Operation Manual

for Micromaster® II Microscopes

This manual covers catalog numbers:
12-561-3M, 12-561-4M, 12-561-4B,
12-561-3D, 12-561-4D, 12-561-4T

Micromaster II Microscope

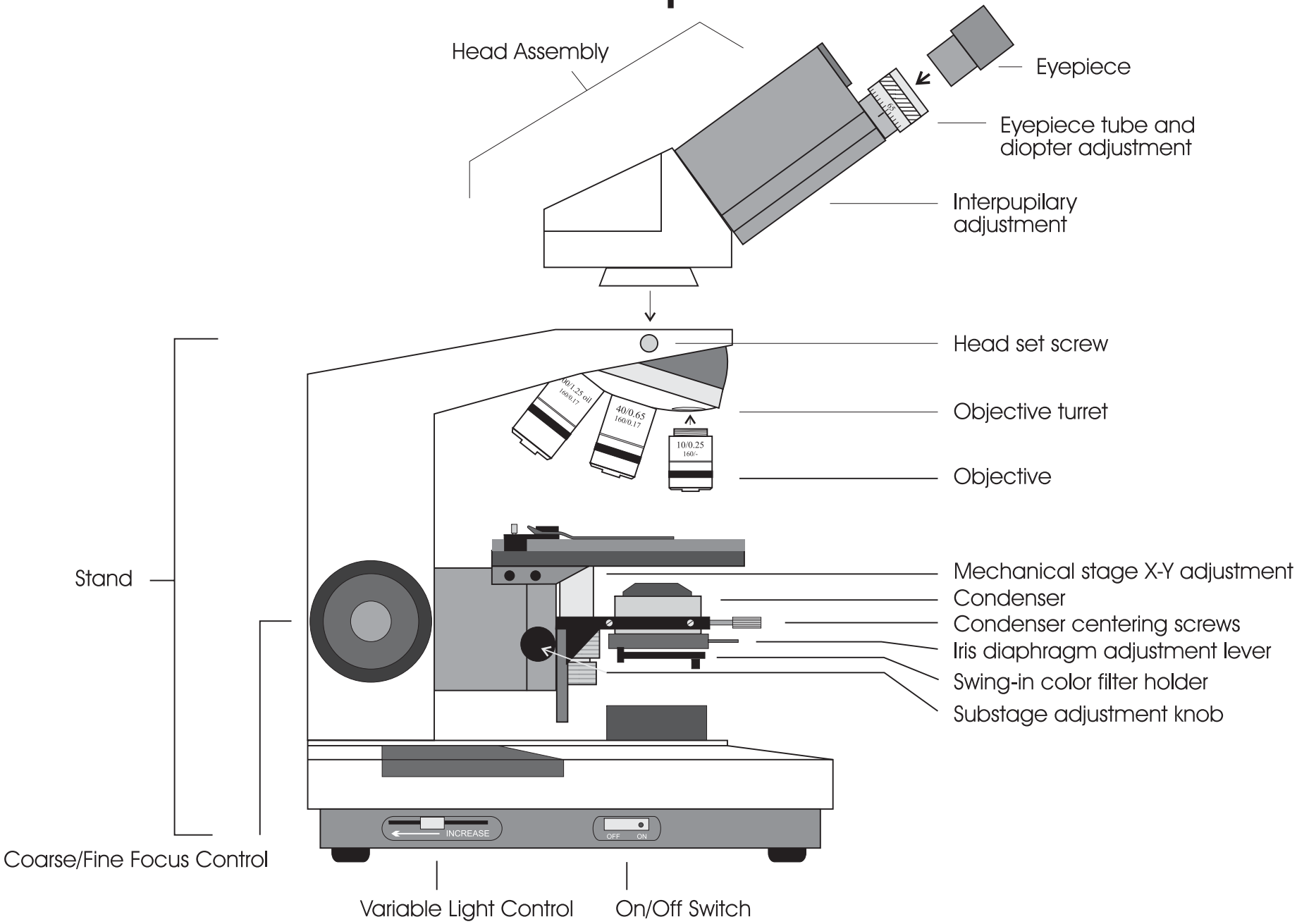


Figure #1

General Operation

Thank you for purchasing a Micromaster II microscope. Micromaster II microscopes have been designed and built for professional use. We recommend you read this entire manual carefully before beginning to use the instrument. Please be sure to record the pertinent information in the "registration" portion at the end of this manual.

