Spring	1
890-1240	Adjust Screw	2
	2-56 Set Screw 1/16" long	2
<u>Lower Positioner Bearing and Rod Assembly:</u>		
291-0323	Spherical Bearing	1
891-0121	Guide Motion Rod	1
<u>Middle Positioner Bearing:</u>		
291-0323	Spherical Bearing	1
<u>Upper Positioner Bearing and Rod Assembly:</u>		
291-0322	Spherical Bearing	1
891-0122	Rod Motion	1

SPARE PARTS LIST
TU-907

<u>Part No.</u>	<u>Description</u>	<u>Quantity</u>
<u>Logic Board Components:</u>		
190-0204	Transistor #GPS-A05	2
191-0327	I.C. #CD4011	2
191-0328	I.C. #CD4027	2
191-0329	I.C. #CD4047	2
191-0330	I.C. #CD3082	1
191-0331	Transistor MJE 1101	2
<u>Heat Card Components for Machine with Heated Work Station:</u>		
190-0158	I.C. #U6B 7739393	1
190-0293	Triac #SC45B GE	1
190-0360	Heater	1
190-0361	Thermocouple	1
<u>Parts Listed Below are for Export and/or Multiple Orders:</u>		
390-0190	Logic Card	1
<u>For TU-907 with Heated Work Station</u>		
390-0041	Heat Card	1
190-0036	25AT UTI Transducer	1
190-0273	5 Watt UTI Generator	1
390-0188	MEI Power Supply Card	1



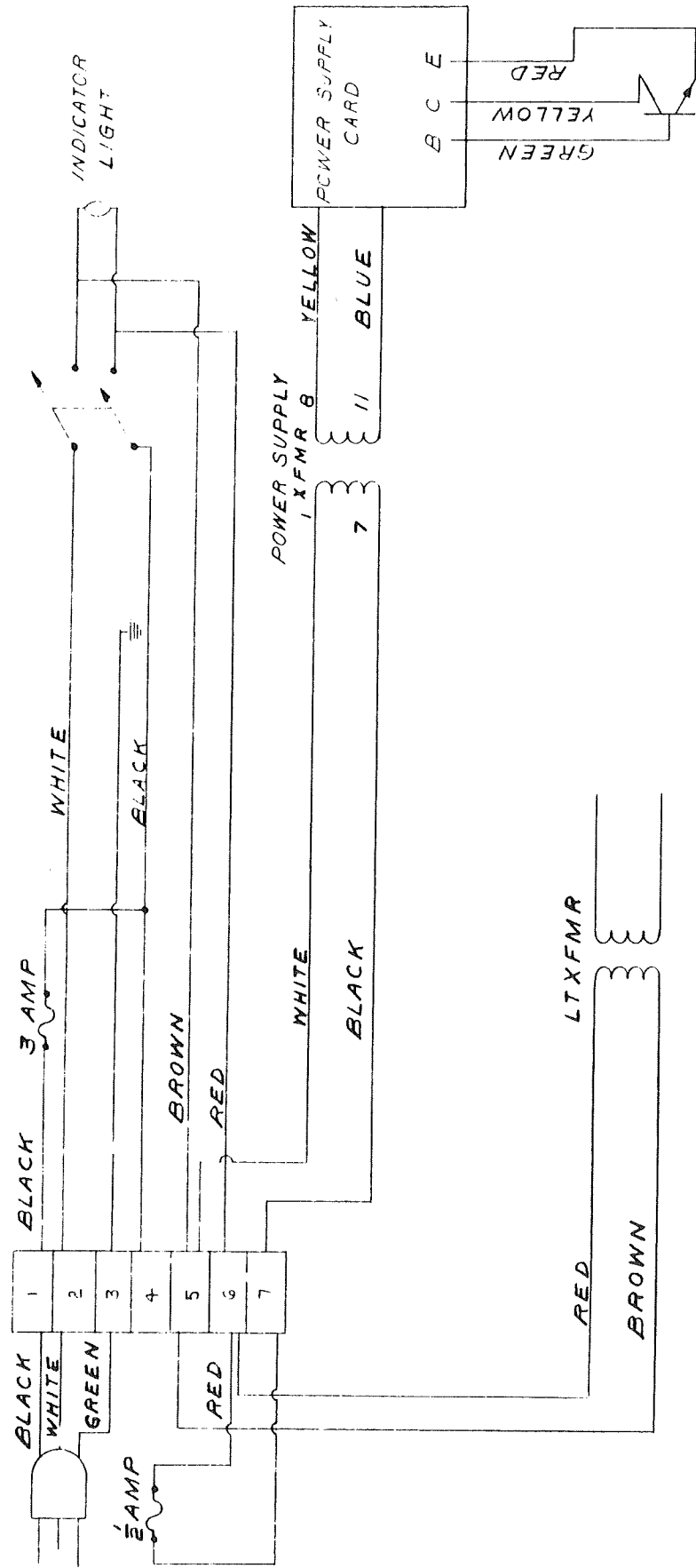
Notes:

