INSTRUCTION MANUAL

PIMT201

Precision Inverted Microscope, Trinocular

www.wpiinc.com
080824

CONTENTS

ABOUT THIS MANUAL

The following symbols are used in this guide:

This symbol indicates a **CAUTION**. Cautions warn against actions that can cause damage to equipment. Please read these carefully.

This symbol indicates a **WARNING**. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.

NOTES and **TIPS** contain helpful information.

Fig. 1—PIMT-201 Precision Inverted Microscope

INTRODUCTION

This document details the assembly of the PIMT-201 Precision Inverted Microscope. It includes optional installation of a camera. All cameras and mounting adapters are sold separately.

Unpacking

Upon receipt of this instrument, make a thorough inspection of the contents and check for possible damage. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed damage should be reported at once to the carrier and an inspection requested. Please read the section entitled "Claims and Returns" on page 27 of this manual. Please contact WPI Customer Service if any parts are missing at 941.371.1003 or customerservice@wpiinc.com.

Returns: Do not return any goods to WPI without obtaining prior approval (RMA # required) and instructions from WPI's Returns Department. Goods returned (unauthorized) by collect freight may be refused. If a return shipment is necessary, use the original container, if possible. If the original container is not available, use a suitable substitute that is rigid and of adequate size. Wrap the instrument in paper or plastic surrounded with at least 100mm (four inches) of shock absorbing material. For further details, please read the section entitled "Claims and Returns" on page 27 of this manual.

Fig. 2—Contents of the two boxes

MICROSCOPE SETUP

Before setting up the microscope, carefully open the box and inspect its contents. The pieces of the microscope are stored in two Styrofoam containers, and many of the pieces are wrapped in plastic (**Fig. 2**). Carefully unwrap each piece before setting up the instrument. The following instructions graphically show how to setup your inverted microscope.

NOTE: If you have a problem/issue that falls outside the definitions of this manual, contact the WPI Technical Support team at 941.371.1003 or technicalsupport@wpiinc.com.

Setting up the Base and Stage

1. Remove the base of the microscope and set it up on a firm tabletop surface (**Fig. 3**). **Fig. 4** shows the back of the microscope base. The A/C power plug adapter, the serial number and the fuse compartment are located on the back. **Fig. 5** shows the power switch and lamp brightness control located on the side of the microscope.

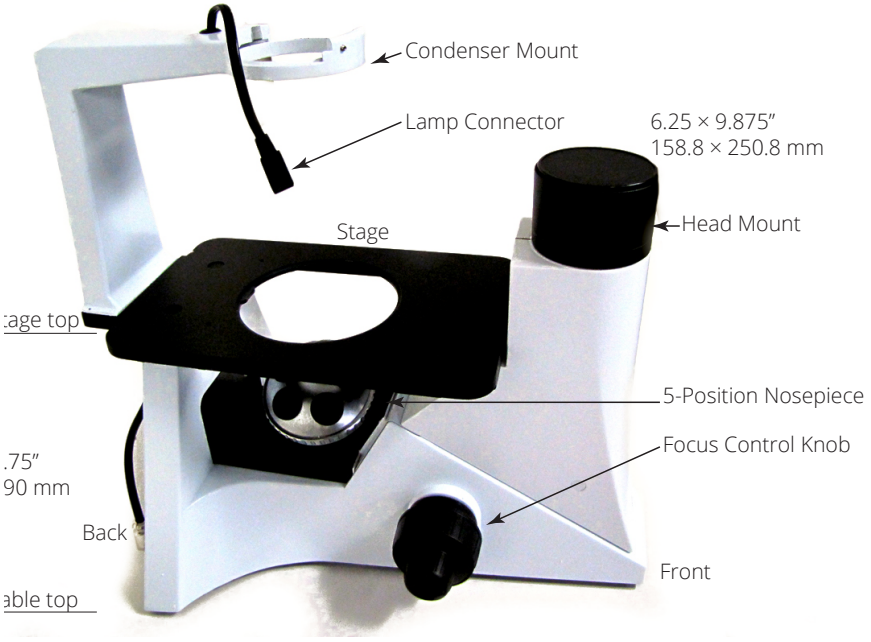


Fig. 3—Base of the microscope.