Assembly: (see figure #1)

Before assembling, you should check over the packaging for all parts and accessories. Make sure you have all of the items on the list below, and any items you may have ordered as optional accessories. If you are missing any items, or would like additional accessories, please contact your sales representative.

Standard items for all microscopes (see figure #1):

- stand w/ condenser
- head assembly
- eyepieces
- objectives
- blue frosted filter, dust cover, spare bulb, and spare fuse.

1) Start by removing the stand its protective foam packaging and placing on a stable counter top. Remove head from packing and place on top of stand so the dovetail flange slides into place. Secure with the knurled set screw. **Note: Do not release the head until it is firmly secured with the set screw.**

3) Remove eyepiece(s) from packaging and slide into the eyetubes.

4) Remove the objectives and install one at a time by screwing them into objective turret.

5) Install the condenser into the condenser mount by loosening the set screw until the condenser can slide into place. Slide the condenser up into the condenser mount as far as possible. While maintaing light upward pressure on the condenser, tighten the condenser set screw. Tighten set screw enough to provide a firm mount. **(Overtightening may cause damage and is not necessary)**

Lighting and Power:

1) Connect the power cord to suitable 110 VAC power supply and turn on light with the "on/off" switch. If light does not come on, check to see that the variable control is set to the "high" setting.

2) Once in operation, light intensity is adjusted with the "variable light control" by means of voltage regulation (see figure #1).

3) If the lamp fails to light, replace the it with one of the spares. Occasionally, these lamps are damaged in shipping. Before attempting to replace or remove the lamp, **UNPLUG THE MICROSCOPE FOR ANY POWER SOURCE!** Lamp replacement is done by *gently* laying the microscope on its side and opening the trap door. Once the door is open, the lamp can easily be removed simply by grasping the lamp

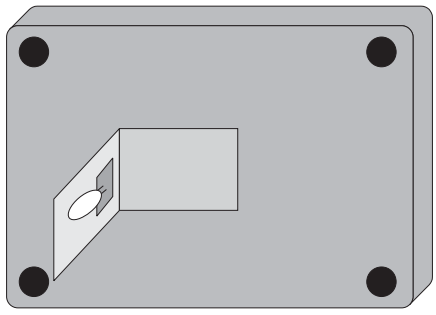


Figure #2

and pulling it from its fixture. When replacing, insert the new lamp into the same fixture. When replacing the lamp, be careful **NOT TO TOUCH THE GLASS ENVELOPE WITH YOUR FINGERS.** Use a tissue or other medium to grasp the lamp. This will prevent oils from your hand from reducing lamp life (see figure #2).

Focusing and Mechanical Stage Mechanisms:

1) Focusing adjustment is done with the "Coarse/Fine Focus Control" knobs (See Figure #3). The coaxial arrangement allows for easy, precise adjustment without stage drift.

2) Turning the "Coarse/Fine Focus Control" will raise and lower the stage vertically. One complete turn of the fine focusing mechanism will raise or lower the stage 0.3mm, and the smallest graduation refers to 2um of vertical movement. One complete turn of the coarse focusing knob will raise or lower the stage 3.6mm.

3) To ensure long life, always turn the focusing control knobs slowly and uniformly.

4) The focusing mechanism is equipped with a tension adjustment ring (see Figure #3). When you first setup the microscope, turn the coarse focus control knob to feel for tension. If you find the knob difficult to turn, loosen the tension adjustment ring situated between the coarse focus knob and the stand on the right hand side. This ring will reduce the force needed to turn the knob. Be careful, if the ring is loosened too far, the stage will have no tension to hold it in place and will "drift" down when not held in place. You must find a balance in which the tension is adequate to hold the stage in place, but not so tight that it is difficult to turn.

