

MEI1204 SERIES WIRE BONDER

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DRAWINGS

DESCRIPTION

NUMBER PAGE

Positioner Assembly	A.I. 25
Workstage	A.I. 34
Wire Clamp Assembly	395-0147
Dual Weight Electronic	390-0647
Damper Assembly	390-0640

SCHEMATICS

LED Board	390-0682
Logic Card	390-0683-1
Connector Board	390-0684
Wiring Schematic	390-0688
AC/DC Schematic	390-0689
Solenoid and Switch Wiring	390-0690

MEI1204W WEDGE BONDER SPECIFICATIONS

Bonding processes	Ultrasonic using aluminum wire. Thermocompression or thermosonic wire bonding using gold wire
Wire sizes	.5 mil - 3 mil wire and ribbon. <i>1 mil Aluminum Wire 30° feed</i>
Wire feed	1/2" wire spool Optional 2" wire spool
Tip weight	15 - 150 grams
Bonding tool size	1/16" shank x .828 long <i>generic part# 2130 2525-1-C 2020-1</i>
Optional-Heated workstage	Digital heat control option will regulate temperature from ambient to 300°C +/- 0.5% (dependant upon application).
Ultrasonics	UTI 10G generator with 25PT transducer standard
Services	Electricity: 110-115VAC, 50/60 Hz, 5 amps or 220/240VAC, 50/60 Hz 2.5 amps Vacuum: 20 inches (510 mm) Hg minimum, if required Air: 40 PSI (280 kPa) minimum, if required
Dimensions	Length: 12.0" (30,5 cm) Width: 18.0" (45,7 cm) Height: 17.75" (45,1 cm) Weight: 50 pounds (23 kg)

Note: Exact dimensions are dependent upon the options on the machine.

SET-UP

Installation

1. Assemble the microscope and lights. Mount the microscope bracket to the one inch diameter black rod at the top of the machine. Tighten the two 10-32 set screws to secure the bracket. Place the scope in the bracket. Place the lenses in the microscope.
2. Plug in the machine and the generator. Plug in the generator logic connector (on the rear of the generator).
3. Place the workholder on the gross motion plate (below the transducer). Plug the heat stage into the 9 pin socket if equipped (located at the rear of the machine near the fuses). **CAUTION:** The heat controller power switch should be turned off before inserting the plug.
4. Turn the main power switch "on".
5. Push the generator power switch "on".
6. Set the temperature on the heat controller if equipped to the applicable setting.
7. Turn the workholder heat controller power switch "on".
8. In the transducer, place the appropriate bonding tool (.828" long) for wire size to be bonded. Use the tool height gauge to set the tool height, see appropriate print.
9. Check the transducer position. The front center of the transducer should line up with the bottom of the black arm at left.

NOTE: Transducer position is factory set. It should not need to be re-adjusted unless moved by shipping or accident (see the transducer alignment procedure for detailed set-up).

10. For the 1/2" spool, place the wire spool on the holder. The wire feeds off the top of the spool and threads through the appropriate hole in the transducer for wire angle between the clamps and through the tool.

NOTE: After threading the machine, pull the wire through the tool and check that the wire feeds smoothly off the spool.

11. Check that the generator tunes. Press the test button to check that the green LED comes on.
12. Loosen the set screw on the side of the workholder. Adjust the set screw located in pedestal, turning screw clockwise will raise the workholder, turning screw counterclockwise will lower the workholder. Adjust to 4.268" (use the tool height gauge) from the bottom of the workholder to bonding surface. One turn of the adjust screw equals approximately 1/32".
13. Set the weight. (see the section on the weight set-up). With workholder in place, lower Z lever all the way down so that the tool is touching the work surface. Measure the gram force necessary to pick the tool up off the work surface.

CHECK LIST

When the bonder does not function properly, go through the check list below.

1. The machine cycles properly with the positioner the Z lever (if not, see troubleshooting).
2. Check that all the solenoids function properly (see operation sequence page 26).
3. Is the workstage at correct height and temperature (see set-up).
4. Generator tunes properly (see set-up or generator manual). Press the tune button and the green LED should turn on.
5. Are the weights set properly (see set-up).
6. Is the tool impression proper (if not, see transducer alignment instructions).
7. Check that the power and time (generator settings) are properly set for device being bonded (see visual check).
8. Is the machine is threaded properly with no excess drag or tension on the wire (see set-up pages 54&55).
9. If the problem persists, change the tool and try a known good substrate.

BONDING ADJUSTMENTS

Once the machine has been checked out and you are familiar with the bonding procedure, there are several adjustments to optimize speed and quality of the bonds.

TAIL ADJUST

The tail adjust screw sets the tail length. It is desirable to keep the tail size between .5X and 2X the wire diameter.

To adjust: Turn the tail screw counter clockwise (unscrewing) will increase the tail length and clockwise will decrease the tail length.

NOTE: This is a sensitive adjustment. 1/8 turn of the tail screw should be a noticeable change in tail length.

CONTROLS AND INDICATORS

Manual Operation, Using Z-arm Control

The Z arm allows the operator to have direct control of the up and down motion of the machine during the bonding process. The Z-arm gives the operator multi-level bonding capabilities for more flexibility in complex applications without changing any settings on the machine. The Z-arm allows more precise control over bond placement, loop height and other process controls for demanding applications (see front view). The Z-arm is located on the lower right side of the machine.

Operation

1. Load the workstage with a part to be bonded and check that it is set to the correct height, using the tool height gauge provided.
2. While looking through the microscope, position the part to make the first bond using the micropositioner. Lower the Z-arm until the bonding tool contacts the part. Continue all the way down with the Z-arm to cycle the machine. Once the ultrasonics have fired, raise the Z-arm.
3. Move the part to make the second bond, using the micropositioner. Lower the Z-arm again, which will trigger the ultrasonics at the end of its stroke.

The Z-arm triggers the logic on the machine by using photocells located in the bottom of the machine. These photocells are factory set and should not need adjustment by users.

The operator should not use much force to move the Z-arm. Bond head speed is controlled by the speed knob, and is independent of the speed the Z-arm is moved. This provides a uniform force for bonding.

Semi-automatic Operation, Using Micropositioner Buttons

The silver button on the micropositioner ("cycle button") is used to operate the machine in semi-automatic mode. The procedure is as follows:

1. Set all bonding parameters, including workstage height, ultrasonic time and power, bonding weight(s), search heights, and workstage and tool temperatures (if applicable).
2. Press and hold the cycle button. The bond head will descend to the first search height. Using the micropositioner, move the part to the desired location for "A" bond. Adjust the A bond search knob for 5 to 10 mils above bonding surface.
3. When the "A" bond location is directly below the tool, release the button. This initiates the bonding sequence. The bond head will automatically rise to loop height at the end of this sequence. Adjust the loop knob for sufficient loop height normally 20 to 50 mils above highest bonding surface.
4. Use the micropositioner to move the part to the general location for the "B" bond. Press and hold the silver button again. This will lower the bond head to the second bond search height. Adjust the B bond search knob for 5 to 10 mils above the bonding surface.
5. When the "B" bond location is directly below the tool, release the button. This initiates the "B" bond bonding sequence. The bond head will automatically rise to reset height at the end of this sequence and feed the tail for the next "A" bond.

Reset Control Dial

The reset dial is located on the upper left side of the MEI 1204 series bonders. The purpose of this control is to adjust the height of the bonding tool at reset. This is the position of the bond arm after finishing the second bond. This height should be set high enough to easily load and unload parts from the workholder and clear all obstructions.

How to use the reset control dial

1. Turn the reset control dial clockwise. This will increase the number on the dial and will also increase the reset height. When the machine is in reset position, the clamp motion holdback and (optional) dual weight LED's should be lit.
2. Place the workstage that has been adjusted to the proper height by using the tool height gauge, under the bonding tool.
3. Increase the reset control dial so that the bonding tool clears everything on the workstage.
4. If the reset height cannot be moved high enough to clear all obstructions, follow calibration reset procedure.

Note: The reset control is preset at the factory and should not need any further calibration or adjustment. The following calibration procedure should be necessary only if the height cannot be adjusted properly.

5. The reset control is calibrated for the use of .828" bonding wedge for the MEI1204W.

Calibration Procedure

1. Turn the machine on and put the tool height gauge under the bonding tool which is installed in the transducer. (Use the tool height gauge to install the bonding tool).
2. While looking through the microscope, turn the reset dial until the bonding tool touches the appropriate level on the tool height gauge.
3. At this point, remove the reset dial, make sure not to turn the dial.
4. With the dial removed, set the dial to 0.
5. Place the dial back on the machine, make sure not to turn the dial. The reset dial is now calibrated so that 0 is the bonding height.

"A" Bond Search Height Control Dial

The "A" search height dial is located on the upper left side of the MEI 1204 series bonders. This control is only in effect while using the semi-automatic (push button) bonding feature. When the silver push button is depressed, the bond head will descend from reset height to "A bond" search height so that the operator can accurately target the position for the "A" bond.

How to use the "A" Bond Search Height Control Dial

1. Adjust the workstage to the correct height using the tool height gauge.
2. Press and hold the silver button on the positioner puck assembly. This will bring the bonding tool down to a search height. Check that the "A Search" L.E.D. is lit.
3. Turning the "A" search dial clockwise will increase the number on the dial, and will move the search height higher.
4. Adjust this dial until the bonding tool is 5 to 10 mils above the highest "A" bond location or your most common "A" bond level.
5. Release the silver button and the 1204 will make the "A" bond.

Note: The "A" Bond search height control is preset at the factory and should not need any further calibration or adjustment. The following calibration procedure should be necessary only if the height cannot be adjusted properly.

6. The "A" bond search height control is calibrated for use with a standard bonding wedge the MEI1204W. If a different sized tool is to be used, contact the factory.

Note: The machine may not cycle with the search height adjusted to zero.

"B" Bond Search Height Control Dial

The "B" search height dial is located on the upper left side of the MEI 1204 series bonders. This control is only in effect while using the semi-automatic (push button) bonding feature. When the silver push button is depressed, the bond head will descend from loop height to "B bond" search height so that the operator can accurately target the position for the "B" bond.

How to use the "B" Bond Search Height Control Dial

1. Adjust the workstage to the correct height using the tool height gauge.
2. Cycle the machine so that it is between "A" and "B" bonds. The loop solenoid LED should be lit. Press and hold the silver button on the positioner puck assembly. This will bring the bonding tool down to "B" search position. Check that the "B Search" L.E.D. is lit.
3. Turning the "B" search dial clockwise will increase the number on the dial, and will move the search height higher.
4. Adjust this dial until the bonding tool is 5 to 10 mils above the highest "B" bond location or your most common "B" bond level.
5. Release the silver button and the 1204 will make the "B" bond.

Note: The "B" Bond search height control is preset at the factory and should not need any further calibration or adjustment. The following calibration procedure should be necessary only if the height cannot be adjusted properly.

6. The "B" bond search height control is calibrated for use with a standard .828" wedge for the MEI1204W. If a different sized tool is to be used, contact the factory.

Note: The machine may not cycle with the search height adjusted to zero.

Calibration of "A" and "B" Bond Search Height Controls

1. Calibrate the "A" search height before the "B" search height. Place the tool height gauge under the bonding tool that is in the transducer. (Use the tool height gauge to install the tool).
2. Turn the machine on and push and hold the silver button on the positioner puck. This will allow the bonding tool to move down to the "A" search height. Adjust the "A" search dial while looking through the microscope until the bonding tool touches the correct level on the tool height gauge for the bonding tool.
3. When this process is complete, remove dial using the appropriate Allen wrench (do not move dial). Then, with the dial off the machine, adjust the dial to read 0.
4. Place the dial back on machine. Make sure not to turn the dial. Tighten the Allen screws. At this point, the "A" search dial is calibrated.
5. To calibrate the "B" search control, cycle the machine so that the hold back, loop, clamp, and solenoid LEDs are on.
6. Keep the tool height gauge under the bonding tool, push and hold the silver button on the positioner puck.
7. Look through the microscope, adjust the "B" search dial so that the bonding tool touches the appropriate level of the tool height gauge.
8. When this process is complete, remove the dial using the appropriate Allen wrench. With the dial off the machine, adjust the dial to read 0.
9. Place the dial back on the machine. Make sure not to turn the dial. Tighten the Allen screws. The "B" search control is now calibrated.

