

A Camera Stand for Photomicroscopy

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I have found that there are very good values in Swift microscopes on eBay. Last year I wrote an article on Micscape about restoring a Swift Collegiate. I had been watching eBay for a Swift trinocular and won a bid of \$150 for an MD3300-D with 4x, 10x, 20x and a 100x oil objectives. The seller felt guilty about not shipping it for two weeks and refunded \$50, so I got it for an exceptional price. The only problem was the diffuser for the lamphouse was cracked, but I was able to fabricate a new diffuser by taking the glass out of a 46mm camera filter ring and sanding the glass to a frosted state using very fine grit sandpaper.

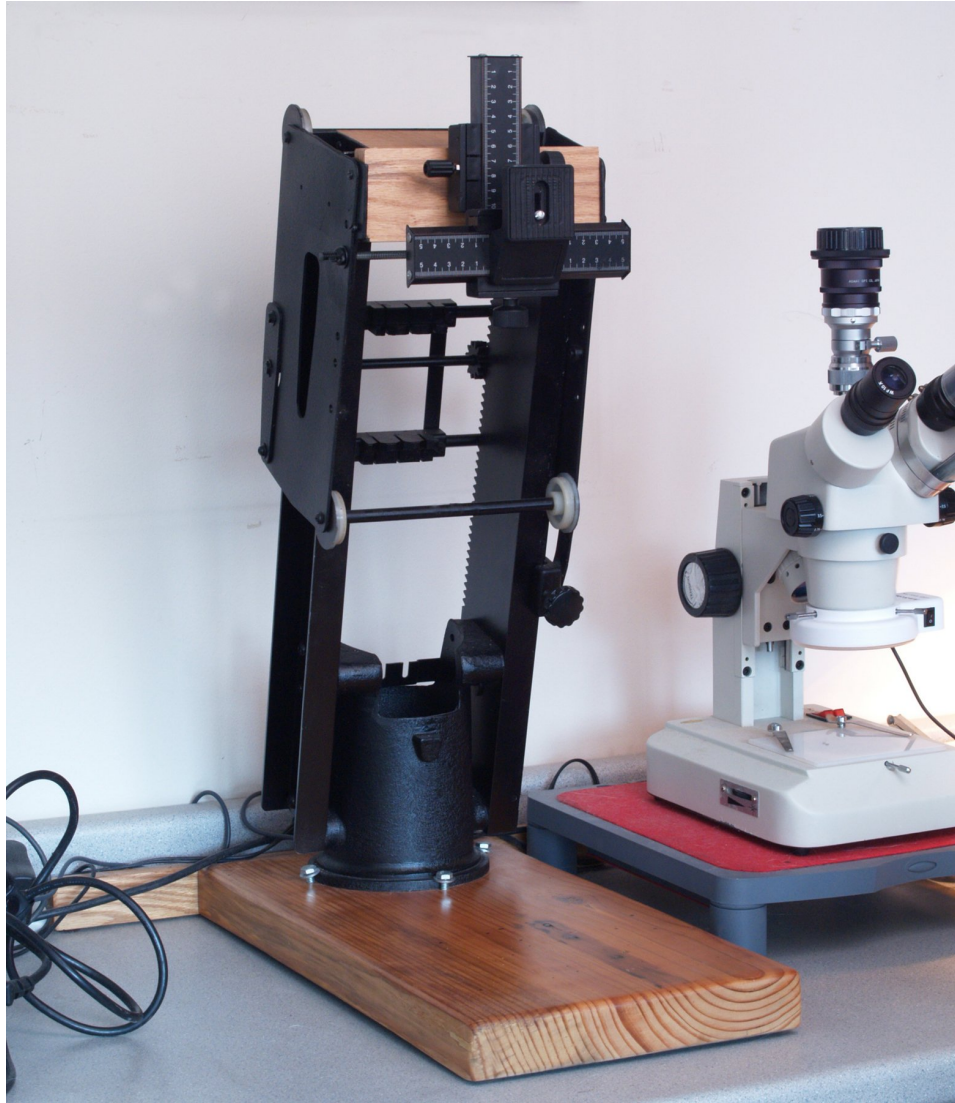
My intention was to mount an Olympus E-420 to the photo tube for photomicrography using a 1960s era Pentax microscope adapter that I modified to Olympus Four Thirds by epoxying an MF-1 OM to Four Thirds Adapter to the Pentax microscope adapter. I'm always on the lookout for the Pentax adapters because they are easily modified and well-built.

As it happened last winter, I found a high-tech yard sale on the Internet. Among the items were a Beseler 45MCRX enlarger and a Pentax microscope adapter. I was interested in both. I emailed the seller asking where he was located. He replied he was in the Finger Lakes region of New York state (about 350 miles from my home) and if I came up to pick up the enlarger it was mine for free. Needless to say, my wife and I trekked up there on a miserable snowing February Saturday to pick up the enlarger. I also got the Pentax adapter for \$10. The seller had all kinds of electronic and photographic items, and he also gave me a 4 foot column for an Omega D-Series enlarger. On the way out the door he also offered me a free set of Vivitar extension tubes that he said didn't fit any of his gear. As luck would have it, when I got home I found out they were for the Olympus OM System, for which I have a lot of macro gear.

This saga actually leads back to the Swift trinocular.

When I mounted the DSLR on the scope's photo tube with the modified Pentax adapter, it was impossible to get a sharp image due to vibration from the camera, even when using the Anti-Shock function in the camera to delay the shutter firing. Since the scope had a swiveling head, I thought that epoxying the head into position would solve the problem, since even with the set screw firmly tightened into the head's dovetail channel it was not solid. No such luck.