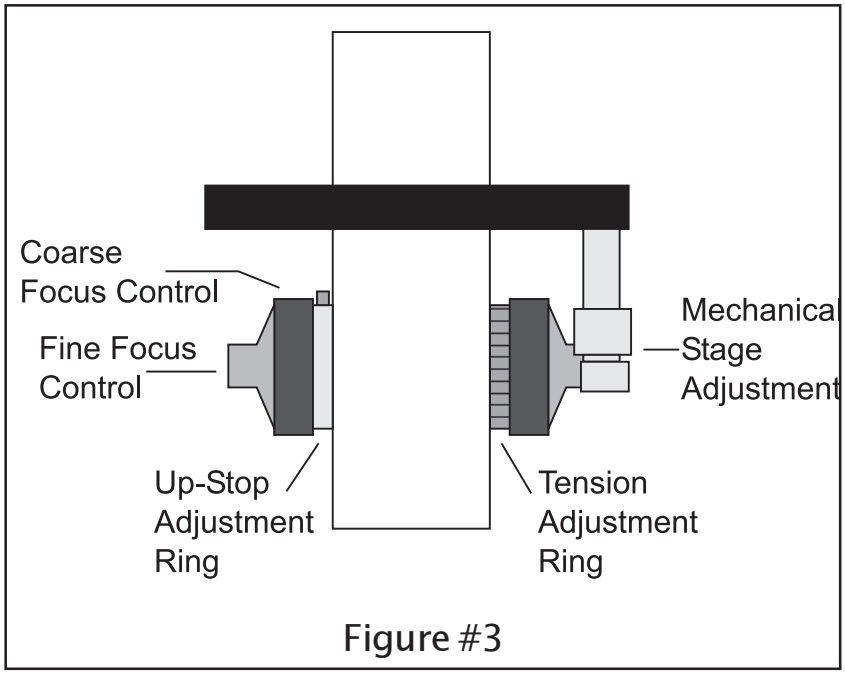


Figure #3

5) The focusing mechanism is also equipped with a safety "up-stop" set ring (See Figure #3). When set, this ring will limit the uppermost travel position of the stage. When used properly, the up-stop will prevent the slide from ever making direct contact with the tip of the objective. The best way to set this position is to place a slide with cover slip on the stage and swing the 100x objective into position. Now look very carefully at the gap between the tip of the 100x objective and the top of the cover slip. Slowly raise the stage with the coarse, and then fine, adjustment until the objective is VERY close to touching (within 1/2 a millimeter) or just touching. Locate the up-stop set ring on the left side of the stand just above the focus control knobs. First loosen this ring to reset the mechanism by rotating the knob counter clockwise until you feel the tension release. Then tighten the knob by rotating it clockwise until it is "finger tight". The stage will now not raise above this location.

6) The "Mechanical Stage Adjustment" controls provide easy and accurate (x-y) positioning of the sample (see figure #3). One complete turn of the longitudinal control will move the specimen 28mm. One complete turn of the transverse control will move the specimen 16mm.

7) The spring loaded slide holder can be removed for users who prefer not to use a mechanical stage. Simply unscrew the two knurled knobs which lock the slide holder onto the stage, and remove the holder.

Aligning the condenser:

1) The first step is to center the Condenser in its mount. Begin by turning the lamp on and gapping the objective.

   Gapping the objective:
   Method #1, place a slide on the stage and rotate the 4x objective into place. Close the **Aperture Iris Diaphragm** about 1/2 to 2/3rd. Focus the image using the coarse and/or fine focusing knobs.

   Method #2, rotate the 100x objective into place. Put a slide on the stage. Using the coarse focus knob, raise the stage until the slide just touches the tip of the 100x objective. Using the fine focus mechanism, lower the stage about 2 turns. Now remove the slide and rotate the nosepiece back to the 4x objective.

