MANUAL

ACCU-SCOPE®

EXC-250

MICROSCOPE SERIES

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SAFETY NOTES

1. Open the shipping carton carefully to prevent any accessory, i.e. objectives or eyepieces, from dropping and being damaged.
2. Do not discard the molded Styrofoam container; the container should be retained should the microscope ever require reshipment.
3. Keep the instrument out of direct sunlight, high temperature or humidity, and dusty environments. Ensure the microscope is located on a smooth, level and firm surface.
4. If any specimen solutions or other liquids splash onto the stage, objective or any other component, disconnect the power cord immediately and wipe up the spillage. Otherwise, the instrument may be damaged.
5. All electrical connectors (power cord) should be inserted into an electrical surge suppressor to prevent damage due to voltage fluctuations.
6. For safety when replacing the LED bulb or fuse, be sure the main switch is off (“O”), remove the power cord, and replace the LED bulb after the bulb and the lamp house has completely cooled.
7. Confirm that the input voltage indicated on your microscope corresponds to your line voltage. The use of a different input voltage other than indicated will cause severe damage to the microscope.

OPERATION NOTICE

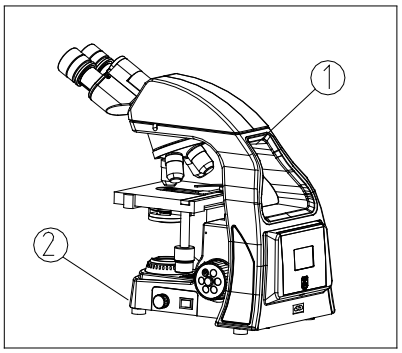


Fig. 1

1. As the microscope is a high precision instrument, always operate it with care, and avoid physical vibrations.
2. Do not expose the microscope to direct sun, high temperatures, or damp or dusty environments. Make sure the work surface is flat and level.
3. When moving the microscope, grasp the rear handle ① and the front bottom edge or the microscope body ② with each hand. Handle with care. (See Fig. 1)

★ Grabbing the microscope by the stage, focusing knob or head may damage the microscope.

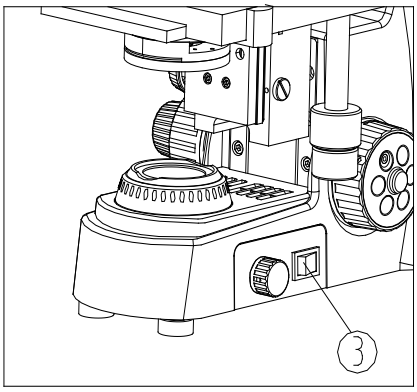


Fig. 2

4. Connect the microscope to the ground to avoid damage from a lightning strike.
5. For safety, make sure the power switch ③ is at “O” (off) and power it off before replacing the LED bulb, and wait until the bulb and base cool down completely (see Fig. 2).

★ Bulb selected only: single 5W LED

6. Wide voltage range is supported as 100~240V. Additional transformer is not necessary. Make sure the power supply voltage is in this range.

7. Use the power cord supplied with your microscope.

CARE AND MAINTENANCE

1. Do not attempt to disassemble any component including eyepieces, objectives or focusing assembly.
2. Keep the instrument clean; remove dirt and debris regularly. Accumulated dirt on metal surfaces should be cleaned with a damp cloth. More persistent dirt should be removed using a mild soap solution. Do not use organic solvents for cleansing.
3. The outer surface of the optics should be inspected and cleaned periodically using an air stream from an air bulb. If dirt remains on the optical surface, use a soft cloth or cotton swab dampened with a lens cleaning solution (available at camera stores). All optical lenses should be swabbed using a circular motion. A small amount of absorbent cotton wound on the end of a tapered stick such as cotton swabs or Q-tips, makes a useful tool for cleaning recessed optical surfaces. Avoid using an excessive amount of solvents as this may cause problems with optical coatings or cemented optics or the flowing solvent may pick up grease making cleaning more difficult. Oil immersion objectives should be cleaned immediately after use by removing the oil with lens tissue or a clean, soft cloth.
4. Store the instrument in a cool, dry environment. Cover the microscope with the dust cover when not in use.
5. ACCU-SCOPE® microscopes are precision instruments which require periodic preventative maintenance to maintain proper performance and to compensate for normal wear. An annual schedule of preventative maintenance by qualified personnel is highly recommended. Your authorized ACCU-SCOPE distributor can arrange for this service.

