



Research Microscope Instruction Manual

Introduction

Thank you for your purchase of a Fisher Scientific microscope. Your new microscope is a precision instrument carefully checked to assure that it reaches you in good condition. It is designed for ease of operation and years of carefree use. The information in this manual probably far exceeds what you will need to know in order to operate, troubleshoot and maintain your microscope. However, it is provided to answer questions that might arise, and to help you avoid any maintenance expense that may be unnecessary.

Types of Microscopes Covered in this Manual

The compound microscope combines two optical lens systems. The lens closest to the specimen slide, the objective, magnifies the primary image and the top lens, called the eyepiece, further magnifies the image. Magnification of the objective times the magnification of the eyepiece is the total magnification produced by this combination of lenses. The image produced by the compound microscope is upside down and reversed. Compounds are used for viewing standard 1" by 3" 1mm thick transparent specimen slides with cover slips. Prepared specimen slides can be purchased to fit the classroom subject matter or user can make his own specimen slides.

The stereo microscope is an instrument that incorporates two separate optical system aligned to produce three-dimensional images. Primary uses of the stereo microscope are the inspection and assembly of small parts, examining plants and insects, dissecting of biological specimen. Stereo microscopes provide an upright, unreversed image that permits easy manipulation of the object being viewed while looking through the microscope. Stereos are designed for viewing solid objects at low magnification, but they will also permit viewing of some transparent specimen slides.

Digital microscopes have all of the features of a compound microscope or stereo microscope but are enhanced with the addition of a built-in digital camera. With software included with these digital microscopes, they become real time learning tools.

Fisher Scientific Microscopes

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Microscope Terminology

- **Abbe Condenser:** The 1.25 N. A. Abbe condenser lens positioned under center of stage is required when using 100x objective lenses. In addition the Abbe condenser is focusable by a rack and pinion mount with a knob to provide movement in the up and down direction.
- **Achromatic Objectives:** Lenses that have corrected the focal point of blue and red rays, to prevent chromatic aberration in the image being viewed.
- **Arm:** Main support for microscope components.
- **Base:** Housing and platform of the instrument to which the arm is attached in addition it usually contains an illumination system for the microscope.
- **Body Tube:** On simple vertical tube models it holds the eyepiece tube and objective, on advanced models it holds nosepiece, objectives and head.
- **Brightfield Microscopy:** Specimen is generally dark (stained) against a white illuminated field.
- **Coaxial Focusing Knobs:** Coaxial focusing system combines both the coarse and fine focus into one set of knobs located on the same axis. The control is designed for a continuous operation over the range of stage movement.
- **Darkfield Microscopy:** Specimen appears light against a dark background. Generally used with objective lenses that have a N.A. less than 0.85 (4 through 40 magnification).
- **Depth of Focus:** The ability of a lens to furnish a distinct image above and below the focal plane. Depth of focus decreases with the increase of numerical aperture or with the increase of magnification.
- **DIN:** Optical term for a type of objective lens (Deutsche Industrie Normen originally Deutsches fur Normun) A German standard of the manufacturing of microscope lenses.
- **Diopter Adjustment:** Adjustable eyepiece diopter permits focusing adjustment of image for any difference in vision between users eyes.
- **Eyepiece (ocular lens):** Lens closest to the eye magnifies the primary image formed by the objective lens.
- **Eyepiece Tube:** This is the component that holds the eyepieces in place. Elementary, student and high school models have set screws in the eyepiece tube used to lock eyepieces in place.
- **Field of View:** View area that is seen through the lens system of the microscope.
- **Filter:** Daylight blue filter designed to make incandescent illumination appear white.
- **Filter Holder:** Attached to bottom of iris diaphragm that swings out allowing user to insert filter of choice. If a built in neutral filter is provided it should be removed from the optical path when using 40x and 100x objectives.
- **Head:** Upper portion of the microscope which contain prisms and eyepiece tube or tubes.
- **Incidental Illumination:** Primarily used on stereo type microscopes to provide illumination from above the specimen.
- **Infinity Corrected Optical Microscope:** Objectives and microscope are designed to maintain a constant magnification and no change in parfocality even if the tube length changes.
- **Interpupillary Distance:** Interpupillary distance (IPD) is the distance between the center of the pupils of the two eyes. Interpupillary distance is critical for the design of binocular viewing heads so that the left and right image can blend into one image.
- **Iris Diaphragm:** Iris Diaphragm, opening and closing of iris is controlled by lever. It is designed to help achieve optimum resolution of the objective lens. Larger apertures used for higher magnifications, and smaller apertures used for lower magnifications.

- **Koehler Illumination:** Illumination system with provisions for providing even illumination with iris diaphragm for controlling field size of illumination.
- **Magnification:** Total magnification obtained with each objective lens is determined by multiplying the magnification of the eyepiece times the magnification of the objective. Keep in mind that as magnification increases, field of view (area of the specimen seen when looking through microscope) decreases.
- **Mechanical Stage:** Permits precise, mechanical manipulation of the specimen slide.
- **Mechanical Tube Length:** Distance between the top of eyepiece tube to mounting face of nosepiece.
- **Neutral Density Filter:** Neutral colored frosted filter designed to soften illumination hot spots.
- **Numerical Aperture (NA):** Mathematical formula devised by Ernst Abbe for the direct comparison of objective lens to resolving power.
- **Nosepiece (REVOLVING TURRET):** Designed to hold objective lenses permitting changes of magnification by rotating different powered objective lenses into optical path. Forward facing position used on elementary and high school models. Reverse facing nosepiece position used on more advanced models permits easier access to stage when positioning specimen slides.
- **Objective Lens:** Lens closest to the object being viewed, forms first image of the specimen.
- **Oil Immersion Lens:** High power (100x) objective lens which requires a medium of immersion oil between the lens and the slide.
- **Phase Contrast:** Utilizes a special condenser and objective lenses allowing user to view a specimen live. Phase contrast eliminates the need to prepare and stain a specimen, which kills the specimen.
- **Resolution (Resolving Power):** Ability of the optical system to distinguish and separate fine structural details in a specimen. The resolving power is limited by the NA of the objective, and it also depends upon the working NA of the sub-stage condenser, the higher the effective NA of the system the greater will be the resolving power.
- **Rheostat:** Variable potentiometer that adjusts the light intensity of the illuminator.
- **Seidentopf Binocular Head:** Seidentopf heads remain parfocality when changing interpupillary distances and are supplied with adjustable diopter adjustment to adjust image for any difference in vision between left and right eyes.
- **Specimen Slide:** Typically a 3 by 1 inch by 1mm thick glass with a specimen held for observation covered by a .01mm thick cover glass.
- **Stage Clips:** Two locked-on clips hold specimen slide in place on stage.
- **Stage:** Platform of the microscope where the specimen slide is placed.
- **Tension Adjustment Collar:** The tension collar is used to adjust and control “body tube” or “stage” drift (Instrument not remaining in focus).
- **Transmitted Illumination:** Used to illumination both compound and stereo microscopes providing illumination from below specimen.
- **Working Distance:** Distance between the top of specimen slide and the front of the objective lens.

Troubleshooting

Electrical

Problem	Reason for Problem	Solution
Lights fail to operate	AC power cord not connected	Connect outlet plug to outlet
	Outlet inoperative	Have qualified service repair outlet
	Lamp burned out	Replace lamp
	Fuse is blown	Replace fuse
Fuse burns out too soon	Improper fuse	Replace with proper fuse
	Fuse blows instantly when replaced	Short in electrical system - have qualified technician repair
Light bulb burns out too soon or immediately	Incorrect bulb, voltage or lamp base used	Replace with specified lamp
Light flickers	Lamp not properly inserted into socket	Properly insert lamp
	Loose connection at AC outlet	Have qualified service technician repair outlet
	Loose fuse	Properly install fuse holder
	Electrical short	Have qualified service technician repair short in electrical system

Troubleshooting

Focusing

Problem	Reason for Problem	Solution
Image does not remain in focus	Stage or body of microscope drops from its own weight	Adjust tension control
Image will not focus (compound models)	Slide is upside down	Place slide on stage with cover slip up
	Slide cover slip is too thick	Use 0.17mm thick cover slip

Image Concerns

Problem	Reason for Problem	Solution
No image	Nosepiece not indexed properly	Move revolving nosepiece until objective lens clicks into position
Poor resolution (Image not sharp)	Diaphragm improperly adjusted	Adjust iris diaphragm
	Too much light	Adjust light intensity control to a lower position
	Objective lenses dirty	Clean objective lenses
	Eyepiece lens dirty	Clean eyepiece lenses
	Washed out image	Adjust iris diaphragm
	Specimen slide dirty	Clean slide
	Spots on field of view (Eyepiece or condenser lens dirty)	Have qualified service technician clean inside of lens
	No immersion oil used on 100X objective lens	Use small amount of immersion oil between the objective and the slide
Bubbles (air) in immersion oils	Remove bubbles by carefully moving nosepiece back and forth	

General Instructions for DIN Compound Microscopes



- I. Remove microscope, vinyl dustcover and any components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping arm with one hand and placing other hand under base.
- II. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepiece.
- III. Before operating microscope, adjust intensity (rheostat) control knob or dial to its minimum position. (This will help extend the life of the light bulb).
- IV. Flip illuminator switch to the "ON" position.
- V. Rotate lamp intensity control knob until image is illuminated.
- VI. Check to insure that the Abbe condenser lens is at the upper limit of travel. If not rotate condenser focus knob to insure that top of Abbe condenser lens is just below top of stage.
- VII. Initial diaphragm adjustment:
 - A. Move iris control lever so that the iris is about 1/3rd open.
- VIII. Rotate coaxial focus knobs in a direction that stage moves "away" from the objectives as far as possible.
- IX. Positioning specimen slide on stage.
 - A. Swing movable finger on slide holder outward, place specimen slide (cover slip facing up) on top of stage against fixed side of slide holder. Slowly release movable finger until it makes contact with specimen side.
 - B. Using mechanical stage X and Y controls move specimen slide until specimen is centered over the condenser lens.
- X. Interpupillary distance adjustment. Binocular and Trinocular Models 11350101, 11350102, 11350104, 1135105, 11350107, 11350108, 11350109, 11350110.

- A. Interpupillary adjustment will enable the user to observe the image with both eyes.
 - B. Rotate nosepiece turret until 10x objective “clicks” into optical path. Note each time you change from one objective to another you should turn the turret until you hear the “click” which indicates that the lens is properly indexed in optical path.
 - C. Look through microscope and adjust the eyepiece tubes of the binocular head by moving the eyepiece tubes in and arc motion to the position where one perfect circle can be seen in the field of view. A full field of view should be observed
 - D. Check the interpupillary scale, located between eyepiece tubes in center of hinged portion of head, note index reading for future reference.
- XI. Looking through the microscope bring specimen into focus.
- XII. Diopter adjustment for Binocular and Trinocular models.
- A. Diopter adjustment is provide to compensate for differences in vision between left and right eyes.
 - B. Rotate left eyepiece diopter so that the 0 of the +/- adjustment scale is centered over the index mark located on the fixed part of the eyepiece tubes.
 - C. Make sure that the 10x objective is centered in optical path.
 - D. Using your right eye only adjust the focus controls of microscope until specimen is in sharp focus.
 - E. Looking through left eyepiece adjust left diopter until specimen image is sharp.
- XIII. Models with a trinocular head with vertical port on top of head.
- A. Allows for addition of a camera or with a built in camera.
 - B. Incorporates a 2 position sliding rod that allows user to select viewing that meet his requirements.
 - C. Rod pushed completely into head allowing 100% of microscope image to be directed to binocular eyepieces’
 - D. Pull rod out to fully extended position directs 80% of image to be to vertical port and 20% to the eyepieces.
- XIV. Adjusting the aperture (opening) of iris diaphragm. Diaphragms are designed to help achieve high resolution of specimen and provide contrast in the image. The Iris diaphragm is marked with MAX to MIN positions, adjust the diaphragm to match the objective lens you are using. Smaller apertures will deliver higher contrast to image. However, closing aperture too much will reduce resolution. Experimentation is the best method of determining the correct opening of diaphragm.
- XV. Suggested openings for iris diaphragm
- A. 4X lens 1/8th open
 - B. 10X Lens 1/8th to 1/4th open
 - C. 40x Lens 1/4 to 1/2 open
 - D. 100x Lens 1/2 to 3/4 open
- XVI. Changing magnification is accomplished by rotating by rotating objective turret until different objective lens is moved into optical path. Always turn turret until you hear the “click”, indicating that lens is properly indexed. Otherwise, you will not be able to see anything when looking through the microscope. A slight adjustment of focus and diaphragm openings will be needed to sharpen the image when changing objective magnification.
- XVII. Models supplied with 100x oil immersion lens. To obtain the maximum resolution of the 100x oil immersion lens it is necessary to apply immersion oil between cover glass of slide and front lens of objective. Use a very small amount of immersion oil.
- A. Air bubbles must be removed from between lens and slide by gently moving nosepiece back and forth.
 - B. Each time immersion oil is used on the 100x it is essential that you carefully clean front of lens after use.

