

ALLIED

HIGH TECH PRODUCTS, INC.

MultiPrep™ System

115 V AC & 230 V AC & CE



Operation Manual

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03/13, Version 7.6

CE

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Safety Precaution Sheet

Warning!

Please read carefully before operating the machine:

1. The operator(s) must be properly trained in all operation aspects of this machine according to this manual.
2. The machine must be placed on a safe, suitable surface to allow for operation without hindrance to the controls.
3. Only consumables suited and compatible with the operation of a grinder/polisher should be used.
4. Any local machinery and occupational safety standards must be strictly observed.
5. The operator must ensure pieces being ground/polished are held securely.
6. The operator should not wear loose clothing, ties, jewelry or other items that may get entangled in the machine during operation.

Safety Labels



Electrical

This label is located on the rear of the machine and indicates where the power cord is connected. **Remove the power cord when changing fuses or when performing any service.**



Hand Entanglement

It is possible to entangle your hands or fingers in the moving parts of this machine. Please use caution and turn off all power when reaching into the machine or when changing platens.



Protective Eyewear Recommended

It is recommended that protective eyewear be worn while operating the machine.

MultiPrep™ System Technical Data

<u>Model:</u>	MultiPrep™ System
<u>Item Number:</u>	#15-2000-GI, #15-2000-GI-230
<u>Description:</u>	Precision Polishing System
<u>Serial Numbers:</u>	_____ MultiPrep™ head _____ MultiPrep™ base
<u>Voltage:</u>	115 V AC _____ 230 V AC _____ (check one)
<u>Frequency:</u>	Factory calibrated to 60 Hz (operates at 50 Hz or 60 Hz)
<u>Motor:</u>	¼ HP (190 W) single phase DC (MultiPrep™ base) 15 V DC (MultiPrep™ head)
<u>Fuse:</u>	6 A, 5 x 20 mm, 250 V
<u>Date of Manufacture:</u>	_____mm/dd/yyyy
<u>Dimensions:</u>	15" (381 mm) W x 26" (660 mm) D x 20" (508 mm) H
<u>System Weight:</u>	125 lb. (57 kg)
<u>Software Version:</u>	_____
<u>Operational Environmental Conditions:</u>	
Recommended for indoor use only	
Temperature Range: 50° F (10° C) – 100° F (40° C)	
Humidity Range: None established. If operated in humid climates, steel components such as bearing and spindle components can fail prematurely.	
Altitude: None established	
Pollution: Degree 2	
Mains Supply Voltage: Not to exceed ±10% of the nominal voltage	
Transient overvoltages according to overvoltage category II	
<u>Frequency Note:</u>	
The MultiPrep™ System is designed to operate at either 50 Hz or 60 Hz frequency; however, the unit is electronically calibrated to 60 Hz prior to shipping. If the unit is to be used with a supply voltage frequency of 50 Hz, it will be necessary to recalibrate the system to achieve an accurate timer count and RPM readings (page 9).	
<u>MultiPrep™ Head:</u>	
Vertical Travel of the Arm:	2" (50.8 mm)
Vertical Travel of the Spindle:	½" (12.7 mm)
Incremental Detectable Movement of Spindle:	1 µm (39.37 µin.)
Voltage of Oscillation/Rotation Motors:	15 V DC
Weight of Vertical Spindle (without fixtures):	500 g (1.10 lb.)
Sample Rotation:	8 speed settings
Sample Oscillation:	6 speed settings

Warranty

Thank you for choosing Allied High Tech!

This product is warranted by Allied High Tech Products, Inc., to be free from defects in material and workmanship for **two (2) years** from the date of original purchase. This warranty does not cover damage from abuse, neglect, accidental breakage, improper use, or failure to exercise reasonable care and maintenance in accordance with the instructions accompanying this product.

To obtain warranty support or spare parts, please contact your Product Application Specialist, or Allied Technical Services at (310) 635-2466, Monday through Friday, 8:00 AM to 5:00 PM, Pacific Time. Please be prepared to supply the serial number for the product about which you are calling; this will help our staff confirm warranty eligibility and provide you with thorough, timely assistance.

At your discretion, after consultation with your Allied Product Application Specialist or an Allied Technical Services representative, we will be happy to send you replacement parts, at no charge, or you may send the product to Allied for warranty repair. All Allied products are designed for ease of parts replacement, so customer repairs, with no-charge parts from Allied, are often the quickest and easiest way to return a product to active service.

If you wish to return a product to Allied for warranty repair, you must first obtain a Return Equipment Authorization number (REA). An REA may be obtained from your Product Application Specialist, or from a member of our Technical Services staff. Please ensure that your REA number is referenced prominently on your shipping paperwork, as outlined below. Pre-pay shipping to Allied and provide an address and phone number for return shipping, which is paid for by Allied during the warranty period.

Please return your product to:

Allied High Tech Products, Inc.
REA#: _____
2376 East Pacifica Place
Rancho Dominguez, CA 90220 USA
P: (310) 635-2466

Please Note: Damage to products during transit to/from Allied, or resulting from improper inbound packaging, will not be the responsibility of Allied. Therefore, please ensure that your product is securely boxed or packaged. It is further recommended that you insure your shipment for the full value of the product. Should damage occur during inbound shipment, we will be happy to provide you with a formal quotation estimating the cost of materials and labor necessary to repair such damage. A purchase order will be required to make these repairs.

Repairs for Products No Longer Under Warranty

Allied will be happy to make repairs to products no longer under warranty. For these products we will be pleased to provide you with an estimate of the costs (materials and labor) necessary to make requested repairs. For non-warranty repairs, the customer is responsible for inbound (to Allied) and outbound (from Allied to customer) shipping and handling costs. Non-warranty repairs are made with the same attention to detail and commitment to quality workmanship that is provided to "in" warranty customers.

Thank you for choosing Allied, and please let us know if you have comments or questions about these warranty provisions.

What is NOT Covered Under Warranty

- Flooding, as a result of failure to clean the drain or drain screen, that damages any internal electrical or mechanical components of the machine will not be covered under warranty.
- Failure to regulate and control the water pressure may cause failure of the water solenoids or overflowing the limits of the drain in the machine (page 8). Damage caused as a result will not be covered under warranty.
- Corrosion and oxidization as a result of negligent cleaning practices, which affect the performance of the MultiPrep™ System and components, will not be covered under warranty. This includes, but is not limited to, the micrometer heads, the run-out of the platen base and/or platen, and the MultiPrep™ head vertical spindle.
- Damage from abuse, neglect, negligence, accidental breakage, improper use, or failure to exercise reasonable care and maintenance in accordance with the instructions accompanying this product will not be covered under warranty.

Installation

The unit should be placed on a clean, dry surface with the control panel facing the front of the counter/table on which it will be placed.

Electrical

Before installing the plumbing, all electrical functions should be tested. See page 9 for a diagram of the control panel and pages 10-11 for illustrations of the buttons and their respective functions.

Plug the power cord into the back of the machine (Figure 1), then into the wall socket (the provided power cord is exclusively for use with the MultiPrep™ System). Turn the main power switch on at the rear of the machine, above where the power cord is connected. Activate the control panel by pressing the on/off button on the lower right of the panel. The LED in the button's upper left corner will illuminate, as will the LEDs in the timer and RPM display windows.

Using the keypad, enter an RPM value in the range between 5 and 350 (in 5 RPM increments) and press ENTER, followed by the green RUN button. The platen will rotate in the direction selected. The direction of the platen is selected using the buttons labeled with clockwise and counterclockwise circular arrows. An illuminated LED on either button indicates which is activated. Press the red STOP button and select rotation in the opposite direction. The LED of that button will illuminate and an audible click will indicate that the relay has switched the motor direction. Press the RUN button to ensure the platen rotates in the newly selected direction.

Press the COOLANT button and be sure the click of the solenoid is audible. This indicates that the solenoid is activating properly.

Press the STOP button to turn the activated functions off.



Figure 1: Rear Panel

Plumbing

Flow Rate:	½ gallons per minute (1.9 L/minute)
Minimum Inlet Water Pressure:	25 psi (1.76 kgf/cm ²)
Maximum Inlet Water Pressure:	50 psi (3.52 kgf/cm ²)
Drainage:	1 gal/minute (3.8 L/minute) (recommended @ 30 psi)
Inlet Tubing:	¼" OD (6.35 mm)
Drainage Tubing:	1¼" ID (32 mm)

Water Inlet

Install the supplied inlet water filter between the water source and the MultiPrep™ base.

The inlet fitting on the rear panel of the MultiPrep™ base (Figure 1) only requires the tube to be inserted until it stops. No tools are required for this installation.

To remove the tubing, press the outer collar of the fitting in and pull the tubing out.

Note: Turn the water off at the source before removing the water tubing.

Drain

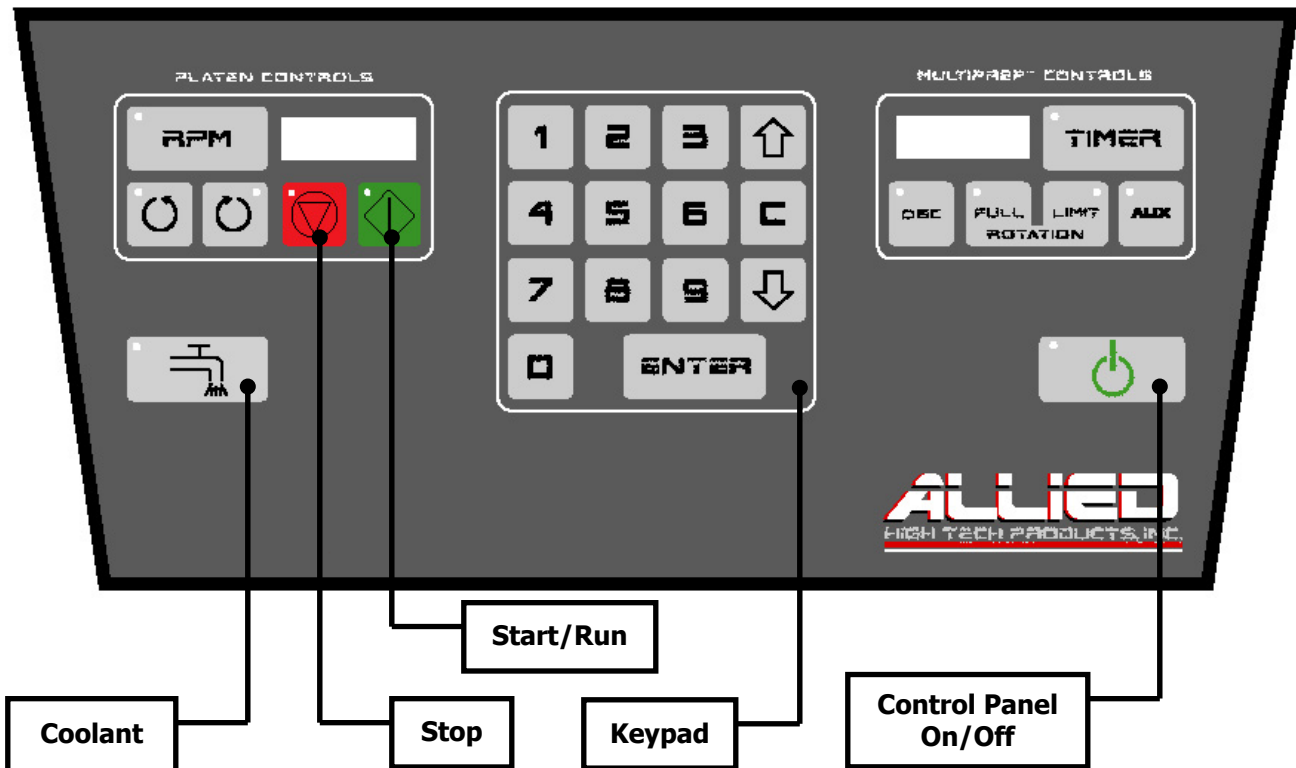
With the hose clamp on the drainage hose, position the hose onto the coupling at the rear service panel (Figure 1). Tighten the hose clamp so the hose does not slip from the coupling. Use the 90 degree elbow fitting to direct the drain hose if the tubing does not bend sharply enough for proper installation.