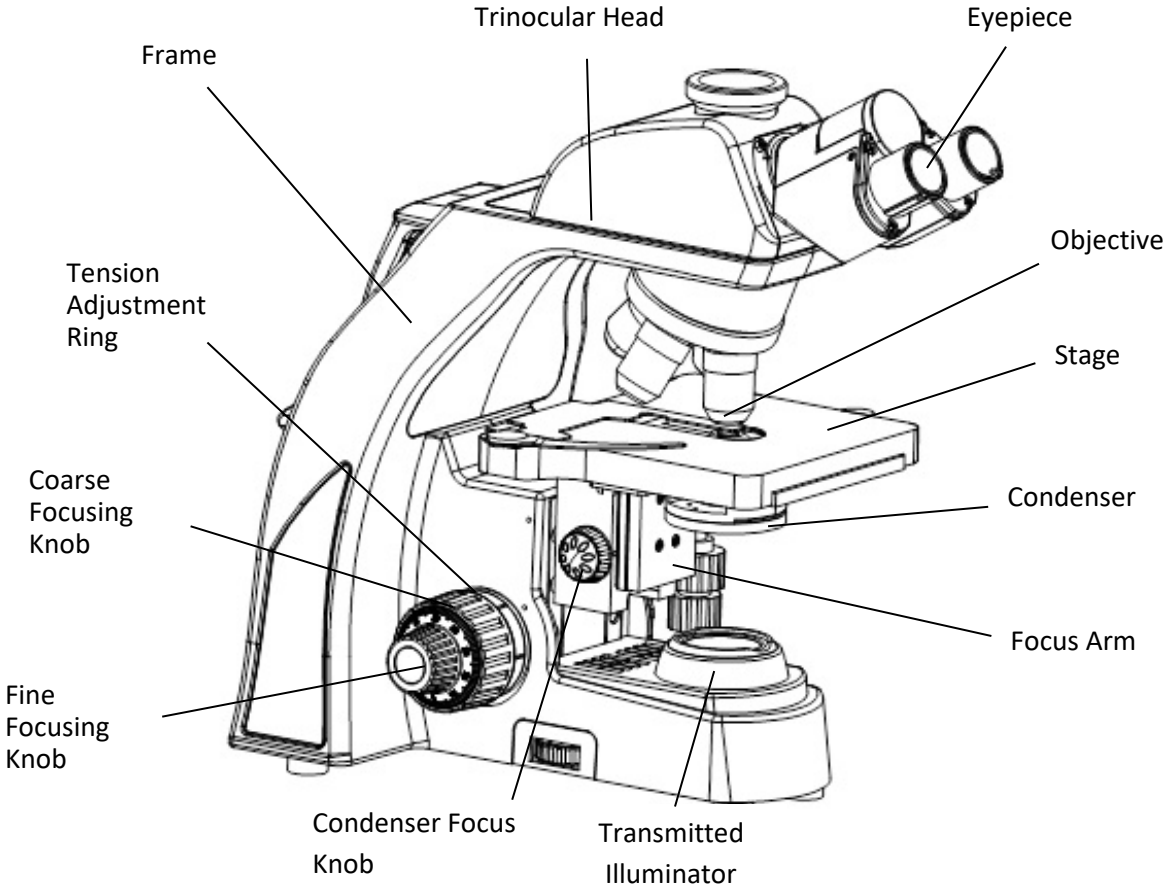
INTRODUCTION

Congratulations on the purchase of your new ACCU-SCOPE microscope. ACCU-SCOPE microscopes are engineered and manufactured to the highest quality standards. Your microscope will last a lifetime if used and maintained properly. ACCU-SCOPE microscopes are carefully assembled, inspected and tested by our staff of trained technicians in our New York facility. Careful quality control procedures ensure each microscope is of the highest quality prior to shipment.