Fig. 4—Back of the microscope base showing power connection, serial number and fuse compartment

Fig. 5—Power switch and lamp brightness control on the side of the microscope

2. Locate the **coaxial stage assembly. It is shown in Fig. 6. The captive mounting screws are located on the side of it (Fig. 7).**

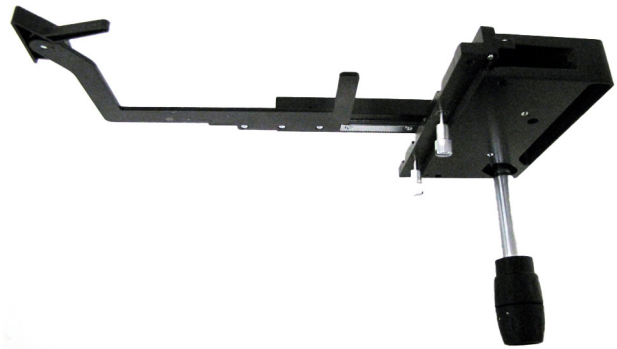


Fig. 6—Coaxial stage assembly

Fig. 7—Captive mounting screws on the coaxial stage assembly

3. Tip the microscope base over on its left side to reveal the location of the screw mounts. Then, position the coaxial stage (**Fig.8**). **Fig. 9** shows a close up of the captive screws.

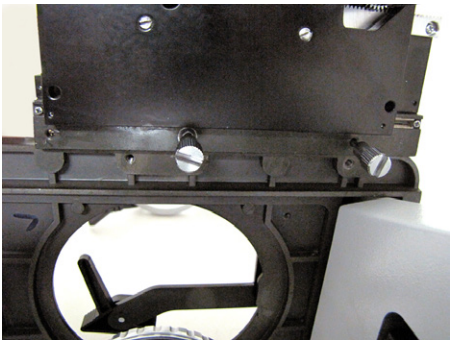


Fig. 8—Microscope on its side
Fig. 9—Close up of captive mounting screws

4. With a flat head screwdriver, gently tighten the captive screws (**Fig. 10**).

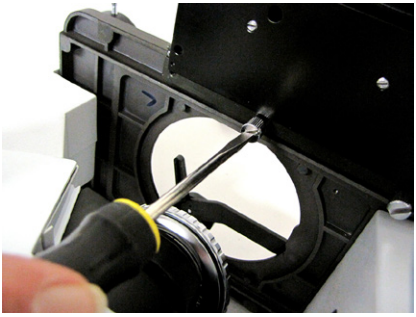


*Fig. 10— **Fig. 10**–Gently tighten the captive mounting screws.*

5. Locate the left extension stage plate bottom shown in **Fig. 11** (bottom view) and **Fig. 12** (top view).

Fig. 11—Extension stage plate (bottom view)
Fig. 12—Extension stage plate (top view)

6. Push extension arm of the coaxial stage assembly inward so that you do not damage it when you mount the left extension stage plate (**Fig. 13**).

Fig. 13—Extension arm of coaxial stage assembly.

7. Then, with the microscope base laying on its right side, locate the captive screws and mounting holes for left stage plate (**Fig. 14**) and install the left stage plate (**Fig. 15**).