Model 11350100 Monocular, 11350101 Binocular, 11350102 Trinocular with DIN Standard Optical System

- I. Components
 - A. WF10X/18mm eyepieces
 - B. EA DIN 4x (0.10N.A.)
 - C. EA DIN 10x (0.25N.A.)
 - D. Retractable EA DIN 40x (0.65N.A.)
 - E. Retractable EA DIN 100x (1.25N.A.) oil immersion lens
 - F. 1.25 N.A condenser with iris diaphragm
 - G. 3 Watt LED illuminator with intensity control.

11350103 Monocular, 11350104 Binocular and 11350105 Trinocular with DIN Standard Optical System

- I. Components
 - A. WF10X/18mm eyepieces
 - B. ASC DIN 4x (0.10N.A.)
 - C. ASC DIN 10x (0.25N.A.)
 - D. Retractable ASC DIN 40x (0.65N.A.)
 - E. Retractable ASC DIN 100x (1.25N.A.) oil immersion lens
 - F. 1.25 N.A condenser with iris diaphragm
 - G. 3 Watt LED illuminator with intensity control.

11350106 Monocular, 11350107 Binocular and 11350108 Trinocular with DIN Standard Optical System

- I. Components
 - A. WF10X/18mm eyepieces
 - B. PLAN DIN 4x (0.10N.A.)
 - C. PLAN DIN 10x (0.25N.A.)
 - D. Retractable PLAN DIN 40x (0.65N.A.)
 - E. Retractable PLAN DIN 100x (1.25N.A.)
 - F. 1.25 N.A condenser with iris diaphragm
 - G. 3 Watt LED illuminator with intensity control.

11350109 Binocular 11350110 Trinocular with DIN Phase Optical System

- I. Phase contrast microscopy provides a means to observe transparent specimens, which are very difficult to observe under bright field illumination. Another advantage of phase microscopy is that it allows the user to observe living specimens that are usually destroyed by staining or fixing reagents. The phase turret control has five positions; one for standard brightfield illumination, one for darkfield illumination, Ph1, Ph2, and Ph3 annuli positions for phase contrast illumination.
- II. Components:
 - A. Finite Plan 10X Ph/0.25 phase DIN objective.
 - B. Finite Plan 20X Ph/0.40 phase DIN objective.
 - C. Finite Plan 40X Ph/0.65 phase DIN objective.
 - D. Finite Plan 100X Ph/1.25 phase DIN objective oil immersion lens.
 - E. Five position 1.25NA Phase turret condenser. Brightfield for 10x, 20x, 40x & 100x, Darkfield for 10x, 20x & 40x, Phase 1 for 10x , Phase 2 for 20x and 40x and Phase 3 for 100x (Annuli phase rings increase in diameter with the increase of numerical aperture of the objectives).

- F. Annuli centering tools (Two each 1.5mm hex wrenches mounted on knurled handles)
- G. Centering telescoping eyepiece.
- H. Filters, green and blue.
- III. Assembly:
 - A. Install phase turret condenser
 - a. Rotate coarse focusing knob to move microscope stage platform to its highest position.
 - b. Loosen knurled locking screw located on the side of microscope condenser mounting ring.
 - c. Insert the phase turret condenser sleeve into condenser mounting ring.
 - d. Tighten the knurled locking screw to secure phase turret condenser.
- IV. Install filter:
 - A. Insert filter into filter recess located at top of illuminator lighthouse condenser lens.
 - a. Blue filter is utilized for bright field observation.
 - b. Green filter is generally utilized for phase observation.
- V. Install objectives:
 - A. Rotate coarse focusing knob to move microscope stage platform to its highest position.
 - B. Remove objective dust caps from the revolving nosepiece.
 - C. Screw objective lenses into nosepiece, making certain to mount them in consecutive order, 10x, 20x, 40x, and 100x.

Phase Operation

- I. Rotate condenser focusing control knob to move phase turret condenser to the top of its travel.
- II. Rotate phase turret annuli control until the letters BF (brightfield) can be seen at front of phase turret
- III. Adjust iris diaphragm to the largest opening.
- IV. Rotate revolving nosepiece to position 10X Ph/0.25 phase objective into optical path.
- V. Place a standard specimen slide (cover slip up) on top of stage surface.
- VI. Adjust microscope focus controls until specimen is in sharp focus.
- VII. Using small L wrench provided remove eyepiece locking screw located on eyepiece tube and remove eyepiece from tube.
- VIII. Install centering telescope eyepiece into eyepiece tube.
 - A. Loosen knurled locking screw located on side of centering telescope eyepiece.
 - B. Hold knurled locking screw with one hand, grasp very top of centering telescope eyepiece with other hand, peer through eyepiece while sliding sleeve up until the phase ring in the objective is in focus (sleeve is approximately 1" up from knurled locking screw).
 - C. Tighten eyepiece knurled locking screw.
- IX. Rotate the phase turret annuli control until the number 10 can be seen at front of phase turret condenser assembly. Annuli must click into position to assure proper centering.
- X. Using condenser focusing control knob, focus the bright annuli ring located in phase turret annulus condenser.
- XI. Observe the two rings in the field of view.
 - A. The dark larger annulus ring is located in the objective lens
 - B. The bright smaller annulus is located in the phase turret condenser.
- XII. Centering of the annuli:
- XIII. Insert the two centering tools into holes provided at rear left and right sides of phase turret condenser until they engage the hex socket screws inside annuli centering mechanism.
- XIV. Keeping the two adjusting tools engaged in socket screws, look through the centering telescope and observe rings located in objective and phase turret condenser. Rotate the centering screws in or out, moving image of the smaller bright annulus ring annuli located in phase turret condenser until it is centered to the larger dark annulus located in the objective. Both rings must be concentric to each other to achieve maximum performance. Make sure that the adjusting tools are removed from the hex socket screws of phase annuli centering mechanism before rotating phase turret condenser.
 - A. Repeat above steps with each objective lens, making sure to position the corresponding annuli of phase condenser with each objective lens in optical path.
 - B. It will be necessary to adjust the focus telescoping eyepiece and phase turret condenser with each

objective lens.

- XV. When you have adjusted all annuli to their respective objective lenses remove centering telescope from eyepiece tube and install eyepiece.
- A. Microscope is now ready for use.

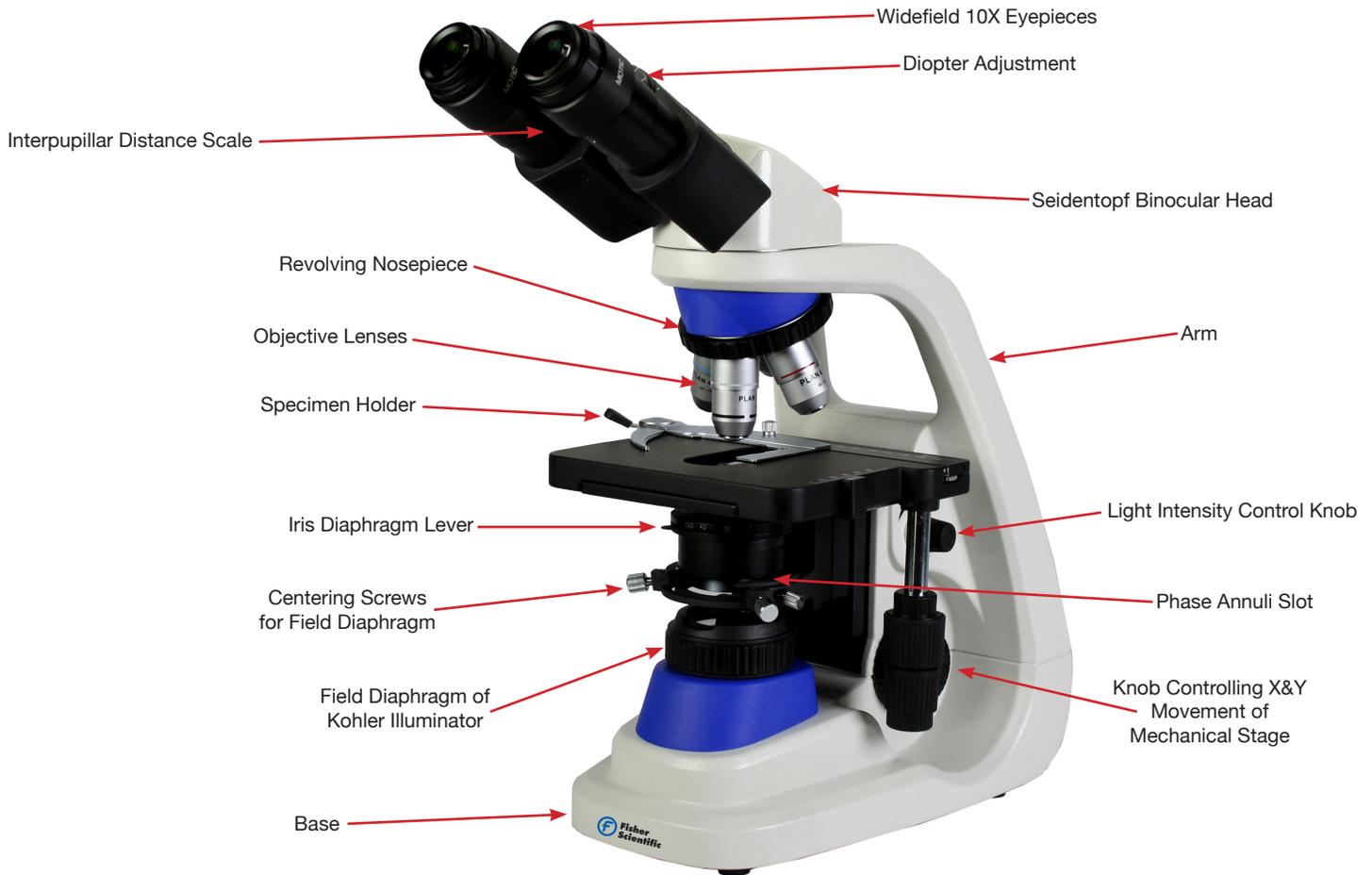
Brightfield Operation

- I. The phase objectives will work well as standard bright field objective lenses.
- II. To view in bright field simply position the 0 position to the front of condenser turret and adjust condenser and iris diaphragm for standard use.

Darkfield Operation

- I. The 10x, 20x and 40x phase objectives can be used for darkfield observation. NOTE: 100x phase objectives should not be used since the N.A. is greater than 0.85.
- II. Setup the phase turret condenser as in the above steps.
- III. With the darkfield annuli in position light will pass light through the annuli producing a bright image on a dark background.
- IV. In darkfield microscopy, the images of light and dark are reversed so that the field appears almost black and the specimen light. This provides a greater depth of field, thus revealing more of the specimen between the slide and cover slip. This is important particularly under high powers and for specimens which are relatively thick. One common practice is to find the plane or object to be studied under darkfield and then switch to phase contrast to view more details.