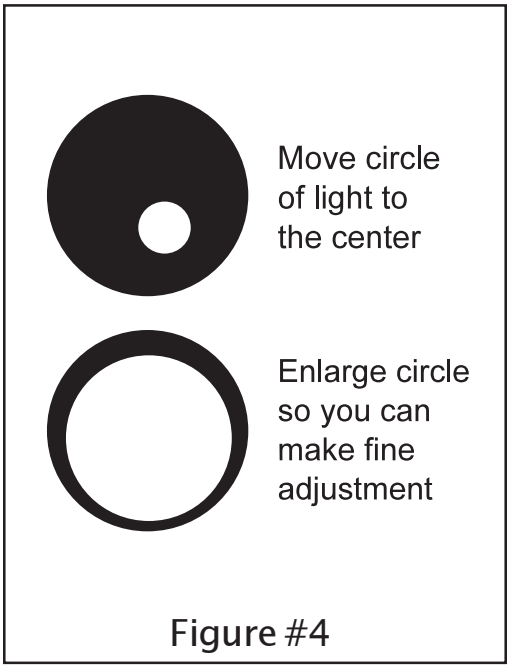


Figure #4

3) Close the **aperture iris diaphragm** as far as it will go (move lever completely to the right).

4) Place your left hand on the Substage Adjustment Knob. While looking through the microscope, lower the condenser slowly. At some point, you will see the image of the iris appear as a white spot within a black field (See Figure #4). Adjust the condenser up and down until you have this image as focused (clear) as possible.

5) Now locate the condenser centering knobs. If you look under the stage, you will see a set of chrome knobs that project out. Using both knobs at the same time, and looking through the microscope at the image of the iris (white spot), begin turning the knobs and notice how they effect the position of the iris image. This system uses three points of contact to move the condenser assembly and one is spring loaded. You may have to play with this for a few seconds to get the feel of how to effectively move the iris image.

6) Move the iris image until you feel that it is in the center of the black field (See Figure #4). Once complete, you have finished the “coarse” centering.

7) To “finely” center the condenser, look into the microscope and open the iris slowly. As the iris opens, the iris image will grow. Just before the iris image fills the entire field, you will reach a point where there is only a small ring of black left on the periphery of the field. Stop opening the diaphragm when you have reached this point.

8) Using use the centering knobs again, locate the iris image exactly in the center. You’ll want an even space of black all the way around the periphery (See Figure #4). Once you have this small ring of black at the edge of the field, your condenser is centered.

Interpupillary and Diopter Adjustment:

1) Interpupillary adjustment, the distance between eyepieces, is made through a folding action that is built into the head. Place a specimen on the stage and focus using the 10x objective. Move the eyepieces together or apart as necessary so the field appears as one circle and viewing is comfortable.

2) Diopter adjustment allows for proper optical correction for each individual's eyesight. This adjustment is easily made, and is recommended prior to use.

3) Using the 40x objective and a sample slide (i.e., one which produces an easily focused image), close your left eye and bring the image into focus with the "Coarse/Fine Focus Control". Once the image is well focused using only your right eye, close your right eye and check the focus with your left. If the image is not perfectly focused, make fine adjustments with the left "Diopter Adjustment" (figure #1). Once complete, the microscope is corrected for *your* vision.

Aligning the Phase Annulus Rings for Phase Contrast Microscopes:

1) Using the Substage Adjustment Knob (left side), raise the condenser assembly all the way up until it stops. Open the aperture iris diaphragm all the way and confirm the field iris diaphragm is still all the way open. Make sure the light is set to its highest setting.

2) The 10x objective should still be "gapped" since you have not moved the main focusing mechanism. If you're not sure, go back and repeat step one from the "Centering the Condenser" section.

3) Remove one of the eyepieces and replace it with the **Phase Centering Telescope**. The **Phase Centering Telescope** (or Phase Telescope) should be included in the packaging with your optics. (It looks like an elongated eyepiece).