- (1) All Resistors 1/4 Watt 10% unless otherwise specified
- (2) R30 and R31 are added, R21 and R24 omitted for use with MEI Gen.
- (3) IC's 4, 7, and 10 for 827 Only
- (4) Q4 for 827 Only
- (5) Q3, 4, 5, 6 and 7 are MJE 1101S
- (6) Q13, 14, 11 and 12 are GPS A05S

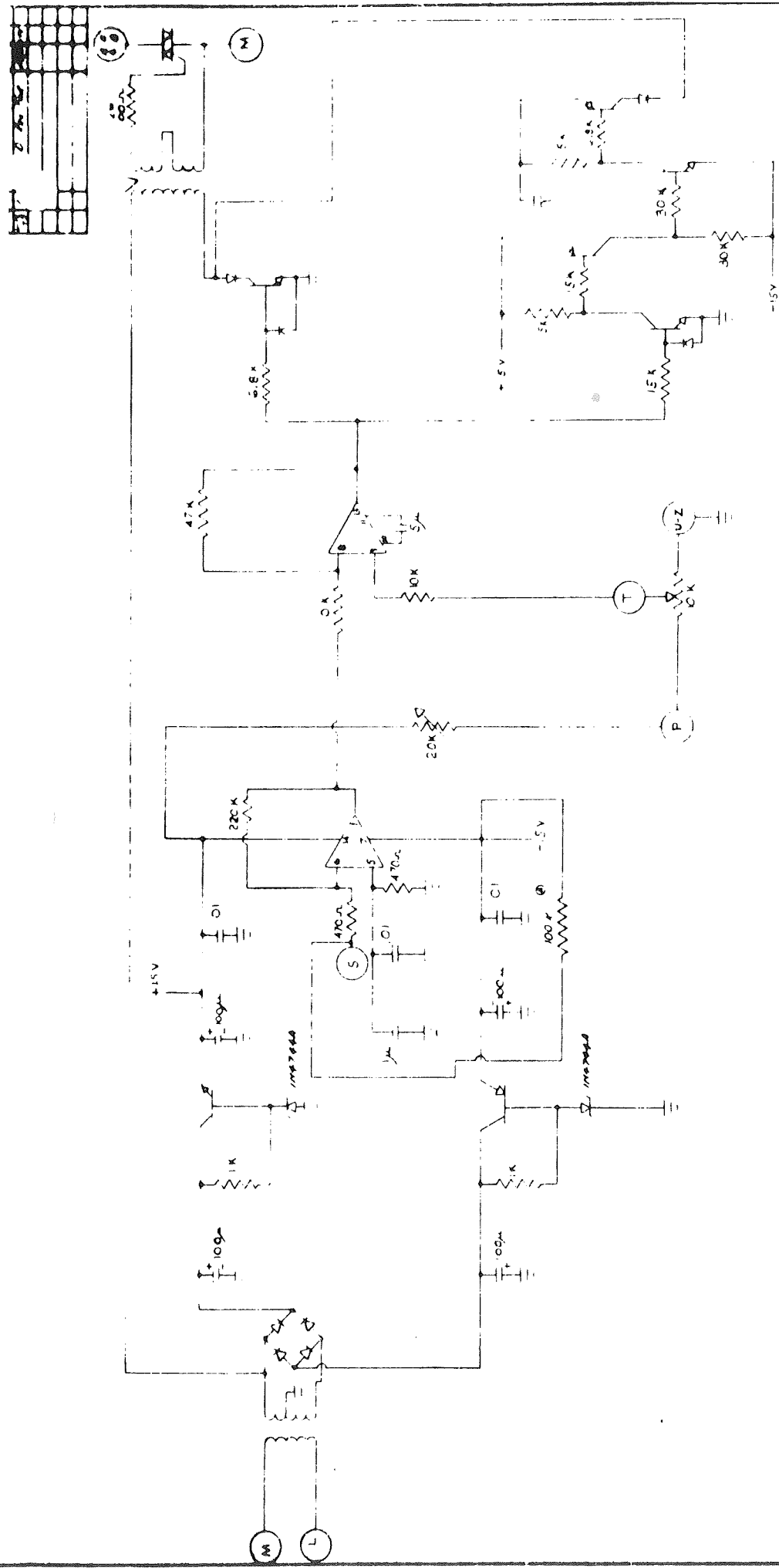
LOC 17
 870908
 1000

DATE	6/1/507
DESIGNER	
DRW	
CHECKED	
APPROVED	
MELCH ELECTRONICS	
1000 10 6-0018	

DATE	BY	REVISION RECORD	AUTH.	DR.	CK.