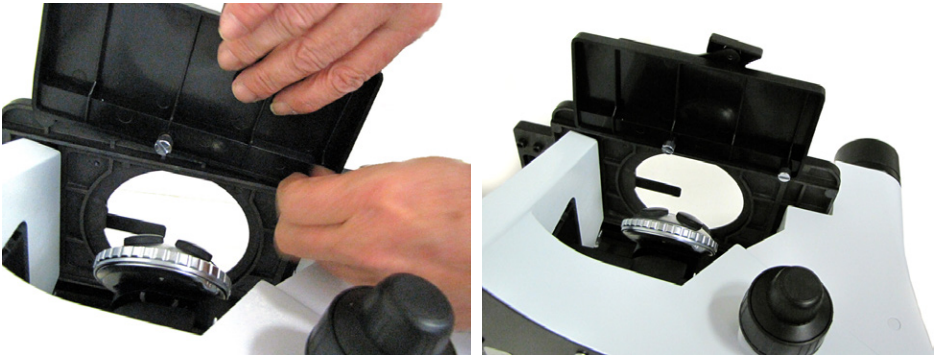


Fig. 14—Left stage plate captive screws
Fig. 15—Plate installed viewed from below

8. Turn the microscope upright (**Fig. 16**).

Fig. 16—Coaxial and left stage plate mounted

Installing the Condenser and Lamp Housing

1. Locate the condenser assembly and lamp housing (**Fig. 17**).

Fig. 17—Condenser assembly and lamp housing

2. Lower the condenser assembly into the condenser mount (**Fig. 18**). It should slide easily into place. (Note the orientation.) Then, rotate the condenser assembly 90° counter-clockwise into position (**Fig. 19**).

Fig. 18—Condenser in mounting position
Fig. 19—Condenser rotated 90º CCW

3. Tighten hex screws to secure the condenser assembly into the condenser mount (**Fig. 20**).

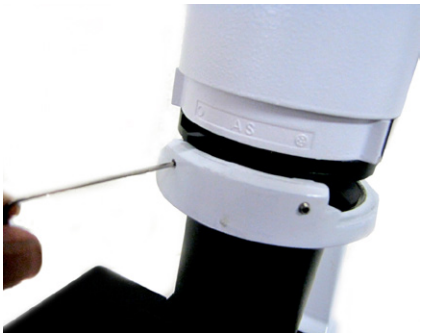


Fig. 20—Tighten hex screws on condenser head

4. Plug the lamp housing into the lamp connector (**Fig. 21**).

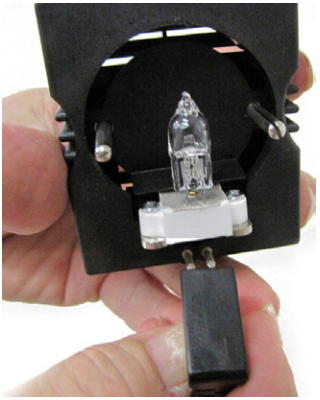


Fig. 21—Connect the lamp
Fig. 22—Lamp connected
Fig. 23—Install lamp

5. Lower the lamp housing onto the mounting pin sockets in the top of the condenser head. (**Fig. 23**). The assembled condenser and lamp housing is shown in **Fig. 24**.

Fig. 24—Assembled condenser with lamp housing

Setting up the Stage and Phase Aperture

1. Position the clear stage plate in the recess on the stage (**Fig. 25**).

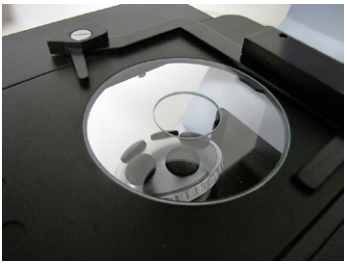
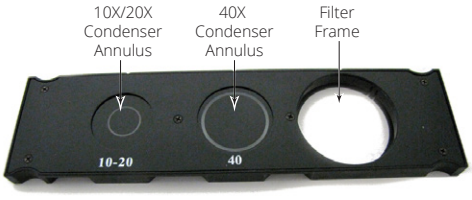


Fig. 25—Clear stage plate, installed

2. Install the phase aperture frame (**Fig. 26**) in the slot on the condenser head from the right side. Orient the phase aperture frame as shown in **Fig. 27**.