Activate the coolant solenoid by pressing the coolant button (water flow may need to be regulated or adjusted using the valve).

Note: Do not use the valve at the water spout to completely shut off the water flow. It is rated for 30 psi and is only intended to restrict the water flow during polishing.

MultiPrep™ Base Operation

Faceplate Diagram



Electronics Calibration

The MultiPrep™ System can operate at either 50 Hz or 60 Hz, and it is calibrated to 60 Hz prior to shipping. If the unit is operated at 60 Hz frequency, no calibration is necessary. **Machines operating at 50 Hz require calibration following installation.** Failure to recalibrate the unit to 50 Hz will result in misrepresentation of the RPM and timer values.

To calibrate the electronics, turn the control panel on, then press 1, 0, 0, followed by ENTER. Activate the platen by pressing the RUN button. After approximately 30 seconds, press 3, 5, 0, then ENTER, and allow it to run for another 10 seconds. With the machine running at 350 RPM, press and hold the ENTER button until two quick beeps followed by four additional beeps are heard, then release the button. This will begin calibration by storing the accurate speeds into memory.

The time of the calibration process will vary, but it will usually be complete after about 25 to 30 minutes. When the calibration cycle is complete, the control panel will power itself off. Turn the main power off at the AC receptacle for at least five (5) seconds, and then back on for normal operation. During the electronics calibration procedure, only the main power switch can stop the machine.

Please contact Allied if there are any questions or concerns regarding this process.

Platens

The 8" aluminum platen included with the machine is precision lapped and hard anodized. The lapping ensures flatness, and the anodizing hardens the aluminum, making it durable and resistant to scratches and dings. On the underside a center hole is used to help locate the platen on center with the platen base. The four smaller holes around the center hole are where the nylon drive-pins engage the platen.

On the platen base, there is a stamped letter "A" (Figure 2). This is used as a reference, when placing platens on the machine, to minimize run-out (page 19). The platen included with the system has an "A" stamped on the underside that indicates where it should be aligned to the platen base. Additional platens, not originally purchased with the machine, will not have this "A", but they can still be matched for minimal run-out (page 19).

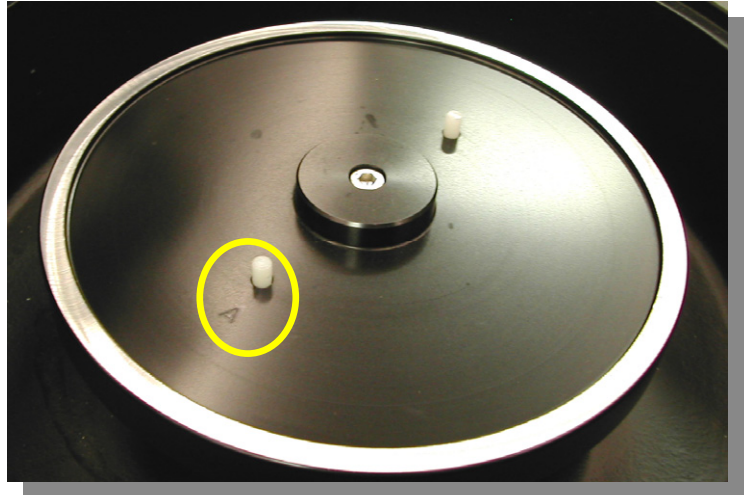


Figure 2

Note: This is a precision polishing machine; care must be taken to ensure its performance. **DO NOT DROP the platen onto the platen base. Repeated abuse will affect the precision of the system.** Keep the surfaces between the platen and the platen base clean and dry, so the platen run-out remains within specifications. Excessive water and polishing suspension buildup will adversely affect the run-out.

Splash Ring

Each machine comes with one (1) splash ring that is designed to collect and direct the water and polishing liquids into the drain bowl. To maintain cleanliness, avoid contamination, and ensure safety, it is strongly recommended the splash rings be used during operation. The splash ring should also be cleaned as needed to prevent buildup of dirt and debris.

Control Panel, On/Off



This button activates and deactivates the control panel.

Platen Controls



The platen controls include buttons for: RPM, START/RUN, STOP/PAUSE, and clockwise and counterclockwise platen rotation directions, which are illustrated above, respectively. Arrows mark each platen direction button; an LED, when illuminated, indicates which direction is selected. If during operation the button for the opposite direction is pressed, all functions are paused. The new direction becomes active, but the machine will remain stopped until the platen is reactivated by pressing the START/RUN button. The STOP/PAUSE button stops the platen, coolant, and any activated MultiPrep™ head controls.

Coolant



The COOLANT button activates and deactivates the water solenoid. When a water supply line is installed, the solenoid allows water to pass through when activated.

Keypad

The keypad is used for platen RPM selection, timer entry and speed selection for the oscillator and rotation functions of the MultiPrep™ head. Any value entered on the keypad defaults to the RPM value. When selecting platen speed, there are two methods: 1) using the arrow buttons to increase (up arrow) or decrease (down arrow) the speed, or 2) pressing the number buttons, then pressing ENTER.

Note: The ENTER button must be pressed following number entry for the RPM or timer function to activate the value.

Timer



The timer display and TIMER button are located in the "MultiPrep™ Controls" box on the control panel. In its default mode it may be used as a counter (counting up, to characterize polishing methods), or it can be set for unattended operation (counting down, to automatically stop after a set period of time).

The timer can be set before or after platen rotation is activated. During operation, it will begin its countdown after the ENTER button is pressed. If it is set before operation, countdown will begin when the START/RUN button is pressed and the platen is activated. Should the machine be stopped during operation, the timer will stop counting; it will resume when the RUN button is pressed again.

Set the timer by pressing the TIMER button (the LED will illuminate). Enter the desired time using the keypad and press ENTER. If during entry a mistake is made, press the C (clear) button and re-enter the correct time followed by pressing ENTER. When the timer reaches 00:00 during countdown mode, the platen, coolant, auxiliary, and any activated MultiPrep™ head controls will all stop. There is no memory, so when the platen is started again, those functions will need to be activated again separately.

Aux



When the auxiliary (AUX) button is active (the LED is illuminated), the AD-5™ automatic fluid dispenser can be controlled via the MultiPrep™ System. When the START/RUN button is pressed and the AUX button is active, the AD-5™ will start dispensing fluid(s) based on which step is selected on the AD-5™ menu. When the STOP/PAUSE button is pressed, or when the timer reaches 00:00 during countdown mode, the AD-5™ will stop dispensing fluid(s). See the AD-5™ operation manual for more information.

The AUX button will only allow communication with the AD-5™ automatic fluid dispenser if the AD-5™ communication cable is connected between the AD-5™ rear panel and the MultiPrep™ System rear panel (Figure 1, page 7). This feature is only available on MultiPrep™ Systems sold in August 2012 and later.

Theory of Operation, MultiPrep™ System

The MultiPrep™ head is a high-precision sample preparation instrument that provides quantifiable material removal and geometric/angular control for the most demanding preparation applications. A suspension arm supports a free-floating spindle to which the sample is secured using a fixture. The vertical position of the suspension arm relative to the platen or abrasive plane is controlled using the vertical adjustment knob, allowing versatile and flexible positioning options to accommodate various sized samples and fixtures.

When a sample is secured to a fixture, it is lowered into the abrasive via counterclockwise rotation of the vertical adjustment knob until it makes contact and fully compresses the abrasive. Continued counterclockwise movement of the knob lowers the arm (mechanical stop), separating it from the spindle pulley. This separation is measured in real time and displayed on the front digital indicator. This “measured distance” indicates the amount of material that will be removed from the sample, plus additional material related to compression of the abrasive prior to the spindle pulley being displaced from the arm. As the sample is ground/polished, gravity causes the spindle assembly (and sample) to travel downward, stopping when the spindle pulley again makes contact with the arm (a mechanical stop).

During downward travel, the spindle maintains rigid, precise, geometric orientation of the sample relative to the abrasive plane. Micrometer heads fitted to the micro-hub assembly, at the bottom of the rotating spindle, provide adjustment for sample tilt, to meet various angular requirements.

The front digital indicator is dynamic (moving), featuring 1 µm resolution (0.001 mm). During grinding/polishing, its value changes as material is removed from the sample, in real time. It also provides valuable data concerning the effectiveness of the chosen abrasive. During grinding/polishing, the rear digital indicator is static (non-moving), featuring 1 µm resolution (0.001 mm). During vertical positioning, it displays movement of the arm and can be zeroed to use as a reference point.

MultiPrep™ Head Installation

Remove the MultiPrep™ head from the packing material.

While looking at the bottom of the MultiPrep™ head, rotate the cam-lock lever attached to the base and observe the moving locking mechanism (plunger) as the lever is rotated. Adjust the lever to fully extend the plunger and place the MultiPrep™ head onto the leveling plate of the MultiPrep™ base so the plunger fits into the slot (Figure 3).

Slide it forward so the front edge of the MultiPrep™ head is about 1" from the front edge (Figure 4) of the leveling plate and tighten the cam-lock lever firmly.

Note: It is important that both the bottom of the MultiPrep™ head and the top of the leveling plate are clean before installation.



Figure 3

The leveling plate is mounted to the MultiPrep™ base with three (3) stainless steel socket head cap screws. These screws are used to align the rotation spindle of the MultiPrep™ head perpendicular to the platen surface of the MultiPrep™ base (page 21).

After the MultiPrep™ head is mechanically attached to the MultiPrep™ base, electrical connections must be made. Ensure that power is off to the MultiPrep™ System and plug the cable from the MultiPrep™ head into the receptacle located on the rear panel of the MultiPrep™ base (Figure 1). The plug is keyed, so be sure to align the sockets correctly.



Figure 4

MultiPrep™ Head Operation

Vertical Adjustment Knob

The vertical adjustment knob (Figure 5) is used to control the vertical position of the arm and sample relative to the platen. When rotated clockwise, the arm travels upward. When rotated counterclockwise, the arm travels downward.



Figure 5

It is also used to establish the stopping point (mechanical stop) for downward travel of the sample, which occurs when the spindle pulley makes contact with the arm. The rear digital indicator displays movement of the arm position in one micron increments, in either + or – values, depending on the selection made on the indicator.

Spindle Riser

The spindle riser (also called the cam-riser), which is located on the left side of the arm (Figure 6), is used to raise the spindle without changing the vertical position of the arm. It should be used when replacing platens, abrasives or cloths, and/or inspecting samples. Rotate the knob toward the front of the arm until the flat spot on the plastic fin is in full contact with the bottom of the spindle pulley (Figure 7).

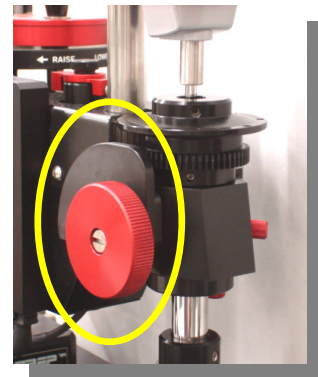


Figure 6

At this point, the sample can be removed for inspection and/or the arm can be swung away to allow platen or abrasive changes. When completed, lower the sample with the spindle riser to continue grinding/polishing. This process returns the sample to its original vertical position, since no adjustments were made to the vertical adjustment knob.

Note: When replacing platens or abrasives that have different thicknesses, a change may be noticed on the front digital indicator display. Use the vertical adjustment knob to re-establish the previous setting.

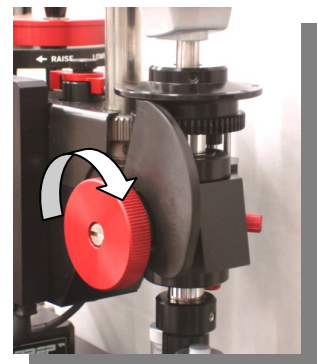


Figure 7

Fixture Attachment

All fixtures are mounted to the bottom plate of the micro-hub assembly at the bottom of the spindle. Each fixture has a common U-shaped cutout. The flat edge of the fixture is positioned against the reference edge located behind the cam-lock plunger (Figure 8).

Note: The spindle should be raised using the vertical adjustment knob so the sample and fixture fit without contacting the platen/abrasive.

To attach a fixture, slide it onto the plate until it makes full contact with the reference edge. Make sure it has engaged the cam-lock plunger. Rotate the cam-lock lever clockwise until tight.