General Instructions for Infinity Corrected Compound Microscopes



- I. Remove microscope, vinyl dustcover and any components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping arm with one hand and placing other hand under base.
- II. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepiece.
- III. Before operating microscope, adjust intensity (rheostat) control knob or dial to its minimum position. (This will help extend the life of the light bulb).
- IV. Flip illuminator switch to the "ON" position.
- V. Rotate intensity control knob until image is illuminated.
- VI. Check to insure that the Abbe condenser lens is at the upper limit of travel. If not rotate condenser focus knob to insure that top of Abbe condenser lens is just below top of stage.
- VII. Initial diaphragm adjustment:
 - A. Move iris control lever to the number 10 position.
- VIII. Rotate coaxial focus knobs in a direction that stage moves "away" from the objectives as far as possible.
- VIII. Positioning specimen slide on stage'
 - A. Swing movable finger on holder outward, place specimen slide (cover slip facing up) on top of stage against fixed side of slide holder. Slowly release movable finger until it makes contact with specimen side.
 - B. Using mechanical stage X and Y controls move specimen slide until specimen is centered over the condenser lens.
 - a. Interpupillary distance adjustment. Binocular and Trinocular Models 11350101, 11350102, 11350104, 1135105, 11350107, 11350108, 11350109, 11350110, 1135011,

11350112, 11350113, 11350114, 11350115, 11350116, 11350117, 11350118, 11350130, 11350131, 11350132, 11350133

- b. Rotate nosepiece turret until 10x objective “clicks” into optical path. Note each time you change from one objective to another you should turn the turret until you hear the “click” which indicates that the lens is properly indexed in optical path.
- c. Bring specimen into focus.
- d. Adjust the interpupillary distance so that both the right and left field of view become one.
- e. This adjustment will enable the user to observe the specimen with both eyes.



- X. Diopter adjustment for Binocular and Trinocular models.
 - A. Diopter provides for differences in vision between left and right eyes. This adjustment also reduces the extent to which focusing is lost when the objective magnification is changed.
 - B. With the 10x objective in optical path make sure that the specimen is in sharp focus.
 - C. Rotate left and right eyepiece diopters so that the 0 of the +/- 5 adjustment scale is centered over the index mark located on the fixed part of the eyepiece tubes.
 - D. Rotate nosepiece to position 40x objective into optical path and bring specimen into sharp focus using the coaxial coarse and fine focusing knobs.
 - E. Rotate nosepiece to position 4x objective into optical path.
 - F. Without adjusting the coaxial coarse and fine focus knobs adjust both diopters until specimen image is sharp in both left and right eyepieces.
 - G. For optimum results it is generally necessary to repeat steps D through G.
- XI. Models with a trinocular head with vertical port on top of head.
 - A. Allows for addition of a camera or with a built in camera.
 - a. Incorporates a 2 position sliding rod that allows user to select viewing that meet his requirements.
 - b. Rod pushed completely into head allowing 100% of microscope image to be directed to binocular eyepieces
 - c. Pull rod to fully extended position and 20% of image is directed to binocular eyepieces, 80% directed to trinocular port.
- XII. Adjusting the Kohler illuminator (Models 11350111, 11350112, 11350113, 11350114, 11350115, 11350116, 11350117, 11350118, 11350130, 11350131, 11350132, 11350133):
 - A. Position the 10x objective into the optical path.
 - B. Focus the specimen slide.
 - C. Adjust the Abbe condenser to its highest position.
 - D. While looking through the eyepieces close the field diaphragm (located on top of light condensing lens assembly) to about 1/3 of the field.
 - E. Focus the field diaphragm of the illuminator by lowering the Abbe condenser.
 - F. Iris leaves should be focused.
 - G. Using the centering screws, located on condenser mount, center diaphragm in the field of view.

- H. Adjust the field diaphragm so that the field of view is filled with light.
- XIII. Adjusting the Diaphragm: Diaphragms are designed to help achieve high resolution of specimen and provide contrast in the image. The Iris diaphragm is marked with Ph, 100, 40, and 10 positions, adjust the diaphragm to match the objective lens you are using. Smaller apertures will deliver higher contrast to image. However, closing aperture too much will reduce resolution. Experimentation is the best method of determining the correct opening of diaphragm.
- XIII. Changing magnification is accomplished by rotating by rotating objective turret until different objective lens is moved into optical path. Always turn turret until you hear the “click”, indicating that lens is properly indexed. Otherwise, you will not be able to see anything when looking through the microscope. A slight adjustment of focus and diaphragm openings will be needed to sharpen the image when changing objective magnification.
- XIII. Models supplied with 100x oil immersion lens. To obtain the maximum resolution of the 100x oil immersion lens it is necessary to apply immersion oil between cover glass of slide and front lens of objective. Use a very small amount of immersion oil. Air bubbles must be removed from between lens and slide by gently moving nosepiece back and forth.
- XIII. Each time immersion oil is used on the 100x it is essential that you carefully Clean front of lens after use.
- A. Replacing LED bulb.
- a. Remove 3 wire AC power cord from back of microscope access panel.
 - b. Locate the electrical access panel located on rear of arm.
 - c. Remove the 4 cross head screws used to secure panel to arm.
 - d. Remove panel and trace the white/pink wire attached to LED lamp assembly to circuit board located on panel.
 - e. Carefully disconnect the white connector from the circuit board.
 - f. Gently lay microscope on its side to reveal base plate on bottom of illuminator base.
 - g. Observe screws located in rubber feet. Using a screwdriver, remove the rubber feet and base plate to expose bulb assembly.
 - h. Grasp black retainer ring securing 3Watt LED lamp and lamp base to illuminator house. Rotate ring in a counterclockwise direction and remove ring.
 - i. Remove the LED lamp assembly from lamp house.
 - j. Using 3W LED replacement lamp, feed wire through retainer ring, install lamp base to lamp house and secure by tightening retainer ring.
 - k. Plug white/pink wire into connector marked LED on circuit board panel.
 - l. Replace access panel and base plate.

Infinity Corrected 11350111 Binocular and 11350112 Trinocular

- I. Components
 - A. N-WF10X/20mm eyepieces with adjustment +/-5 diopter
 - B. Infinity Corrected Standard 4x (0.65) objective lens.
 - C. Infinity Corrected Standard 10x (0.25N.A.) objective lens.
 - D. Infinity Corrected Standard 40x (0.65N.A.) retractable objective lens.
 - E. Infinity Corrected Standard 100x (1.25N.A.) retractable oil immersion objective lens.
 - F. 1.25 N.A condenser with iris diaphragm and slot for contrast sliders.
 - G. 3 Watt LED Koehler illuminator with intensity control.

Infinity Corrected 11350113 Binocular and 11350114 Trinocular with Simple Phase

- I. Components
 - A. N-WF10X/20mm eyepieces with adjustment +/-5 diopter
 - B. EC-H Ph10x (0.25N.A.) Infinity Corrected (Phase) objective lens.
 - C. EC-H Ph 20x (0.40N.A.) Infinity Corrected (Phase) objective lens.
 - D. Infinity Corrected Standard Plan 40x (0.65N.A.) Infinity Corrected retractable objective lens.
 - E. Infinity Corrected Standard Plan 100x (1.25N.A.) Infinity Corrected retractable oil immersion lens.
 - F. 1.25 N.A condenser with iris diaphragm and slot for contrast sliders.
 - G. 3 Watt LED Koehler illuminator with intensity control.
 - H. Centering telescope eyepiece
 - I. Phase slider (fits into the 1.25 abbe condenser with one brightfield opening in center of slider and openings for the PH1, Ph2 annuli).
- II. Assembly of Simple Phase Slider
 - A. Installation of phase slider.
 - a. Rotate coarse focusing knob to move microscope stage platform to its highest position.
 - b. Look under the stage and locate the focusable 1.25 NA Abbe condenser.
 - c. Locate annuli slot in Abbe condenser assembly and remove insert with BF opening.
 - d. Grasp one of the chrome rods from phase annuli slider and rotate in a counterclockwise direction to remove.
 - e. Insert the phase annuli slider into condenser mount opening.
 - f. Install chrome rod on phase annuli slider.
 - B. Install objectives
 - a. Remove objective dust caps from the revolving nosepiece.
 - b. Screw objective lenses into nosepiece, making certain to mount them in consecutive order, Phase 10x, Phase 20x and Infiniti Classic 40x, 100x.
- III. Phase Operation
 - A. Rotate condenser focusing control knob to move condenser to the top of its travel.
 - B. Move phase slider to the center BF position (brightfield) until it clicks into position.
 - C. Rotate revolving nosepiece to position 10X Ph/0.25 phase objective into optical path.
 - D. Place a standard specimen slide (cover slip up) on top of stage surface.
 - E. Focus specimen slide by adjusting coaxial coarse and fine focus controls until slide is in sharp focus.
 - F. Move slider annuli until the number Ph1 Annuli clicks into center position.
 - G. Using small L wrench provided remove eyepiece locking screw located on eyepiece tube and remove eyepiece from tube.
 - H. Install centering telescope eyepiece into eyepiece tube.
 - I. Loosen knurled locking screw located on side of centering telescope eyepiece.
 - a. Hold knurled locking screw with one hand, grasp very top of centering telescope eyepiece with other hand, peer through eyepiece while sliding sleeve up until the phase ring in the objective is in focus (sleeve is approximately 1" up from knurled locking screw).

- b. Tighten eyepiece knurled locking screw.
- J. Observe the two rings in the field of view.
 - a. The dark larger annulus ring is located in the objective lens
 - b. The bright smaller annulus is located in the phase turret condenser.
 - c. Insert the two hexagonal centering tools into hex adjusting screws located on each side of the slider annuli.
 - d. While keeping the two centering tools engaged, look through the centering telescope and observe rings located in objective and phase turret condenser. Rotate the centering screws in or out, moving image of the smaller bright annulus ring annuli located in phase turret condenser until it is centered to the larger dark annulus located in the objective. Both rings must be concentric to each other to achieve maximum performance. Make sure that the knurled head tools are disengaged from the hex socket screws of annuli centering mechanism before moving the annuli slider.
 - e. Move slider annuli until the number Ph 2 Annuli clicks into center position of condenser.
 - f. Repeat above centering steps with the 20x, phase objective.
- K. It will be necessary to focus the telescoping eyepiece and phase turret condenser with each objective lens you are centering.
- L. When you have adjusted both the 10x and 20x annuli to their respective objective lenses remove centering telescope from eyepiece tube and install eyepiece.
 - a. Microscope is now ready for use.
- M. Brightfield Operation
 - a. The phase objectives will work well as standard bright field objective lenses.
 - b. To view in bright field simply position the 0 position to the front of condenser turret and adjust
 - c. Condenser and iris diaphragm for standard use

Infinity Corrected 11350115 Binocular and 1350116 Trinocular with EF-N Plan

- I. Components
 - A. N-WF10X/20mm eyepieces with adjustment +/-5 diopter
 - B. EF-N PLAN 4x (0.65) Infinity Corrected objective lens.
 - C. EF-N PLAN 10x (0.25N.A.) Infinity Corrected objective lens.
 - D. EF-N PLAN 40x (0.65N.A.) Infinity Corrected retractable objective lens
 - E. EF-N PLAN 100x (1.25N.A.) Infinity Corrected retractable oil immersion objective lens.
 - F. 1.25 N.A condenser with iris diaphragm and slot for contrast sliders.
 - G. 3 Watt LED Koehler illuminator with intensity control.