Dual Weight and Bond Force Weight Control Dials

All MEI1204W wedge bonders series machines can be supplied with dual weighting. This allows the bonder to use two different weights for either first or second bonds. The dual weighting is activated by depressing the foot switch provided, (note) when dual weight is activated the weight of the bond arm will always be lighter.

Adjustment of the Dual Weight and Bond Force Weight Control Dials

1. Cycle machine to the reset position (holdback, clamp motion, LED's will be lit). This will allow the operator to adjust the bond force to the desired gram force (10-160 grams). This weight must be adjusted before dual weight.

2. Turning the bond force dial clockwise will increase the number on the dial and increase the gram force applied to the bonds. To measure the bond force, lower the bond head using the Z arm until the transducer is resting on the tool height gauge. Take a gram gauge and lift the tip of the transducer until the bonding tool just lifts off the tool height gauge. The gram gauge reading is the actual weight used for the bonding.

3. Cycle the machine to the reset position (holdback, clamp motion LED's are lit). This will allow the operator to adjust the dual weight to the desired gram force. NOTE: Foot switch has to be depressed to adjust dual weight.

4. Turning the dual weight dial clockwise will increase the number on the dial and increase the gram force applied to the bond. To measure the bond force for the dual weight, press and hold foot switch. Lower the Z arm until the transducer is resting on the tool height gauge. Take a gram and lift the tip of the transducer until the bonding tool just lifts off the tool height gauge. The gram gauge reading is the actual weight used for the dual weight bond.

Calibration of Bond Force Weight Dial

1. Remove rear cover from the MEI1204W.
2. Turn the machine off. Turn the bond force dial counter clockwise until it stops turning.
3. Adjust the lower round weight to its correct position at the end of the weight rod. Place the tool height gauge under the transducer.
4. Using the Z arm, lower the bond arm until the transducer rests on the tool height gauge. Using a gram gauge, lift the bond head at the tip of the transducer. NOTE: The reading on the gram gauge. Adjust the round weight until the gram gauge reads 20 grams.
5. Lock the position of the round weight on the shaft using the nuts on the weight rod. Remove the bond force dial, make sure not to turn the dial.
6. With the dial off the machine, adjust the dial so that it reads 0. Put the dial back on the machine and make sure the number does not change.
7. Once the bond force calibration is complete, if your machine has dual weight option, we can calibrate the dual weight dial.
8. Turn the dual weight dial all the way counter clockwise until it stops turning.
9. Remove the dual weight dial, make sure not to turn the dial.
10. With the dial off the machine, adjust it so that the dial reads 0. Put the dual weight dial back on the machine, making sure the dial does not turn. This dial is now calibrated. The range of the weight for dual weight will be approximately 10 to 110 grams with 0 on dial the lightest. The dual weight setting can never be heavier than the bond force setting.

Speed Control Dial

The speed control dial is located on the upper right side of the MEI-1204 series bonders. This dial controls the speed (velocity) of the bonding tool as it moves up or down. The speed dial is connected by a flexible cable to the damper assembly located at the rear of the machine.

Adjustment of the Speed Control

1. Turn the dial clockwise (increase the number), this will decrease the downward velocity of the bond head.
2. Turn the dial counterclockwise (decrease the number), this will increase the downward velocity of the bond head.
3. Too much dampening will cause contact sensor failure, which will cause the machine to cycle improperly. In this case, the machine will either cycle to second bond before the first bond is made, or refuse to cycle at all.
4. Too little dampening will cause smashed bonds and tool bounce.

Note: Zero on the dial is calibrated at the factory to be the slowest damper speed possible.

Adjustment of Damper Speed

1. Adjust the speed control to 15 (slowest downward velocity). In half-turn increments, keep cycling the machine while watching the bond tool. When the bond head begins to bounce as it comes to the search height, note the speed setting. Back off one full turn from this. This is the fastest speed possible for this weight setting. For example, bounce is first noticed at a setting of 6.5. Move the control to 7.5. A particular application may require a slower speed than this maximum (i.e., a setting of 8 or 9). The speed setting is a function of weight, changing the weight will effect damper speed but damper speed will not effect the weight.

Calibration of the Speed Dial

1. Turn the speed dial clockwise until the mechanical limit is reached.
2. Remove the dial from the machine, make sure that the dial does not move.
3. With the dial off the machine, set the dial so that it reads 0.
4. Put the speed dial back on the machine, make sure that it does not move during this step. The speed dial is now calibrated.

Loop Control Dial

The loop control dial is located on the upper left side of the MEI-1204 series machines. This knob controls the height of the bonding tool between first and second bonds. This distance determines the loop height of the bond.

Use of the loop control

1. Check that the workstage is at the correct height using the tool height gauge. Adjust this height as necessary, so that the surface to be bonded is at the proper height.
2. With a part to be bonded on the workstage, make an "A" bond using either the push button or Z-arm.
3. At this point, the loop LED should be lit. Adjust the loop height by turning the loop control dial. Turn the loop dial clockwise (increase the number) to increase the loop height. Look through the microscope, adjust the loop height as required for the application.
4. The loop height should only be adjusted while the loop LED is lit. If the loop height does not change while the LED is lit, perform the calibration procedure below.

The loop height is calibrated at the factory, and should not normally need adjustment. For MEI1204W series bonders, the loop height is calibrated for use with a .828 wedge. If a different sized tool is to be used, consult the factory.

Calibration of the Loop Dial

1. Turn the machine on. Place the tool height gauge under the bonding tool which is installed in the transducer.
2. Cycle the machine so the Clamp, Loop and Holdback Solenoid LEDs are lit.
3. Look through the microscope, adjust the loop dial so that the bonding tool touches the correct level on the tool height gauge for that length tool.
4. Remove the loop dial using the appropriate Spline Allen Wrench. Be careful not to move the dial.
5. After the dial is removed, adjust it to read 0.
6. Put the dial back on the machine and tighten the set screws, make sure the dial does not turn during this step. The loop dial is now calibrated.

Heated Workstage Controls (Option)

There are two controls for heated workstages, both located at the far right of the upper control panel. The on/off switch turns the controller on, and a digital controller with an LED readout accurately regulates the heat supplied. The digital display indicates the temperature; by depressing the asterisk key, the setpoint temperature is displayed. Both temperatures are displayed in degrees Centigrade.

To change the setpoint temperature, depress and hold the asterisk key. While this key is depressed, use the up arrow or down arrow keys to adjust the setpoint.

A small square LED located above the up arrow key lights up when the heater elements are turned on. Heat is provided by two 50 watt heater elements in the workholder.

Solenoid Indicator LEDs

The purpose of the solenoid indicator LED display located on the upper left side of the machine is to indicate which solenoids are on at a particular state in the machine's logic cycle. The solenoid indicators will help in trouble shooting if the machine is not cycling properly.

When the LED is lit, that particular solenoid is energized. If the LED does not light when that function is on, a logic problem may exist.

Note: The LED indicators will not tell if a solenoid is shorted or faulty.

The following charts shows the correct solenoid operation sequence.

SOLENOID OPERATION WITH Z LEVER

ARM POSITION

<u>Solenoid</u>	<u>Reset</u>	<u>First Bond</u>	<u>Loop</u>	<u>Second Bond</u>	<u>Reset</u>
Arm Down	Off	Off	Off	Off	Off
First Search	Off	Off	Off	Off	Off
Second Search	Off	Off	Off	Off	Off
Loop	Off	Turns On	On	Turns Off	Off
Clamp	Off	Turns On	On	Turns Off	Off
Clamp Holdback	ON	On	On	Turns Off	Turns Off
Clamp Motion	On	On	Turns Off Off		Turns On

SOLENOID OPERATION WITH PUSH BUTTONS

ARM POSITION

<u>Solenoid</u>	<u>Reset</u>	<u>First Search</u>	<u>Loop</u>	<u>Second Search</u>	<u>Second Bond</u>	<u>Reset</u>
Arm Down	Off	On	Off	ON	On	Off
First Search	Off	On	Off	Off	Off	Off
Second Search	Off	Off	Off	On	Off	Off
Loop	Off	Off	Turns On	On	Turns Off	Off
Clamp	Off	On	Turns On	On	Turns Off Off	Off
Clamp Holdback	On	On	On	On	Turns Off	Turns On
Clamp Motion	On	On	Turns Off Off	Off	Off	Turns On

Stitch Bonding Button (Optional)

If the machine has stitch bonding capability, there will be a black button on the micropositioner. This button allows the machine to make more than one stitch bond. This feature operates in both manual ("Z-arm") mode and semi-automatic ("push-button") mode.

Stitch bonding operates the same in both modes. Make the first bond following normal procedure. When the machine is at loop height, depress and hold the black stitch bond button. The machine will continue to make second bonds while the button is depressed. Release the button before making the last "B" bond. The machine will automatically terminate the wire after this last "B" bond.

Tool Heat Control Knob (Optional)

This knob controls the voltage supplied to heater elements to heat the bonding tool. This heater element is usually located inside the transducer (called a heated transducer), but may also be a mini-heater that wraps around the bonding tool. This control, a rotary dial, is located on the upper control panel, to the right of the microscope mount. A tool heater is recommended for gold wire applications that have a limited workstage temperature. A workstage temperature of 150° C is recommended; if the application restricts the temperature to less than this, tool heat is recommended.

Workstage Height Control

Proper workstage height is a critical part of proper setup of the machine. To adjust the workstage to the proper height, perform the following procedure.

1. Place the tool height gauge beside the workstage on the machine's positioner plate (See figures 1&2).
2. Put a part to be bonded on the workstage and clamp it in position, using either the mechanical clamps or vacuum, depending upon your workholder.
3. Use a straight edge and measure from the appropriate level on the tool height gauge to the lowest bonding surface on the part to be bonded. The two heights need to be made identical.
4. To adjust the workstage, loosen the 10/32 set screw on the side of the workstage. Then adjust the 10/32 set screw on the pedestal so that the two surfaces are at the identical height.
5. Tighten the 10/32 set screw on the side of the workstage to fix it at the proper height.

Ultrasonic Power and Time Controls

The ultrasonic generator is divided into two channels, first bond and second bond. Each channel has a power setting and a time setting. The power setting controls how much power is applied to the bonding tip. The time controls how long the power is applied (in milliseconds).

For 1 mil wire, start with settings of 3 power and 3 time for both channels. Adjust power and time settings for good bonds.

NOTE: For 1 mil gold wire, acceptable bonding should take place between power and time settings of 2 through 5. If the settings are above 5, increase weight for that bond (whether it is first or second bond). If settings are less than 2, decrease the weight setting for that bond until acceptable bonds are made in the power and time range. This range applies generally for 1 mil bonding. If the application is difficult, it may be necessary to bond above a setting of 5.

ASSEMBLIES

Up/down Solenoid

The up/down solenoid on the MEI 1204 series bonders allows the bond head to move up or down when using the push buttons for bonding. When the up/down solenoid is energized, the shaft will push up, allowing the bond head to descend. When the solenoid is de-energized, a spring will pull the shaft down, which in turn raises the bond head to either loop or reset position. The loop and reset positions are controlled by the loop and reset dials located on the upper left side of the machine.

Note: The up/down solenoid is preset at the factory and should not need any further calibration or adjustment. The following calibration procedure should only be necessary if you are replacing the solenoid.