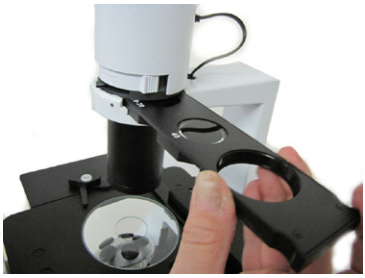


Fig. 26—Phase aperture frame
Fig. 27—Install the phase aperture frame

Installing the Trinocular Head Assembly

1. Remove the dust cover from the trinocular head assembly (**Fig. 28**) and the head mount (**Fig. 29**).

*Fig. 28—***Fig. 28***–Trinocular head and dust cover*
*Fig. 29—***Fig. 29***–Cover on head mount of microscope base*

2. Place the trinocular head on the head mount and tighten the side screw (**Fig. 30**).

Fig. 30—Position head on the mount

3. Locate the threaded C-mount, eye tube mount and trinocular extension tube (**Fig. 31**).

Fig. 31—C-mount, eye tube mount and trinocular tube extension

4. Remove the trinocular extension tube mount dust cover from the trinocular head (**Fig. 32**) and place the extension tube into the opening (**Fig. 33**). Tighten the locking screw on the side.

Fig. 32—Remove dust cover
Fig. 33—Position extension tube

5. Depending on your application, either the eye tube mount or the C-mount can be installed. Choose one of the two options.
    - Mount the eye tube mount by inserting it into the extension tube (**Fig. 34**).
    - Mount the threaded C-mount by screwing it into the extension tube (**Fig. 35**).

Fig. 34—Eyepiece tube screw mounted
Fig. 35—Threaded C-mount mounted

Installing the Objectives

Four objectives are included with the microscope. They are in protective shipping tubes with captive dust covers (**Fig. 36**). The nosepiece allows you to mount up to five objectives. The nosepiece (for mounting the objectives) is shown in **Fig. 37**. (The clear plate was removed for this part of the installation.) When mounting the objectives, remove the nosepiece dust covers individually when you are ready to install an objective. Leave the dust covers in place on unused mounting holes.

Fig. 36—Objective, pictured as shipped
Fig. 37—5-Position nosepiece

1. Remove a single dust cover from the nosepiece (**Fig. 38**). When it is removed, an opening is revealed (**Fig. 39**). For ease of installation, that opening should point straight up through the opening on the microscope stage.

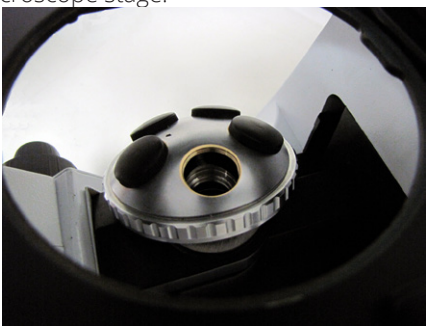


Fig. 38—Removing dust cover to mount objective
Fig. 39—Position for mounting objective

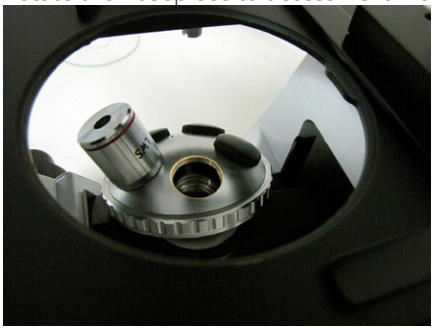
2. Remove the desired objective from its shipping case (**Fig. 40**). Then, remove the captive dust cover (its cap) (**Fig. 41**).

Fig. 40—Objective out of case
Fig. 41—Objective with cap removed

3. Insert the objective into the nosepiece and rotate it clockwise. Finger tighten it (**Fig.42**). DO NOT OVERTIGHTEN. Finger tight is sufficient!