4) Before using the telescope, familiarize yourself with it. You'll notice that it has a main "body", and a "ring" or "tip" that rotates. This "ring" will be the part closest to your eye when you look into it. Use one hand to hold the "body", and the other hand to turn the "ring". This is how you focus the Centering Telescope. **[Be careful, if you unscrew this ring too far, the telescope will come apart. If this happens, simply screw it back together.]**

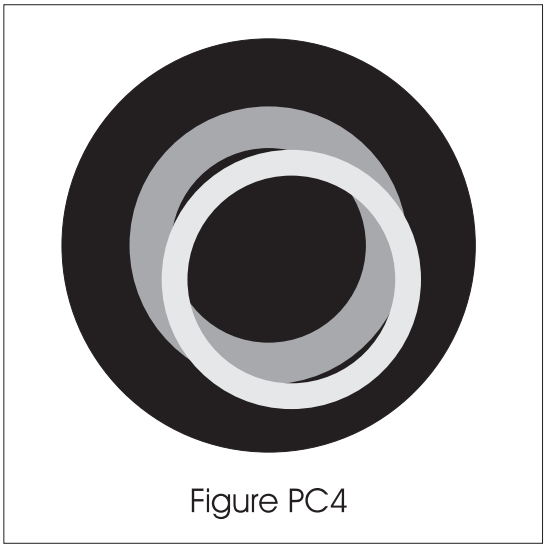


Figure PC4

5) Make sure the 10x objective is still in place and turn the Phase Condenser Turret until the number "10" shows in the viewing window (See Figure PC1).

7) Look into the telescope. You should see some sort of image of light. Focus the **Phase Telescope** (NOT THE MICROSCOPE OR THE CONDENSER) until the image is clear. You should see the image of 2 light rings. One light ring will be white. If you look carefully, you 'll see the other ring. This light ring will be charcoal gray or black and located below the image of the white light ring (See Figure PC4). In order to align the phase annuli, you must move these rings until they are concentric and placed on top of one another. The white ring must be completely surrounded by the black ring.

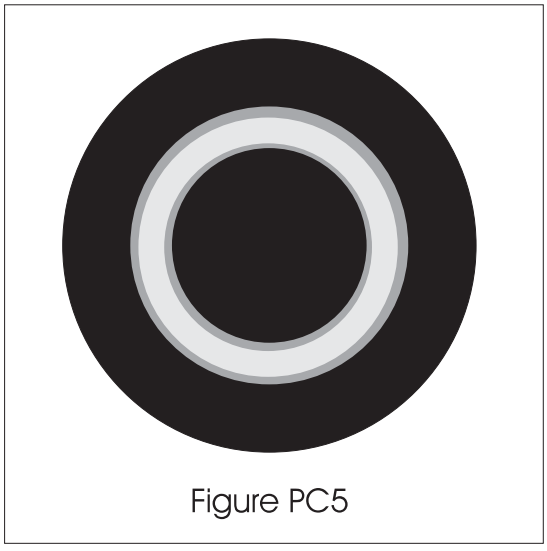


Figure PC5

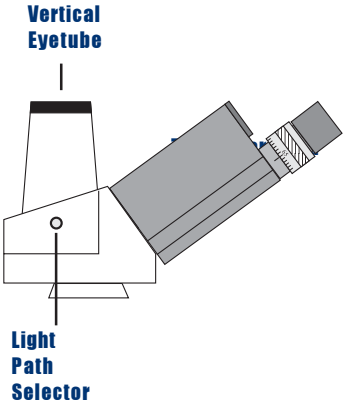
8) Locate the Phase Centering Knobs. These are the smaller knobs located just in front of, and below the Condenser Centering Knobs, and function in the same manner. Look into the Phase Telescope and adjust the Phase Centering Knobs until the rings appear concentric (See Figure PC5).

9) Once the rings are concentric, the system is aligned and ready to use at 10x. Remove the Phase Telescope and replace the eyepiece.

Note: You should repeat this process for each magnification and double check alignment whenever you change magnification.

Remember, when using phase, both iris diaphragms (field and aperture) should be completely open and the condenser should be raised all the way up.

Trinocular Head

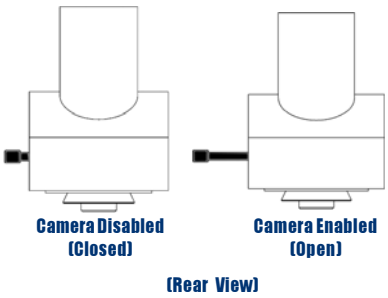


Install the trinocular head

The trinocular head (Part number MP-HT1300) is used in place of the binocular head for taking photomicrographs or performing videomicrography. To install, loosen the head set screw on the microscope frame (If attached, remove the binocular head.). Insert the circular dovetail mount on the bottom of the trinocular head into the opening on the microscope frame, setting the head into place so that the binocular eyepieces are at the front. Clamp the head in place by tightening the set screw.