Infinity Corrected 11350117 Binocular and 11305118 Trinocular with Full Phase Set

- I. Components
 - A. N-WF10X/20mm eyepieces with adjustment +/-5 diopter
 - B. EC-H Plan Ph 10x (0.25N.A.) Infinity Corrected (Phase) objective lens
 - C. EC-H Plan Ph 20x (0.40N.A.) Infinity Corrected (Phase) objective lens
 - D. EC-H Plan Ph 40x (0.65N.A.) Infinity Corrected (Phase) retractable objective lens
 - E. EC-H Plan Ph 100x (1.25N.A.) Infinity Corrected (Phase) retractable oil immersion objective lens.
 - F. 1.25 N.A condenser with iris diaphragm and slot for contrast sliders.
 - G. 3 Watt LED Koehler illuminator with intensity control.
 - H. Centering telescope eyepiece
 - I. Five position 1.25NA Phase turret condenser. Brightfield for 10x, 20x, 40x & 100x, Darkfield for 10x, 20x & 40x, Phase 1 for 10x , Phase 2 for 20x and 40x and Phase 3 for 100x (Annuli phase rings increase in diameter with the increase of numerical aperture of the objectives.
 - J. Annuli centering tools (Two each 1.5mm hex wrenches mounted on knurled handles)
 - K. Centering telescoping eyepiece.

- L. Filters, green and blue.
- II. Assembly:
 - A. Install phase turret condenser
 - a. Rotate coarse focusing knob to move microscope stage platform to its highest position.
 - b. Loosen knurled locking screw located on the side of microscope condenser mounting ring.
 - c. Insert the phase turret condenser sleeve into condenser mounting ring.
 - d. Tighten the knurled locking screw to secure phase turret condenser.
- III. Install filter:
 - A. Insert filter into filter recess located at top of illuminator lighthouse condenser lens.
 - a. Blue filter is utilized for bright field observation.
 - b. Green filter is generally utilized for phase observation.
- IV. Install objectives:
 - A. Rotate coarse focusing knob to move microscope stage platform to its highest position.
 - B. Remove objective dust caps from the revolving nosepiece.
 - C. Screw objective lenses into nosepiece, making certain to mount them in consecutive order, 10x, 20x, 40x, and 100x.

Phase Operation

- I. Rotate condenser focusing control knob to move phase turret condenser to the top of its travel.
- II. Rotate phase turret annuli control until the letters BF (brightfield) can be seen at front of phase turret
- III. Adjust iris diaphragm to the largest opening.
- IV. Rotate revolving nosepiece to position 10X Ph/0.25 phase objective into optical path.
- V. Place a standard specimen slide (cover slip up) on top of stage surface.
- VI. Adjust microscope focus controls until specimen is in sharp focus.
- VII. Using small L wrench provided remove eyepiece locking screw located on eyepiece tube and remove eyepiece from tube.
- VIII. Install centering telescope eyepiece into eyepiece tube.
 - A. Loosen knurled locking screw located on side of centering telescope eyepiece.
 - B. Hold knurled locking screw with one hand, grasp very top of centering telescope eyepiece with other hand, peer through eyepiece while sliding sleeve up until the phase ring in the objective is in focus (sleeve is approximately 1" up from knurled locking screw).
 - C. Tighten eyepiece knurled locking screw.
- IX. Rotate the phase turret annuli control until the number 10 can be seen at front of phase turret condenser assembly. Annuli must click into position to assure proper centering.
- X. Using condenser focusing control knob, focus the bright annuli ring located in phase turret annulus condenser.
- XI. Observe the two rings in the field of view.
 - A. The dark larger annulus ring is located in the objective lens
 - B. The bright smaller annulus is located in the phase turret condenser.
- XII. Centering of the annuli:
- XIII. Insert the two centering tools into holes provided at rear left and right sides of phase turret condenser until they engage the hex socket screws inside annuli centering mechanism.
- XIV. Keeping the two adjusting tools engaged in socket screws, look through the centering telescope and observe rings located in objective and phase turret condenser. Rotate the centering screws in or out, moving image of the smaller bright annulus ring annuli located in phase turret condenser until it is centered to the larger dark annulus located in the objective. Both rings must be concentric to each other to achieve maximum performance. Make sure that the adjusting tools are removed from the hex socket screws of phase annuli centering mechanism before rotating phase turret condenser.
 - A. Repeat above steps with each objective lens, making sure to position the corresponding annuli of phase condenser with each objective lens in optical path.
 - B. It will be necessary to adjust the focus telescoping eyepiece and phase turret condenser with each objective lens.
- XV. When you have adjusted all annuli to their respective objective lenses remove centering telescope from

eyepiece tube and install eyepiece.
A. Microscope is now ready for use.

Brightfield Operation

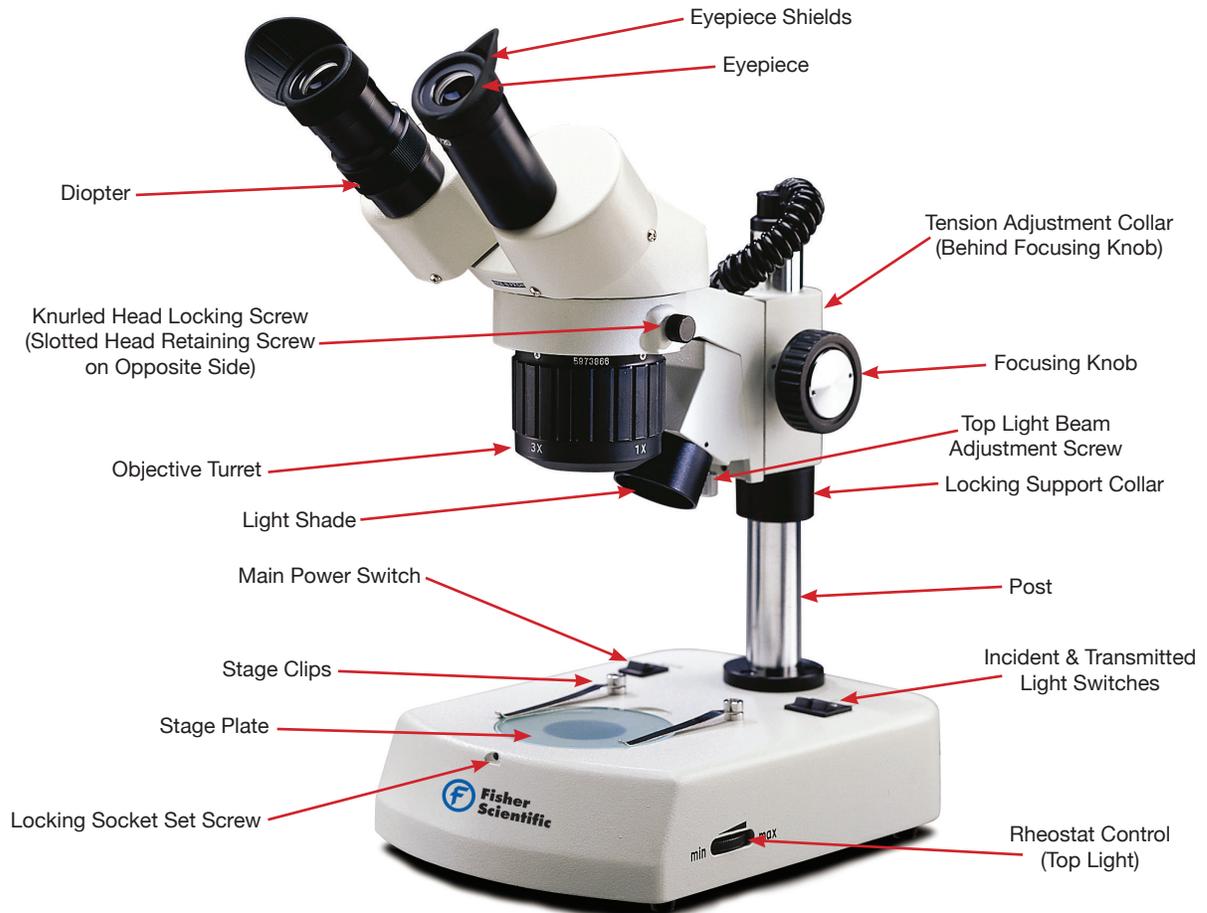
- I. The phase objectives will work well as standard bright field objective lenses.
- II. To view in bright field simply position the 0 position to the front of condenser turret and adjust condenser and iris diaphragm for standard use.

Darkfield Operation

- I. The 10x, 20x and 40x phase objectives can be used for darkfield observation. NOTE: 100x phase objectives should not be used since the N.A. is greater than 0.85.
- II. Setup the phase turret condenser as in the above steps.
- III. With the darkfield annuli in position light will pass light through the annuli producing a bright image on a dark background.
- IV. In darkfield microscopy, the images of light and dark are reversed so that the field appears almost black and the specimen light. This provides a greater depth of field, thus revealing more of the specimen between the slide and cover slip. This is important particularly under high powers and for specimens which are relatively thick. One common practice is to find the plane or object to be studied under darkfield and then switch to phase contrast to view more details.

General Instructions for Stereo Microscopes

115000100, 15000101, 11350122 and 11350123

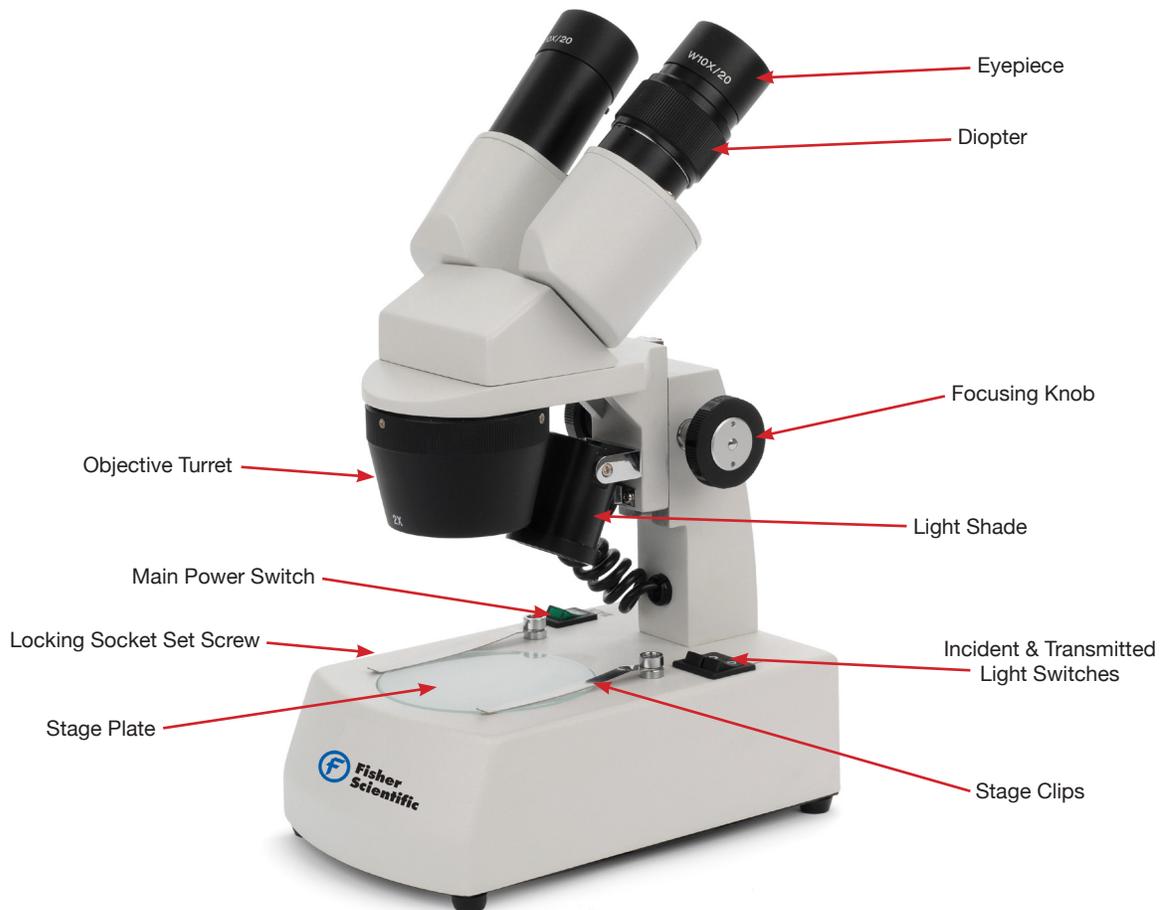


- I. Remove microscope and all components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping focusing mechanism with one hand and placing other hand under base. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepieces.
- II. Install rubber eyepiece shields over top of eyepieces with the flared portion of the shield positioned at outside of eyepiece.
- III. Illuminate specimen according to specific instructions for your model.
- IV. Stage plate selection: Select the stage plate that best meets requirements of specimen being examined.
 - A. Frosted transparent plate is used when viewing transparent specimen slides or for viewing some specimen thin enough through which light can pass (insect wings, etc.)
 - B. Black contrast plate can be used when viewing light colored opaque objects or for dissecting.
 - C. White contrast plate can be used when viewing dark colored opaque objects or for dissecting.
 - D. To change stage plates loosen locking screw, used to secure plate to the base. (Use the "L" wrench supplied with microscope).
 - E. Remove stage plate and Insert stage plate that best suits the needs of specimen that is being viewed, then secure plate with setscrew.
 - F. These models are supplied with a daylight blue filter which can be removed if desired by loosening set screw securing stage plate removing plate and filter. Install frosted stage plate, and tighten