Fig. 42—Installing the objective

4. Rotate the nosepiece to access next mounting location (**Fig. 43**).



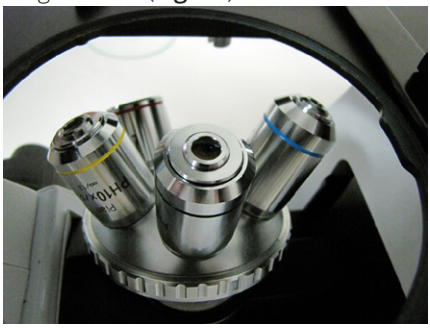


Fig. 43—Rotated nosepiece
Fig. 44—Four objectives mounted

5. Repeat steps 1-4 to install the remaining objectives. Do not remove the dust covers until you are ready to install the next objective. This prevents any stray dust from being trapped on the objective. The final assembly is shown in **Fig. 44**. The objectives are arranged in order (4X, 10X, 20X, 40X). An optional fifth objective location is also provided. If a fifth objective is not installed, leave the dust cover in place.

6. Re-position the clear stage plate in the recess on the stage (**Fig. 45**).

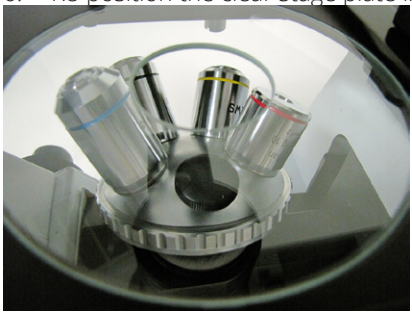


Fig. 45—Clear stage plate in place

Installing Adapter Plates, Eyepieces and Filters

1. Locate the 100mm round stage mount, rectangular plate and 35mm insert (**Fig. 46**).

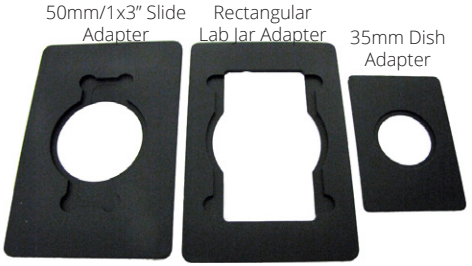


Fig. 46—100mm round stage mount, rectangular plate and 35mm insert

2. Insert the 35mm adapter plate into the rectangular plate (**Fig. 47**).

Fig. 47—Assembled rectangular plate and 35mm insert

3. Place the rectangular plate on the stage plate (**Fig 48**).

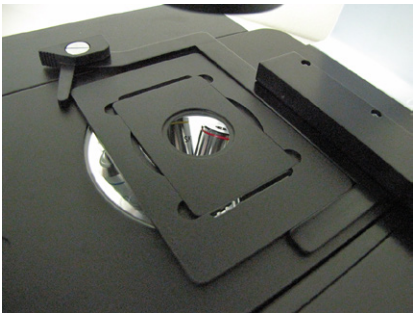


Fig. 48—Placement location of the assembled stage plate

4. Remove the eyepieces from the dust wraps (**Fig. 49**) and remove the dust covers from the eyepiece openings on the trinocular head (**Fig. 50**).