Vertical Eyetube

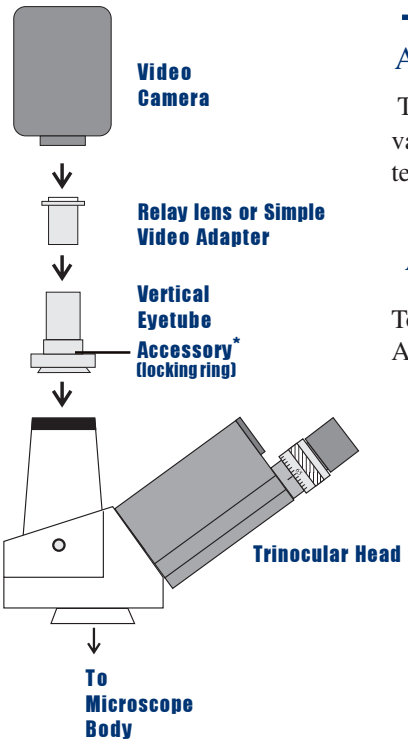
The vertical eyetube accommodates standard adapters for both video and photomicroscopy.



Light Path Selector Rod

The two position, "slider" rod is used to select the desired light path. For 100% light at the binocular eyepieces (viewing mode), push (slide) the knob all the way in. If performing video or photomicroscopy, pull (slide) the knob all the way out. Now, 100% light is directed to the vertical eyetube.

Videomicroscopy



Assembling the video microscopy system

The diagram at left illustrates the basic assembly configuration for video microscopy. Video systems vary widely. Please refer to the assembly instructions and procedures for using specific video systems described in their respective instruction manuals. Our basic configuration is described below.

Adjustments

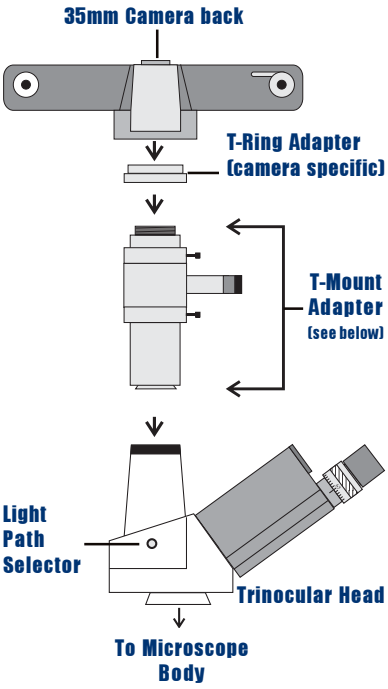
To achieve parfocality of the eyepieces and the video system, adjustments may be needed. After assembling the system:

1. Focus on the sample through the eyepieces.
2. Slide the light path selector rod out to allow 100% light into the vertical eyetube.
3. **Loosen the knurled locking ring** on the bottom of vertical eyetube accessory.
4. Bring the image in focus by adjusting the height of the eyetube. This is achieved by turning the threaded chrome tube while looking at the monitor . Do not use the coarse or fine focus control knobs on the microscope to focus on the image.
5. Once the image is in focus, tighten the locking ring on the vertical eyetube assembly.

* The **Vertical Eyetube Accessory** is used to adjust the vertical tube length, thereby bringing the video camera to the proper focal distance.