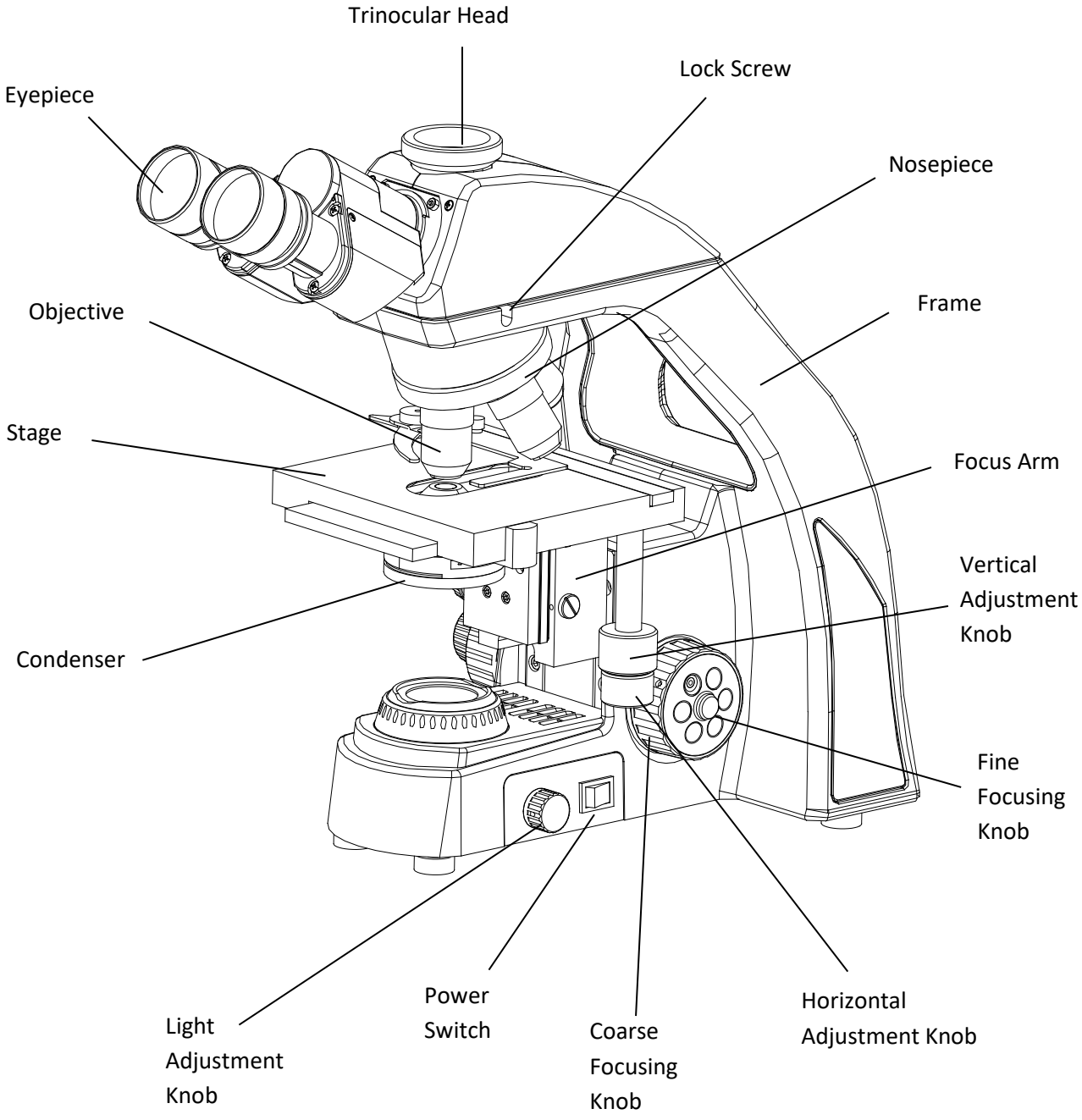
UNPACKING AND COMPONENTS

Your microscope arrived packed in a molded Styrofoam container. ***Do not discard the container*:** the Styrofoam container should be retained for reshipment of your microscope if needed. Avoid placing the microscope in dusty surroundings or in high temperature or humid areas as mold and mildew will form. Carefully remove the microscope from the Styrofoam container by its arm and base and place the microscope on a flat, vibration-free surface.

COMPONENTS DIAGRAM



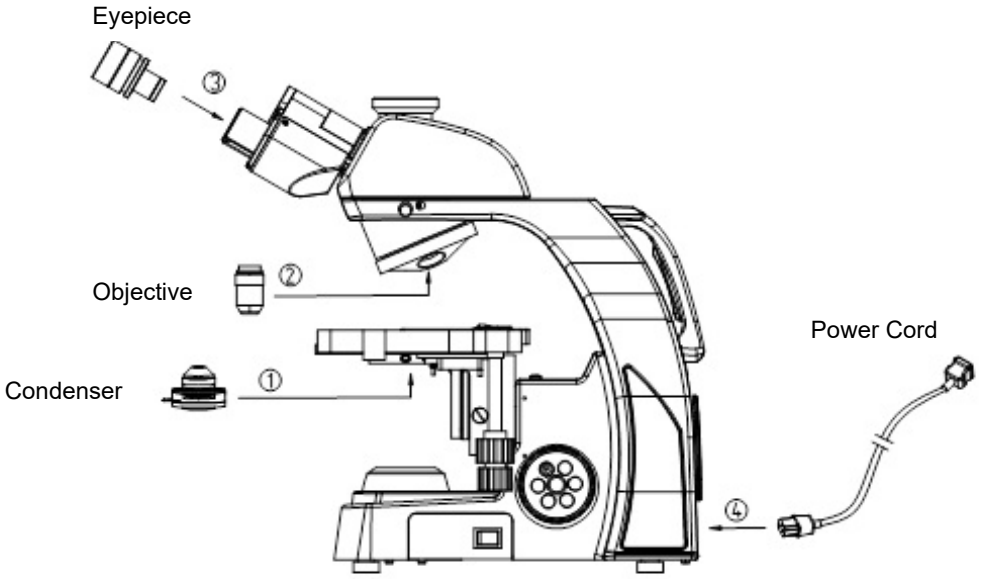
COMPONENTS DIAGRAM



ASSEMBLY DIAGRAM

The diagram below shows how to assemble the various components. The numbers indicate the order of assembly. Some components may already be installed. Your microscope was preassembled by our factory technicians at our New York facility prior to shipment. Should you need to disassemble/assemble your microscope in the future, please follow the instructions outlined below.

When assembling the microscope, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces.