Calibration Procedure

1. With the machine turned on, loosen the clamp collar on the up/down solenoid shaft. This is located in the right rear of the machine.
2. After the clamp collar is loosened, the bond head will drop down. Make sure that a bonding tool is installed in the transducer. Use the tool height gauge to make sure the tool is installed at the proper height.
3. Place the tool height gauge under the bonding tool. Make sure the tool is resting on the appropriate level of the gauge.
4. Turn the ultrasonic generator off. With the bonding tool resting on the correct level, press and release the silver button on the micropositioner puck. Adjust the clamp collar so there is a 0.125" (3,18 mm) space from the bottom of the collar to the red rubber on the bracket. Tighten the 4/40 cap screw on the collar and turn the generator on. Cycle the machine to reset position.

Wire Clamp Assembly (1204W Wedge Bonder series)

The wire clamp assembly on the MEI1204W is a two part assembly. The fixed portion of the clamp is mounted on the clamp arm, using two 25 recap screws. The clamp solenoid also mounts to this part of the clamp assembly. The second part is the removable clamp, which has a sapphire clamp pad mounted to it.

Adjustment

1. To adjust the clamp pressure on the MEI1204W series machines refer to drawing. Cycle machine until it is in the reset position. Clamp motion, Hold back and dual weight (optional) LED's are lit. Thread bonding wire through the clamp assembly on the removable half of the of the clamp assembly, there are two curled plastic knobs. The larger of these knobs adjust the clamp pressure. Clockwise will decrease pressure, counter clockwise will increase pressure. The smaller knurled knob is only used to remove and install the clamp.

Z-Arm Assembly

The Z arm lets the operator have direct control of the up and down motion of the machine during the bonding process. The Z-arm gives the operator multi-level bonding capabilities more complex applications without changing any settings on the machine. The Z-arm is located on the lower right side of the machine.

Operation

1. Load the workstage with a part to be bonded and check to make sure that it is set to the correct height, using the tool height gauge provided.
2. While looking through the microscope, position the part to make the first bond using the micropositioner. Lower the Z-arm until the bonding tool contacts the part. Continue down with the Z-arm to cycle the machine. Once the ultrasonics have fired, raise the Z-arm.
3. Move the part to make the second bond, using the micropositioner. Lower the Z-arm again, which will trigger the ultrasonics at the end of its stroke.

The Z-arm triggers the logic on the machine by using photocells located in the bottom of the machine. These photocells are factory set and should not need adjustment by users.

The operator should not use much force to move the Z-arm. Bond head speed is controlled by the damper, and is independent of the speed the Z-arm is moved. This provides a uniform force for bonding.

Electronic Dual Weight Assembly (OPTIONAL)

The electronic dual weight on the MEI-1204 is used to engage an additional counterweight to the weighting mechanism. This additional counterweight is engaged when the foot switch is depressed. When the foot switch is released the dual weight solenoid de-energizes, taking the additional counterweight out the mechanics of the weighting system. The weight on the second bond will therefore be heavier. The foot switch can activate the dual weight on the first bond or the second bond per customer application needs.

Adjustment

1. Remove the two front panels. The dual weight solenoid is located just under the transducer.
2. Loosen the two 8/32 cap screws above the dual weight solenoid.
3. With the machine on and ready to make the first bond, press the foot switch. Move the dual weight solenoid until the plunger is firmly against the stainless steel plate, and tighten the screws.
4. Lower the Z-arm to make sure that the plunger engages and disengages the stainless steel plate. If not, re-adjust the solenoid.
5. Replace the two front panels.

ELECTRONIC DUAL WEIGHT

CHECK-OUT

1. Remove the white front panel held in place by magnets. Depress the foot switch, the dual weight solenoid (made visible by removing this cover) should be energized, compressing the metal plate against the rubber pad. This compression engages the dual weight arm (for lighter bond).
2. Release the foot switch, the solenoid should de-energize and the dual weight arm should be disengaged.

NOTE: The dual weight assembly is factory set and should not need adjusting.

TRANSDUCER ALIGNMENT PROCEDURE

1. Bring base of transducer flush with front of mounting collar. Snug transducer clamp. If machine is equipped with a heated transducer, the base of transducer should be extended approximately 1/8" forward of the mount.
2. Install a 1/16" dowel in transducer in place of bonding tool. Use a straight edge and line up the dowel by loosening the transducer clamp. Line up transducer so wire will feed through the center of the clamps and through the bonding tool in a straight line.

TO REMOVE AND INSTALL TRANSDUCER HORN OR HEATED TIP (TIP OPTIONAL)

1. Loosen transducer clamp and slide transducer out the back of the machine. Disconnect transducer wires.
2. Slide new transducer in through front. Reconnect transducer wires (observe polarity for 10G generator transducers).

GENERAL TROUBLESHOOTING

NO POWER

- | | |
|-------------------|-----------------------------|
| 1. Blown fuse. | 1. Replace defective fuses. |
| 2. Line cord out. | 2. Plug in line cord. |

MACHINES DOES NOT CYCLE WITH CYCLE BUTTON. LIGHT REMAINS "ON" OR "OFF"

- | | |
|---|--|
| 1. Logic card unplugged. | 1. Check all logic card connectors. Make sure connectors are firmly seated on logic card. |
| 2. Cycle button defective. | 2. Replace cycle button. In positioner puck. |
| 3. Power supply defective. | 3. Check wiring for shorts or opens. Check for 12 volts D.C. on the logic card. If power supply is defective, replace. |
| 4. Generator "off" or generator fuse bad. | 4. Turn on generator, or replace bad fuse. |
| 5. Generator logic plug out. | 5. Plug 25 pin male into 25 pin female rear of generator. Check for loose wires on generator logic plug. |

MACHINE CYCLES FIRST BOND. LOOP LED ON, LOOP LED STAYS ON WHEN CYCLE BUTTON IS PRESSED.

- | | |
|-------------------------|---|
| 1. Generator defective. | 1. Consult factory for further information. |
|-------------------------|---|

**MACHINE CYCLES WITH BUTTON BUT
CLAMPS DO NOT CLOSE**

- | | | | |
|----|-------------------------|----|---|
| 1. | Clamp pressure too low. | 1. | Adjust large knurled knob on removable half of clamp. Refer to wire clamp assembly. |
| 2. | Clamp solenoid bad. | 2. | Check continuity with ohmmeter. Approximately 50 ohms resistance. |

**CLAMPS CLOSE BUT DO
NOT DROP**

- | | | | |
|----|---|----|--|
| 1. | Bad Clamp Motion solenoid | 1. | Check continuity with ohm meter for approximately 50 ohms of resistance. |
| 2. | Tail adjust screw to low | 2. | Tail adjust screw should be set for approximately 0.030" between top of tail adjust screw and bottom of clamp arm when machine is at reset position. |
| 3. | Solenoid shaft lodged between clamp arm and bond arm. | 3. | Visually inspect solenoid mounted in rear of main bonding arm. Nylon plunger should be sitting on top of clamp motion arm. |

**MACHINE CYCLES PROPERLY WITH CYCLE
BUTTON BUT DOES NOT CYCLE WITH Z
LEVER**

- | | |
|--|--|
| 1. Workstage too low. | 1. Adjust workstage height to 4.267" from base to bonding surface. |
| 2. Z lever photocells not adjusted properly. | 2. Check logic board for proper signals. |

WORKSTAGE DOES NOT HEAT UP

- | | |
|------------------------------|--|
| 1. Heat switch not "on". | 1. Check heat "on/off" switch. |
| 2. Thermocouple open. | 2. Check thermocouple for an open with ohm meter. Pins C and H on workholder plug. |
| 3. Heater open. | 3. Check heaters for an open with ohm meter. Pins A-E on workholder plug. |
| 4. Workstage not plugged in. | 4. Check workholder plug. |
| 5. Fuse blown. | 5. Check fuse in rear of machine. |

ELECTRONIC DUAL WEIGHT DOES NOT WORK

- | | | | |
|----|----------------------------------|----|--|
| 1. | Solenoid not "on". | 1. | Check coil wires for open. Check for voltage change on pin 1 of 22 pin connector. |
| 2. | Solenoid "on" but not holding. | 2. | Adjust solenoid by loosening two screws that are on solenoid mount and move away from or closer to clutch pad until solenoid holds weight. |
| 3. | Dual weight arm plate has moved. | 3. | Shut off machine and slide dual weight arm between solenoid plunger and clutch pad. |

WORKSTAGE THERMAL RUN AWAY

1. Thermocouple shorted.
2. Defective controller.

1. Check for shorted thermocouple.
2. Consult factory.

1 ST BOND DOES NOT STICK

1. Power or time too low.
2. Weight too low.
3. Ball too large.
4. Movement of device during bonding.
5. Poor bonding surface.
6. Generator not tuning.
7. Wedge defective.
8. Generator defective.
9. Transducer defective.

1. Adjust time and power settings.
2. Adjust first bond weight to approximately 30g for 0.001" wire.
3. Adjust tail adjustment for approximately .5X the wire diameter.
4. Check device being bonded. Check clamps or vacuum.
5. Try a known good substrate.
6. Consult factory.
7. Replace.
8. See generator manual.
9. See generator manual.

TOO MUCH DEFORMATION ON 1 ST BOND

- | | |
|----------------------------|--|
| 1. Power or time too high. | 1. Decrease power and/or time on Channel "A". |
| 2. Weight too high. | 2. Check and adjust if necessary. |
| 3. Loop height too low. | 3. Check loop height. After bond is made, release Z lever. Adjust loop adjustment so wedge is approximately 0.020" above the bond. |

POOR LOOPING WIRE SAG

- | | |
|-------------------------------------|-------------------------------|
| 1. Loop height too high or too low. | 1. Adjust loop height. |
| 2. Improper wire. | 2. Try harder or softer wire. |

SECOND BOND DOES NOT STICK

- | | |
|--|---|
| 1. Not enough power, time or weight. | 1. Adjust time and power "B" channel. Adjust weight for approximately 30g for 1 mil wire. |
| 2. Generator not tuned. | 2. See generator manual. |
| 3. Wedge hanging up on uneven thick film material. | 3. Position second bond on top uneven metallization. |

4. Defective wedge.
5. Poor bonding surface.
6. Generator defective.
7. Transducer defective.

4. Visually inspect and replace if worn.
5. Try a known good substrate.
6. See generator manual.
7. See generator manual.