- locking setscrew to secure stage plate to base.
- V. Illumination: Select illumination that meets the requirements of specimen and turn ON illuminator.
 - A. There are three rocker type light controls located on microscope base.
 - a. MAIN = Turns power ON and OFF
 - b. "I" Turns incidental light on (top illumination)
 - i. Incidental illumination can be used with either frosted, black or white stage plate.
 - ii. Top light can also be centered on specimen by using the top light beam adjustment screw. This allows user to select the best spot illumination required for specimen being viewed.
 - iii. Rheostat intensity control knob is located on side of base to control the intensity of top light..
 - c. "T" Turns transmitted light on (sub-stage illumination)
 - i. NOTE: USE TRANSMITTED ILLUMINATION ONLY WITH FROSTED GLASS STAGE PLATE (AND BLUE FILTER IN PLACE ON MODELS SUPPLIED WITH FILTER). HEAT GENERATED IN BASE FROM BOTTOM LIGHT WILL WARP OR DAMAGE THE PLASTIC BLACK/WHITE PLATE. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY.
 - d. Transmitted and Incidental illumination combined can provide extra illumination for certain objects where additional top illumination will enhance the object being viewed.
 - VI. Interpupillary Adjustment of Viewing Head:
 - A. Interpupillary adjustment is used to adjust spacing between eyepieces in order to accommodate varied distance between users eyes. While looking through the microscope eyepieces with both eyes, grasp eyepiece tube housings with both hands and rotate them on their axis, moving eyepieces apart or together until a full field of view is observed and images blend into one. Interpupillary distance is now corrected for your own inter-ocular distance and does not require further adjustment later unless another user changes this adjustment.
 - B. Place object or specimen slide in center of stage plate.
 - a. Rotate objective turret until the lowest magnification objectives click into position. (For proper focusing make sure that the turret has clicked into position).
 - C. Focusing (Height of head can be adjusted up or down on post in order to focus on difference sized specimen).
 - a. Position focusing knobs in the center of the up and down travel of mechanical movement.
 - b. Loosen locking knob located on support collar and slide collar down to bottom of post.
 - c. While firmly holding viewing head loosen the post locking knob located on back of focus block so that it can move freely up or down on post.
 - d. Look through the eyepieces while moving head up and down and bring specimen into approximate focus.
 - e. Tighten post-locking knob. It is not necessary to make this adjustment every time you change objects being viewed, unless there is a significant difference in thickness or height of objects.
 - f. Position the support collar under the focusing block and tighten locking knob on support collar.
 - g. Look through eyepieces and focus the microscope on the specimen.
 - h. Rotate objective turret until the lowest magnification objectives click into position. (For proper focusing make sure that the turret has clicked into position).
 - i. Rotate focusing knobs with both hands until specimen comes into sharp focus.
 - D. Diopter Adjustment: Since people have some difference in vision between the left and right eye, your microscope is equipped with a diopter adjustment located on the left eyepiece to compensate for this difference and assure that you will see one corrected image when looking through microscope.
 - a. Observe that the knurled diopter ring on the left eyepiece tube can be rotated to move the eyepiece up or down slightly. When a silver ring on the eyepiece tube is visible just below the diopter ring, the focus of both sides of microscope is matched for 20/20 vision. If you do not have 20/20 vision.
 - b. Look through the right eyepiece and make sure that the image is in sharp focus (if not make a slight adjustment using the focusing knobs)

- c. Look through the left eyepiece and turn knurled diopter ring until left side of microscope is also in sharp focus. Left and right images should now blend into one focused image. The microscope is now adjusted for your vision, and no further adjustment of the diopter should be required. Only the focusing knobs will require further adjustment when viewing objects of different thickness.
- E. Changing magnification:
 - a. Rotate objective turret until next pair of objectives clicks into position.
 - b. Slight adjustment to focus controls might be required to sharply focus image.

15000102 & 15000103



- I. Remove microscope and all components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping focusing mechanism with one hand and placing other hand under base. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepieces.
- II. Install rubber eyepiece shields over top of eyepieces with the flared portion of the shield positioned at outside of eyepiece.
- III. Illuminate specimen:
 - A. Stage plate selection: Select the stage plate that best meets requirements of specimen being examined.
 - B. Frosted transparent plate is used when viewing transparent specimen slides or for viewing some specimen thin enough through which light can pass (insect wings, etc.)
 - C. Black contrast plate can be used when viewing light colored opaque objects or for dissecting.

- D. White contrast plate can be used when viewing dark colored opaque objects or for dissecting.
 - E. To change stage plates loosen locking screw, used to secure plate to the base. (Use the “L” wrench supplied with microscope).
 - F. Remove stage plate and install stage plate best suited for your use, and tighten locking setscrew to secure stage plate to base.
- IV. Charging Batteries:
- A. It is recommended that you charge the batteries before initial use and after prolonged storage as the batteries may have discharged.
 - B. Use the supplied Automatic Switching Recharger when charging batteries
 - C. Plug output cord from battery charger into DC recharging socket located on side of LED illuminator. Your automatic switching recharger operates on 100 to 240 volts AC 50/60 Hz. Plug recharger into your AC wall outlet.
 - D. Battery charger is also equipped with an automatic “trickle charge” feature; the red LED indicator lamp located on charger will be illuminated when batteries are receiving maximum charge. After batteries are charged, the red LED indicator lamp will turn to green and charger automatically switches to “trickle charge”.
 - E. The charger can be left plugged in, but for safety reasons it is a good idea to disconnect the charger from the AC wall outlet and the output cord from recharging socket after 12 hours. Batteries and charger may feel warm when charging, and unplugging the recharger is a safety precaution.
- V. Illumination: Select illumination that meets the requirements of specimen and turn ON illuminator.
- A. There are three rocker type light controls located on microscope base.
 - a. MAIN = Turns power ON and OFF
 - b. “I” Turns incidental light on (top illumination)
 - i. Incidental illumination can be used with either frosted, black or white stage plates.
 - c. “T” Turns transmitted light on (sub-stage illumination)
 - d. Transmitted and Incidental illumination combined can provide extra illumination for certain objects where additional top illumination will enhance the object being viewed.
- VI. Interpupillary Adjustment of viewing head.
- A. Interpupillary adjustment is used to adjust spacing between eyepieces in order to accommodate varied distance between users eyes. While looking through the microscope eyepieces with both eyes, grasp eyepiece tube housings with both hands and rotate them on their axis, moving eyepieces apart or together until a full field of view is observed and images blend into one. Interpupillary distance is now corrected for your own inter-ocular distance and does not require further adjustment later unless another user changes this adjustment.
- VII. Focusing Microscope
- A. Place object or specimen slide in center of stage plate.
 - a. Rotate objective turret until the lowest magnification objectives click into position. (For proper focusing make sure that the turret has clicked into position).
 - B. Rotate focusing knobs with both hands until specimen comes into sharp focus.
- VIII. Diopter Adjustment: Since people have some difference in vision between the left and right eye, your microscope is equipped with a diopter adjustment located on the left eyepiece to compensate for this difference and assure that you will see one corrected image when looking through microscope.
- A. Observe that the knurled diopter ring on the left eyepiece tube can be rotated to move the eyepiece up or down slightly. When a silver ring on the eyepiece tube is visible just below the diopter ring, the focus of both sides of microscope is matched for 20/20 vision. If you do not have 20/20 vision.
 - B. Look through the right eyepiece and make sure that the image is in sharp focus (if not make a slight adjustment using the focusing knobs)
 - C. Look through the left eyepiece and turn knurled diopter ring until left side of microscope is also in sharp focus. Left and right images should now blend into one focused image. The microscope is now adjusted for your vision, and no further adjustment of the diopter should be required. Only the focusing knobs will require further adjustment when viewing objects of different thickness.
- IX. Changing magnification:
- A. Rotate objective turret to the highest magnification, making sure that the turret clicks into a positive

position.

- a. 15000102 supplied with 1x & 3x objective turret providing 10x and 30x magnification.
- b. 15000103 supplied with 2x & 4x objective turret providing 20x and 40x magnification.

B. Slight focusing might be required when changing magnification.

X. Replacing Rechargeable Batteries

- A. Gently lay microscope on its side. Remove the rubber feet located on bottom of base and remove base plate.
- B. Observe battery compartment inside of illuminator base.
- C. Remove the screw securing battery cover to bottom of illuminator. Slide cover back to expose and remove batteries. Remove "ALL" 3 batteries and replace with new rechargeable AA nickel hydride batteries, insert with correct polarity according to markings on battery holder.
- D. Replace battery cover and secure screw.
- E. Replace base plate and the rubber feet.

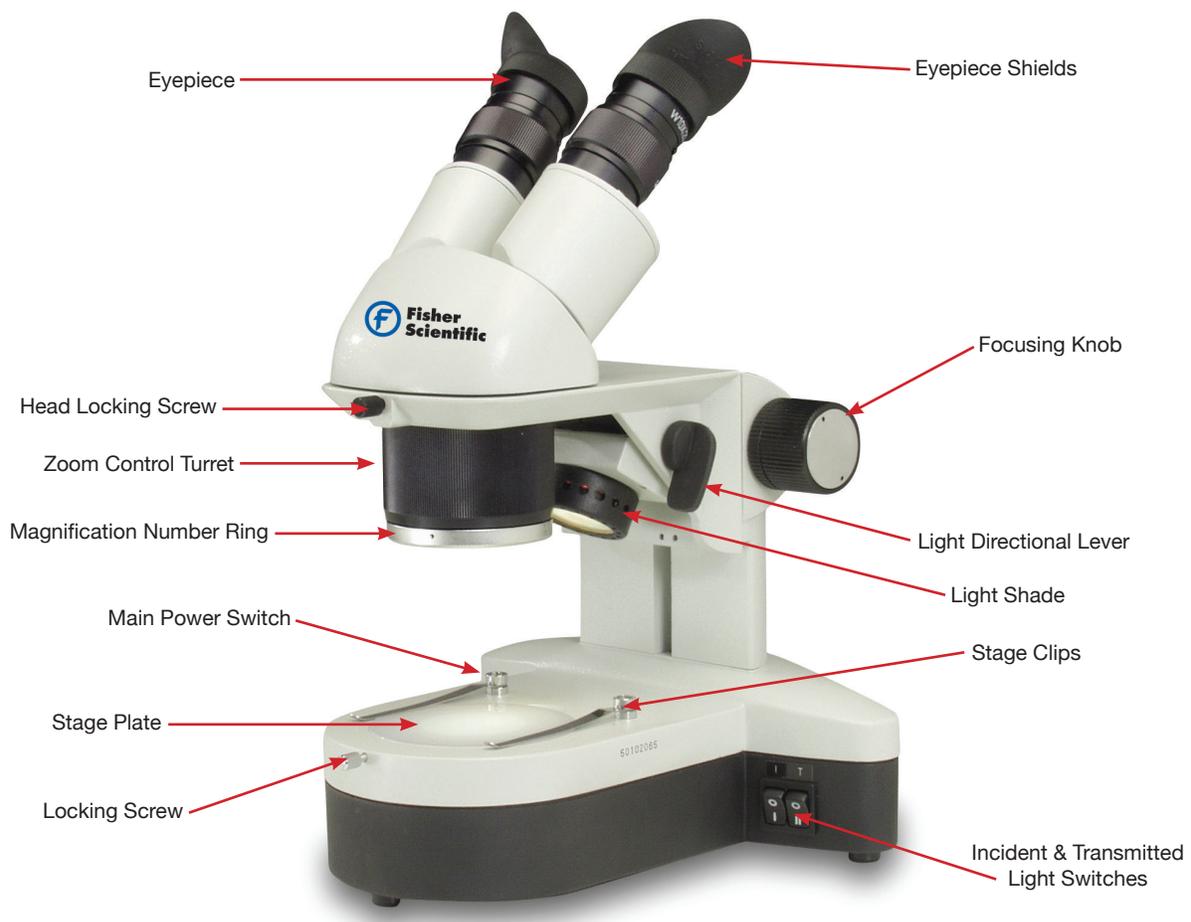
XI. To replace top light replace top light, remove two chrome crosshead screws securing top lighthouse to light bracket and the two chrome crosshead screws securing coiled cord clamp to arm.