MECH-EL INDUSTRIES INC.	
TOLERANCES (EXCEPT AS NOTED)	SCALE
DECIMAL ±	DRAWN BY B. GIBBS
FRACTIONAL ±	APPROVED BY M.K. 12
ANGULAR ±	TITLE 907 AC WIRING
DATE 3 DEC. 74	DRAWING NUMBER E-0023

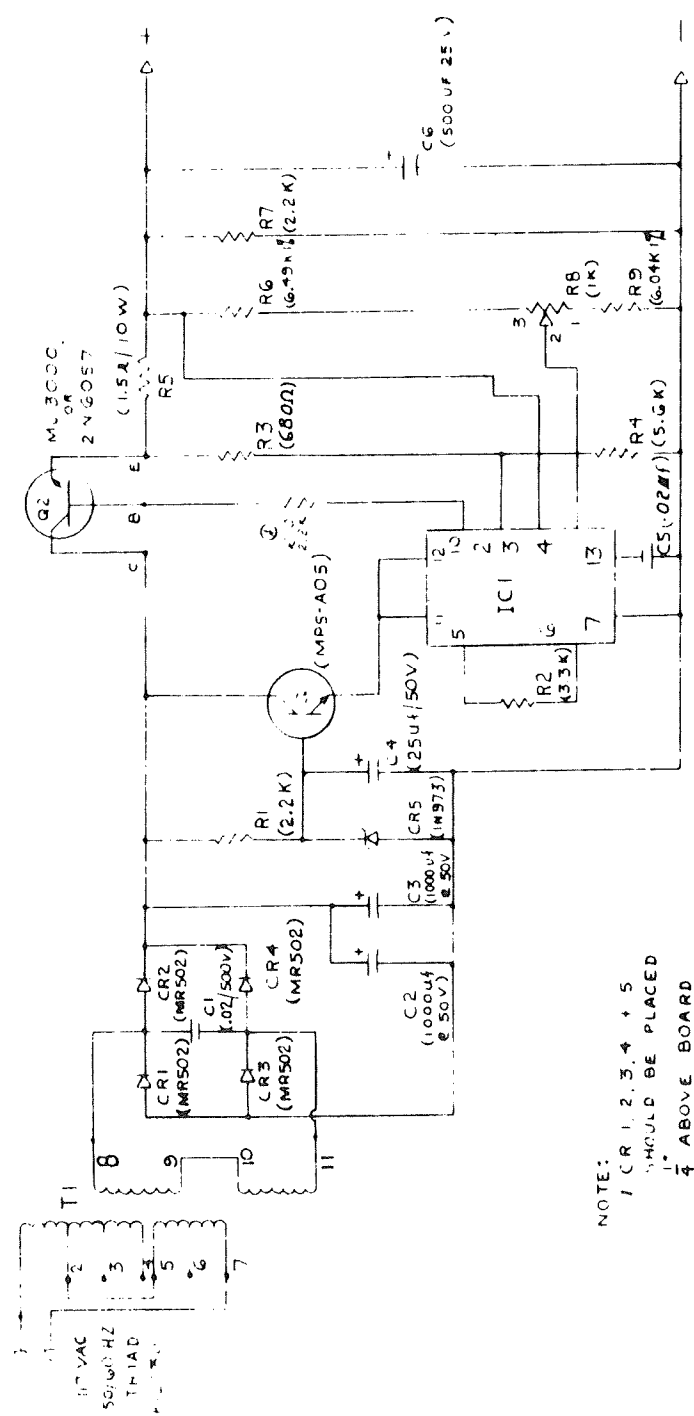


NOTE :