POSITIONER TOO LOOSE

1. Drag not set.

1. Screw 5/16 x 24 threads per inch cap screw up to increase drag.

SPARE PARTS LIST

MACHINE COMPONENTS

REV. 1- 3/15/91

PART NUMBER

DESCRIPTION

191-0592	Switch (Power) DPDT
190-0032	3 Amp Fuse (Heat Stage, EFO)
191-0532	5 Amp Fuse (Main Power)
190-0064	Solenoid SP-37 (Clamp)
190-0208	Solenoid SP-50 (Loop, Dual Weight, Clamp Arm)
195-0693	Fluorescent Light Bulb
191-0422	High Intensity Light Bulb
191-0596	Photocell
194-0079	LED Red (5V for 12V use with 680 OHM Resistor)
890-1269	Teflon Weight (2" Spool Only)
291-0323	Spherical Bearing Assembly
891-0121	(For Positioner)
292-0214	Clamp Spring

LOGIC CARD COMPONENTS**REV. 1-3/15/91**

194-0267	LM 308A
194-0279	LM 319
191-0405	I.C. 4098
191-0605	CD40106
191-0602	CD4081BE
191-0601	CD4071BE
191-0328	I.C. 4027
194-0056	CD4070
194-0258	ULN2004
194-0507	CD4001BE
190-0204	Transistor MPS A05
390-0683-2	Logic Card
191-0612	MAX636
191-0331	Transistor 2N6043

891-1958

Tool Height Gauge Figure 1

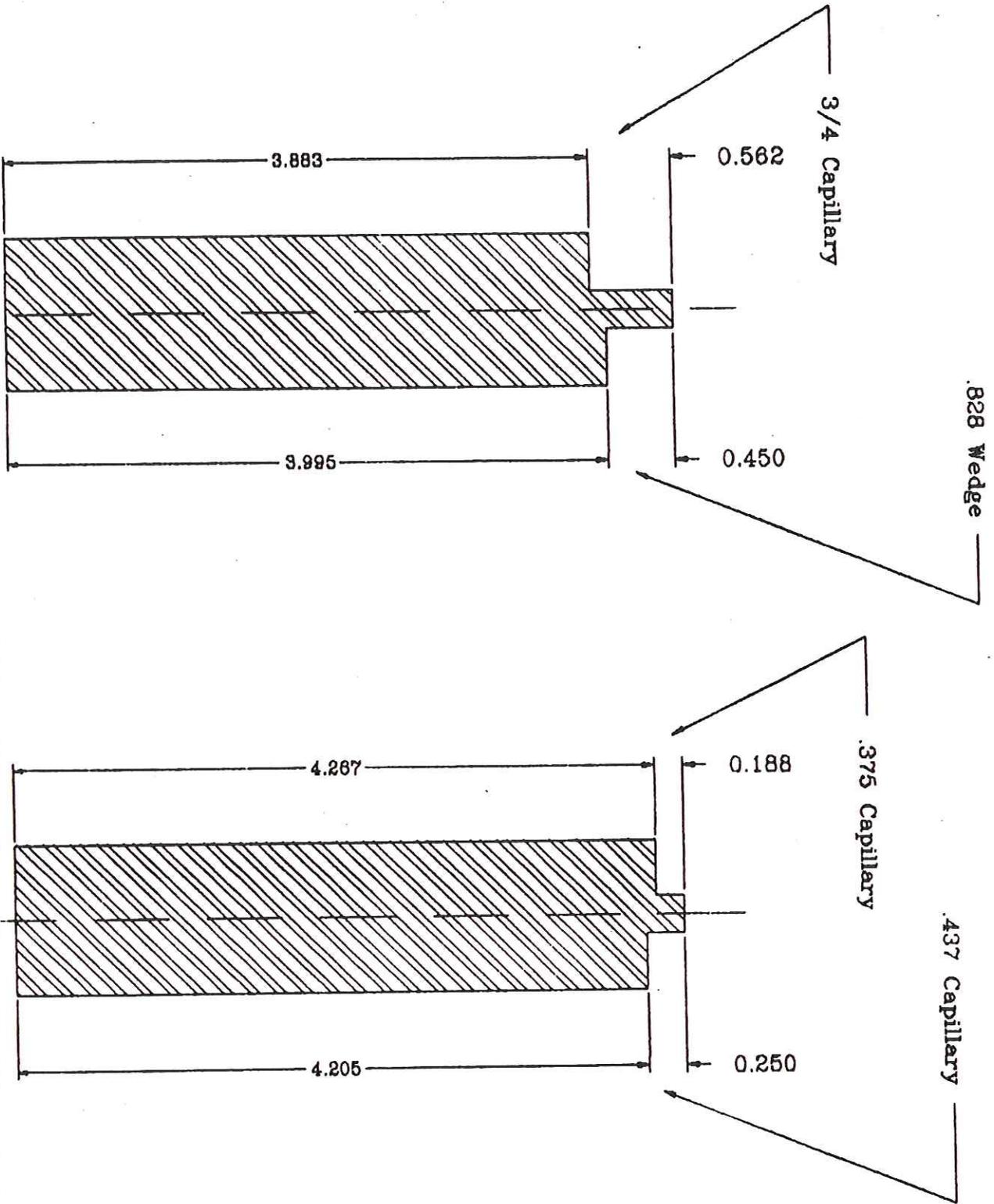
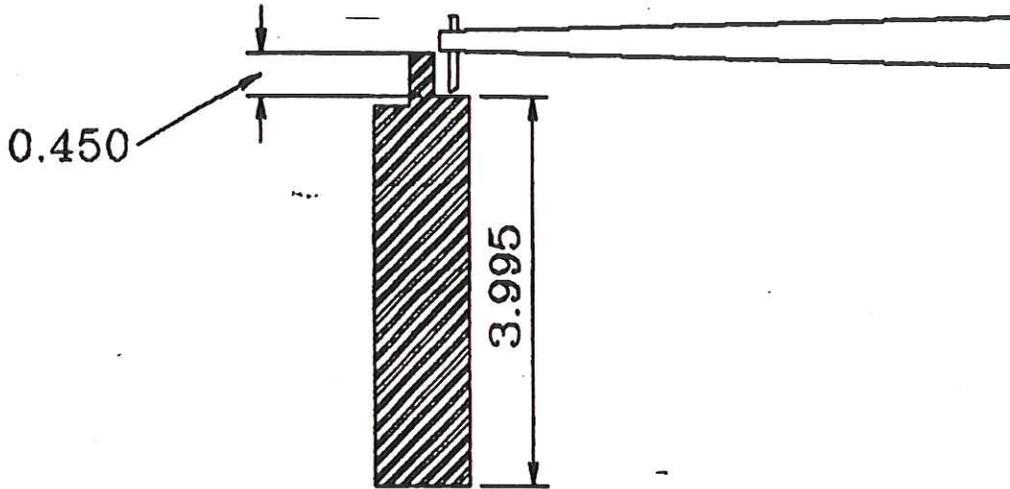
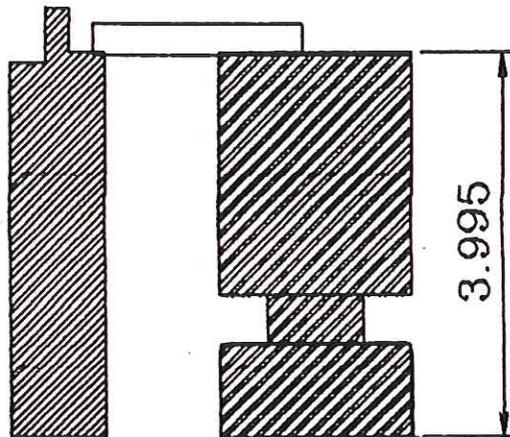