ASSEMBLY *(continued)*

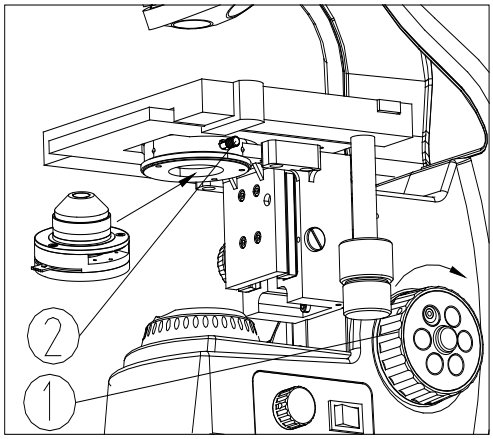


Fig. 3

Condenser

1. The condenser was installed and centered by our technicians prior to delivery. If the condenser needs to be re-installed or adjusted in the future, rotate the coarse focusing knob ① to raise the stage to the highest position (see Fig. 3).
2. Rotate the condenser up-down knob ② to lower the bracket of condenser to the suitable position.
3. Fully loosen the condenser lock-screw ③.
4. Insert the condenser into the hole of the stand according to the directional arrow, until the condenser is even with the stand, and then rotate the condenser to make sure the iris diaphragm control lever faces forward.
5. Tighten the lock-screw ③ of the condenser, then raise the condenser with the up-down knob to the highest position.

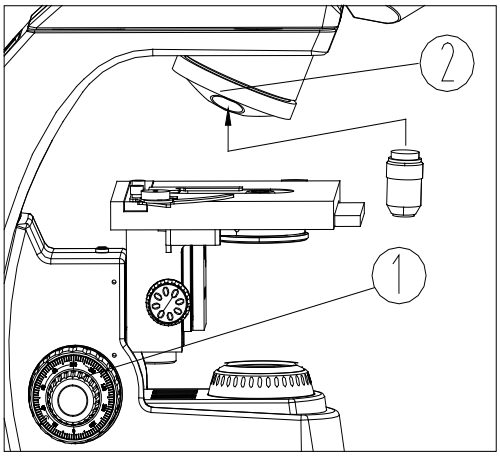


Fig. 4

Objectives

1. Rotate the coarse focusing knob ① to lower the stage to a suitable position (see Fig. 4).
2. Install the objectives into the objective nosepiece ② from the lowest magnification to the highest in a clockwise direction from the rear.

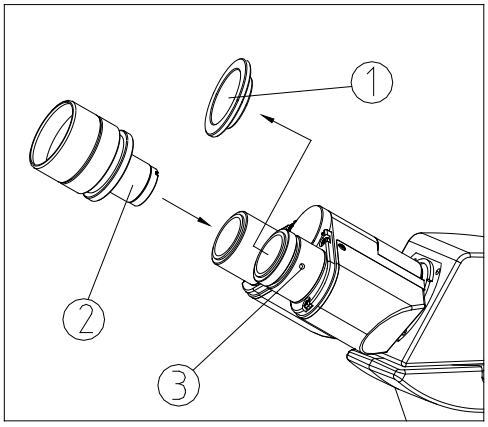


Fig. 5

Eyepieces

1. Remove the cap on the eyepiece tube ①.
2. Insert an eyepiece ② into the eyepiece tube completely.
3. If desired, tighten the locking screw ③ with a 2.5mm hex wrench to secure the eyepieces in the eyetubes (see Fig.5).

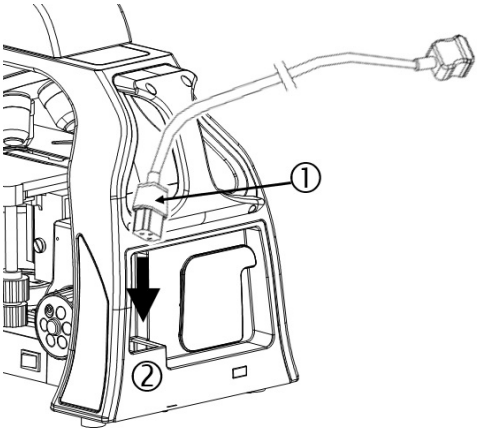


Fig. 6

Connecting the Power Cord

IMPORTANT: Use care when storing the power cord so that it does not bend or twist.

1. Make sure the power switch is at “0”(OFF) before connecting.
2. Insert the connector ① of power cord securely into the power socket ②, (see Fig. 6).
3. Insert the other connector securely into an electrical outlet.
4. When not in use, the power cord can be wrapped around the cord wrap for convenient storage. Wrap in clockwise direction.

★ Use only the special power cord supplied by ACCU-SCOPE. If it’s lost or damaged, contact ACCU-SCOPE or your ACCU-SCOPE dealer for a replacement.

ADJUSTMENT & OPERATION

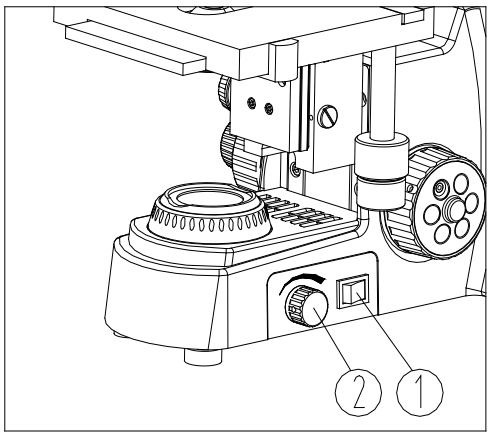


Fig. 7

Illumination

1. With the microscope turned on, rotate the light adjustment knob ① until the illumination is comfortable for observation. Rotate the light adjustment knob clockwise to raise the voltage and brightness. Rotate the light adjustment knob counterclockwise to lower the voltage and brightness (see Fig. 7).