- A. Remove front lens from lighthouse by rotating in a counter clockwise direction. Holding top lighthouse in one hand, remove silver spacer then feed coiled cord through bottom of lighthouse, pushing LED lamp assembly out of lighthouse.
- B. Unplug connector located on bottom of LED lamp mount and remove from housing.
- C. Using LED replacement lamp, plug the connector to supply cord. Wipe bulb to insure that it is clean and free of fingerprints.
- D. Reassemble lamp assembly in reverse order.

XII. To replace transmitted (bottom light), loosen setscrew located at side of base and remove stage plate. Removing stage plate will expose the bottom LED bulb.

- A. Grasp LED bulb and pull straight up and out of socket.
- B. Using LED replacement lamp, insert the new LED "bulb" making sure to align the lamp base with lamp socket. Wipe bulb to insure that it is clean and free of fingerprints.
- C. Replace the stage plate and tighten locking setscrew.

15000104



- I. Remove microscope and all components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping focusing mechanism with one hand and placing other hand under base. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepieces.
- II. Install rubber eyepiece shields over top of eyepieces with the flared portion of the shield positioned at outside of eyepiece.
- III. Illuminate specimen according to specific instructions for your model.
- IV. Stage plate selection: Select the stage plate that best meets requirements of specimen being examined.
 - A. Frosted transparent plate is used when viewing transparent specimen slides or for viewing some specimen thin enough through which light can pass (insect wings, etc.)
 - B. Black contrast plate can be used when viewing light colored opaque objects or for dissecting.
 - C. White contrast plate can be used when viewing dark colored opaque objects or for dissecting.
 - D. To change stage plates loosen locking screw, used to secure plate to the base. (Use the “L” wrench supplied with microscope).
 - E. Remove stage plate and Insert stage plate that best suits the needs of specimen that is being viewed, then secure plate with setscrew.
- V. Illumination: Select illumination that meets the requirements of specimen and turn ON illuminator.
 - A. There are three rocker type light controls located on microscope base.
 - a. MAIN = Turns power ON and OFF
 - b. “I” Turns incidental light on (top illumination)
 - i. Incidental illumination can be used with either frosted, black or white stage plate.

- ii. Top light can also be centered on specimen by using the top light beam adjustment screw. This allows user to select the best spot illumination required for specimen being viewed.
- iii. Rheostat intensity control knob is located on side of base to control the intensity of top light..
- c. "T" Turns transmitted light on (sub-stage illumination)
 - i. NOTE: USE TRANSMITTED ILLUMINATION ONLY WITH FROSTED GLASS STAGE PLATE (AND BLUE FILTER IN PLACE ON MODELS SUPPLIED WITH FILTER). HEAT GENERATED IN BASE FROM BOTTOM LIGHT WILL WARP OR DAMAGE THE PLASTIC BLACK/WHITE PLATE. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY.
- d. Transmitted and Incidental illumination combined can provide extra illumination for certain objects where additional top illumination will enhance the object being viewed.

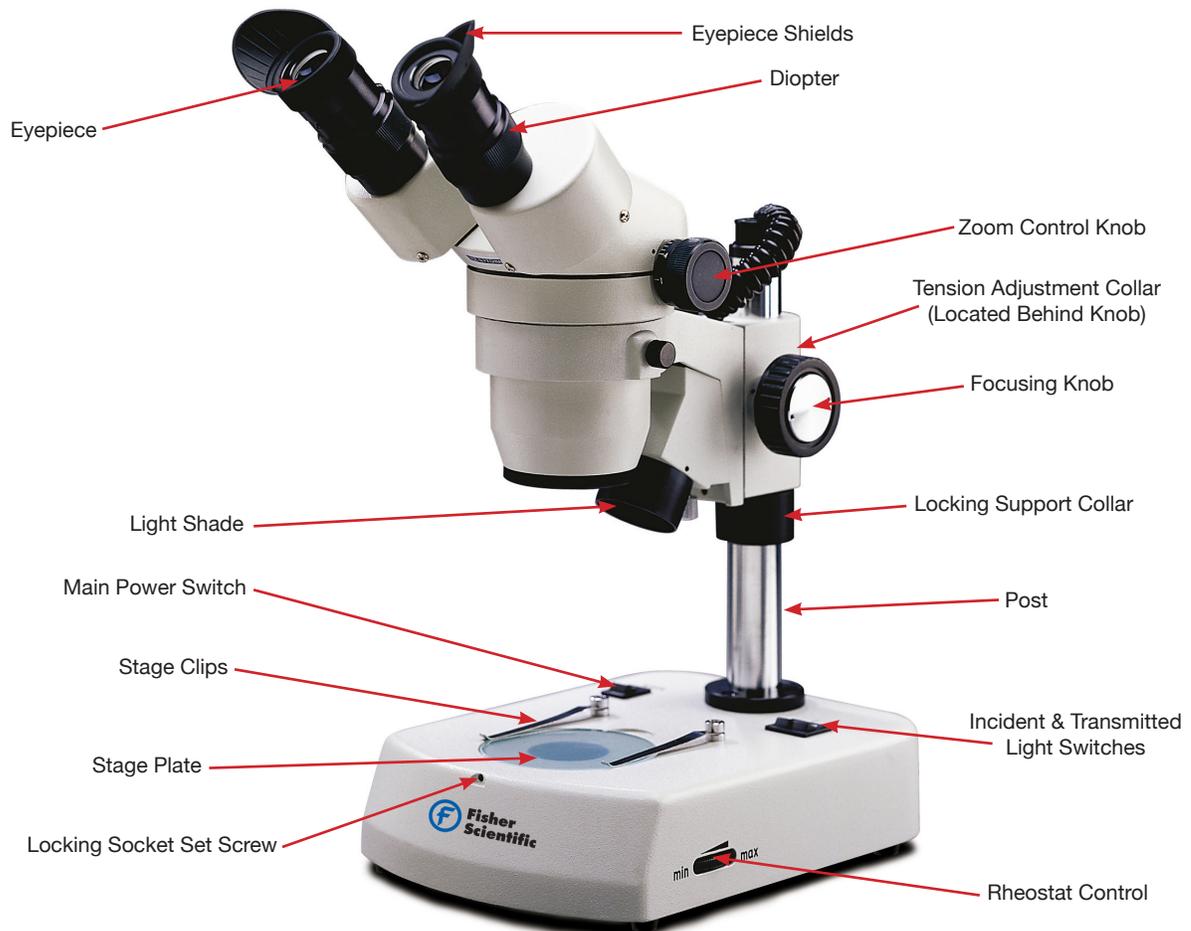
VI. Interpupillary Adjustment of Viewing Head:

- A. Interpupillary adjustment is used to adjust spacing between eyepieces in order to accommodate varied distance between users eyes. While looking through the microscope eyepieces with both eyes, grasp eyepiece tube housings with both hands and rotate them on their axis, moving eyepieces apart or together until a full field of view is observed and images blend into one. Interpupillary distance is now corrected for your own inter-ocular distance and does not require further adjustment later unless another user changes this adjustment.
- B. Focusing:
 - a. Rotate zoom turret until number "1", located on silver ring of objective turret, aligns with the dot located on rotating turret. Lower magnifications have larger fields of view, making it easier to position and locate specimen to be viewed.
 - b. Place a flat object or specimen slide (cover slip up) on center of stage plate.
 - c. Look through the microscope and center the specimen.
 - d. Rotate zoom control turret to the highest magnification by aligning the number "3" to the dot located on zoom turret.
 - e. Rotate both left and right eyepiece diopters clockwise to the lowest position on tube.
 - f. Look through both eyepieces and focus microscope on the specimen.
 - g. Rotate zoom turret until number "1", located on silver ring of objective turret, aligns with the dot located on rotating turret.
 - h. Look through the right eyepiece and adjust right diopter until image is sharp (Do not touch the focusing knobs.)
 - i. Next look through the left eyepiece and adjust left diopter until image is sharp.
 - j. Your microscope should now be parfocalled to your eyes.
 - k. Once you parfocal your microscope you can easily change magnification to meet your requirements.

VII. Transmitted (Bottom) Lamp Replacement:

- A. Carefully lay instrument on its side.
- B. Loosen large locking screw located on lamp access panel.
- C. Remove access panel from illuminator base.
- D. Gently grasp the lamp and pull straight out from socket.
- E. Push new lamp into place.
- F. Replace access panel and tighten locking screw.

11350124 Binocular and 11350127 Trinocular Zoom Stereo



- I. Remove microscope and all components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping focusing mechanism with one hand and placing other hand under base. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepieces.
- II. Install rubber eyepiece shields over top of eyepieces with the flared portion of the shield positioned at outside of eyepiece.
- III. Illuminate specimen according to specific instructions for your model.
- IV. Stage plate selection: Select the stage plate that best meets requirements of specimen being examined.
 - A. Frosted transparent plate is used when viewing transparent specimen slides or for viewing some specimen thin enough through which light can pass (insect wings, etc.)
 - B. Black contrast plate can be used when viewing light colored opaque objects or for dissecting.
 - C. White contrast plate can be used when viewing dark colored opaque objects or for dissecting.
 - D. To change stage plates loosen locking screw, used to secure plate to the base. (Use the “L” wrench supplied with microscope).
 - E. Remove stage plate and Insert stage plate that best suits the needs of specimen that is being viewed, then secure plate with setscrew.
 - F. These models are supplied with a daylight blue filter which can be removed if desired by loosening set screw securing stage plate removing plate and filter. Install frosted stage plate, and tighten locking setscrew to secure stage plate to base.
- V. Illumination: Select illumination that meets the requirements of specimen and turn ON illuminator.
 - A. There are three rocker type light controls located on microscope base.