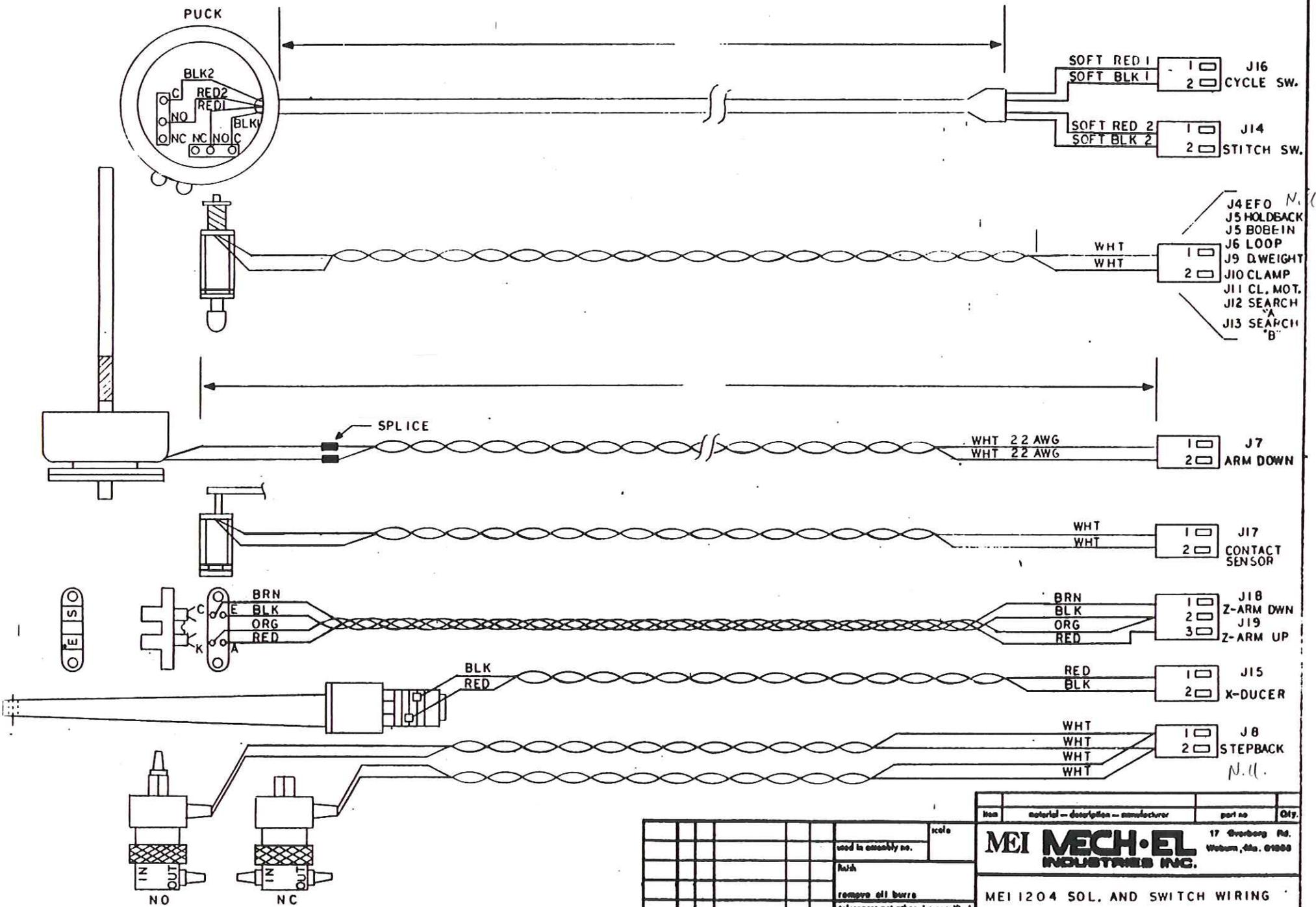
Figure 2



Install Bonding Tool



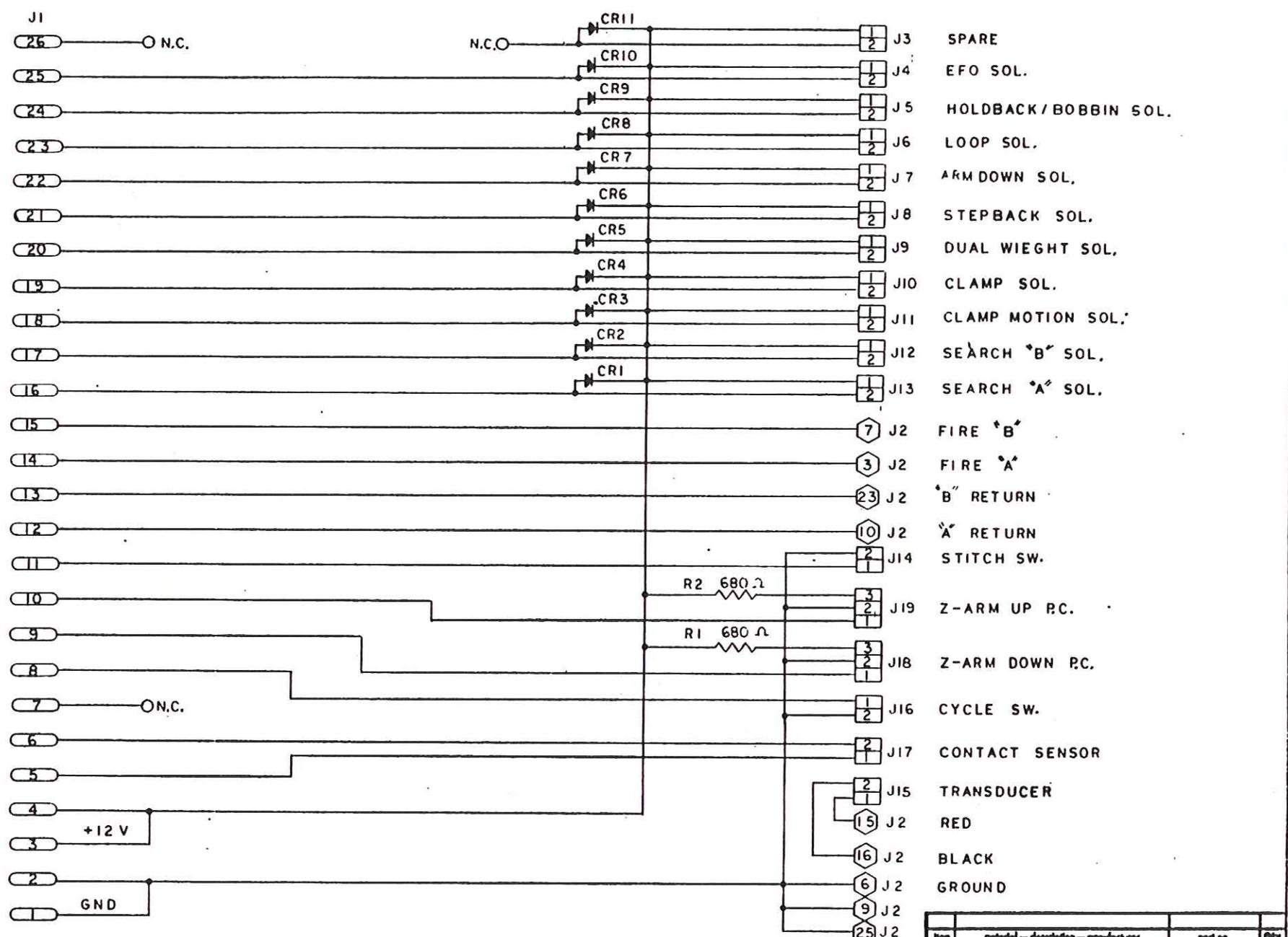
Set Workstage Height



mod	rev no.	change	app	date
O	A	REL.	JH	10/6

Item	material - description - manufacturer	part no	Qty.
17 Starborg Rd. Woburn, Mass. 01800			
MEI MECH-EL INDUSTRIES INC.			
MEI 1204 SOL. AND SWITCH WIRING			
dr	ch	eng	app
date	date	date	date
size C 390-0690			for A

N.I.

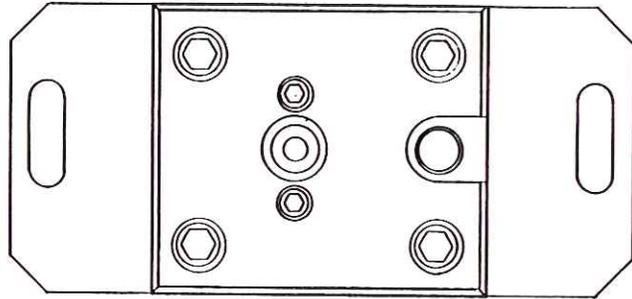


mod	rev no.	change	app	date	scale
					used in assembly no.
					finish
					remove all burrs
					tolerances not otherwise specified
					fractional ± 1/64
					diamet mm ± .01
					mm ± .005 surface
					angular ± 30' finish ✓

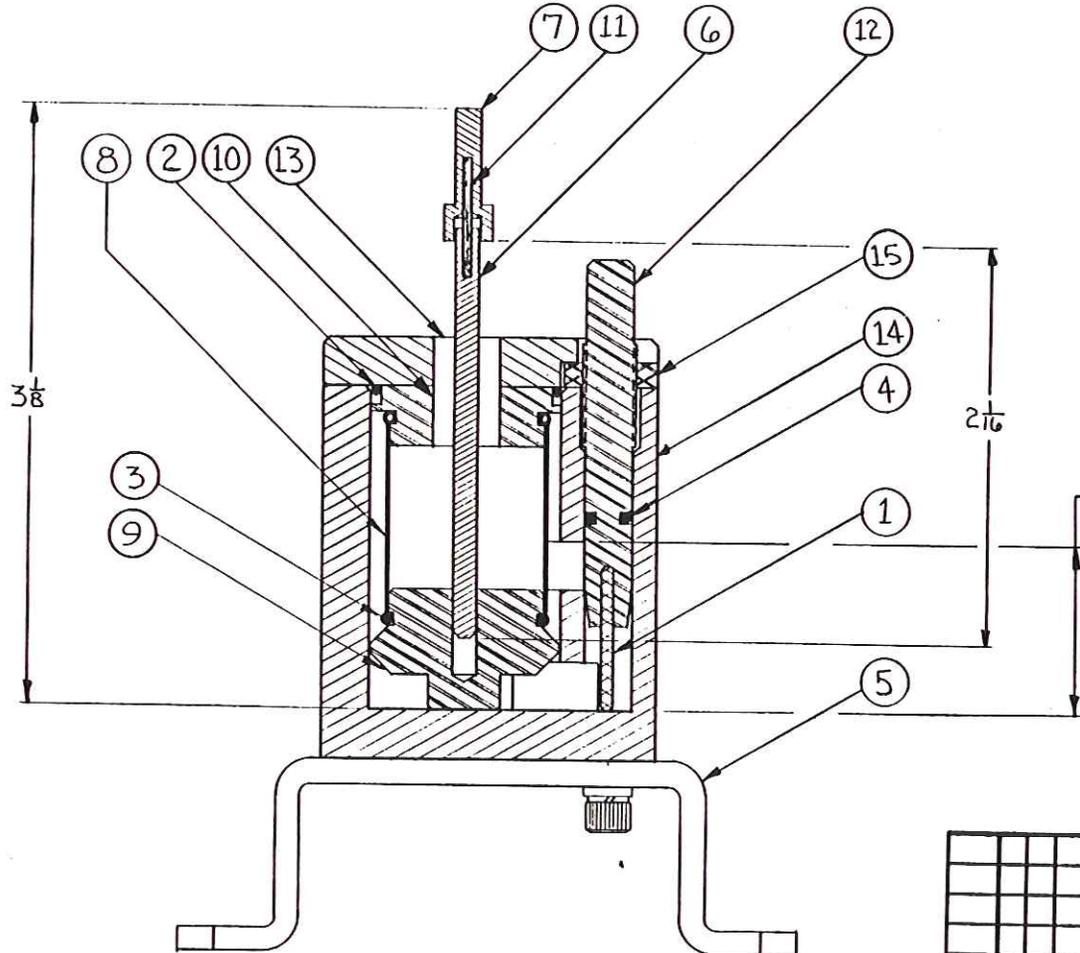
item	material - description - manufacturer	part no	Qty.
MEI MECH-EL INDUSTRIES INC.			
MEI 1204 CONNECTOR BOARD			
dr	ch	eng	app
1/18	1/18	HA	1/12
date	date	date	date
1/18	6/10	1/190	1/11
size C 390-0604			17 Ervberg Rd. Woburn, Ma. 01800
sheet	of	mod	
1	1		

390-0640-A

Sheet 1 of 1



NOTE: 1) CRIMP ITEM 11 INSIDE ITEMS 6 AND 7 AS INDICATED AND TO DIMENSIONS SHOWN
 2) PRESS PISTON ROD ASSEMBLY INTO PISTON (ITEM 9) TO INDICATED DIMENSION.



FILL EMPTY DAMPER HOUSING TO THIS LEVEL WITH ITEM 16.

Item	material - description - manufacturer	part no	Qty.
16	PROPYLEN GLYCOL FLUID	291-0448	1oz.
15	NUT, DAMPER	891-1994	1
14	HOUSING, DAMPER	891-1894	1
13	COVER, DAMPER	891-1893	1
12	SCREW, DAMPER ADJUST	891-1888	1
11	LINKAGE	891-0704	1
10	ADAPTER, SLEEVE	891-0703	1
9	PISTON	891-0696	1
8	SLEEVE	891-0695	1
7	ROD, UPPER PISTON	891-0668	1
6	ROD, LOWER PISTON	891-0667	1
5	SPACER, DAMPER	790-0264	1
4	O RING	294-0073	1
3	O RING	291-0445	1
2	O RING	291-0444	1
1	DOWEL PIN	290-0092	1

120AW		scale
used in assembly no.		2x
finish		
remove all burrs		
tolerances not otherwise specified		
fractional ± 1/64		
decimal xx ± .01		
xxx ± .005 surface		
mod rev no. change app date		
○	A	16 11/50

MEI MECH-EL INDUSTRIES INC. 17 Everberg Rd. Woburn, Ma. 01888

DAMPER ASSEMBLY

dr	RG	ch	eng	app	RG	size	390-0640	rev	A
date	date	date	date	date	date				

HOLD BACK/BOBBIN

SEARCH 'A'

SEARCH 'B'

LOOP

CLAMP MOTION

UP/DOWN

DUAL WIEGHT

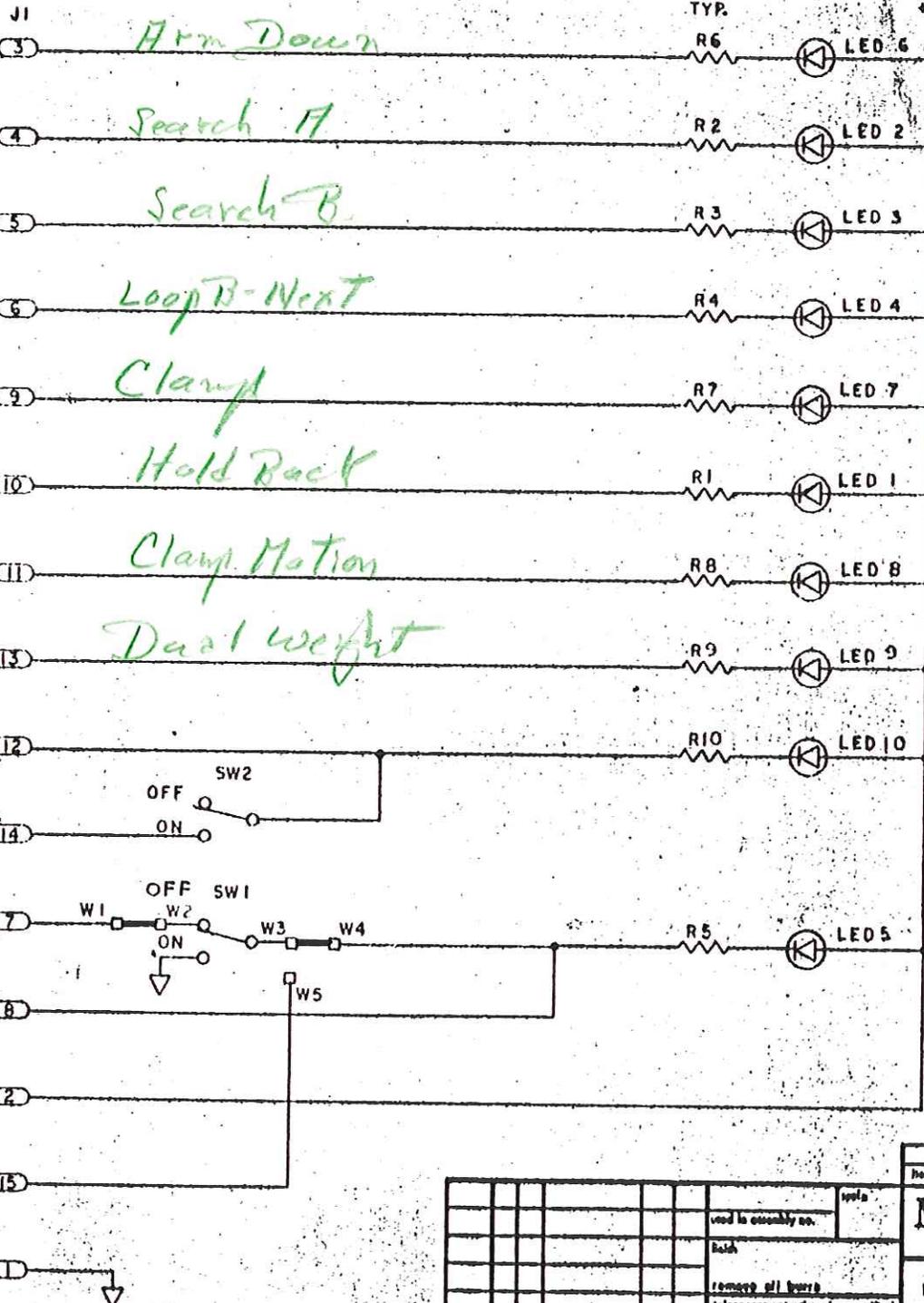
EFO

NU STEP BACK

CLAMP
+12V

NU FLAME OFF

GROUND



see page 28
Disregard the
green labeling

mod	rev no.	change	date	by	check
○	A	REL.	1/64	UP	

used in assembly no.