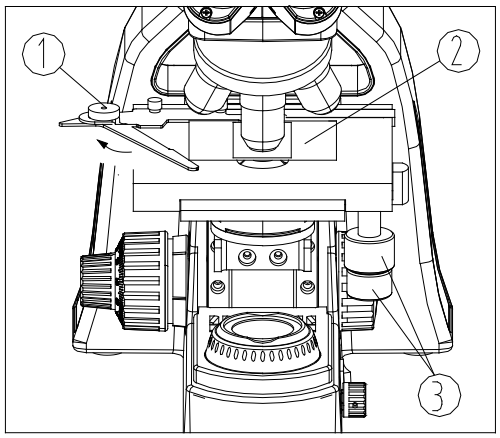


Fig. 8

Placing the Specimen Slide

1. Push the slide finger ① of the specimen holder out to the left.
2. Place the slide ② into the slide holder with the cover glass facing up and release the slide finger slowly so it closes and secures the slide in place.
3. Rotate the X and Y-axis knobs ③ to move the slide into position. (Fig. 8)

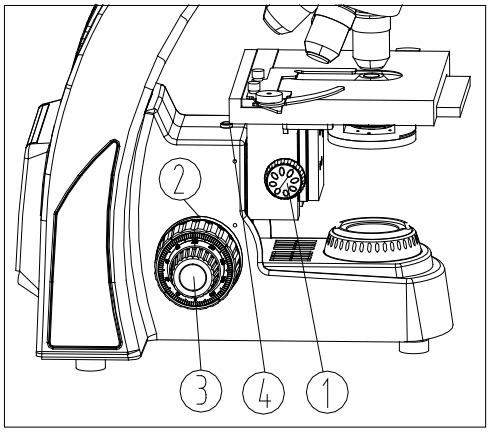


Fig. 9

Adjusting the Focus and Diopter

To ensure that you obtain sharp images with both eyes (since eyes vary, especially for those wearing glasses) any eyesight variation can be corrected in the following manner:

1. Rotate the condenser up-down knob ① to raise the condenser to its highest position.
2. Set both diopter collars to “0”.
3. Using your left eye only and the 10X objective, focus your specimen by adjusting the coarse adjustment knob ②. When the image is in view, refine the image to its sharpest focus by turning the fine adjustment knob ③.
4. Rotate the diopter collar to obtain the sharpest focus.
5. To obtain the same sharp image using your right eye, do not touch the coarse or fine adjustments. Instead, rotate the right diopter collar until the sharpest image appears.
6. Repeat several times to check.

NOTE: Do not counter rotate the focusing knobs as this will damage the focusing system. (Fig. 9)

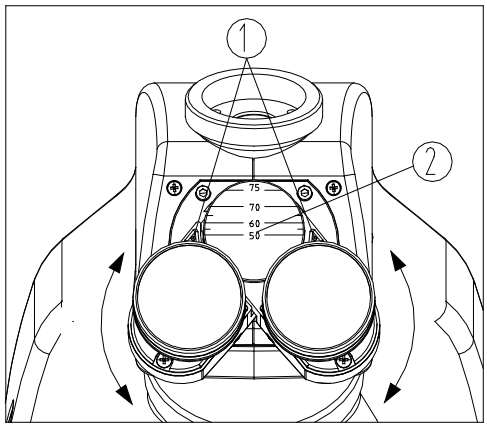


Fig. 10

Adjusting the Interpupillary Distance

1. To adjust the interpupillary distance, hold the left and right eyetubes while observing a specimen. Rotate the eyetubes around the central axis until the fields of view of both eyetubes coincide completely. A complete circle should be seen in the viewing field when viewing the specimen slide. An improper adjustment will cause operator fatigue and will disrupt the objective parfocality.
2. Where “·” ① on the eyepiece tube lines up with the scale ②, then that is the number for the interpupillary distance. Range：50～75mm. (Fig. 10).
3. Interpupillary adjustments are found on most microscopes. Remember your interpupillary distance number for future operation on this and other microscopes.

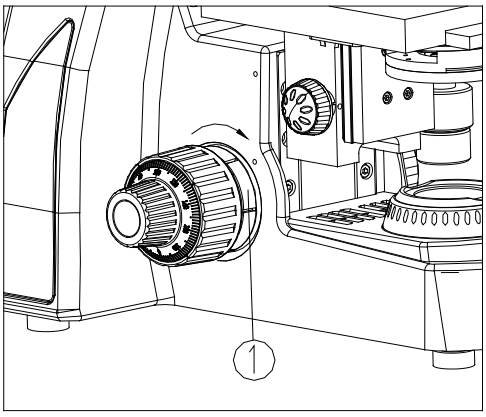


Fig. 11

Adjusting the Focusing Tension

If the focus knobs feel heavy or difficult to move, or the focus of the specimen drifts (stage lowers by itself), then the focus tension can be adjusted.