Mounting the sample onto the fixture is usually done with hot mounting wax, double-sided adhesive tape, glue, or set-screws, as required by the type of sample and desired sample orientation.

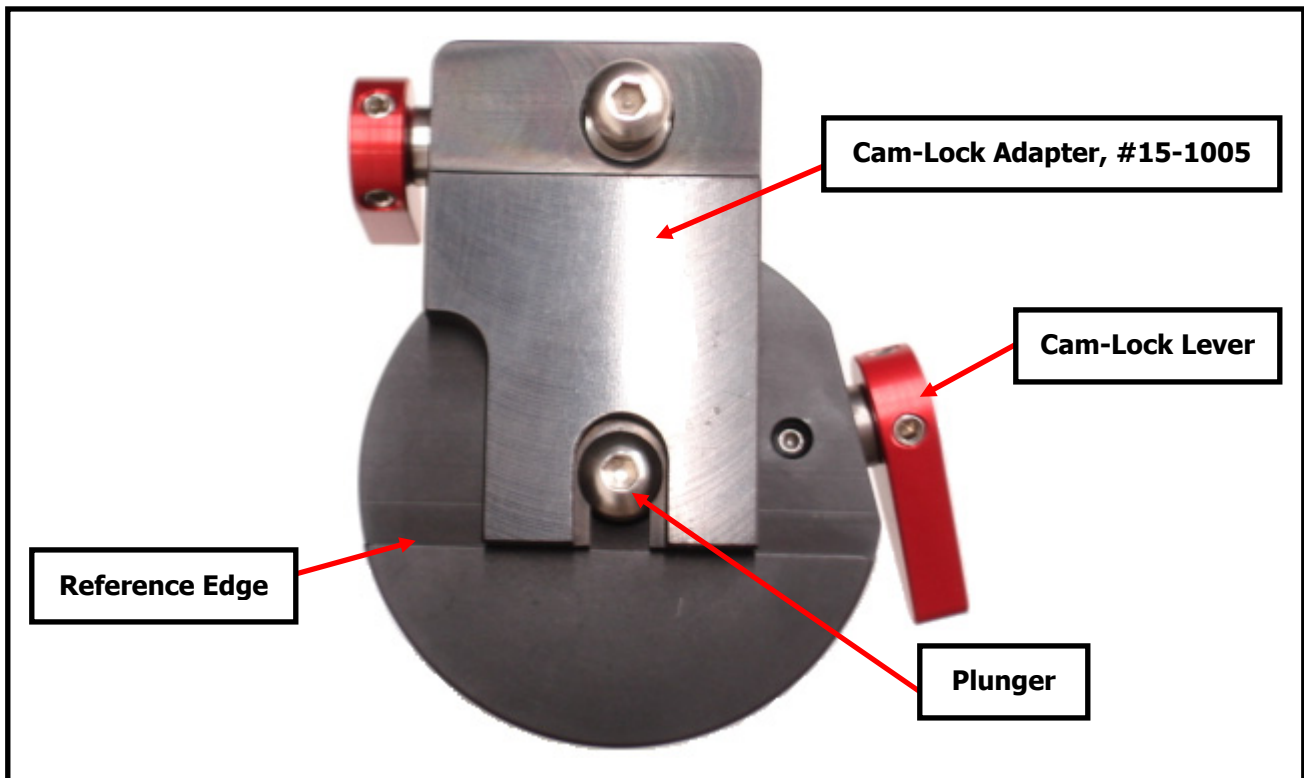


Figure 8: Bottom view of a fixture attached to the Micro-Hub Assembly

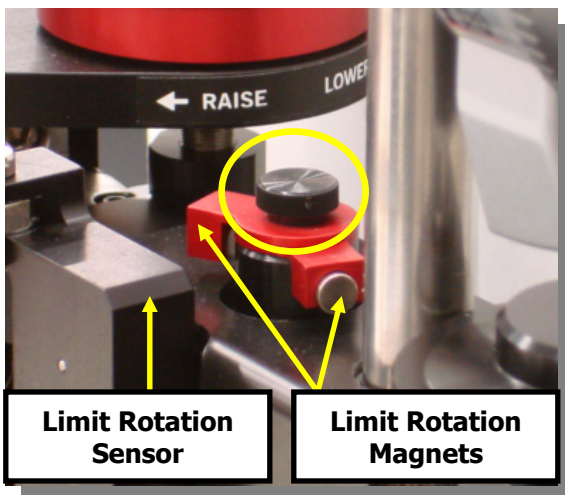
Rotation

1. **Full Rotation:** Sample rotation is activated by pressing the FULL button in the "MultiPrep™ Controls" box on the control panel. The rotation speed is variable, with eight (8) settings. The speed number is arbitrary, increasing from 1 to 8.

To program the speed, press the FULL key once, then press it again and hold it until the LED turns orange and a double beep is heard. Release the key and select the desired speed using the up/down arrow buttons. In the timer window, the number at the right indicates the current rotation speed setting. Once that speed is selected, press the FULL key again and the LED will turn green. The selected speed will remain the default speed until it is reprogrammed.



2. **Limit Rotation:** Limit rotation allows the sample to be rotated (swiveled/pivoted) in an alternating direction between two points defined by the position of two magnets. The speed setting is adjusted as described above, except by pressing the LIMIT button rather than FULL button.



A sensor in the oscillator linkage housing secured to the arm picks up the magnetic field from the magnets, which are secured to the flags that rotate when rotation is activated (Figure 9).

A knurled screw, when loosened, allows adjustment of the two magnets to define the range of motion (Figure 9).

Figure 9

Oscillation

1. **Range:** To set the sweep range, loosen the range thumbscrew on the oscillator pulley (Figure 10). Slide the dovetail bar so the drive pin moves closer to or farther from the center of the hub. Moving the pin closer to the center will provide a smaller sweep (range), and moving it farther from the center will create a larger sweep. The oscillation speed is variable, with six (6) settings. The speed number is arbitrary, increasing from 1 to 6.

To program the speed, press the OSC key once, then press it again and hold it until the LED turns orange and a double beep is heard. Release the key and select the desired speed using the up/down arrow buttons. In the timer window, the number at the left indicates the current oscillation speed setting. Once that speed is selected, press the OSC key again and the LED will turn green. The selected speed will remain the default speed until it is reprogrammed.



2. **Position:** The oscillation position is the area over the platen where the sample will sweep and is defined by the drive linkage length. Set the oscillation position after setting the sweep range.

It can be adjusted after loosening the position thumbscrew (Figure 10). The longer the linkage assembly, the further to the outside of the platen oscillation will occur. A shorter linkage positions the sample toward the center of the platen. After adjustments are made, activate the oscillator and make sure the position selection does not cause the sample to extend over the edge or center of the platen.

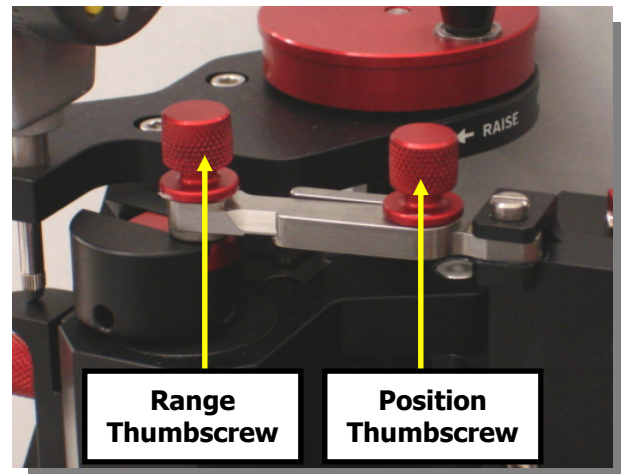


Figure 10

Note: When changing platens and abrasives, it is necessary to swing the arm to the right to gain access. Loosen the position thumbscrew to move the arm away and engage the magnet that holds it in place at the right of the machine.

Angular Adjustments

Angular adjustments are necessary for certain polishing procedures, or for correcting any misalignment of a sample to the fixture, due to fluctuations in glue, wax, or other sample mounting media. The adjustments are made by rotating either of the micrometers located on the micro-hub. Both micrometers are oriented 90° from a fixed pivot pin. The spindle hub and angle adjustment plate are spring-loaded. The micrometers and pivot pin are fixed in the spindle hub and apply constant pressure to the angle adjustment plate. The pivot pin creates a known distance between the two plates. The micrometers are identified as the left front micrometer and the right rear micrometer.

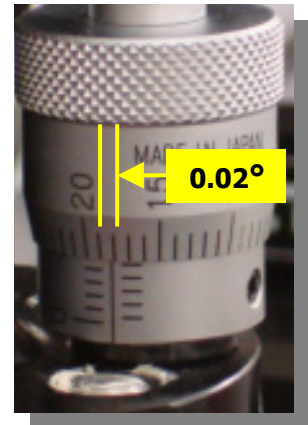


Figure 11

The reference edge on the underside of the micro-hub assembly (Figure 8) is the reference for all of the fixtures, and it must be kept clean. It is parallel to the pivot pin and the right rear micrometer. It is perpendicular to the pivot pin and the left front micrometer.

- **Radial:** Left to right adjustments are made using the micrometer located at the right rear. The left to right adjustment is also known as "Roll." Rotate the micrometer clockwise to lower the right side, and rotate it counterclockwise to raise the right side.



- **Axial:** Front to back adjustments are made using the micrometer located at the left front. The front to back adjustment is also known as "Pitch." Rotate the micrometer clockwise to lower the front side, and rotate it counterclockwise to raise the front side.



Note: Each division on the micrometers moves the sample 0.02° in the appropriate orientation (Figure 11).

The pivot pin (Figure 12) creates a gap between the spindle hub and the spring-loaded angle adjustment plate.

The gap is factory set at 2032 μm (.080"), allowing axial and radial adjustments of +10°/-2.5°. If more angular adjustment is necessary, the gap can be increased. However, a larger gap between the plates will decrease spring life. Also, the sample can be re-mounted, or a specific angle fixture can be used, if more angular adjustment is desired.



Figure 12

Sample Load

The spindle load (without a fixture) is approximately 500 g. The total load will change based on the fixture that is used and the weight of the sample. Therefore, the scale is not based on a specific load; it is more of a reference.

For certain polishing applications (fragile specimens, TEM thinning), it may be desirable to reduce the amount of load on the sample.

Adjust the sample load by turning the knurled screw (load adjustment screw) until the indicator moves to the desired setting on the scale (Figure 13).

Variations in surface area will influence the pressure applied based on a standard load. As the surface area changes, so does the pressure applied to the sample. Delicate samples that easily fracture, and those with very small surface areas, require lighter loads than samples with larger surface areas.

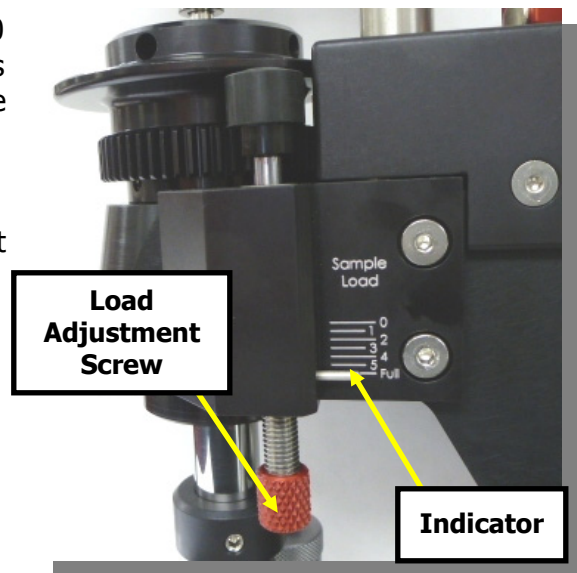


Figure 13

MultiPrep™ System Alignment – Theory

Alignment of the MultiPrep™ System is required to establish perpendicular and parallel reference surfaces to which samples will be secured. Since adjustments will be made during its operation to meet various applications, a method to re-establish alignment is necessary.

The frequency of this alignment depends upon how much use the MultiPrep™ System sees in a given time period. Alignment is a process that takes only minutes to accomplish, and it is highly recommended prior to starting any sample preparation procedure.