- a. MAIN = Turns power ON and OFF
 - b. "I" Turns incidental light on (top illumination)
 - i. Incidental illumination can be used with either frosted, black or white stage plate.
 - ii. Top light can also be centered on specimen by using the top light beam adjustment screw. This allows user to select the best spot illumination required for specimen being viewed.
 - iii. Rheostat intensity control knob is located on side of base to control the intensity of top light..
 - c. "T" Turns transmitted light on (sub-stage illumination)
 - i. NOTE: USE TRANSMITTED ILLUMINATION ONLY WITH FROSTED GLASS STAGE PLATE (AND BLUE FILTER IN PLACE ON MODELS SUPPLIED WITH FILTER). HEAT GENERATED IN BASE FROM BOTTOM LIGHT WILL WARP OR DAMAGE THE PLASTIC BLACK/WHITE PLATE. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY.
 - d. Transmitted and Incidental illumination combined can provide extra illumination for certain objects where additional top illumination will enhance the object being viewed.
- VI. Interpupillary Adjustment of Viewing Head:
- A. Interpupillary adjustment is used to adjust spacing between eyepieces in order to accommodate varied distance between users eyes. While looking through the microscope eyepieces with both eyes, grasp eyepiece tube housings with both hands and rotate them on their axis, moving eyepieces apart or together until a full field of view is observed and images blend into one. Interpupillary distance is now corrected for your own inter-ocular distance and does not require further adjustment later unless another user changes this adjustment.
 - B. Focusing:
 - a. Rotate zoom control knobs until number "1" located on knobs aligns with the dot located each side of head. Lower magnifications have larger fields of view, making it easier to position and locate specimen to be viewed.
 - b. Place a flat object or specimen slide (cover slip up) on center of stage plate.
 - c. Look through the microscope and center the specimen.
 - d. Position viewing head on post stand.
 - i. Adjust focusing knobs to the center of the up and down travel of mechanical movement.
 - ii. Loosen locking knob located on support collar and slide collar down to bottom of post.
 - iii. While firmly holding viewing head loosen the post locking knob located on back of focus block so that it can move freely up or down on post.
 - iv. Look through the eyepieces while moving head up and down and bring specimen into approximate focus.
 - v. Tighten post-locking knob. It is not necessary to make this adjustment every time you change objects being viewed, unless there is a significant difference in thickness or height of objects.
 - vi. Position the support collar under the focusing block and tighten locking knob on support collar.
 - e. Adjust zoom control knobs to the highest magnification by aligning the number "4" on zoom control knobs to the black index dot on viewing head.
 - f. Rotate both left and right eyepiece diopters clockwise to the lowest position on tube.
 - g. Look through eyepieces and focus the microscope on the specimen.
 - h. Rotate zoom control knobs to lowest magnification by aligning the Number 1 on knobs to black index dot on head.
 - i. Look through the right eyepiece and adjust right diopter until image is sharp (Do not touch the focusing knobs).
 - j. Next look through the left eyepiece and adjust left diopter until image is sharp.
 - k. Your microscope should now be parfocaled to your eyes.
 - l. Once you parfocal your microscope you can easily change magnification to meet your requirements.
 - C. Trinocular head 11350127 is equipped with a port on top of binocular head.
 - a. By using optional accessory adapters SLR digital cameras can be mounted onto the

microscope

- b. Located on back the side of binocular head is a chrome sliding rod.
 - i. Rod pushed completely into the head, the microscope 100% of the image is directed to both eyepieces of the microscope.
 - ii. Rod pulled out as far as possible from the head, the image from the right side eyepiece is directed into the trinocular port. You will be able to observe image through left eyepiece, but no image is visible through right eyepiece.
- c. Mounting camera:
 - i. Locate two knurled screws located on side of trinocular port of microscope. Turn both screws counterclockwise to permit removal of black plastic dust cover.
 - ii. Mount appropriate camera adapter to your camera following instructions for your camera.
 - iii. Insert adapter into vertical camera port and tighten the two knurled screws to secure camera to vertical port.
 - iv. Pull sliding rod until fully extended to direct microscope image to trinocular port.

11350125 Binocular and 11350128 Trinocular (w/1107 Platform Stand)



Please refer to the instructions for models 11350124 and 11350127 to use 11350125 and 11350128 microscope optical system.

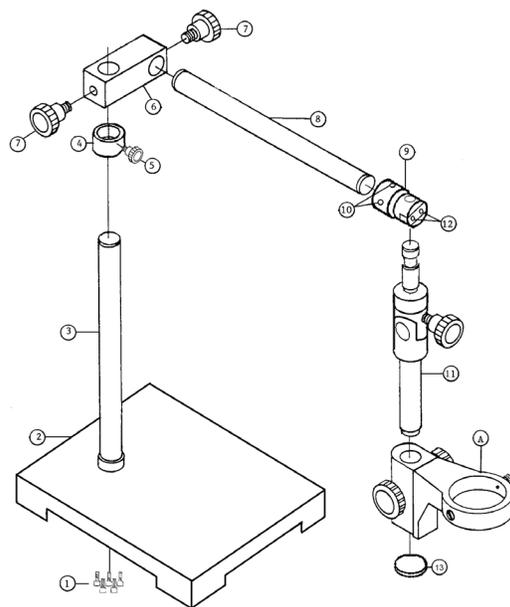
11350126 Binocular and 11350129 Trinocular (w/1105 Univ. Boom Stand)



Please refer to the instructions for models 11350124 and 11350127 to use 11350126 and 11350129 microscope optical system.

Assembly Instructions:

- I. Insert the 5 each vertical post locking screws (1) and secure vertical post (3) to base (2).
- II. Place base (2) on solid, level surface.
- III. Slide one support collar (4) on to vertical post (3) until it is about 10 inches from top of black portion of base. Tighten locking screw (5) on support collar to secure in place.
- IV. Slide adapter block (6) onto vertical post (3) until it rests on support collar (4).
- V. Tighten locking screw (7) into threaded hole in each of both ends of adapter block (6), turning knobs clockwise only enough to engage.
- VI. Slide horizontal bar (8) into slide adapter block (6), about half the length of the bar.
- VII. Slide pivot adapter (9) on to horizontal bar (8).
- VIII. Tighten small locking set screws (10) of pivot adapter (9), to horizontal bar (8).
- IX. Carefully slide pivot bar (11) into the slot provided on pivot adapter (9).
- X. Tighten hex set screws (12) to secure pivot bar (11) to pivot adapter (9).
- XI. Remove bottom plug (13) from pivot bar (11).
- XII. Your focusing block (A) will have a knobbed wing nut on rear part of block (A). Loosen wing nut and slide focusing block (A) on to pivot arm (11), tightening wing nut to temporarily secure focusing block into place on swing arm.
- XIII. Replace bottom plug (13) onto pivot arm (11).
- XIV. Insert microscope head into focusing block (A), following directions in your microscope instruction brochure.
- XV. Exact positioning of microscope can be made by loosening various of the locking knobs and support collars on the stand and sliding the various bars or focusing block to desired position, and then re-tightening locking knobs and support collars.



11350120 Binocular and 11350121 Trinocular Stereo



- I. Remove microscope and all components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping focusing mechanism with one hand and placing other hand under base. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepieces.
- II. Install rubber eyepiece shields over top of eyepieces with the flared portion of the shield positioned at outside of eyepiece.
- III. Stage plate selection: Select the stage plate that best meets requirements of specimen being examined.
 - A. Frosted transparent plate is used when viewing transparent specimen slides or for viewing some specimen thin enough through which light can pass (insect wings, etc.)
 - B. Black contrast plate can be used when viewing light colored opaque objects or for dissecting.
 - C. White contrast plate can be used when viewing dark colored opaque objects or for dissecting.
 - D. To change stage plates loosen locking screw, used to secure plate to the base. (Use the “L” wrench supplied with microscope).
 - E. Remove stage plate and insert stage plate that best suits the needs of specimen that is being viewed, then secure plate with setscrew.
 - F. Supplied with a daylight blue filter which can be removed if desired by loosening set screw securing stage plate removing plate and filter. Install frosted stage plate, and tighten locking setscrew to secure stage plate to base.
- IV. Illumination: Select illumination that meets the requirements of specimen and turn ON illuminator.
 - A. There are three rocker type light controls located on microscope base.
 - a. “I” Turns incidental light on (top illumination)
 - i. Incidental illumination can be used with either frosted, black or white stage plate.
 - ii. Top light can also be centered on specimen by using the top light beam adjustment screw. This allows user to select the best spot illumination required for specimen being viewed.
 - iii. Rheostat intensity control knob is located on side of base to control the intensity of top and bottom illumination.
 - b. “T” Turns transmitted light on (sub-stage illumination)
 - i. NOTE: USE TRANSMITTED ILLUMINATION ONLY WITH FROSTED GLASS STAGE PLATE (AND BLUE FILTER IN PLACE ON MODELS SUPPLIED WITH FILTER). HEAT

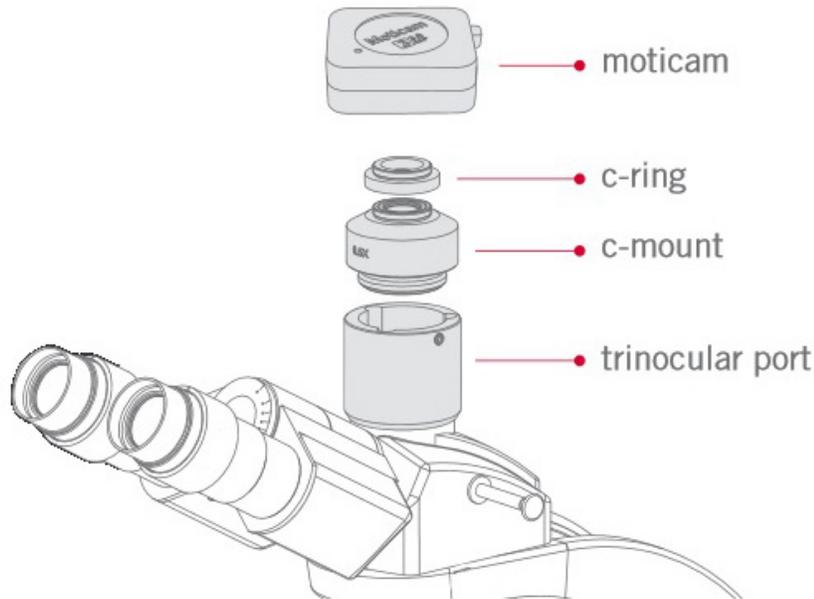
GENERATED IN BASE FROM BOTTOM LIGHT WILL WARP OR DAMAGE THE PLASTIC BLACK/WHITE PLATE. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY.

- c. Transmitted and Incidental illumination combined can provide extra illumination for certain objects where additional top illumination will enhance the object being viewed.
- V. Interpupillary Adjustment of viewing head.
- A. Interpupillary adjustment is used to adjust spacing between eyepieces in order to accommodate varied distance between users eyes. While looking through the microscope eyepieces with both eyes, grasp eyepiece tube housings with both hands and rotate them on their axis, moving eyepieces apart or together until a full field of view is observed and images blend into one. Interpupillary distance is now corrected for your own inter-ocular distance and does not require further adjustment later unless another user changes this adjustment.
- VI. Focusing:
- A. Rotate zoom control knobs until number “.75” located on knobs aligns with the dot located each side of head. Lower magnifications have larger fields of view, making it easier to position and locate specimen to be viewed.
 - B. Place a flat object or specimen slide (cover slip up) on center of stage plate.
 - C. Look through the microscope and center the specimen.
 - D. Position focusing knobs in the center of the up and down travel of mechanical movement.
 - a. Loosen locking knob located on support collar and slide collar down to bottom of post.
 - b. While firmly holding viewing head loosen the post locking knob located on back of focus block so that it can move freely up or down on post.
 - c. Look through the eyepieces while moving head up and down and bring specimen into approximate focus.
 - d. Tighten post-locking knob. It is not necessary to make this adjustment every time you change objects being viewed, unless there is a significant difference in thickness or height of objects.
 - e. Position the support collar under the focusing block and tighten locking knob on support collar.
 - E. Adjust zoom control knobs to the highest magnification by aligning the number “5” on zoom control knobs to the black index dot on viewing head.
 - F. Rotate both left and right eyepiece diopters clockwise to the lowest position on tube.
 - G. Look through eyepieces and focus the microscope on the specimen.
 - H. Rotate zoom control knobs to lowest magnification by aligning the Number 1 on knobs to black index dot on head.
 - I. Look through the right eyepiece and adjust right diopter until image is sharp (DO NOT TOUCH THE FOCUSING KNOBS).
 - J. Next look through the left eyepiece and adjust left diopter until image is sharp.
 - K. Your microscope should now be parfocaled to your eyes.
 - L. Once you parfocal your microscope you can easily change magnification to meet your requirements.
- VII. Trinocular head 11350121 is equipped with a port on top of binocular head.
- A. By using optional accessory adapters digital cameras can be mounted onto the microscope.
 - B. Located on the backside of binocular head is a chrome control rod.
 - a. Control rod pushed completely into the head, 100% of image is directed through both left and right eyepieces of microscope
 - b. Rod pulled out as far as possible from the head, the image from the right side eyepiece is directed into the trinocular port. You will be able to observe image through left eyepiece, but no image is visible through right eyepiece.
- VIII. Mounting camera:
- A. Locate two knurled screws located on side of trinocular port of microscope. Turn both screws counterclockwise to permit removal of black plastic dust cover.
 - B. Mount appropriate camera adapter to your camera following instructions for your camera.
 - C. Insert adapter into vertical camera port and tighten the two knurled screws to secure camera to vertical port.
 - D. Pull sliding rod until fully extended to direct microscope image to trinocular port.