The tension adjustment ring ① is located on the left side of the microscope (Fig. 11). Rotate the ring in the direction of the arrow to increase tension. Rotate the ring towards the back of the microscope to lower or reduce the focus tension.

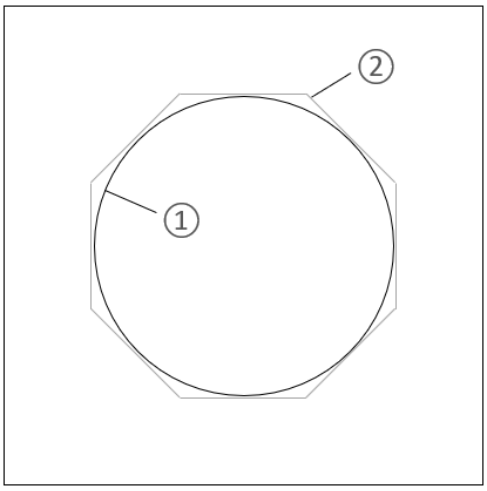


Fig. 12

Adjusting the Field Diaphragm (Optional)

By limiting the diameter of the light entering the condenser, the field diaphragm ② can prevent other extraneous light from entering the microscope, thereby increasing image contrast. When the image is just outside the edge of the field of view ①, the objective can show the best performance and obtain the clearest image (Fig. 12).

Iris Diaphragm Koehler Illuminator is Optional

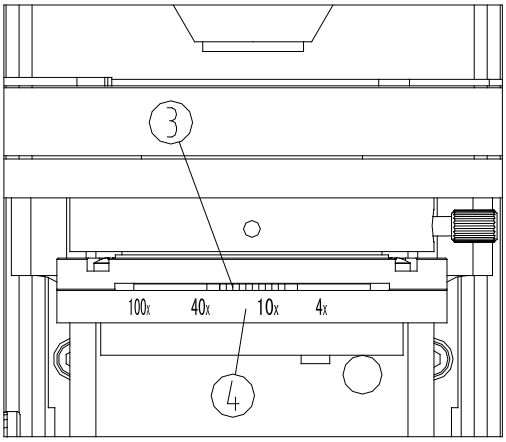


Fig. 13

Adjusting the Aperture Diaphragm

Increase or decrease the opening of the aperture diaphragm by rotating the condenser aperture diaphragm lever ③. When the aperture is closed, the brightness and resolution are decreased but the contrast and range of focus are increased. If the aperture diaphragm is opened, the brightness and resolution are increased; however, the contrast and range of focus are diminished. For optimal viewing conditions set the condenser aperture diaphragm lever to match the magnification of the objective in the optical path as shown on the front of the condenser ④ (Fig. 13).

To check aperture diaphragm position, remove one eyepiece and look down into the eyetube. A properly adjusted aperture diaphragm will be approximately 70%-80% open (Fig. 14).

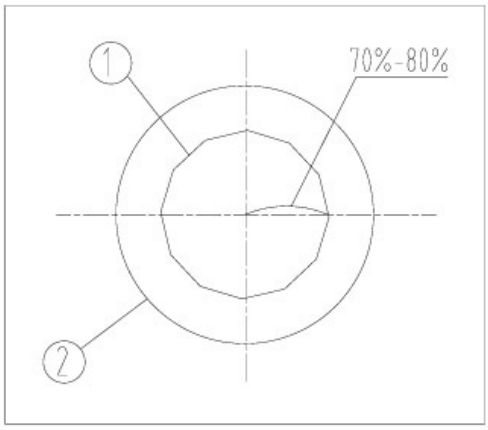


Fig. 14

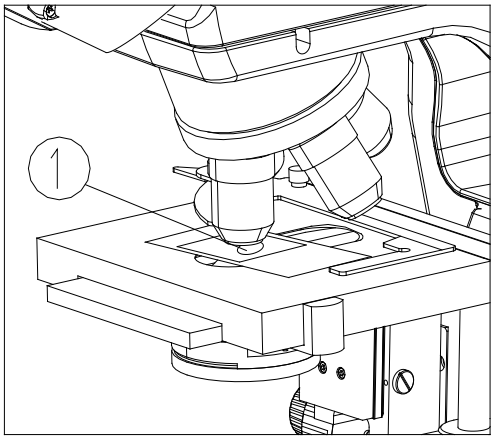


Fig. 15

Using An Oil Immersion Objective (100x; optional)

1. Rotate the nosepiece so the low power objective is in the optical path and the specimen is in focus. For best results, increase to the 10x power objective, focus, and increase to the 40x objective and focus again before returning back to the lowest power objective positioned next to the 100x oil immersion objective.
2. Place one drop of immersion oil on the lighted area of the specimen slide ① (Fig 15). Dust or air bubbles in the oil can destroy the definition of the image. If the bubbles are trapped between the objective lens and the slide, clean off the oil and start again or try to eliminate the bubble by rotating the objective back and forth.
3. Rotate the nosepiece so the 100x oil immersion objective is in the light path. You should see a slight flash of light as the oil contacts the bottom of the objective.
4. Each time you finish using the oil immersion objective wipe off all traces of oil from the objective and the specimen cover glass with a lens tissue or soft, clean cloth. Cleaning after each use will prevent oil from contaminating the high dry objective (40x) and degrading its optical performance. Cleaning an objective reduces dust and dirt accumulation on the lens of the objective and degrading its optical performance. A clean slide can be readily stored and is ready for future observation.