Fig. 49—Eyepieces
Fig. 50—Remove dust covers from trinocular head

5. Place the eyepieces in the microscope ocular openings (**Fig 51**). Adjust the diopter setting to zero.

Fig. 51—Placement of eyepieces

6. Locate the filters (**Fig. 52**).

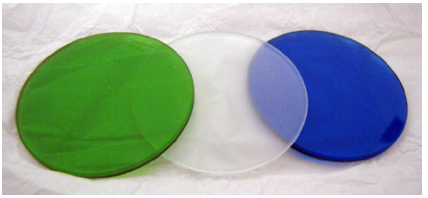


Fig. 52—Filters

7. Remove the filter holder from the condenser head as shown in **Fig. 53** and **Fig. 54**.

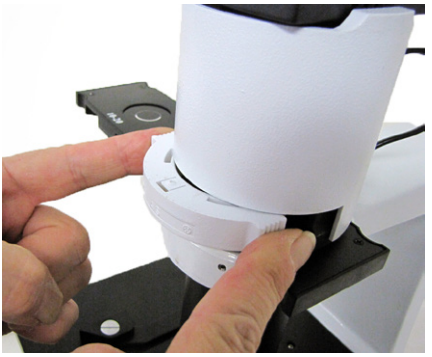
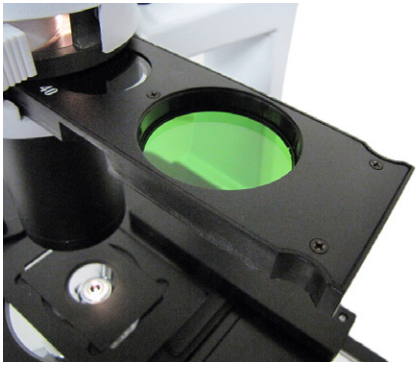


Fig. 53—Filter holder position
Fig. 54—Filter holder removed

8. Place the desired filter in the filter holder (**Fig. 55**) and slide the holder back into the condenser head (**Fig. 56** and **57**).

Fig. 55—Insert filter
Fig. 56—Position holder
Fig. 57—Slide holder in place

TIP: If desired, the filter may alternatively be placed in the condenser annulus slider (**Fig. 58**) and slid into position for use (**Fig. 59**).



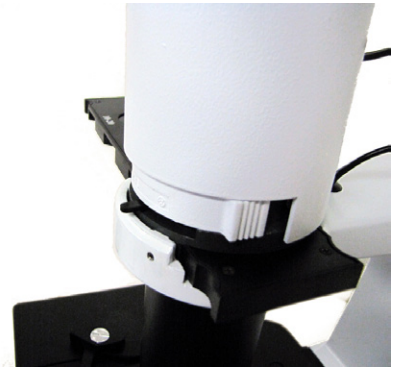


Fig. 58—Filter in condenser annulus slider
Fig. 59—Condenser annulus slider in position

Phase Contrast Alignment

There are two phase contrast objectives included with the PIMT-201 microscope, the 10X and the 20X. On a simplified level, phase contrast imaging occurs by the interference of light that is created by special masks in the light path. There are two masks, each located in a different part of the light path, which must be positioned correctly relative to each another to create the phase contrast effect.

The annular ring (condenser annulus) is located in the phase aperture frame, and it has a light masking pattern that looks similar to **Fig. 60**. The phase ring is the conjugate of the condenser annulus, and its pattern is a ring that is the same size as the white area in the condenser annulus pattern. The phase ring pattern is located in the objective and cannot be adjusted by the user.

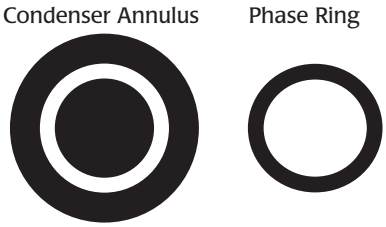


Fig. 60—Annual Ring

The condenser annulus is adjustable by the user, and it is located in the phase aperture frame. The user adjusts the position of the condenser annulus to establish the proper relationship between the two masks to optimize the phase contrast effect.

Notice that there are two condenser annulus masks on the phase aperture frame. (See **Fig. 26**, page 10.) One is for use with the 10X and 20X phase contrast objectives, and the larger one is for a 40X phase contrast objective (not included). Adjust the phase aperture frame so that the correct mask is in the light path corresponding with the objective to be used.

Adjusting the Phase Contrast Alignment

1. Adjust the phase aperture frame so that the open filter hole is in the light path of the condenser head. With the open filter hole in this position, the only mask in the light path is the phase ring in the phase contrast objective.
2. Select a phase contrast objective. In this case, it will be either the 10X or the 20X.
3. Replace one of the eyepieces with the phase telescope (**Fig. 61**).