Photomicroscopy

Components



The diagram at left illustrates the basic configuration for photomicroscopy. Photography systems vary widely. Please refer to the assembly instructions, operating procedures and photography techniques for using specific cameras and photo systems, described in their respective instruction manuals. A valuable reference for Basic Photomicroscopy is:

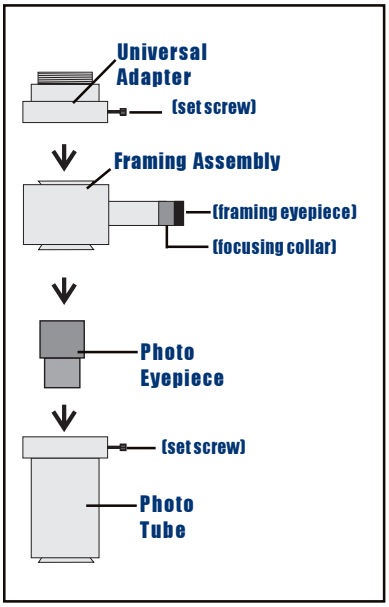
Photography Through the Microscope
by Eastman Kodak Company, John Gustav Delly

For photomicroscopy, the trinocular head (Part number MP-HT1300) is used in place of the binocular head to accommodate different photo adapter assemblies. In addition, a 35mm SLR camera is needed. We **do not** sell cameras, or supply cameras as part of our photomicroscopy packages. The user is best served by personally selecting and supplying one of the many cameras available today.

We stock many different camera specific **T-Ring Adapters** and a variety of **T-Mount Adapters.** Our most popular T-Mount Adapter configuration (12-563-TM) comes assembled when ordered and includes:

- **Universal Adapter** - attaches the T-Ring Adapter to the T-Mount Adapter
- **Framing Assembly with Framing Eyepiece** - simple attachment which fits into the camera port on the photo tube. The framing eyepiece allows you to frame the image.
- **Photo Eyepiece** - a low magnification lens responsible for putting the **real** image [as apposed to the **virtual** image] on the film plane
- **Photo tube** - carries the imaging information from the microscope to the camera without contamination from stray light.

T-Mount Adapter (disassembled)
(from above)



Attach the T-Mount Adapter

Remove the **photo adapter** from its protective packaging and insert the circular dovetail flange at the bottom of the adapter into the opening on top of the head.. Next, remove the **head** from its packaging. Secure in place by tightening the knurled set screw.

Adjusting the Photo Adapter

1. Rotate the 10x objective into the optical path and place a specimen on the stage.
2. Looking through the eyepieces, using the focusing knobs on the microscope focus on the specimen.
3. Divert the light to the photo port by pulling the knurled knob on the light path selector straight out on the right hand side of the head.
4. Look through the framing eyepiece and using the focusing knobs on the microscope refocus the image.
5. Look through the view finder on your camera and using the focusing knobs on the microscope refocus the specimen to achieve the sharpest image possible.
6. Return to the framing eyepiece and without touching the focusing knobs on the microscope adjust the focusing collar on the photo adapter to bring the image into sharp focus.
7. Your photo adapter is now adjusted and ready for use. To take photo, divert the image to the photo port and focus at the framing eyepiece.

Maintenance:

1) In general, the most important element of maintenance is to keep the instrument clean and dry. Dust, dirt, and moisture will greatly reduce the longevity of the optical coatings and cements which keep the instrument functioning properly. Always place the dust cover over the unit when not in use. Use a moisture removing chemical (ie: silica) if the instrument is to be stored in a humid environment.

2) At least once a year we recommend a Fisher Service Technician or some other qualified technician replace lubricants within the gearing mechanisms and clean all accessible optical components. This might also be a good time to replace lamps.

Statement of Limited Product Warranty:

Westover Scientific, Inc. certifies that this microscope is free from defects in workmanship or materials under normal use and maintenance. The period of warranty is 24 months from the date of purchase. If defects in workmanship or materials appear within 24 months of the date of initial purchase, and, the unit has been subjected *only* to normal use and properly maintained, Westover Scientific agrees to repair or replace, as its sole option, without charge to the purchaser any defective component part of the product. The remedies herein are the buyers sole and exclusive remedies. Westover Scientific, Inc. shall not be held liable for any direct, indirect, or consequential damage or decay to the product that results from improper use or maintenance.

Catalog Number: (found on back of microscope) _____

Serial Number: (found on back of microscope) _____

Date Purchased: _____

Doc. No. ZP-MC-0008[a]

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