- ALL PNP TRANSISTORS GPS A55
- ALL NPN TRANSISTORS GPS A05
- IC μ6B-7739393
- DIODES ARE 1N4002

MECH-EL INDUSTRIES INC			
DESIGNED BY	REVISED BY	DATE	BY
2	NONE	9 MAR 73	A
TITLE		HEAT CARD SCHEMATIC	
2	E-0026		

REV	DATE	BY	CHKD
1	10/10/74	J. H. GIBBS	
2	11/10/74	J. H. GIBBS	
3	11/10/74	J. H. GIBBS	
4	11/10/74	J. H. GIBBS	
5	11/10/74	J. H. GIBBS	
6	11/10/74	J. H. GIBBS	
7	11/10/74	J. H. GIBBS	
8	11/10/74	J. H. GIBBS	
9	11/10/74	J. H. GIBBS	
10	11/10/74	J. H. GIBBS	
11	11/10/74	J. H. GIBBS	
12	11/10/74	J. H. GIBBS	
13	11/10/74	J. H. GIBBS	
14	11/10/74	J. H. GIBBS	
15	11/10/74	J. H. GIBBS	
16	11/10/74	J. H. GIBBS	
17	11/10/74	J. H. GIBBS	
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19	11/10/74	J. H. GIBBS	
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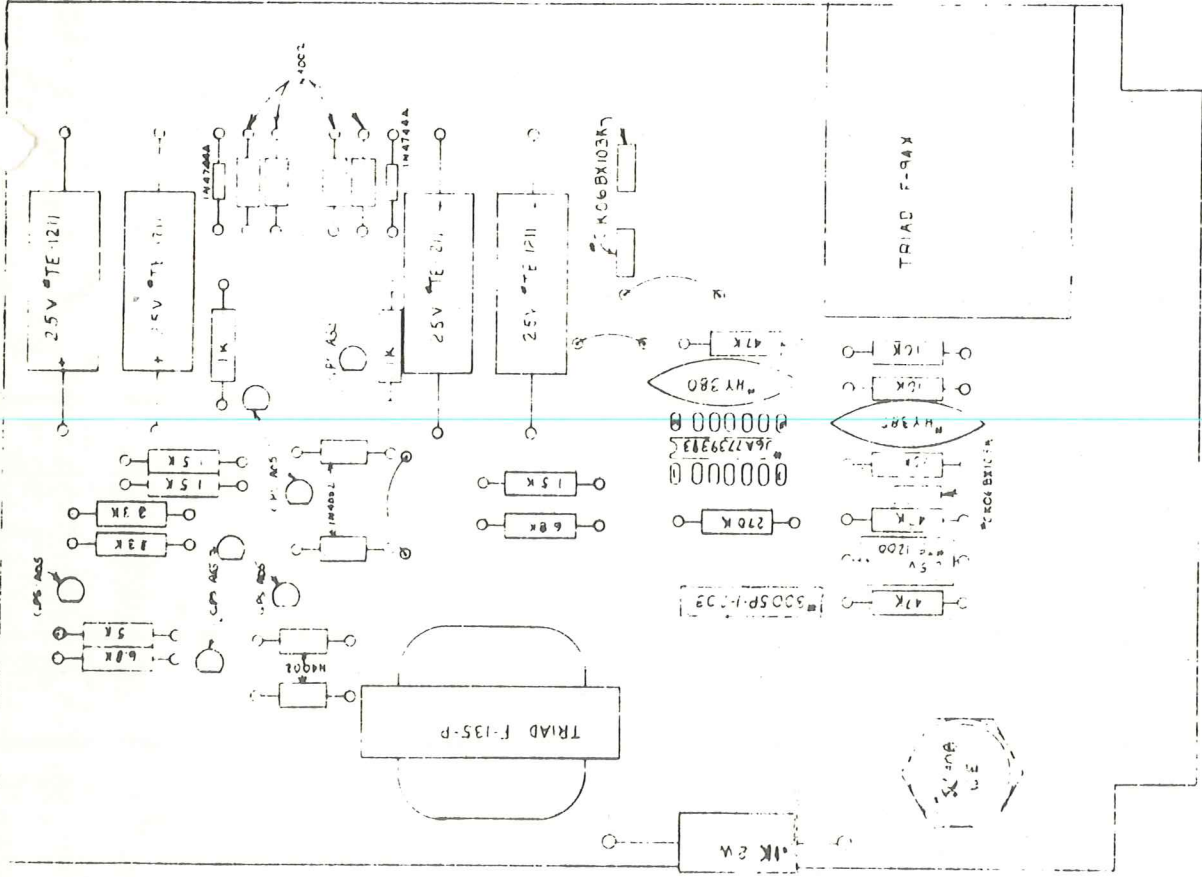


NOTE:
 1 CR 1, 2, 3, 4 + 5
 SHOULD BE PLACED
 1" ABOVE BOARD
 2 FOR 12 V OUTPUT
 RC SHOULD BE
 51K

TOLERANCES UNLESS OTHERWISE SPECIFIED		MECH-EL INDUSTRIES INC.	
RESISTORS	1%	DATE	23 JULY 74
CAPACITORS	5%	DESIGN NUMBER	E-0017
INDUCTORS	5%	REV	A
TRANSISTORS	5%	TITLE 15 V POWER SUPPLY	
DIODES	5%	DESIGNED BY J. H. GIBBS	
RELAYS	5%	APPROVED BY J. H. GIBBS	



NOTE
CIRCUIT SOCKET # 14 DIP



TOLERANCES (UNLESS OTHERWISE SPECIFIED)	MECHEL INDUSTRIES INC		
SCALE	2:1	DRAWN BY	AG
PARTS LIST	TEMPERATURE CONTROL BOARD		
DATE	6 APR 73	DESIGNED BY	390-0041