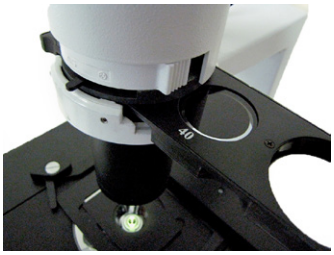
Fig. 61—Phase telescope in eyepiece

4. View the phase ring through the phase telescope.
5. Adjust the focus on the phase telescope for a sharp image of the phase ring. The phase telescope focus is adjusted by screwing it in or out (**Fig. 62**).

Fig. 62— Focus adjustment

6. Slide the phase aperture fame into position with the 10X/20X condenser annulus in the condenser light path. (**Fig. 63**)

   NOTE: If you are using a 40X phase contrast objective (not included), use the 40X condenser annulus on the phase aperture frame.



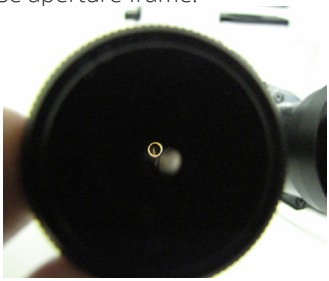


Fig. 63—(Left) Plate position by phase
Fig. 64—(Right)Aperture disc seen through the telescope

7. You will see an overlap of the condenser annulus and phase ring patterns through the phase telescope (**Fig. 64**). To optimize the phase contrast image, the condenser annulus must be concentrically aligned with the phase ring. The two rings can be seen through the telescope. See **Fig. 60**, page 18.

8. To adjust the condenser annulus, insert the large hex wrench into the adjustment holes on either side of the phase aperture frame as shown in **Fig. 65** and **Fig. 66**. Tightening the hex screw in the left side moves the plate towards the upper right corner. Loosening it moves the plate towards the lower left corner. The opposite adjustments can be made with the hex wrench in the right opening. See **Fig. 67** for a schematic representation of the appearance of the phase contrast masks both in and out of alignment.

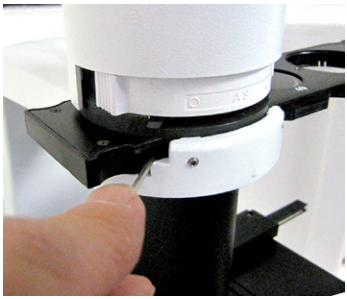


Fig. 65—Insert hex wrench in the right opening
Fig. 66—Make adjustments on the left side

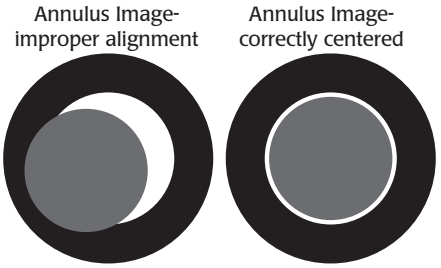


Fig. 67—Annulus alignment

Mounting a Camera

A camera is not included with the microscope, but WPI carries a variety of cameras if one is necessary. In the example shown below the COLCAM closed circuit television (CCTV) camera is used. This camera can be connected to a television. Digital cameras are available that will connect with a computer or laptop.

When mounting a camera, the WPI camera adapter package (#**503097**) may be purchased for added flexibility. This package includes an eyepiece lens, a 30mm adapter and a female C-mount. With this kit, a camera can be mounted to the microscope in one of a variety of ways, as shown on the next few pages. Choose the option that best meets your needs.

Direct C-Mount on a Threaded Triangular Attachment

1. Position the camera over the 1X threaded C-mount (**Fig. 68**) and screw it into position (**Fig. 69**).

Fig. 68—Position camera
Fig. 69—Screw into place

2. Adjust an microscope for par focalization:
    - View the object through the eyepieces.
    - Set the diopters on both eyepiece to zero.
    - Focus using your right eye, while adjusting the diopter of the left eyepiece.
    - View the image on the monitor.
    - Adjust the focus of the camera by rotating the mount as shown in **Fig. 69**.
    - Once the image is in focus, lock the rotation using the set screw.
    - To adjust the camera view orientation, loosen the lower set screw and rotate the extension tube. Once the rotation is set, lock the lower screw.

