

# Adjusting the TE-2000 PZM Rack and Gears

**Be sure the power is off and the Stage is removed from the Microscope. You will also need a Phillips screwdriver, a 2.5 mm hex ball driver, a Caliper, an assortment of short shim stock or thin metal, and a foam pad as big as the stage.**

Step 1: Stage rack and gears can sometimes fall out of adjustment when a stage is shipped onsite. Start by removing the Piezo stage and invert it onto a foam pad. Find the XY adjustment knob and then locate the four rack mounting screws. Two of the screws are Phillips and two are 2.5mm hex head cap screws, as seen below.

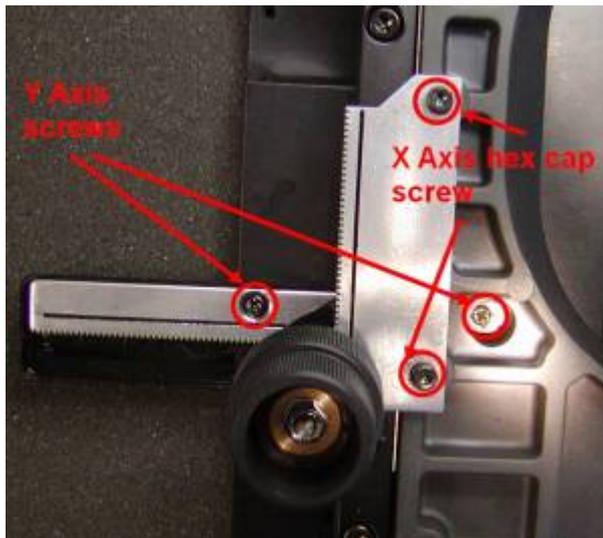


Fig 1

Step 2: To tighten the Y-axis first use the caliper to measure the distance from the back of the rack to the stage near each screw, as seen below.

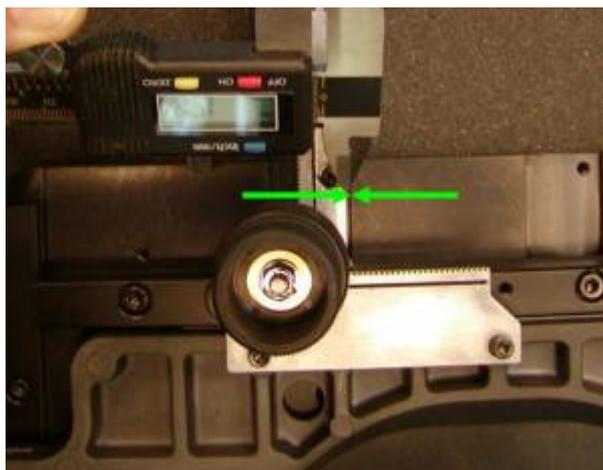


Fig 2



Fig 3

Step 3: Gather enough shim stock or thin metal stock to create a spacer that is larger than the gap measured in step 2 by .005 to .010". Check the thickness with the caliper. Align the stage so that the screw can be seen through the bottom plate of the stage as seen in step 1. Loosen the Y-axis stage screws without removing them. Slip the spacers in behind each screw and tighten the screw back while pressing in the middle of the rack.



Fig 4



Fig 5



Fig 6



Fig 7

Step 4: Check the motion of the Y-Axis to see if it is firm enough between the rack and gear. There should be almost no play in the Y-Axis plate when the Y knob is held firmly. If there is still play in the Y-Axis plate repeat step 3, but increment the spacing thickness by another .005 to .010". If the stage is too tight and feels gritty or sticky when moved reduce the shim stock thickness by .005" and repeat step 3. The important point of the alignment of the rack is to keep it parallel to the stage plate and firmly engaged in the teeth of the gear.

Step 5: To tighten the X-axis first use the caliper to measure the distance from the rack to the X-Axis stage plate near each screw, as seen below.



Fig 8



Fig 9

Step 6: Loosen the X-Axis cap screws and move the gear to the center of the rack. Push the gear into the rack from its center and tighten both screws. Check the left screw distance as in step 5 and compare it to the right one. Make the appropriate changes to make the right and left distance from the rack to the to the X-Axis stage plate the same for both and firmly tighten the cap screws.





Fig 10



Fig 11

Step 7: Check the distances from step 5 to see if the rack is parallel. Also, check the motion of the x-Axis to see if it is firm enough between the rack and gear. There should be almost no play in the X-Axis plate when the X knob is held firmly. If there is still play in the X-Axis plate repeat step 6. The important point of the alignment of this rack is to keep it parallel to the stage plate and firmly engaged in the teeth of the gear.

Step 8: Remount the stage on the microscope and focus the stage on a sample. Test the motion of the stage. If the stage is adjusted correctly there should be no backlash, no gritty motion, and stable landings on the target.

Step 9: Troubleshooting the adjustment: If the stage-plate backlashes in one direction in response to motion in either direction it is likely the respective rack is not parallel or skewed and must be re paralleled. If the stage-plate backlashes in both direction in response to motion in the opposite direction of the backlash it is likely the respective rack is over tightened and has become slightly bowed and must be retightened. If the knob feels gritty, the rack could be over tightened and rubbing or dirt might be in the cross roller bearing race and should be blown out with air.

If these steps don't correct the play in the stage plates contact ASI for further instructions on this unit.

[xystage](#), [nikon](#), [te2000](#)

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