The MultiPrep™ head and base are machined to very tight tolerances. The accuracy of alignment is dependent upon the cleanliness of the platen and platen base. It is very important that they be cleaned and dried after every use to ensure accuracy.

Alignment requires three (3) steps: 1) Verification of platen run-out, 2) Perpendicular alignment of spindle (sample rotation axis) to platen, and 3) Alignment of micro-hub assembly to platen

All systems are inspected and aligned before shipping, but they should also be checked upon installation using the procedure described on pages 19-23.

Note: Prior to performing the following alignment procedures, adjust the load setting to “full.” Use a lint-free wipe (or cotton swab) to clean any grease or oil from the bearing on the underside of the spindle pulley and the bearing cover on which the inner race of the bearing makes contact.

For additional assistance in aligning the MultiPrep™ System, a video CD has been included with each machine. This CD contains an AVI file that can be played on most computers with DivX-compatible video player software. Please contact Allied for more information.

MultiPrep™ System Alignment – Instructions

Step 1: Verification of Platen Run-out

With the first step of the alignment procedure, it is important to make sure that the total vertical run-out (movement up and down as it rotates) of the platen is within 4 μm .

If either the platen underside or platen base are contaminated, the run-out will be influenced, which will interfere with accurate alignment.

Procedure:

- 1) Remove the splash ring and place a platen (without abrasive/cloth) onto the base.
- 2) Remove the dial indicator and its adapter plate (Figure 14) from the MultiPrep™ accessory case.
- 3) Slide the long edge of the dial indicator onto the dovetail on the silver pin of the adapter plate (Figure 15).
- 4) Lock the indicator approximately 1/4" from its rounded edge by rotating the threaded ring/collar.
- 5) Position the dial indicator tip at an angle, just below the adapter body (Figure 16).
- 6) Attach the adapter plate/indicator to the MultiPrep™ using the cam-lock, and then lower the cam-riser. Rotate the indicator bezel so "100" is at the 6 o'clock position (Figure 17).
- 7) Adjust the oscillator linkage to position the dial indicator tip approximately one (1) inch from the edge of the platen. The dial should be facing the front of the machine (Figure 17).
- 8) Rotate the vertical adjustment knob counterclockwise until the indicator tip makes contact with the platen (clockwise deflection of the needle indicates contact) and reads "100."
- 9) Set the platen speed to 20 RPM and activate counterclockwise rotation, to observe the motion of the indicator needle.

If more than 4 μm of vertical run-out are observed, check the platen and platen base contact surfaces for debris, corrosion, etc., and clean as needed.

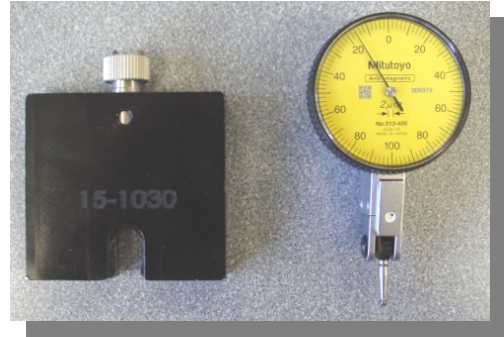


Figure 14

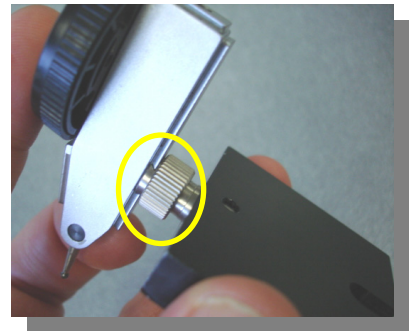


Figure 15

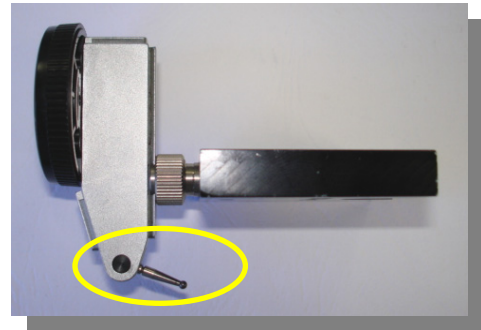


Figure 16

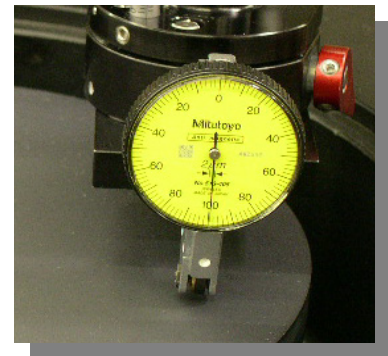


Figure 17

If the run-out is still more than 5 μm after cleaning, see the Maintenance section on pages 35-36, or contact Allied for further service options.

Note: The platen and platen base are precision lapped surfaces; however, the tolerances may vary up to 2-3 μm each. The platen orientation, as it rests on the platen base, can affect the overall (compounded) run-out. For example, if the thicker side of the platen rests on the high side of the base, the run-out can be compounded up to 5-6 μm (Figure 18).

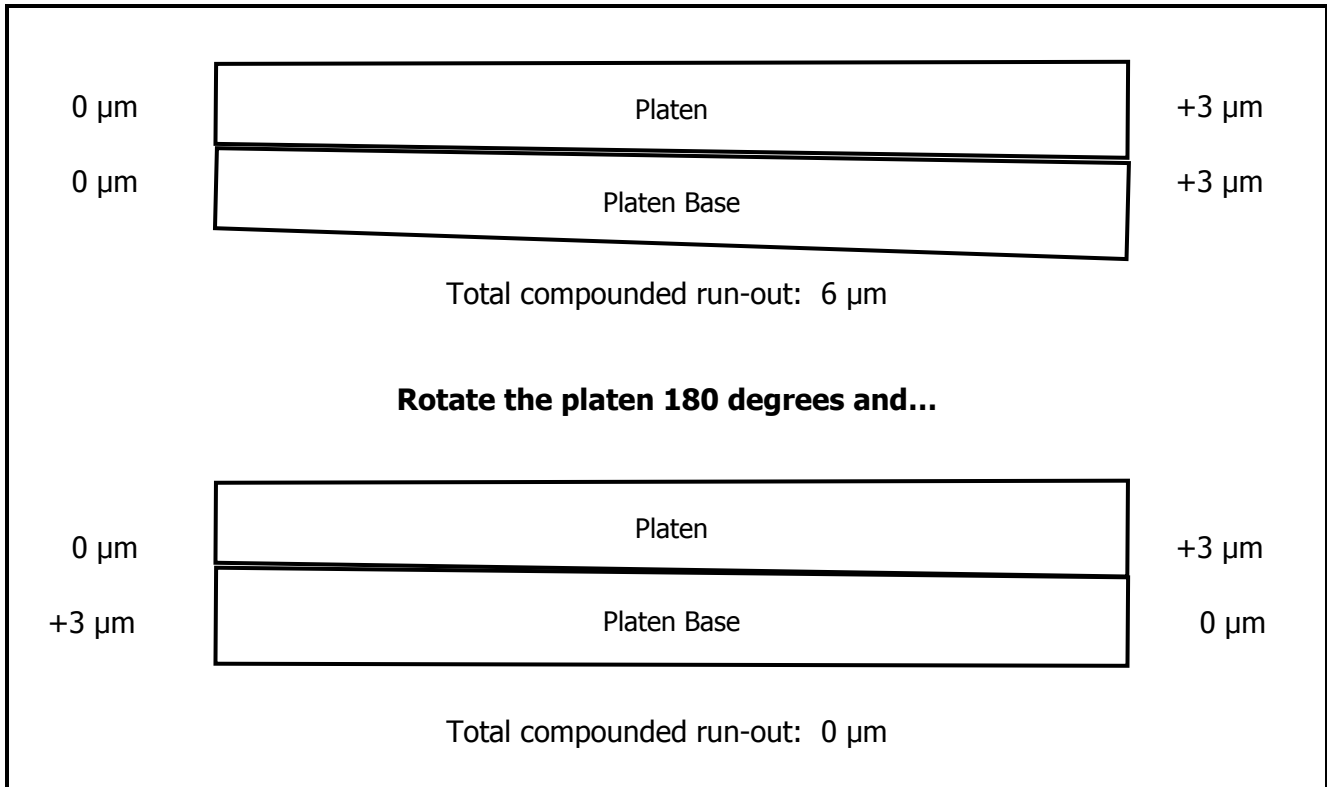


Figure 18: Platen run-out illustration

When platens not originally shipped with the system are used, it is recommended that they be checked, marked, and matched for minimal run-out. On the underside of the platen, there are four (4) small holes into which the drive-pins of the platen base fit. Rotate the platen on center until the drive-pins engage and the platen rests on the edge of the platen base. Check the run-out at each of the four (4) possible positions (90 degree rotations).

For example, the run-out may be 5 μm , 4 μm , 2 μm and 2 μm . At the minimal position of run-out (i.e., 2 μm), remove the platen and mark the corresponding platen drive hole that engages the pin in the platen base where it is stamped "A" (Figure 19). If using the platen with a polishing cloth, this is less critical, since the cloth thickness will vary more than 5 μm .

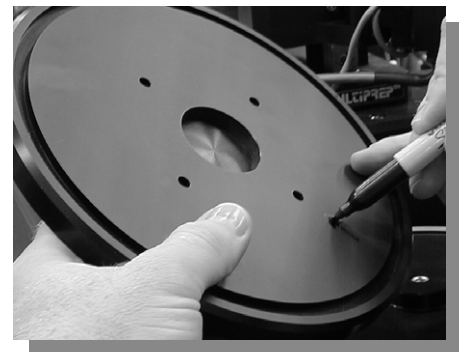


Figure 19

Step 2: Perpendicular Alignment of Spindle (sample rotation axis) to Platen

Vertical spindle alignment is necessary to establish perpendicularity of the rotation axis to the platen. This ensures the sample will remain in contact with the platen during an entire rotation cycle. Alignment of the axis prevents coning of the sample and keeps it parallel to the platen.

With the dial indicator still attached from the verification of platen run-out, loosen the oscillator linkage to swing the arm and re-position the indicator closer to the center of the platen (Figure 20).

Activate FULL rotation at the lowest speed and make sure the tip of the dial indicator makes continuous contact with the platen for a complete rotation. If over the full rotation the needle on the indicator varies more than 2 divisions ($4\ \mu\text{m}$), alignment is necessary.

Perpendicular alignment is accomplished by adjusting the screws on the leveling plate (Figure 21).

The first adjustment involves positioning the dial indicator at the 3 and 9 o'clock positions and adjusting the screws on the right side of the leveling plate until the readings are equal.

The second adjustment involves positioning the indicator at the 6 and 12 o'clock positions and adjusting the screw on the front side of the leveling plate until the values at each position are equal.

Procedure:

- 1) Rotate the bezel on the dial indicator so "100" is at the 6 o'clock position on the face.
- 2) Activate sample rotation and position the dial indicator at the 3 o'clock position on the platen (Figure 20).
- 3) Set the indicator needle to "100" (Figure 22) on the dial by rotating the vertical adjustment knob.
- 4) Activate sample rotation and stop the indicator at the 9 o'clock position (180° rotation). If the variation is greater than 2 divisions ($4\ \mu\text{m}$), proceed to step 5. If not, proceed to step 6.