Vertical Eye Tube Mounting

This option requires the use of the eyepiece lens from the eyepiece adapter kit (WPI #**503097**). It allows the camera to be mounted on the eyepiece tube.

1. Install the eyepiece lens on the camera and position it over the vertical (trinocular) eyepiece tube (**Fig. 70**). When properly assembled, it looks like **Fig. 71**.

Fig. 70—Line up the camera with tube

Fig. 71—Final position of camera

Eyepiece Mounting

This option requires the use of the eyepiece lens and the +30mm adapter of the eyepiece adapter kit (WPI #**503097**). It allows the camera to be mounted on an eyepiece.

1. Remove an eyepiece from the microscope.

2. Install the eyepiece lens on the camera and slide it into the +30mm adapter. Position it over the eyepiece (**Fig. 72**) and slide it into place. When properly assembled, it looks like **Fig. 73**.

Fig. 72—Camera mounted in eyepiece
Fig. 73—Mounted camera

Eyepiece Plus C-Mount Mounting

This option requires the use of the eyepiece lens, +30mm adapter and female C-mount of the eyepiece adapter kit (WPI #**503097**). Then, the camera can be mounted on the 1X C-mount.

1. Install the eyepiece lens on the camera, slide it into the +30mm adapter (**Fig. 74**)
2. Install the threaded female C-mount on the eyepiece tube 1X C-mount (**Fig. 75**).

Fig. 74—Adapter assembly
Fig. 75—C-mount parts assembled

3. Position the camera over the eyepiece tube and slide the camera unit into place. When properly assembled, it looks like **Fig. 76**.

Fig. 76— Camera in position

BASIC MICROSCOPE OPERATIONS

Camera Shutter (Optical) Path

To enable viewing through the trinocular extension tube, pull out (open position) the handle shown in **Fig. 77**. When this switch is in the closed position, nothing can be viewed through the trinocular extension tube. When no camera is mounted, this switch should be in the closed position to prevent excessive light entering the system.

Fig. 77—Switch to enable trinocular extension viewing

Coaxial X-Y Control

The knob shown in **Fig. 78** controls the x and y movement of the microscope stage.

Fig. 78—Coaxial X-Y Control

Micrometer Focus Control

The knob shown in **Fig. 79** adjusts the height of the microscope stage and is used for coarse and fine focusing of the microscope. Rotate the entire knob for coarse adjustment and the inner dial for fine adjustment.

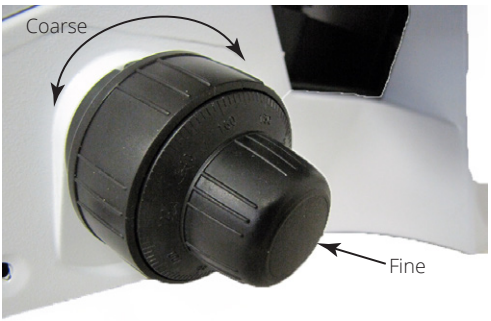


Fig. 79—Micrometer Focus Control

Focus Tensioning Adjustments

The tension on the focus knob can be adjusted (if desired) by using the tension adjustment tool that came in the spare parts and tool kit with the microscope.

NOTE: The phase telescope comes with spare fuses, a spare bulb and a tool kit (**Fig. 80**).

Fig. 80—Spare parts and tool kit

1. Locate the tiny notch on the back side of the tension knob and insert the tip of the tension adjustment tool in the notch (**Fig. 81**).
2. Rotate the tool clockwise to tighten the tension or counter-clockwise to loosen it (**Fig. 82**).

Fig. 81—Tension Adjustment Tool installed
Fig. 82—Rotate Tension Adjustment Tool

WARRANTY

WPI (World Precision Instruments) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of one year* from the date of invoice. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. In some instances, photographic documentation may be required. Some items are time-sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

** Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.*

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