both

remove all parts

tolerances not otherwise specified

fractional ± 1/64

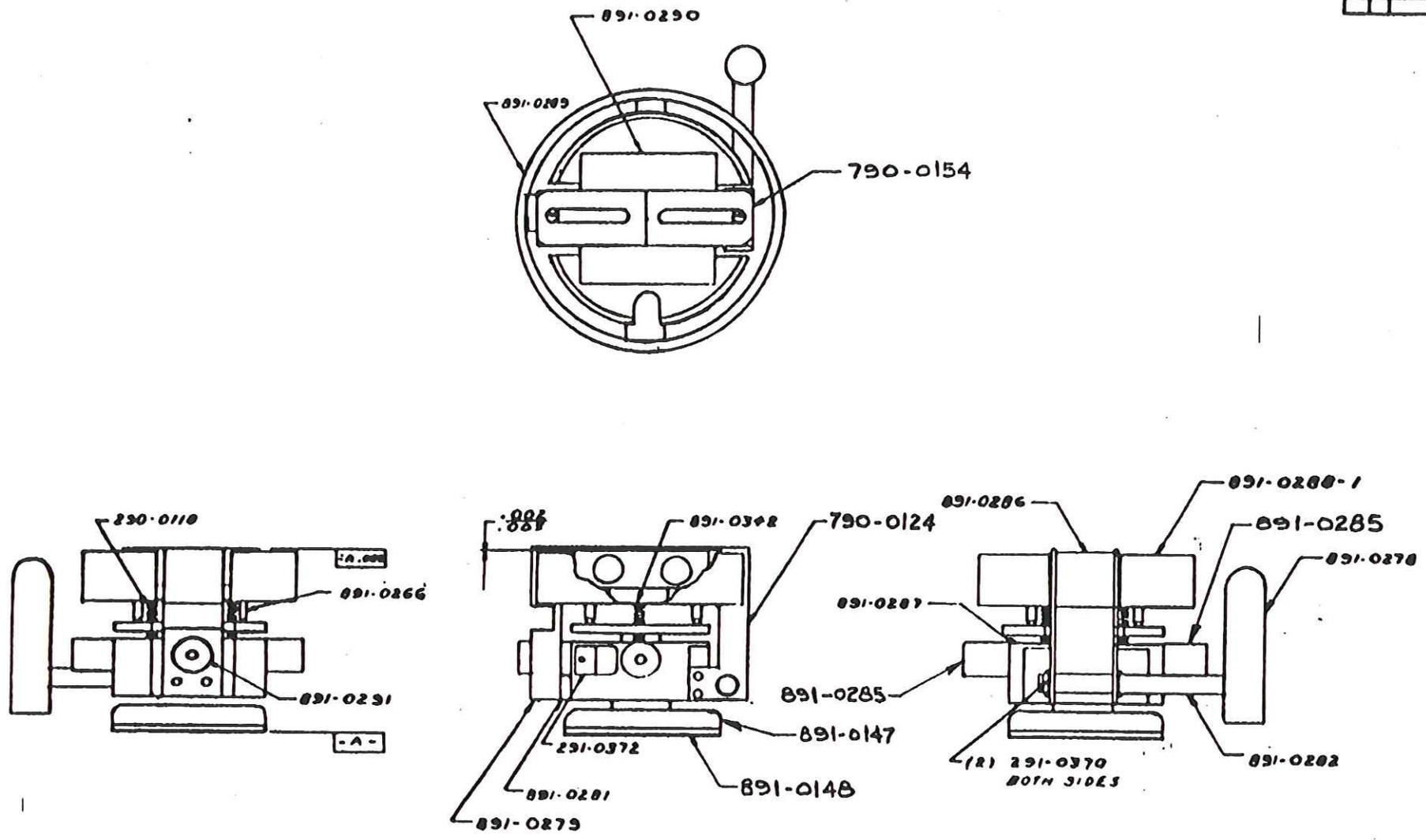
decimal ± .01

min ± .005 surface

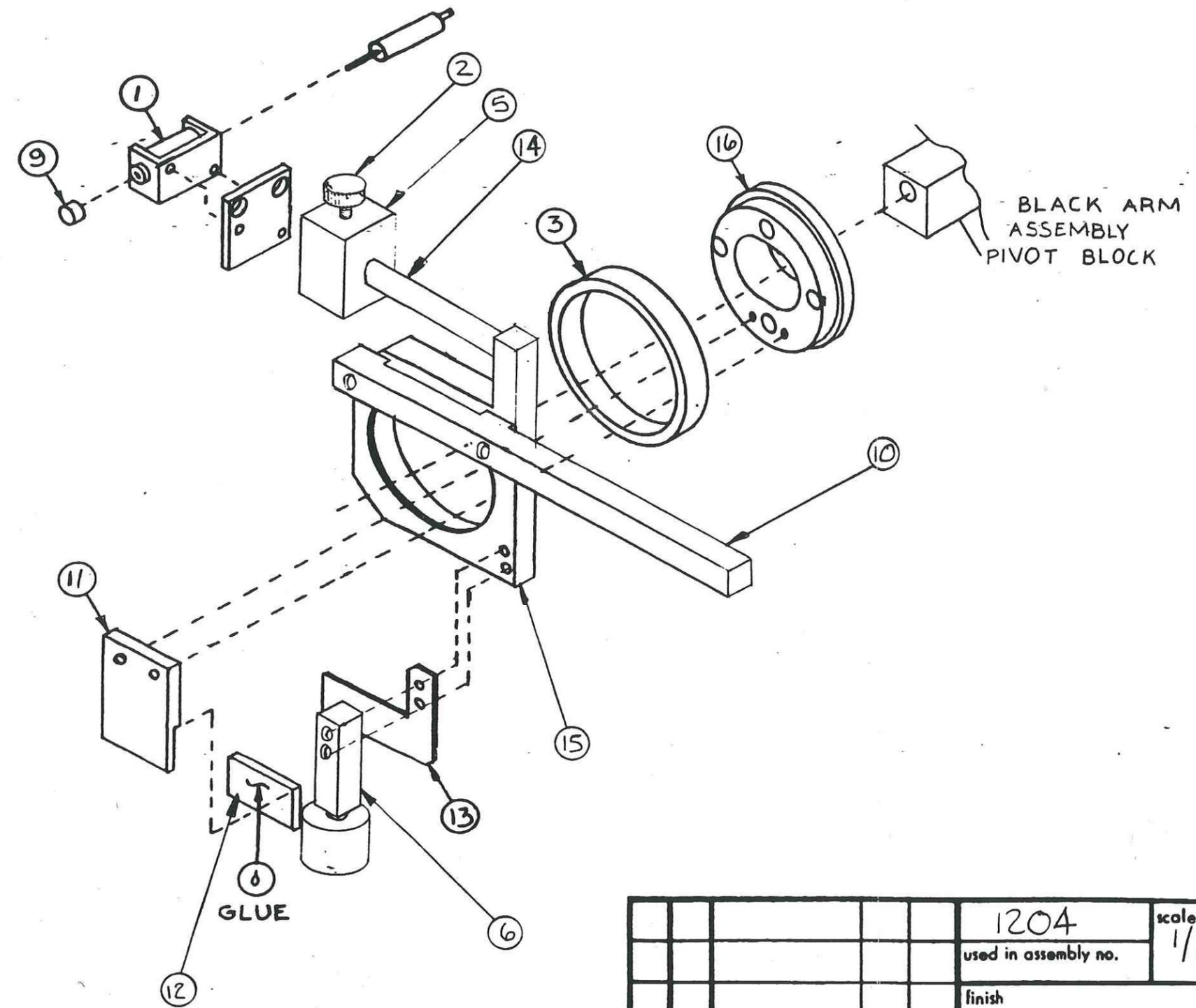
item	material - description - manufacturer	part no	qty
MEI MECH-EL INDUSTRIES INC.		17 Everberg Rd. Woburn, Ma. 01898	
MEI 1204W LED BOARD			
1	MEI 1204W LED BOARD		
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			



Figure #14 - Heated Workstation-Mechanical Clamp



DESIGNED BY	MECH-EL INDUSTRIES INC.		
DRAWN BY		DATE	REVISED BY
CHECKED BY			
TITLE	ASSEMBLY HEATED WORKSTATION MECHANICAL CLAMP		
DATE	3-FEB-78	REVISED DATE	AI 54



#	PART #	DESCRIPTION	QTY
1	190-0208	SOLENOID SP50	1
2	291-0418	SCREW, THUMB NLY, 8-32x1/2x1/2	1
3	291-0494	BEARING. TCF 29-36	1
4			
5	891-0656	COUNTERWEIGHT	1
6	891-1938	ROD, STOP	1
7	891-1006	SLEEVE, STOP	1
8	891-1007	MOUNTING, SOLENOID	1
9	891-1008	ADAPTER, SOLENOID	1
10	891-1935	ACTUATOR, DUAL WEIGHT	1
11	891-1010	ADAPTER, CLUTCH	1
12	891-1011	PAD, CLUTCH	1
13	891-1012	SPRING CLUTCH	1
14	891-1937	ROD, WEIGHT	1
15	891-1936	HOUSING BEARING	1
16	891-1015	ADAPTER, PIVOT	1