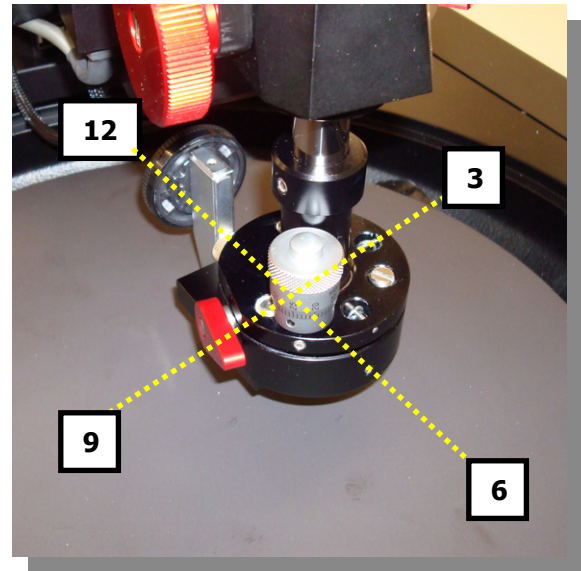


Figure 20

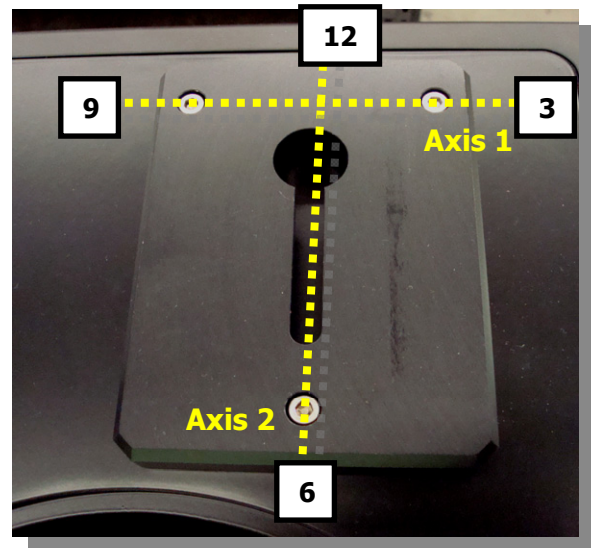


Figure 21



Figure 22

5) If at the 9 o'clock position the needle has rotated clockwise, tighten the screw at the right rear corner of the leveling plate until the needle returns to "100". If it has rotated counterclockwise, loosen the screw at the right rear corner of the leveling plate until the needle returns to "100." Repeat steps 2-4 until the variation is 2 divisions (4 μm) or less on the indicator.

6) Activate sample rotation and stop when the dial indicator is at the 12 o'clock position. Rotate the vertical adjustment knob until the needle reads "100." A mirror is supplied in the accessory kit to help see the indicator face when it is at the 12 o'clock position facing away (Figure 23). Activate sample rotation and stop at the 6 o'clock position.

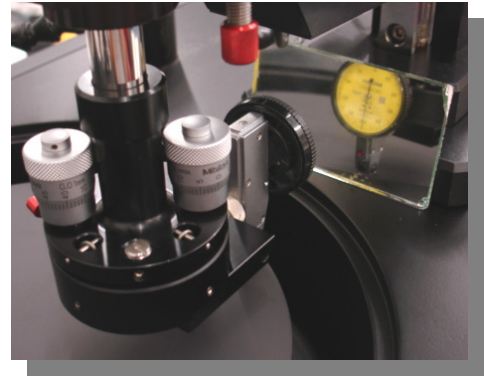


Figure 23

7) Adjust the screw on the front side of the leveling plate to return the needle to "100" and repeat steps 6 and 7 until the variation at the 2 positions is 2 divisions (4 μm) or less on the indicator.

8) Observe one full rotation to verify the total variation of movement of the needle is less than 2 divisions (4 μm).

Step 3: Alignment of Micro-Hub Assembly to Platen

The micrometer heads on the micro-hub assembly are used to adjust/tilt a sample, by changing its angle relative to the platen. Changing its angle should be performed when there are variations caused by mounting wax, uneven encapsulation of potted and packaged samples, tape, etc.

Alignment through adjustment of the micrometer heads, using the parallel polishing fixture (#15-1020), is required to establish a parallel surface to which the sample is secured and referenced. Additionally, alignment permits the maximum angular range of travel.

Micrometer Head Alignment Values (from factory)

Left-front micrometer: _____mm
Right-rear micrometer: _____mm

For applications not requiring absolute parallel calibration, the values above represent the micrometer positions that accurately align the fixtures (to within 2-3 μm) relative to the platen surface. Adjust to these settings before starting any procedure.

Note: If the micrometer heads are removed for repair, replacement, or cleaning, realign the micro-hub using a parallel polishing fixture and the procedure below, and then change the values above.

Procedure:

- 1) If proceeding from the previous section, remove the adapter plate and indicator and separate the two components so the indicator can be used by itself.
- 2) Manually position the indicator tip to about a 25° forward angle, and secure the indicator to the platen using double sided adhesive tape so the indicator tip is facing the micro-hub assembly. Rotate the indicator bezel so the "0" is rear-facing (Figure 24).
- 3) Attach a parallel polishing fixture (#15-1020) to the MultiPrep™ head and lower the spindle using the spindle riser.
- 4) Activate sample rotation and stop when the pivot pin is over the contact point of the indicator tip (Figure 24).
- 5) Lower the arm using the vertical adjustment knob until the bottom of the fixture makes contact with the indicator tip and the needle of the dial indicator is aligned with the "0."
- 6) Activate full sample rotation and stop it when the indicator tip is directly beneath the first micrometer head (Figure 25).
- 7) Adjust the micrometer head to return the dial indicator needle back to "0," in the opposite rotational direction of its movement during Step 6. For example, if the indicator moved clockwise from "0," return it counterclockwise by rotating the micrometer head counterclockwise.
- 8) Activate full rotation and stop it when the indicator tip is directly beneath the second micrometer head (Figure 26).
- 9) Adjust the micrometer head to return the indicator needle to "0."
- 10) Activate full rotation until the fixed pivot pin is located over the tip of the dial indicator (Figure 24).
- 11) Adjust the vertical adjustment knob until the indicator needle is at "0."
- 12) Repeat steps 6-11 until less than 4 μm of variation are noted on the dial indicator over a full 360° rotation.
- 13) Note the left and right micrometer settings to assist with future calibration.

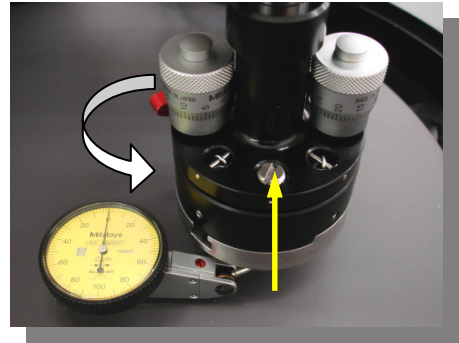


Figure 24: The indicator tip is aligned directly under the micro-hub pivot pin

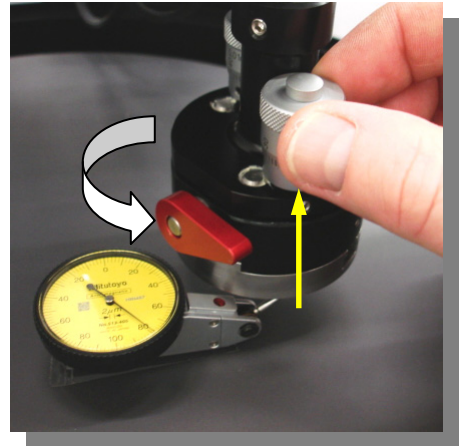


Figure 25: The indicator tip is aligned directly under the first micrometer head

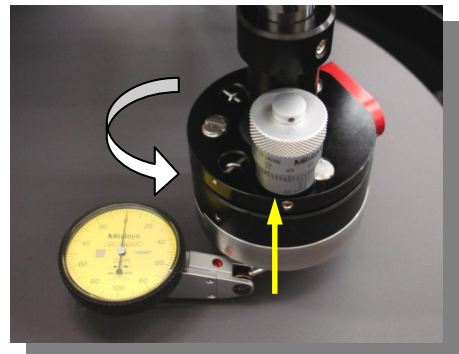


Figure 26: The indicator tip is aligned directly under second micrometer head

Explanation of Digital Indicators

Button Functions

The functions of the 3 buttons on each digital indicator (Figure 27) are as follows:

Button 1: Push and release to switch between inches and millimeters.

Button 2: Push and release to zero the display OR push and hold for more than 2 seconds to enter ABS mode, where preset values can be set for the indicator.

Button 3: Push and release to "hold" the value on the display OR push and hold for more than 2 seconds to turn the power off on the indicator. When the power is off, push and release this button to turn the indicator on.

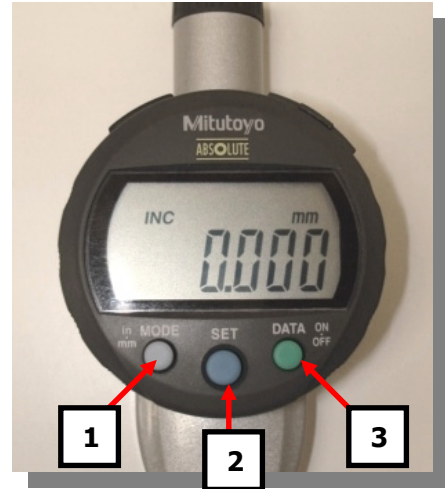


Figure 27

Front Digital Indicator

The front digital indicator is dynamic, displaying vertical movement of the spindle as the sample is ground/polished. The display can read in + or - value, increasing or decreasing when the spindle advances the sample downward into the abrasive plane as material is removed.

It is important to understand that contact between the sample and abrasive can be made without a change in the front display. This is due to sample compression into the non-moving abrasive, since the abrasives are not hard (plastic, paper, cloth). Therefore, it will not accurately indicate the amount of material removed from a sample (removal = amount displayed + amount compressed). Assuming the indicator is zeroed, the display will change once the abrasive is fully compressed and supports the entire weight of the sample and spindle as the arm is lowered.

Advancement of the sample stops when the spindle comes to rest on the arm, which serves as a mechanical stop. During polishing, the front indicator may or may not go to zero, depending upon its value from the start.

Rear Digital Indicator

The rear indicator displays movement of the arm, and it only changes when the vertical adjustment knob is rotated. The value in the display remains static during grinding/polishing of the sample. A zeroing function allows the operator to establish a start position, or reference, in order to collect quantifiable data pertaining to the distance the sample is advanced for each abrasive step.

The rear indicator addresses compression; when contact of the sample is made with a moving abrasive surface, the sound of the abrasive grinding the sample is an indication of contact. At this point, the rear indicator can be zeroed and the arm advanced to remove a desired amount of material. It is possible that when advancing the sample on a moving abrasive surface, the front indicator may not change, because material is being removed as quickly as the sample is advanced.

Because sound is used as an indicator of contact, this method has limitations to its precision and is therefore recommended for coarse grinding applications.

The rear digital indicator spindle can move up or down within a range of about 2½", while the MultiPrep™ head vertical spindle can be moved with the vertical adjustment knob within a range of about 4". Because of this difference, the rear digital indicator may stop contacting its reference point during some operations. If the display on the rear digital indicator stops changing when using the vertical adjustment knob, then the indicator has likely stopped contacting its reference bracket. This bracket can be adjusted up or down by loosening its red knob, sliding the bracket in the desired direction, and then tightening the bracket adjustment knob (Figure 28).

Specific Material Removal

Coarse Material Removal (>100 µm)

For coarse material removal (>100 µm), utilizing the rear digital indicator is recommended, using fixed abrasive disc products with abrasive sizes 6 µm and larger.

1. Place the desired abrasive onto the platen.

Note: Thickness variations between abrasive discs may be encountered on each step of the procedure. Therefore, the initial point of contact must be established this way for each step.

2. Secure the sample/fixture to the MultiPrep™ head and adjust the sample load, if necessary.
3. Activate the water and platen rotation at the desired speed.
4. Lower the arm slowly, using the vertical adjustment knob, and stop when the sample makes initial contact with the abrasive. Contact is determined by sound or when a trail of debris is observed on the abrasive.
5. Zero the rear indicator, activate rotation and oscillation (if used) and lower the arm (sample) the required distance, which is displayed in the indicator.
6. Let the sample grind/polish until the spindle comes to rest on the arm, which stops advancement of the sample into the abrasive. At this point, the sample will be suspended just above the abrasive surface.
7. Raise the arm using the cam-riser, to remove the fixture and clean the sample. Verify the material removal using an optical microscope.
8. Change the abrasive disc to the next step once the desired amount of material has been removed. Steps 1-7 can be repeated for each abrasive until the ideal results are obtained.