I had been very lucky with my other trinocular and my stereo scope regarding vibration, but it looked like I would have to go with the only solution left to my fellow microscopists – the enlarger stand jerry-rig. Ted Clarke and Paul James have written about positioning the camera above the eyepiece with no contact with the scope itself.

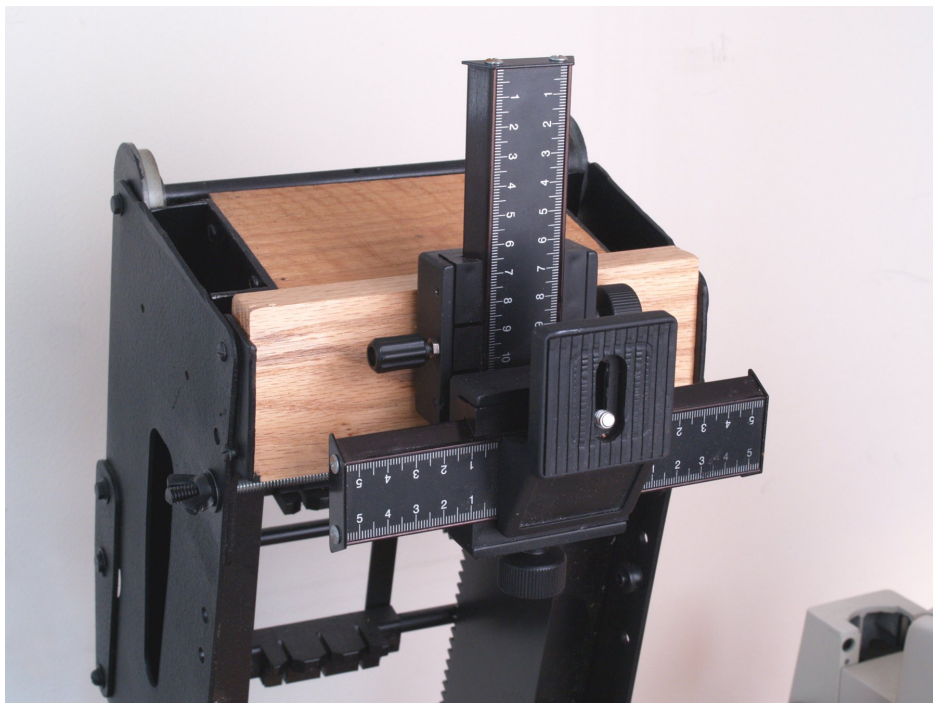


I put the Omega enlarger column on my workbench and started evaluating what wasn't necessary, which was quite a lot. The assemblies for spring loading the enlarger head, the lamp house mechanisms, the negative stage and about two feet of the four foot height would have to go. So in addition to lots of unscrewing, it also meant a lot of metal cutting with the Dremel power tool to get rid of unnecessary metal. For years I had been using the ceramic Cut-Off Wheels, and every Christmas I buy that huge selection of Dremel

expendables in the big plastic case, but I had never tried the fiber Cut-Off Wheels. Friends, they are miraculous. If too much pressure is put on the ceramic wheels, they shatter. The fiber wheels hold in there until they are just a nub. And they cut much faster. The column was mounted on a heavy oak base with an 18 inch outrigger on the back to laterally stabilize the base.



The top of the enlarger column was closed with a block of oak and a focusing rail was mounted on another block of oak to accommodate the camera. The flanges on the sides of the column were squeezed in to lock them in place with a 1/2-20 threaded rod, as can be seen just below the oak block holding the focusing rail.



The focusing rail was necessary to be able to align the camera with the microscope for parfocality.



Now the saga gets interesting. I tried numerous eyepieces – wide field, Olympus NFKs, everything I had, but two problems remained: the magnification was too great and the chromatic aberration was horrendous when trying to project the image directly onto the camera sensor. What was different about this setup from my other trinocular? My other trinocular has a prism that is pulled out of the light path for the binocular eyepieces to project the image directly to the camera sensor.

The Swift uses a beam splitter, so part of the light always goes to the eyepieces and part of the light goes to the photo tube. The setup would require a relay lens to correct the magnification and the chromatic aberration. I had two Olympus OM-Series lenses – a 28mm and a 50mm. The 50mm had too much magnification, but the 28mm was just right. I had gotten the 28mm years ago after reading about

Ted Clarke's setup, but on my scope there was too much barrel distortion and the field flatness was unacceptable. For some reason (and I am not an optical physicist – I do this stuff through trial and error – which is why have a load of parts), the 28mm performs brilliantly on this system.



As you can see, the relay lens (the Olympus 28mm) has to be almost in contact with the eyepiece on the scope. Then the optical path is made light tight with the neck of a black silk sock held in place below the photo tube by a pipe cleaner (the black professional model). The last step is to setup parfocality by focusing using the focus rail and Live View in the E-420 using a stage micrometer slide for calibration. The E-420 has a magnified view in Live View, allowing critical focus. The next step will be to make a table of the field coverage in microns for each objective using the stage micrometer slide.



I hope what I have learned through this arduous process may help you in setting up your systems. This whole process took about four months of on-again off-again experimentation, but now I can actually get down to creating some images.

I would also like to express my appreciation to all of the contributors to Micscape for their generous sharing of their knowledge and travails.

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