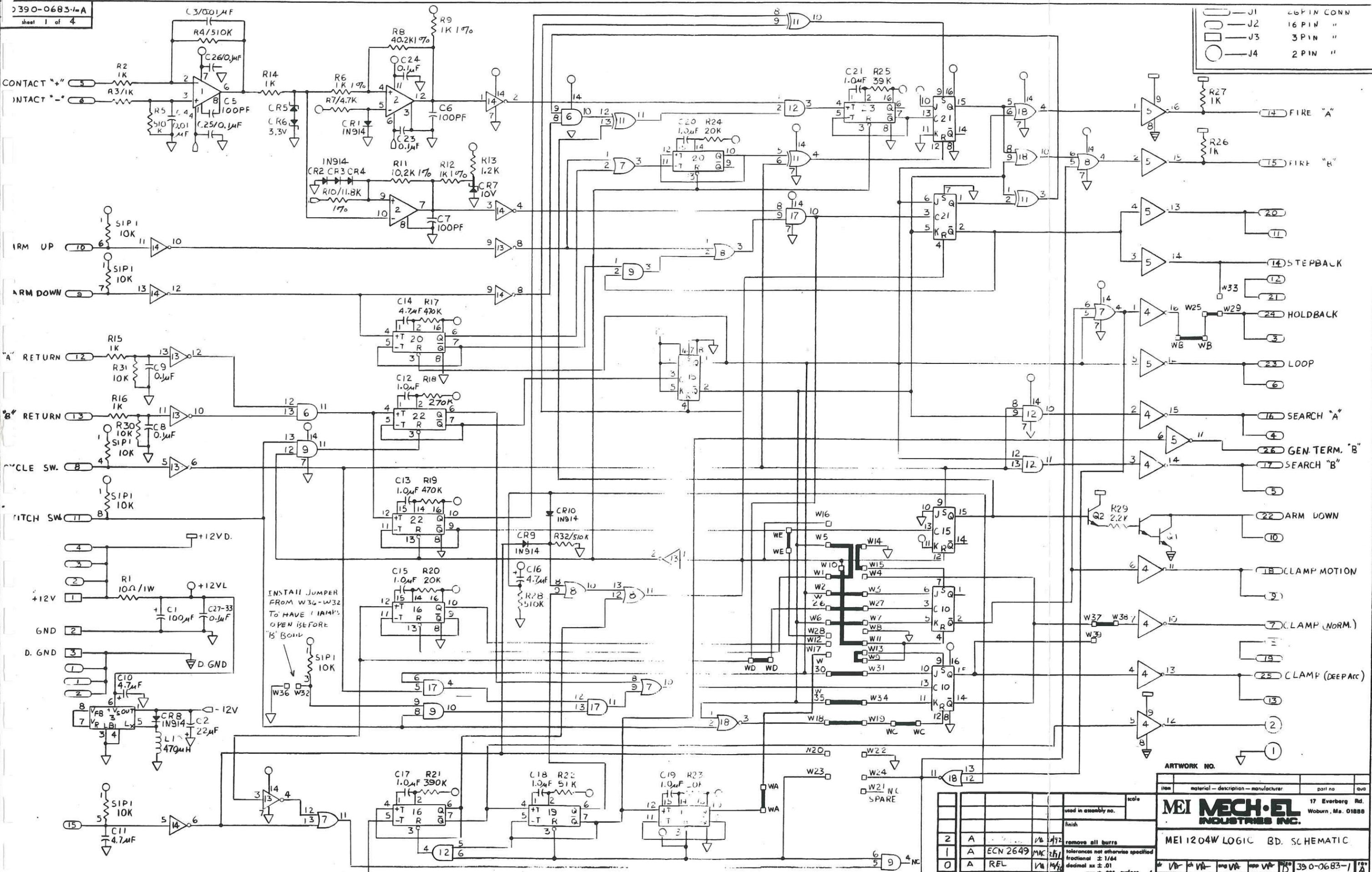
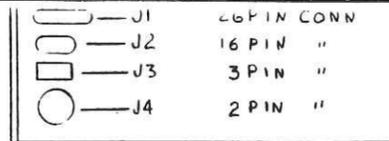
item	material -- description -- manufacturer	part no	qua
------	---	---------	-----

					1204	scale
					used in assembly no.	1/2
					finish	
					remove all burrs	
					tolerances not otherwise specified	
					fractional ± 1/64	
					decimal xx ± .01	
					xxx ± .005 surface	
					angular ± 30' finish	✓
0	A	REL	116	1/90		
mod	rev	change	app	date		

MEI MECH·EL INDUSTRIES INC. 17 Everberg Rd. Woburn, Ma. 01888

DUAL WEIGHT ASM., 1204

dr	116	ch		eng		app	116	size	B	390-0647	rev	A
date	11/90	date		date		date	11/90	sheet	1 of 1	mod	0	



INSTALL JUMPER FROM W36-W32 TO HAVE 1 AMP'S OPEN BEFORE 'B' BOND

ARTWORK NO.

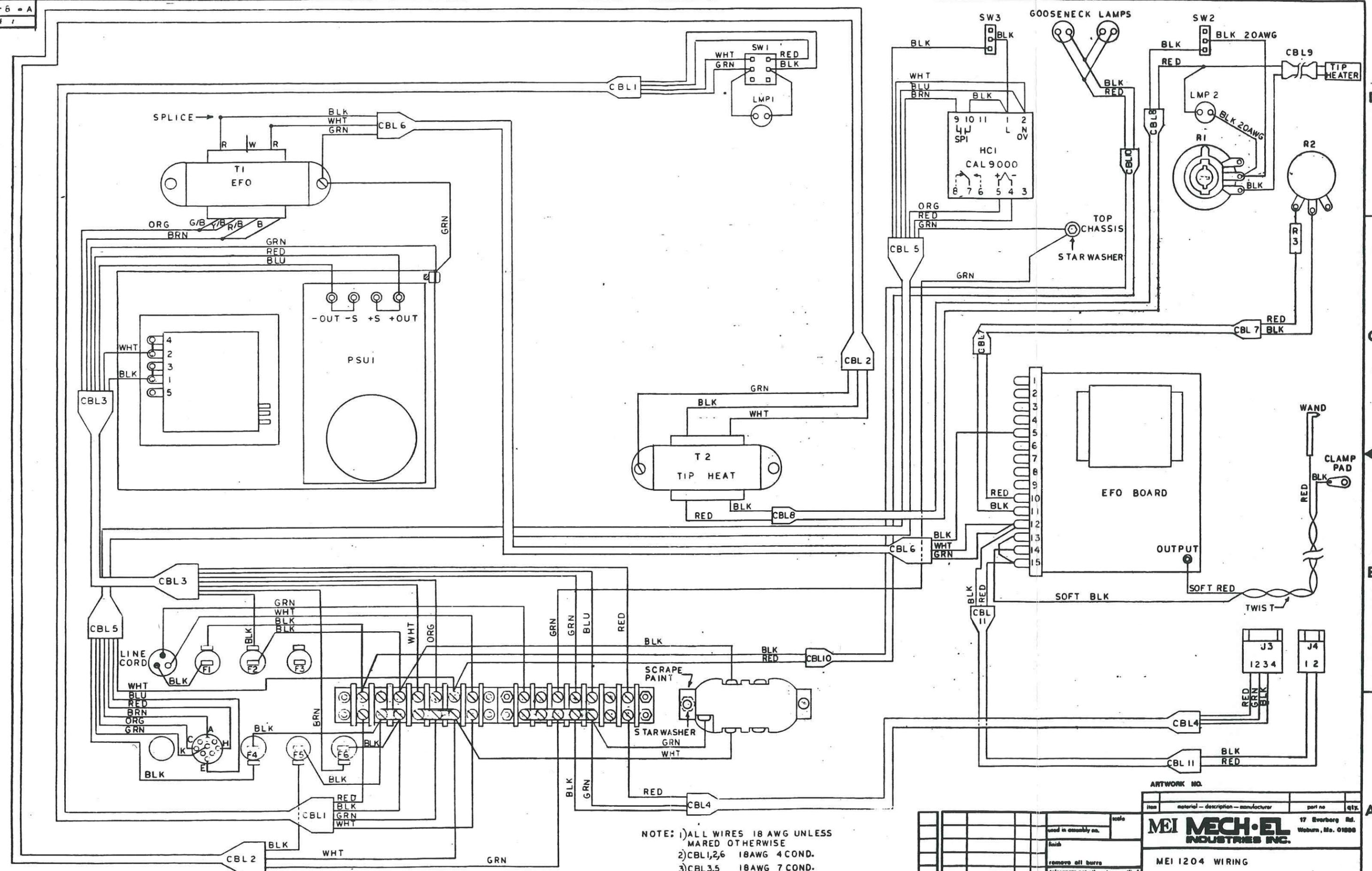
item	material - description - manufacturer	part no	qty
2	A	1/8 1/2	remove all burrs
1	A	ECN 2649	tolerances not otherwise specified fractional ± 1/64
0	A	REL	decimal ± .01
mod	rev no.	change	opp date

MEI MECH-EL INDUSTRIES INC. 17 Everberg Rd. Woburn, Ma. 01888

MEI 1204W LOGIC BD. SCHEMATIC

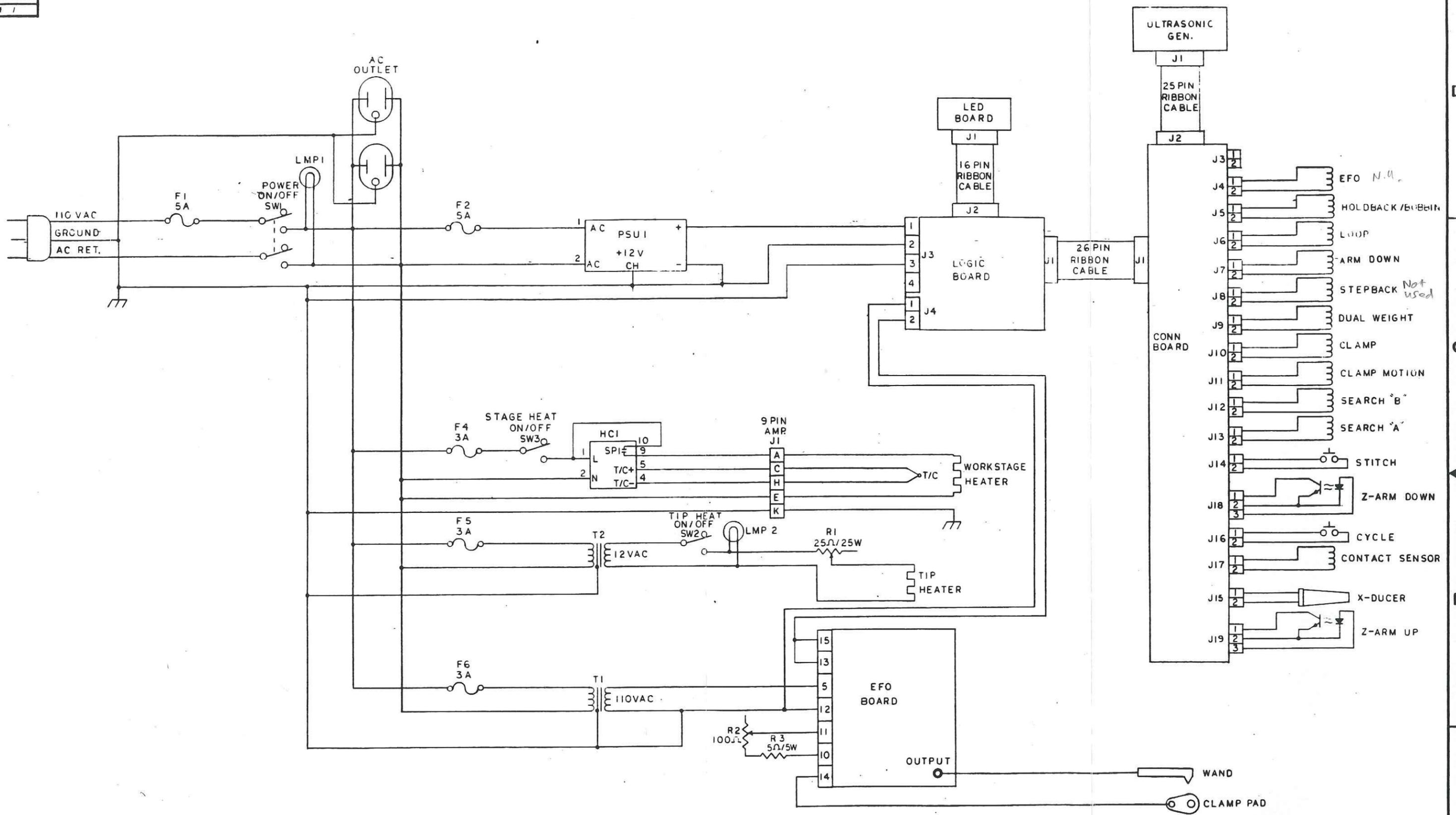
390-0683-1

date 6/92



NOTE: 1) ALL WIRES 18 AWG UNLESS MARED OTHERWISE
 2) CBL1,2,6 18AWG 4 COND.
 3) CBL3,5 18AWG 7 COND.
 4) CBL7-11 20AWG 2 COND.
 5) CBL4 22 AWG 5 COND.