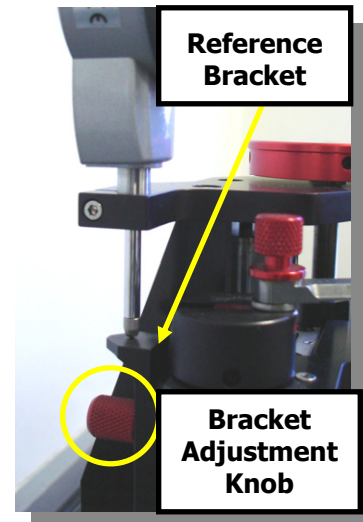


Figure 28

Fine Material Removal (<100 µm)

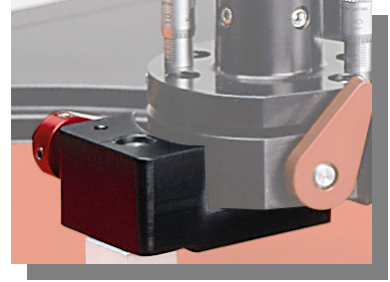
For fine material removal (<100 µm), the front digital indicator should be used, along with diamond lapping films 3 µm and finer, on samples having surface areas less than 25 mm².

1. Place the desired abrasive onto the platen.
2. Secure the sample/fixture to the MultiPrep™ and adjust the load, if necessary.
3. Lower the cam-riser, assuring the sample is not making contact with the abrasive surface, and then zero the front digital indicator.
4. Lower the arm, using the vertical adjustment knob, until the sample just makes contact with the abrasive, and stop when the display is between 0.100 and 0.150 mm (100 to 150 µm) more than the desired amount to be removed from the sample.
5. Raise the spindle using the cam-riser.
6. Activate the water and platen rotation at 10 RPM.
7. Lower the sample onto the platen/abrasive with the cam-riser and zero the front indicator.
8. Increase the platen speed to the desired RPM. The indicator value will change as material is being removed.
9. When the desired amount of material to be removed is indicated in the display, lift the sample off the abrasive using the cam-riser.

Fixture Descriptions

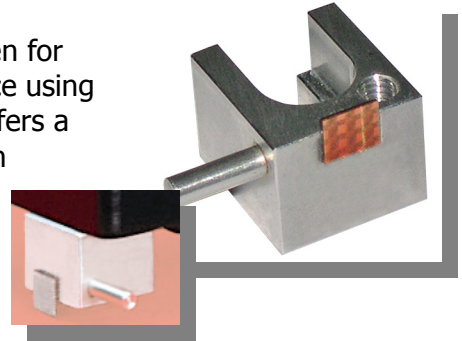
#15-1005, Cam-Lock Adapter

This adapter is used with fixtures #15-1010 and #15-1013 to allow easier attachment to the micro-hub assembly. It also positions the fixtures so the sample makes contact nearest to the center of the platen; this allows for maximum abrasive usage.



#15-1010 & 15-1010-4 (Pk/4), Cross-Sectioning Paddle

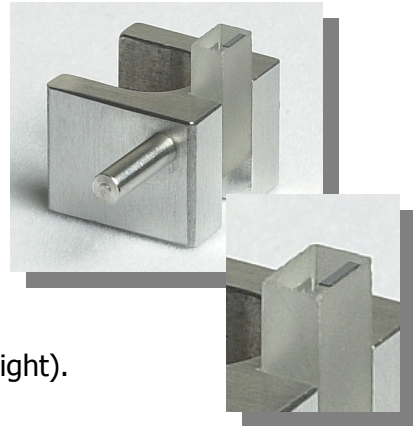
This fixture is used to secure samples perpendicular to the platen for cross-sectioning. Samples are attached/secured to the front face using hot mounting wax (#71-10040). The aluminum construction offers a conductive medium for placement into a SEM, and it is corrosion resistant. The removable pin on the side is 3.1 mm in diameter; it can be unscrewed and moved to the top, so the paddle can be placed into an SEM without having to remove the sample.



#15-1013, TEM/Pyrex Fixture

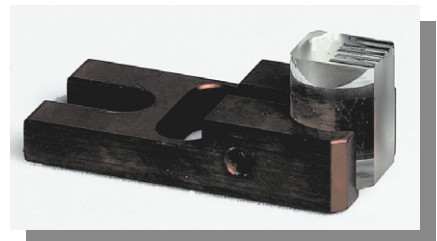
The small (3 x 5 mm) Pyrex® insert is ideal for preparing TEM samples. By providing a small footprint, shallow angular adjustments are possible when the sample is thinned. This helps to prevent grinding into the Pyrex®.

The pin on the side allows for easy placement of the paddle into the cam-lock adapter (#15-1005), and also when removing the sample for inspection. During the thinning operation, the Pyrex® allows light to pass through the sample for observation and thickness determination (when working with materials, such as silicon, that permit measurement via observed color in transmitted light).



#15-1014, TEM/Pre-FIB Thinning Fixture

With a larger Pyrex® insert than #15-1013, many small samples, or one large sample, can be polished at one time. The 1/2" diameter Pyrex® is interchangeable and four (4) pieces are supplied with this fixture, which can also be purchased separately (#69-40015). The Pyrex® can be planarized and made parallel to the platen using abrasives (diamond lapping film works the best). This provides a "zero" reference plane to the platen, so angular adjustments can be made using the micrometer heads. Samples can be secured using wax or glue.



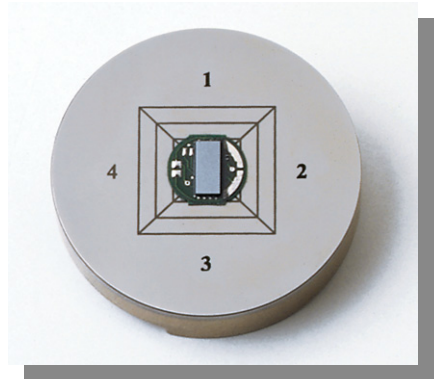
#15-1018, SIMS Pyrex® Fixture

This fixture features a ½" round Pyrex® glass insert secured to an aluminum body. It allows light to pass through the Pyrex® for transmitted light observation of sample thickness, which is useful when thinning silicon based devices from the backside for SIMS analysis. Samples are secured to a square glass microscope slide using EpoxyBond 110™ (#71-10000), and then attached to the Pyrex® of this fixture using hot mounting wax.



#15-1020/1020-80/1020-100, Parallel Polishing Fixtures

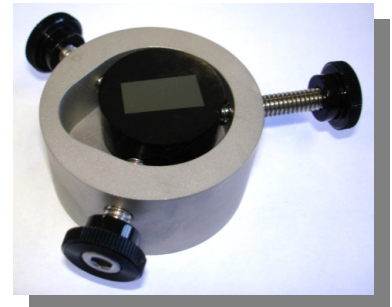
Both sides of this fixture are lapped, providing a smooth, flat surface on which to secure samples for parallel lapping/delaying, substrate thinning, backside thinning of flip-chip/C4 devices, and many other applications. The stainless steel does not corrode or warp from the heating and cooling cycles necessary to melt the wax used for securing samples. The grid provides alignment assistance and reference points for sample orientation.



Diameter	Item #
57 mm (2¼")	15-1020
80 mm (3")	15-1020-80
100 mm (4")	15-1020-100

#15-1025, Mount Holder

The mount holder is used to secure encapsulated samples, up to 1½" diameter. The stainless steel construction resists corrosion and provides extra weight for grinding larger samples.



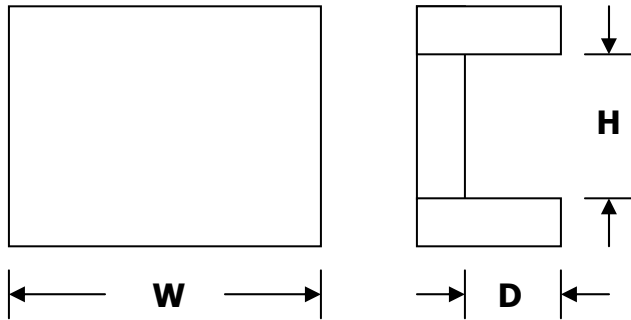
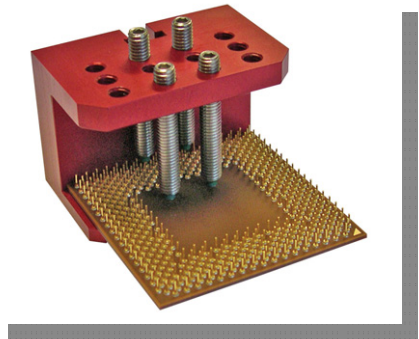
#15-1035, Weight Kit

A complete set of brass weights comes with this kit. The slotted weights are applied to the top of the spindle below the digital indicator. The rod and barrel weights are positioned above the spindle once the digital indicator has been removed. Slide the rod into the spindle to secure it in place. For specific material removal, the rear digital indicator can still be used.

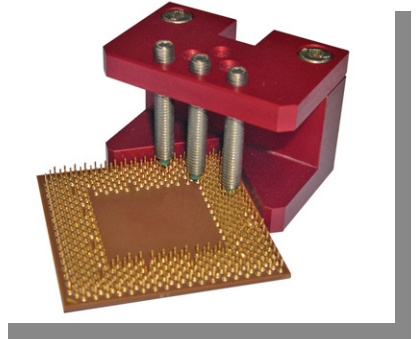


#15-1045/46/47/48, Multipurpose Fixtures

Each of these fixtures is designed to mechanically secure samples that cannot be waxed or secured well enough to the Cross-Sectioning Paddle (#15-1010). Fixtures #15-1046/48 orient microelectronic packages and devices diagonally (45 degrees) to the platen. Fixtures #15-1045/47 provide sample orientation parallel to the platen. The screws are adjusted to fit samples of various shapes and sizes, and they feature Nylon tips to prevent damage to samples.

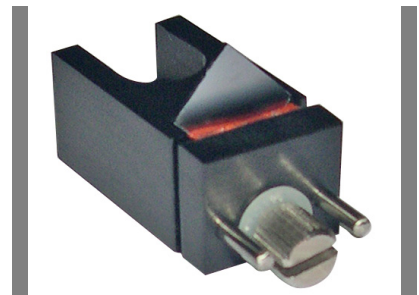
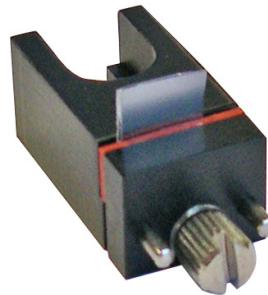


Dimensions (W x H x D)	Item #
2.0" x 1.0" x 0.800"	15-1045
2.0" x 1.0" x 0.800"	15-1046
1.0" x 0.4" x 0.5"	15-1047
1.0" x 0.4" x 0.5"	15-1048