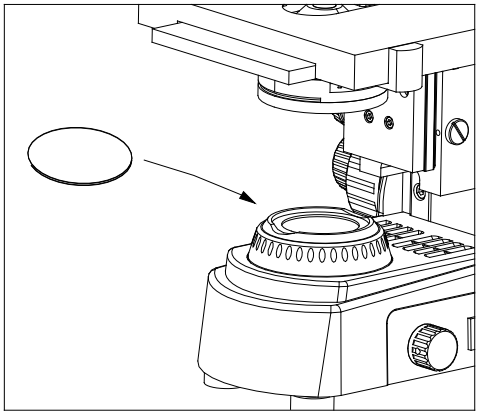


Fig. 16

Installing And Using A Filter (optional)

A filter is used to make the background color more suitable for the application and as a method to increase the contrast.

Install the filter (rough side downward) onto the top of the transmitted illuminator (Fig. 16).

Filters are available in several colors (e.g., clear blue, frosted blue, green, yellow and frosted white).

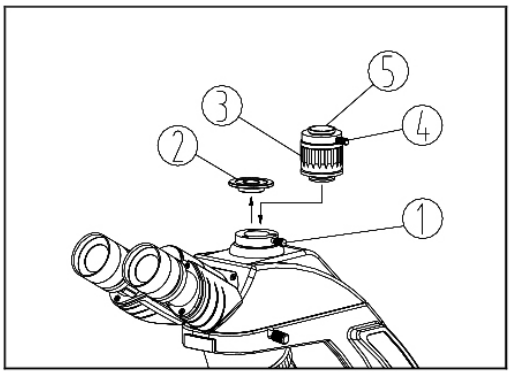


Fig. 17

Camera and Camera Adapter (optional)

1. Loosen the lock screw ① on the trinocular head and remove the dust cap ② on the trinocular port.
2. Remove the dust caps of the C-mount adapter and insert the C-mount into the trinocular head as shown in Fig. 17.
3. Screw the threaded end of the C-mount camera adapter ⑤ onto the camera and then install assembled C-mount and camera back onto the lower assembly. Lock it in place by tightening the lock screw ①.
4. Observe the specimen through the eyepieces and bring it into focus.
5. Look at the camera image and adjust the focus of the camera image by the rotating ring ③ until it matches the focus as seen through the eyepieces.
6. Tighten the lock screw ④ on the C-mount.

Fig. 18

Phase Contrast Condenser – Slider Type (optional)

The slider-type phase contrast condenser for the EXC-250 is pre-installed onto the microscope. If it is removed, it can easily be reinstalled without the need to realign the phase annuli to the phase ring in each corresponding phase contrast objective.

NOTE: The slight angle of the slider is intentional. It allows clearance for full travel of the slider plate between the <-10 BF 40-> phase annulus positions.

Fig. 19

Fig. 20

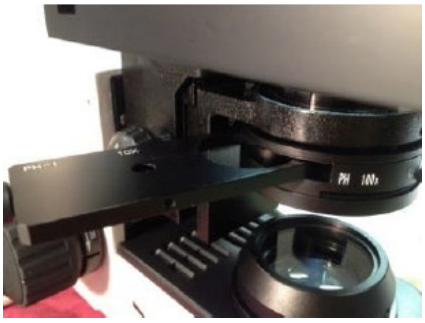


Fig. 21

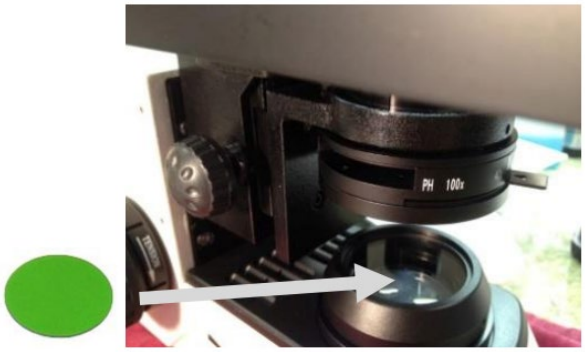


Fig. 23

Removing the Dust Shield Cover

Slide the dust shield cover out from the condenser housing (FIG. 19). Be sure to keep it to reinstall it should you need to transport the microscope. FIG. 20 shows the condenser housing with the dust shield cover removed.

Installing the Phase Slider

Before inserting the Phase slider, it is recommended the iris diaphragm lever be set to PH on the condenser.
Insert the slider into the slot on the condenser as shown in FIG. 21-22.

Move the slider to its position that corresponds to the phase objective in use (i.e., 40x objective = 40x position on slider).

Raise the condenser to its highest position.
Refer to the instruction manual provided with the microscope on how to focus on a specimen.

Fig. 22

Green Filter (optional)

To use the green filter (may aid in adding contrast), set the filter on top of the illuminator housing.