General Instructions for Digital Microscopes

The microscopes that are fitted with a built in camera are used in the same manner as the standard microscopes but with the additional feature of digital imaging. Your microscope is fully functional as a conventional compound or stereo microscope. The following instructions apply to operation of the microscope. Refer to the Quick Start Guide located on your CD for installation of the software and operation.

11350130, 11350131, 11350132, 11350133 Digital Camera Bundles



- I. To mount the Moticam camera, insert the 0.5x C-Mount adapter (supplied with microscope) into the trinocular port of your microscope (see picture).
- II. Observe that adapter has two black knurled rings. If your digital c-mount camera has a 1/2 inch chip, leave both knurled rings in place, thereby creating a "CS" type mount. If your digital c-mount camera has a 1/3 inch chip, remove only the top black knurled ring from c-mount by turning counter-clockwise. The remaining black knurled ring is a "C" type adapter.
- III. Remove front cap from the digital Moticam camera. Thread front of camera onto threads of c-mount adapter.
- IV. Locate hex socket screw located on side of trinocular port of microscope. Turn screw counter-clockwise to permit removal of black plastic disk covering trinocular port.
- V. Insert c-mount adapter tube into trinocular port. If adapter does not insert easily, further loosen hex socket screw at side of port until adapter tube drops into port and is firmly seated. Re-tighten hex socket screw to secure adapter and camera in place. Pull sliding rod until fully extended, to direct 80/20 microscope image to trinocular port. Proceed with operation of Moticam camera and computer/monitor according to manufacturer's directions. If microscope image does not remain in focus when microscope magnification is changed, recheck Moticam camera chip size. Perhaps it will be necessary to either replace or remove the top "CS" adapter ring in order for the C-Mount adapter to be compatible with the chip size of your Moticam camera.
- VI. See general instructions for compound microscopes located on pages 8-16 for operation of microscope.

11350134 Digital Stereo Microscope

Microscope operation: See stereo microscope instructions for models 11350124 and 11350127 located on page 24.

Above referenced instructions are for the microscope only. Camera operation and installation covered in PDF format located on included Motic Images software disc.

11350135, 11350136, 11350137 11350138, 11350139 and 11350140

- I. Assembly:
 - A. Remove microscope, vinyl dustcover and any components from Styrofoam carton. Retain the container, and use it for extended storage, for transporting, or in case the microscope ever needs to be shipped. Always carry microscope by grasping arm with one hand and placing other hand under base.
 - B. Place the microscope directly in front of you in a manner, which permits you to comfortably look into the eyepiece.
 - C. Insert power plug into 12VDC switching power converter, then insert plug on other end of converter into power jack on back of microscope base. Note that the 12VDC converter will operate on either 120v or 240v current, 50 hertz or 60 hertz, eliminating the need for any other transformer.
- II. Operation:
 - A. Before operating microscope, adjust intensity (rheostat) control knob or dial to its minimum position. (This will help extend the life of the light bulb).
 - a. Flip power switch located on back of microscope base "ON". Note that camera LED indicator will not light until USB cable is connected to computer, when instructed in separate Quick Start Guide located on your CD.
 - b. Rotate intensity knob until image is illuminated.
 - B. Check to insure that the Abbe condenser lens is at the upper limit of travel. If not rotate condenser focus knob to insure that top of Abbe condenser lens is just below top of stage.
 - a. Initial diaphragm adjustment should be approximately one third open
 - C. Rotate coaxial focus knobs in a direction that stage moves "away" from the objectives as far as possible.
 - D. Positioning specimen slide on stage'
 - E. Swing movable finger on holder outward, place specimen slide (cover slip facing up) on top of stage against fixed side of slide holder. Slowly release movable finger until it makes contact with specimen side.
 - F. Using mechanical stage X and Y controls move specimen slide until specimen is centered over the condenser lens.
- III. Interpupillary adjustment:
 - A. Position the 10x objective into optical path.
 - B. While looking through the eyepiece, rotate focusing knobs until specimen comes into focus. If image does not appear in field of view, move specimen slide slightly until image appears in field of view.
 - C. Grasp the eyepiece tubes and slide the tubes together until they stop (smallest interpupillary distance)
 - D. Look through microscope and slide the eyepiece tubes apart until a perfect circle is observed (Full field of view)
 - E. Check the interpupillary scale located between eyepiece tubes on siding mount, note index reading for future reference.
- IV. Diopter adjustment.
 - A. Adjust the diopter scales, located on each eyepiece tube, to the same numerical value as indicated on the interpupillary scale. This must be done in order to maintain parfocality.
 - B. If interpupillary distance is changed you must adjust the diopters accordingly.\

- C. While looking through the eyepiece, rotate the fine focus knobs until specimen is in sharp focus.
- V. Adjusting the Diaphragm: Diaphragms are designed to help achieve high resolution of specimen and provide contrast in the image. Listed below are a few suggested starting points for adjusting the aperture. Smaller apertures will deliver higher contrast to image. However, closing aperture too much will reduce resolution. Experimentation is the best method of determining the correct opening of diaphragm.
 - A. Standard Models: Iris Diaphragm suggested openings
 - a. 4x objective-iris open $\frac{1}{8}$
 - b. 10x objective-iris open $\frac{1}{8}$ to $\frac{1}{4}$,
 - c. 40x objective, iris open $\frac{1}{4}$ to $\frac{1}{2}$,
 - d. 100x objective-iris open $\frac{1}{2}$ to $\frac{3}{4}$.
- VI. Changing magnification is accomplished by rotating by rotating objective turret until different objective lens is moved into optical path. Always turn turret until you hear the “click”, indicating that lens is properly indexed. Otherwise, you will not be able to see anything when looking through the microscope. A slight adjustment of focus and diaphragm openings will be needed to sharpen the image when changing objective magnification.
- VII. Models supplied with 100x oil immersion lens. To obtain the maximum resolution of the 100x oil immersion lens it is necessary to apply immersion oil between cover glass of slide and front lens of objective. Use a very small amount of immersion oil. Air bubbles must be removed from between lens and slide by gently moving nosepiece back and forth.
- VIII. Each time immersion oil is used on the 100x it is essential that you carefully Clean front of lens after use.
- IX. The three-position sliding rod located on side of viewing head allows user to easily direct microscope image to desired path. Pushing rod completely into head directs 100% of microscope image into binocular eyepieces. Rod at mid- position (pull or push rod until you feel a gentle click stop) 100% of image directed to built-in camera. Rod pulled to fully extended position 30% of image is directed to binocular eyepieces and 70% directed to built-in camera.
- X. Refer to Quick Start Guide located on your “CD” for Installation of the software and operation of camera.
- XI. Lamp replacement:
 - A. Carefully lay instrument on its side, taking care to avoid damage to the specimen slide holder located on top of mechanical stage.
 - B. Loosen large chrome locking screw located on hinged door of illuminator base.
 - C. Swing door open to expose the halogen lamp.
 - D. Using a tissue or cloth gently grasp the halogen bulb, pull straight out of lamp socket.
 - E. Replace lamp.
 - F. Make certain that new bulb is clean, as fingerprints on bulb can affect light transmission. Grasping bulb gently with a tissue or cloth, insert pins straight into lamp socket.
 - G. Close lamp door and tighten chrome locking screw.

WiFi Camera Operation

1. Powering the WiFi camera

- a. The built-in WiFi camera is powered through the USB port located behind the camera housing of the microscope. Supplied with your microscope is a USB (5V) wall plug power adapter and USB cable. First plug the adapter into the A/C wall power outlet. Then insert the flat end of the USB cord into the adapter and the other square end into the USB port behind the camera housing.
- b. As power is being established, you will notice a blue LED flashing, located in front of the camera housing. Once the blue LED remains solid, the WiFi camera is ready to be used.

2. Connecting to Android or Apple device

- a. The built-in WiFi camera in this unit performs much like a wireless router. You will first need to locate the wireless signal with your Android or Apple device. This is usually done through the settings feature of your device (please refer to your devices manual for further instructions). Once you have located the signal (usually labeled MC-WiFi-...), you will need to connect using the default password of 12345678. This password can only be changed by the factory. Any attempt to change the password yourself will render your WiFi camera inoperable and will void your warranty.
- b. Once the connection has been established, you can begin using the WiFi camera through the MotiConnect App (automatic) or through your web browser, using the following IP address: <http://192.168.1.151:8080>.
- c. For further help and instructions on using MotiConnect, please visit both the Motic and National Optical YouTube pages.

3. Connecting to a wireless enabled laptop or desktop

- a. You will first need to locate the wireless signal, the same way you would connect to any wireless router or signal. Once you have located the signal (usually labeled MC-WiFi-...), you will need to connect using the default password of 12345678. This password can only be changed by the factory. Any attempt to change the password yourself will render your WiFi camera inoperable and will void your warranty.
- a. Once connected, open your Motic Images software. If you are using a Windows based system, click on the capture button. This will open the Live Imaging Module. Locate the Video Device box. You will notice that by default the Moticam X is selected. Click on the Open button and the software will enable the camera. If you are using an Apple based system, click on File at the top of the Motic Images tool bar. Select Capture or New and then Live Video, to enable the camera. Instructions on the Motic Images software are covered within the software under Help. You may also visit both the Motic and National Optical YouTube pages.

Fisher Scientific Warranty

The Fisher Scientific 5 Year Warranty assures that the microscope is guaranteed against defects in material and workmanship for 5 years from the purchase date of the product. Electrical components are covered for three years; video components are covered for one year after purchase. Normal wear, routine maintenance, light bulbs, power supplies, rechargers, batteries, fuses, cords, add-on accessories, damage resulting from repair by unauthorized parties, accident, alteration, shipping, misuse or abuse is not covered. Warranty service is provided by National Optical & Scientific Instruments, Inc.'s authorized technicians. Determination of warranty is at the technician's discretion.

The Fisher Scientific Warranty for cameras is 1 year.

Other than set forth above, Fisher Scientific hereby disclaims all warranties, expressed or implied, of fitness for a particular purpose.

Defective products covered by the warranty will be repaired free of charge when they are returned, postpaid, to:

Fisher Scientific
c/o National Optical & Scientific Instruments, Inc.
Attn: Warranty Repair
6508 Tri-County Parkway
Schertz, TX 78154

For all warranty repairs or service requests, please call Fisher Scientific repair department at (800) 766-7000 before anything is shipped. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

*For customers living outside the United States, Fisher Scientific will provide standard warranty service. However, inbound and outbound shipping cost is the responsibility of the consumer.

In the United States:

For customer service, call 1-800-766-7000

To fax an order, use 1-800-926-1166

To order online: www.fishersci.com



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