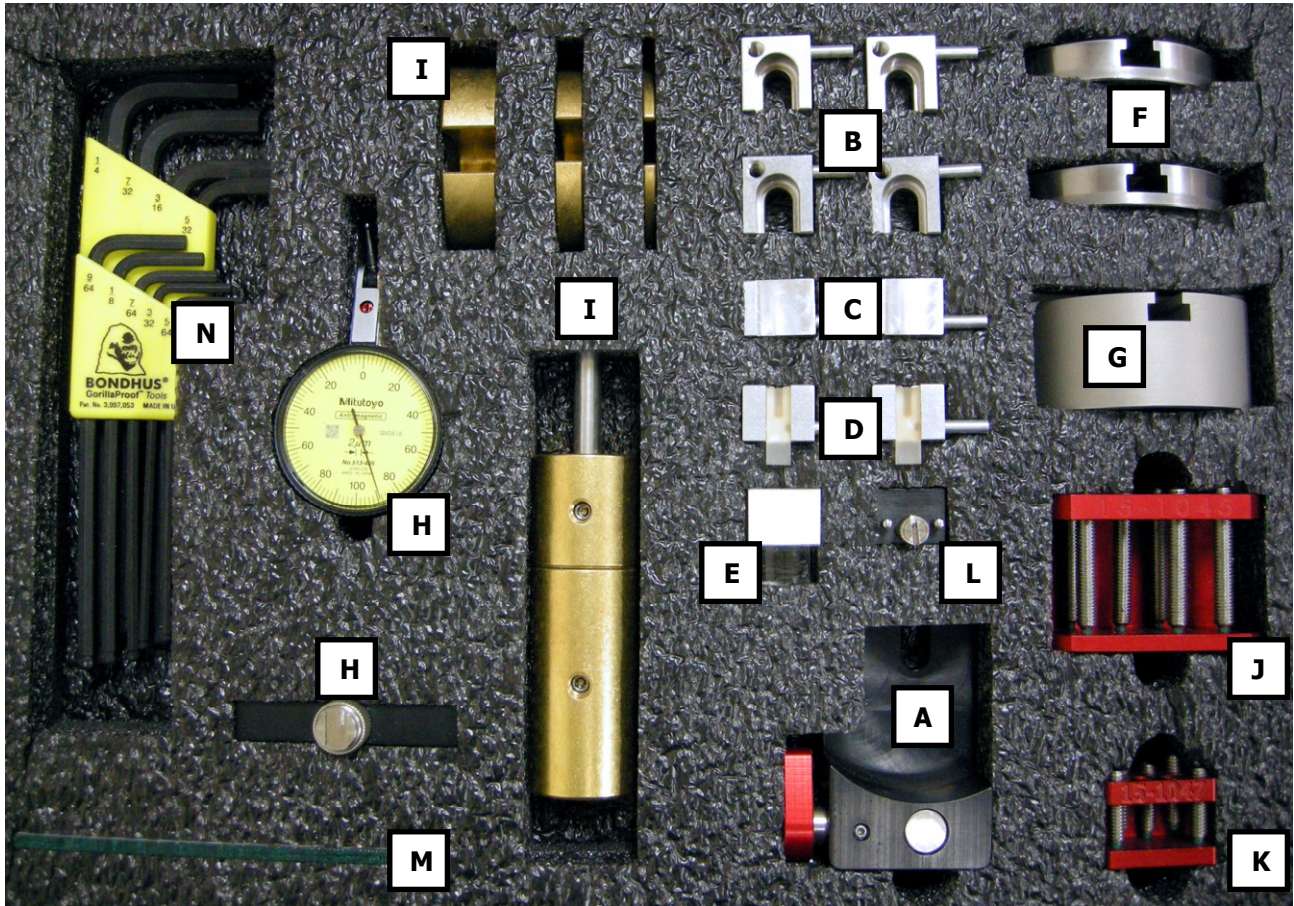


#15-1050/51, Cross-Sectioning Paddle, Clamp Style

This fixture is used to secure small package devices, or other samples, when wax cannot be used (the heat required to melt the wax could create problems with heat sensitive samples or materials). It can also be used as a substitute when waxing is troublesome. Fixture #15-1051 offers a diagonal (45 degrees) orientation of the sample.



Options/Accessories



Label	Item #	Description
A	15-1005	Cam-Lock Adapter (to secure 15-1010 & 15-1013 to the micro-hub)
B	15-1010	Cross-Sectioning Paddle
C	15-1010-RE	Cross-Sectioning Paddle, with Reference Edge
D	15-1013	TEM Wedge/FIB Thinning Paddle with Pyrex® (5 mm x 3.5 mm)
E	15-1018	SIMS/Backside Pyrex® Fixture
F	15-1020	Parallel Polishing Fixture, 2.25" Diameter
G	15-1025	Mount Holder, 1.5" Capacity
H	15-1030	Dial Calibration Kit (included with the MultiPrep™ System)
I	15-1035	Weight Kit, 650 g Total
J	15-1045	Multipurpose Fixture, Large
K	15-1047	Multipurpose Fixture, Small
L	15-1050	Cross-Sectioning Paddle, Clamp Style
M	15-1060	Mirror, for MultiPrep™ Alignment (included with the MultiPrep™ System)
N	15-SET	Standard Allen Wrench Set

Maintenance

Platen Base Cleaning and Platen Cleaning/Storage

Vertical run-out of the platen must be kept at a minimum in order to optimize the precision of the MultiPrep™ System. To prevent oxidation from water and polishing suspensions on the platen base, it is very important to clean and dry this surface after each use of the machine. Warm, soapy water or a mild solvent is recommended. Platens should be removed immediately after use and kept dry (i.e. between two paper towels). If oxidation occurs or colloidal silica dries on the rim of the platen base, it can be removed using diamond lapping film.

To clean it, run the platen base, without the platen, at 150 RPM, while running water directly onto the edge. Place a piece of 30 μm diamond lapping film onto the exposed rim, and apply pressure against the back of the film with a finger, pressing the abrasive against the rim (Figure 29). Hold it in place for at least 30 seconds, and then move the film to expose another area and repeat the process. After 30 seconds, stop the rotation of the platen base and check the vertical run-out of the platen as it rests on the platen base. Repeat the cleaning if necessary to achieve minimal run-out (less than 5 μm total). Keep in mind that debris from grinding must be cleaned thoroughly, and lint from any cloth used to dry the platen base must be wiped away so it does not hinder contact between the platen and platen base.

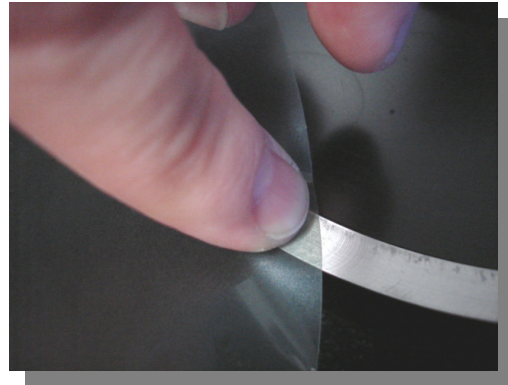


Figure 29

Safe Cleaning Solutions and Methods

The entire exterior of the MultiPrep™ base is coated with an epoxy-based paint. Although it is mainly resistant to solvents, acetone will remove the paint if it is exposed for too long. Mild, soapy water or detergents (such as Formula 409®) are suitable for cleaning most areas of the machine. On the MultiPrep™ head, most parts are either stainless steel or anodized aluminum, for corrosion resistance. The micrometer heads and spindles are steel, which corrode when exposed to water and not dried immediately. No oil, grease, or lubricants should be used on the MultiPrep™ head vertical spindle, because it will collect dust and debris that will prematurely wear the surface and degrade its performance.

Removing Colloidal Silica

Colloidal silica suspensions dry very quickly and are very difficult to clean once they have dried. A solution of Micro Organic Soap (#148-10000) and warm water will successfully clean dried colloidal silica from most surfaces. A soft, mild brush or scrubbing pad may need to be used.

Micrometer Heads and Replacement

It is difficult to recommend when the micrometer heads need replacement, due to many factors, including frequency of use, water exposure, cleaning, etc. They should move effortlessly as the thimble is rotated. Each set-screw should be snug against the base of the micrometer head it secures, but not so tight that they hinder movement. Removing the micrometer heads every few months to coat the steel hub with either Vaseline® or grease will help prevent corrosion and freezing of the spindle.

Spring Replacement

There are two springs that hold together the two plates of the MultiPrep™ head micro-hub assembly. Over a period of time, depending upon the frequency of use, the springs will fatigue. Closely observe the tension of these springs and replace them at your discretion.

Vertical Spindle

The vertical spindle travels up and down in a steel bushing in the arm of the MultiPrep™ head. This is a precision steel guide that will rust if it is exposed to water. At no time should water directly splash onto the spindle. Light contact with water is normal and will not cause damage if it is promptly dried.

Drain Screen (#10-1272)

The proper orientation of the drain screen within the bowl of the MultiPrep™ base is with the narrow end up, like a volcano. This enables the water to flow over the top, yet it still allows the screen to catch a sample that has fallen from the holder into the drain bowl. It **MUST** be cleaned frequently to avoid overflowing of the bowl. **Damage to electrical and mechanical components as a result of overflow is not covered under the warranty.**

Spare Parts

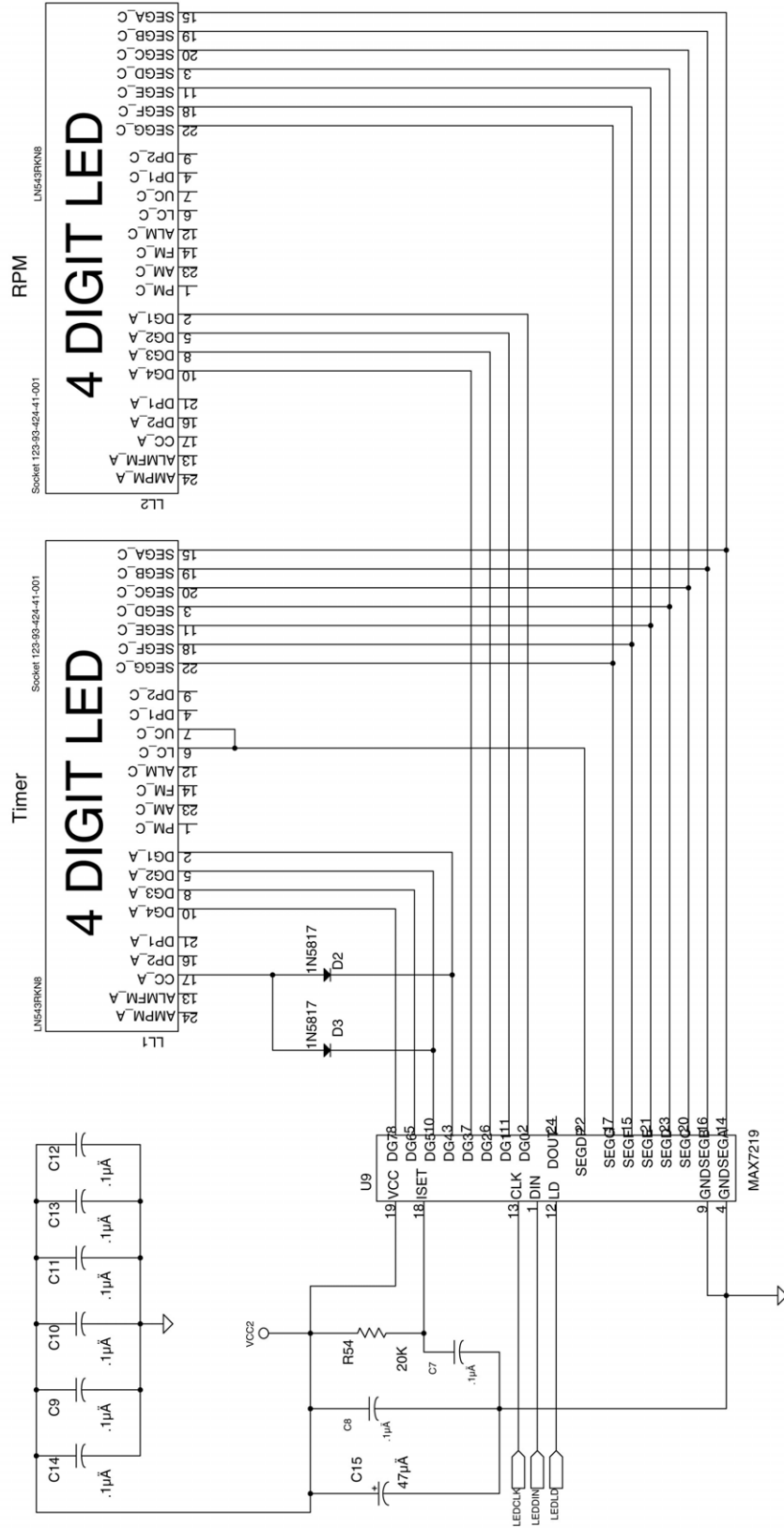
Contact Allied for a list of recommended spare parts.