ARTWORK NO.			
Item	material - description - manufacturer	part no	qty.
MEI MECH-EL INDUSTRIES INC.			
17 Everberg Rd. Webster, Ms. 01000			
MEI 1204 WIRING			
used in assembly on:		scale	
finish		remove all burrs	
tolerances not otherwise specified		fractional ± 1/64	
decimal ± .01		mm ± .025 surface	
0	A	REL	14
mod	rev no.	change	date
DATE		DATE	DATE
D 390 0688		A	



ARTWORK NO.

Item	material - description - manufacturer	part no	QTY.
	MEI MECH-EL INDUSTRIES INC.		
MEI1204 AC/DC SCHEMATIC			
17	Everberg Rd.		
		Woburn, Ma.	01898
0	A	REL.	
D 390-0689 A			

Mod	Rev	No.	Desc	Date

VIEW A-A

ALIGN SAPHIRE TO EDGE OF CLAMP, AND GLUE ON WITH ITEM #16 (SCOTCH ADHESIVE, 2 PART EPOXY) AS SHOWN. TYR 2 PLACES.

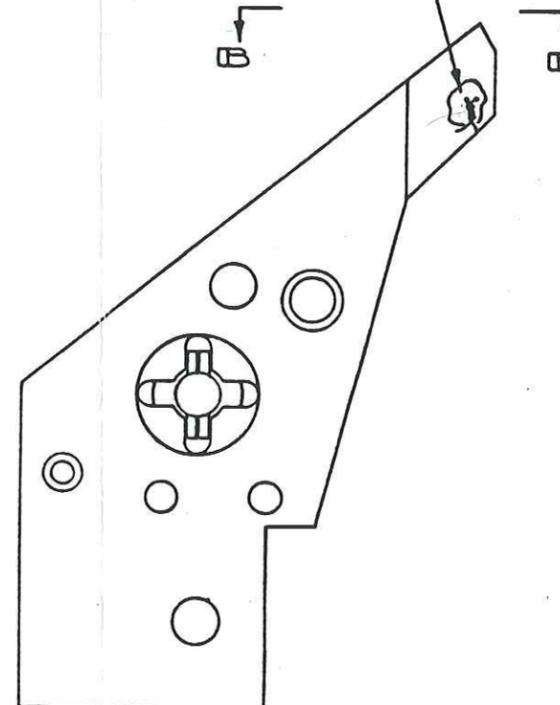
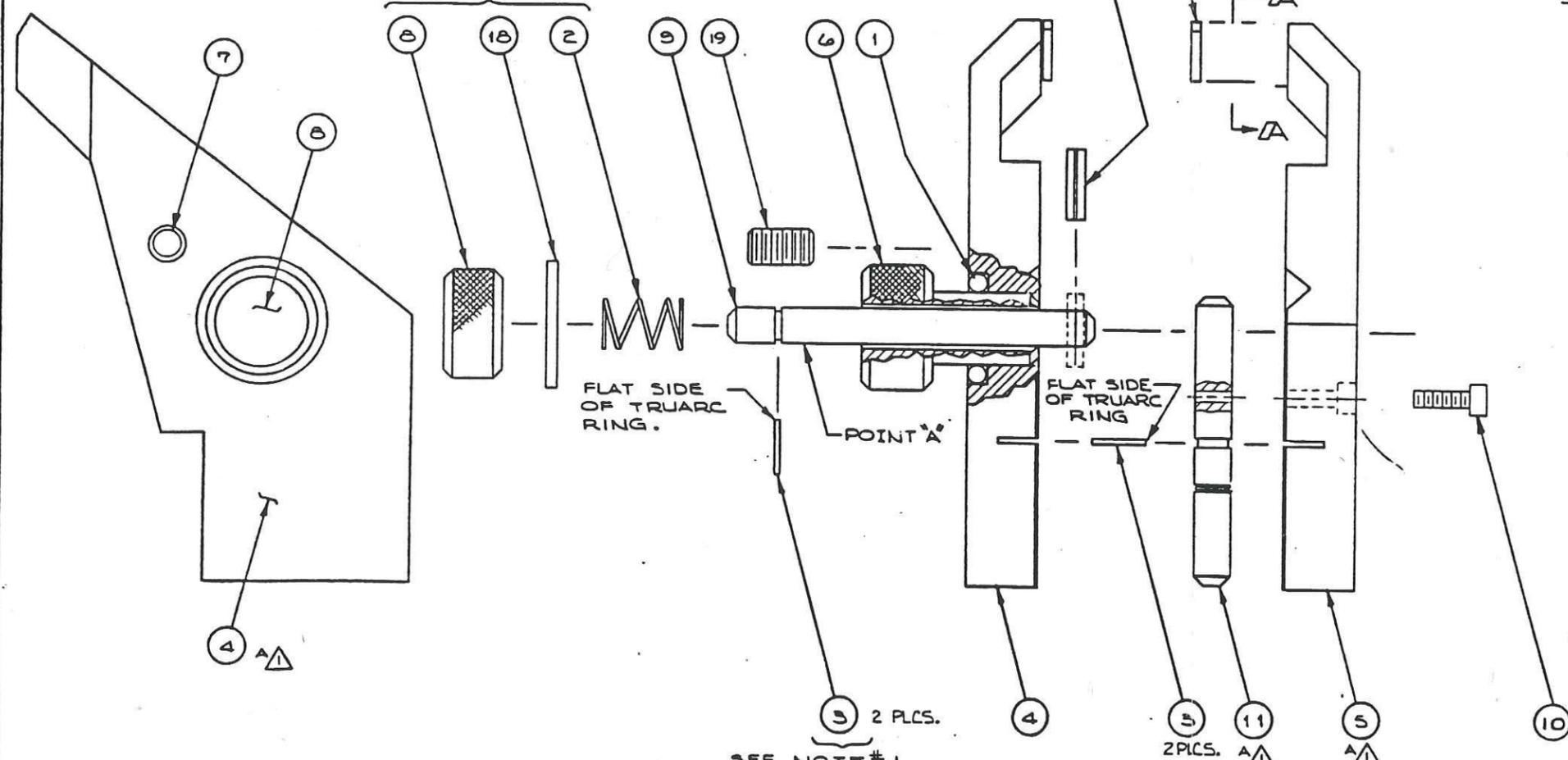
VIEW B-B

.042
.040

CENTER ITEM #13 INTO ITEM #5 APPROXIMATELY AS SHOWN. 2 PLCS. TYR 2 PLC'S, SEE VIEW A-A

LOOP ITEM #17 THRU 2 HOLES ON ITEM #5 TO HEIGHT AS SHOWN. TWIST WIRE TIGHT AND BEND FLAT AGAINST CLAMP AS SHOWN. GLUE DOWN WITH ITEM #16 (SCOTCH ADHESIVE, 2 PART EPOXY.)

SEE NOTE #2

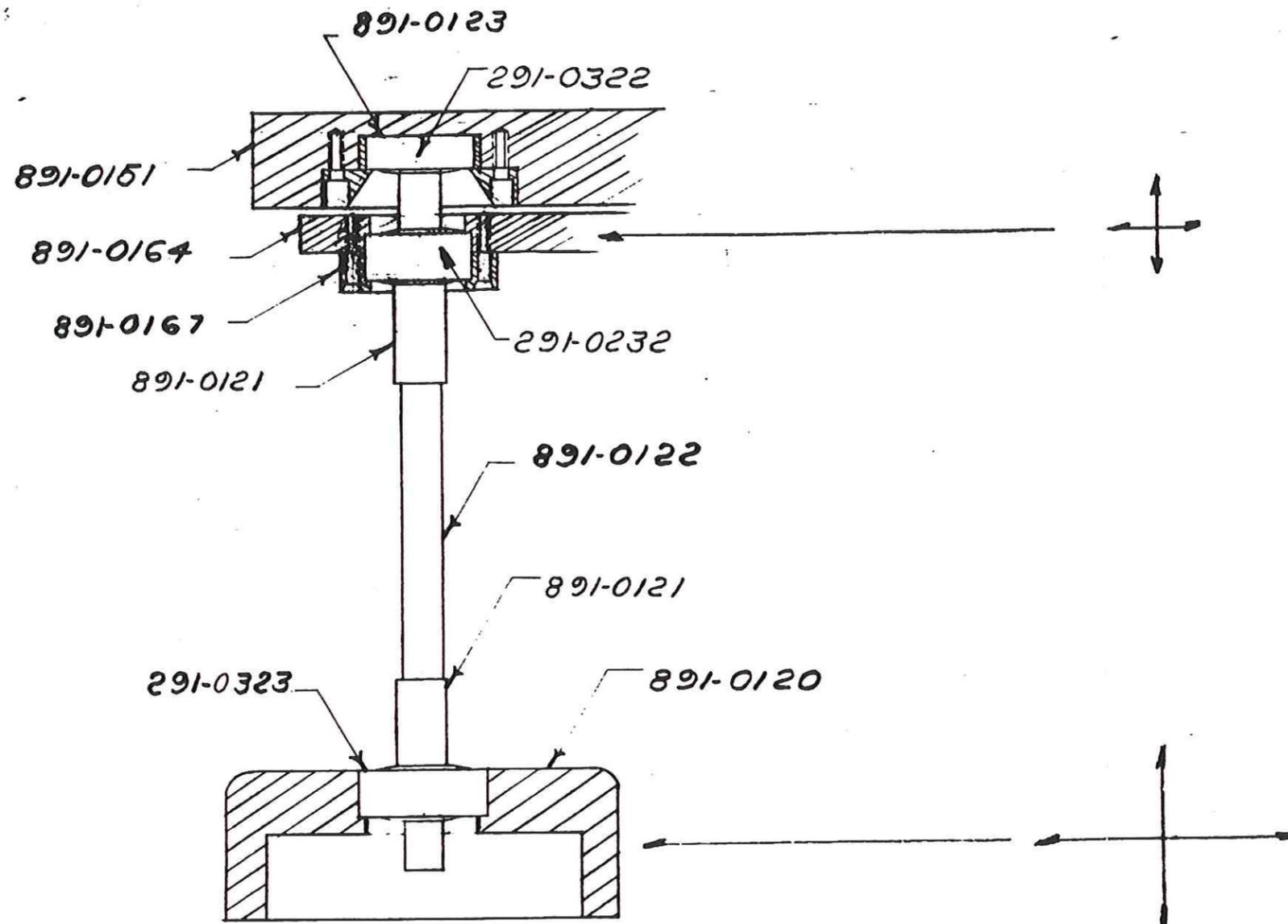


NOTES:

1. SLIDE ITEM #5 2 AND 18 ONTO ITEM #9. PULL ITEM #18 TO POINT 'A', AND INSERT ITEM #3 ONTO THE GROOVE ON ITEM #9 AS SHOWN.

D395-0147-A		scale 4X		MEI MECH-EL INDUSTRIES, INC. WOBURN, MASSACHUSETTS 01888	
1		A ECNIGSS h/c		30° WIRE CLAMP ASS'Y	
A RELEASE		12/82		D395-0147	
p.e. rev mod		rev no. change app date		date PAUL EDM. J.D. app AFC	
				12/82 0cr82 0cr82 1/82	
				sheet 1 of 1	
				MCO 1	

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.



TOLERANCES (EXCEPT AS NOTED)		MECH-EL INDUSTRIES, INC.	
DECIMAL	_____	SCALE	DRAWN BY B. GIBBS
±	_____		APPROVED BY
FRACTIONAL	_____	TITLE POSITIONER ASSLY.	
±	_____	DATE	DRAWING NUMBER
ANGULAR	_____	11-5-75	B A.I. 25
±	_____		