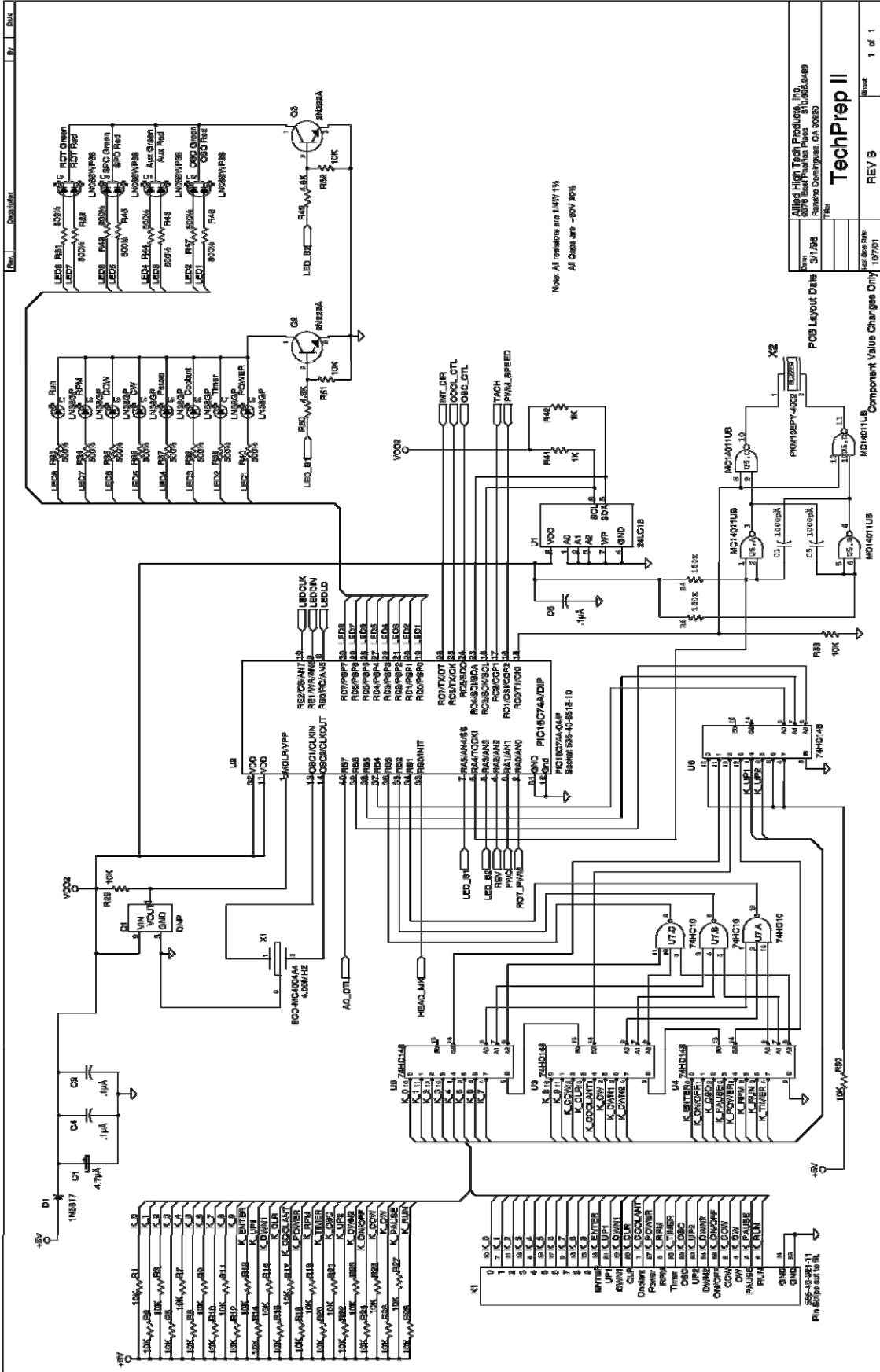
Troubleshooting

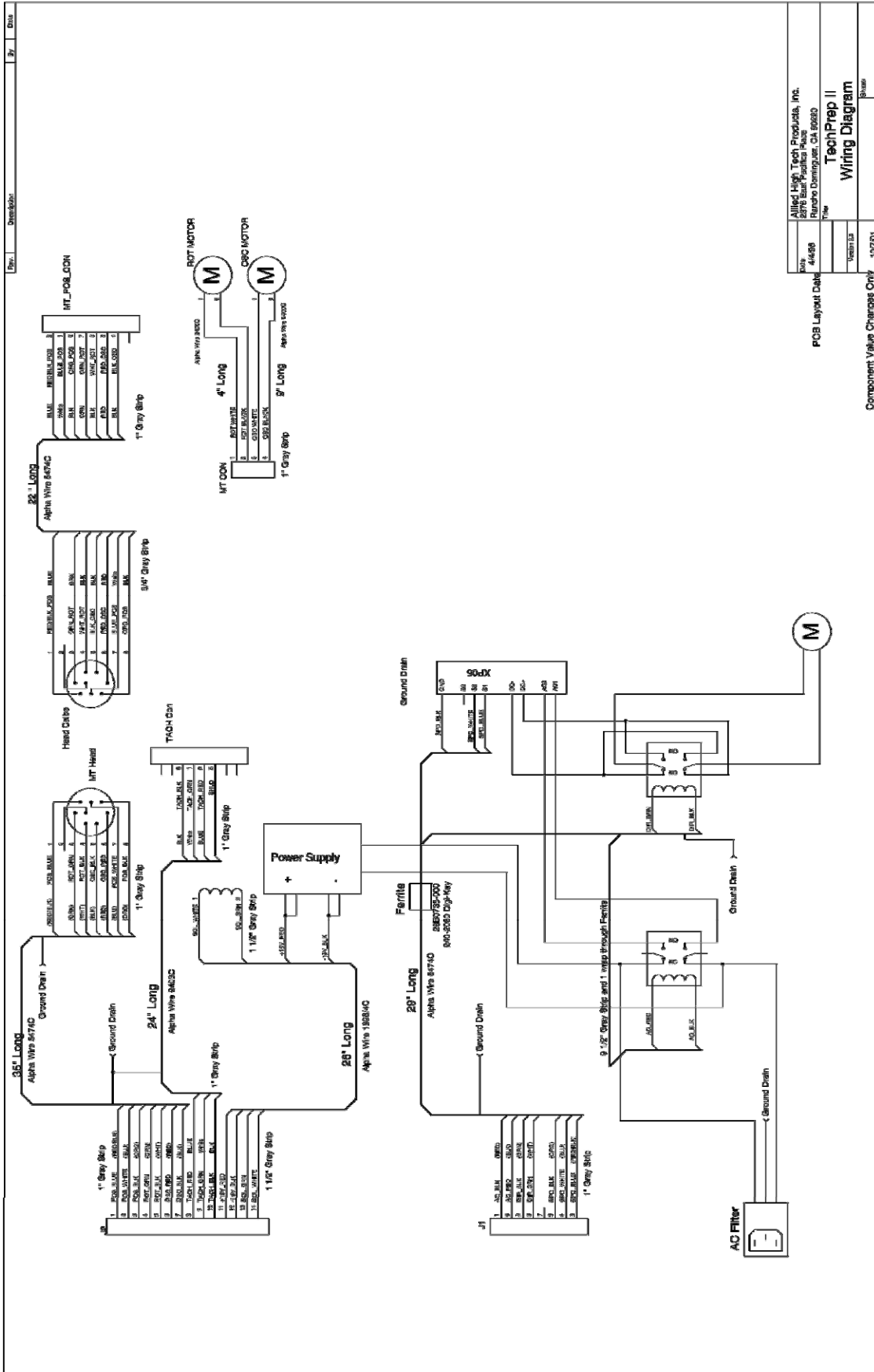
Problem	Cause	Solution
Edge Rounding	The edge was not properly supported, because there was a gap between the mounting material and the sample.	Use a mounting material with better adhesion.
		Degrease and clean the sample thoroughly before mounting.
	The polishing cloth was too soft	Use a more rigid polishing cloth.
	The polishing time was too long	Shorten the polishing time.
	The applied force was too high	Decrease the force.
Smearing	Insufficient lubrication	Apply more lubricant.
		Use a more viscous lubricant.
	The polishing cloth was too soft	Use a more rigid polishing cloth.
Pullout	The fibers of the polishing cloth pulled out sample constituents when they brushed across the surface.	Use a low-nap polishing cloth.
	Insufficient lubrication	Apply more lubricant.
		Use a more viscous lubricant.
Particle Embedding	The polishing cloth was too rigid	Use a softer polishing cloth.
	Insufficient lubrication	Apply more lubricant.
		Use a more viscous lubricant.
	The applied force was too high	Decrease the force.

Comet Tails	The polishing motion was in one direction only.	Rotate the sample to create a random polishing pattern.
	The power head and platen speeds were too different, which created an unidirectional effect	Set the power head and platen to rotate at similar speeds.
Lapping Tracks	The polishing cloth was too rigid	Use a softer polishing cloth.
	The applied force was too low	Increase the force.
Large Scratches	Scratches from the previous steps were not removed	Use a more rigid polishing cloth.
	The polishing cloth did not support the abrasive size used.	If using a flocked cloth, use a more rigid flock.
		If using a woven cloth, use a tighter weave.
	The polishing cloth was contaminated	Do not use the same cloth to polish materials with different hardness.
		Replace the cloth with a new one.
The polishing cloth was worn and not removing material at its normal rate	Replace the cloth with a new one.	
Relief & Preferential Polishing	The polishing cloth was too soft.	Use a more rigid polishing cloth.
	The polishing time was too long.	Shorten the polishing time.
	The applied force was too high.	Decrease the force.
	The chemicals in polishing solutions affected the sample's constituents differently.	Shorten the polishing time.
		Use a different polishing solution.

MultiPrep™ System Wiring Diagrams








Rev.	Drawn by:	Date

POB Layout Date: 4/4/98
 Allied High Tech Products, Inc.
 2878 Bear Flanker Place
 Rancho Dominguez, CA 90230
 TechPrep II
 Wiring Diagram

Component Value Changes Only
 13701

CE Certificates


TÜV

C E R T I F I C A T E

of Conformity
EC Council Directive 98/37/EC
Machinery

Registration No.: AM 2279248 01
Report No.: M 2172817 . 01

Holder: **Allied High Tech Products, Inc**
2376 East Pacifica Place
Rancho Dominguez, CA 90220

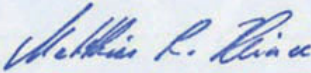
USA

Product: BEARBEITUNGSMASCHINE
Precision Polishing Machine

Identification: Model Number: Multiprep/Techprep

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. This is to certify that the tested sample is in conformity with all provisions of Annex I of Council Directive 98/37/EC, referred to as the Machinery Directive. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex II of the Directive.

Certification Body


Dip.-Ing. Heinze

Cologne, 30.04.2002

TÜV Rheinland Product Safety GmbH - Am Grauen Stein - D-51105 Köln

Ⓒ The CE marking may be used if all relevant and effective EC Directives are complied with. Ⓒ



CERTIFICATE
of Conformity
EC Council Directive 89/336/EEC
as last amended by EC Directive 93/68/EEC
Electromagnetic Compatibility

Registration No.: AE 2172833 01

Report No.: P 2172816 . 01

Holder: Allied High Tech Products, Inc
2376 East Pacifica Place
Rancho Dominguez, CA 90220
USA

Product: BEARBEITUNGSMASCHINE
Polishing System

Identification: Model No.: MultiPrep

Tested acc. to: EN 61326:1997+A1

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex III of Council Directive 89/336/EEC, in its latest amended version, referred to as the EMC Directive. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Article 10.1 of the Directive.

Certification Body

Cologne, 11.10.2001


Dip.-Ing. Heinze

TÜV Rheinland Product Safety GmbH - Am Grauen Stein - D-51105 Köln

Ⓒ The CE marking may only be used if all relevant and effective EC Directives are complied with. Ⓒ



TÜV

CERTIFICATE

of Conformity

Low Voltage Directive 73/23/EEC
as last amended by EEC Directive 93/68/EEC

Registration No.: AN 2279247 01

Report No.: M 2172817 . 01

Holder: Allied High Tech Products, Inc
2376 East Pacifica Place
Rancho Dominguez, CA 90220

USA

Product: BEARBEITUNGSMASCHINE
Precision Polishing Machine

Identification: Model Number: Multiprep / Techprep

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex I of Council Directive 73/23/EEC, in its latest amended version, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex III of the Directive.

Cologne, 03.05.2002



Certification Body
Der Stellvertreter

J. Raap
Dipl.-Ing. Raap

TÜV Rheinland Product Safety GmbH - Am Grauen Stein - D-51105 Köln

CE The CE marking may only be used if all relevant and effective EC Directives are complied with.



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