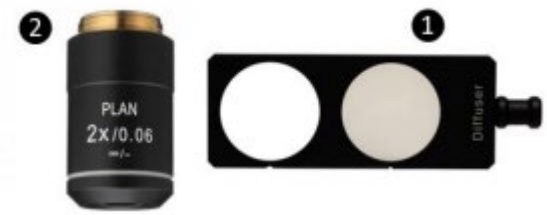


Fig. 24

2x Objective and Diffuser Slider (optional)

A diffuser slider ❶ (CAT #00-3222-2X) is recommended for use with the 2x objective ❷ (CAT #00-3172-PL) for the EXC-250 microscope series. The diffuser slider and 2x objective are sold separately. The diffuser aids to provide even specimen illumination across the entire field of view. The diffuser slider slips into the filter slider slot of the Abbe condenser ❸. The condenser is provided with the EXC-250 microscope.

Install the 2x objective in the nosepiece, typically in the open position adjacent to the 4x objective.

Turn the 2x objective into the light path.

Remove the slider blank ❹ from the condenser slot.

Slide the diffuser slider into the condenser filter slider slot from the right side to the left side. The writing should be up, and the handle on the right.

When using the 2x objective for observation, slide the diffuser slider all the way in to place the diffuser in the light path. A positive detent on the slider will help to find the “in” position. Open the condenser aperture diaphragm completely.

When using 4x and higher objectives, the diffuser slider can be pulled partially out until the open position is in the light path. A detent on the slider will help to find the “out” position. The slider does not need to be removed during most observations but is easily removed and reinserted as necessary.

Fig. 25

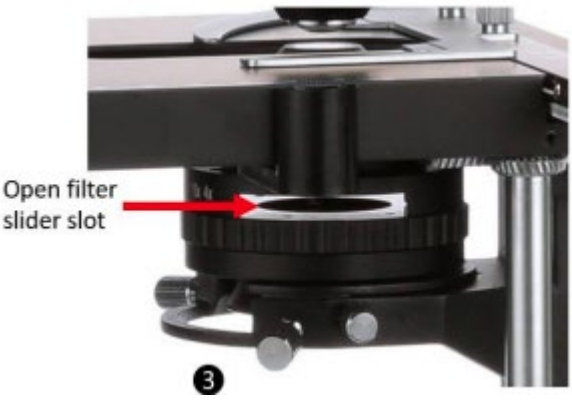


Fig. 26

Fig. 27

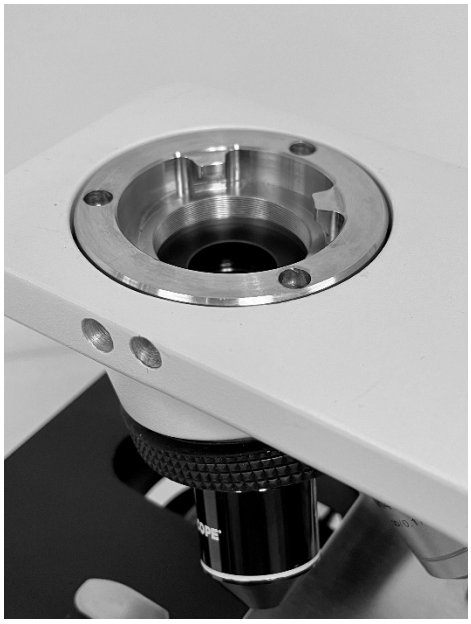


Fig. 28

Fig. 29

Simple Polarization (optional)

Remove the viewing head using a 2.5mm hex wrench (Fig 27). Both locking screws must be loosened enough just until the head can be lifted off the frame. The dovetail is now exposed (Fig.28).

Place the analyzer (the smaller diameter portion facing downwards) into the dovetail (Fig. 29).

Re-attach the viewing head and re-align. Tighten the locking screws until snug. Do not overtighten.

Place the polarizer on the light well.

Without a sample on the stage and while looking through the eyepieces, rotate the polarizer until background in the field of view is at its maximum darkness – this is referred to as “extinction”.

Place a sample on the stage and begin observation.

Note: The polarizer can be rotated 90° for free viewing of the sample, without the need to remove the polarizer from the light well.

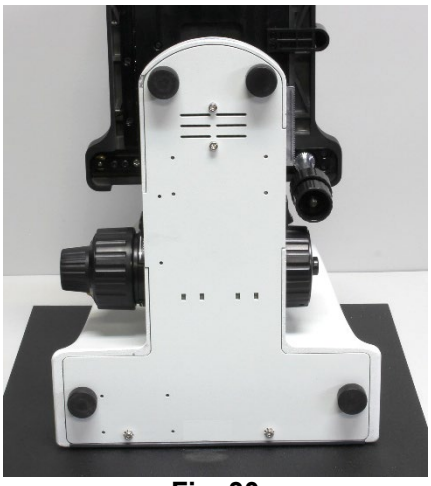


Fig. 30

Replacing the LED Bulb

Turn the main switch to “0” (OFF) before replacing the LED bulb. Unplug the power cord from the microscope.

Gently place the microscope on its back as shown in Fig. 30.

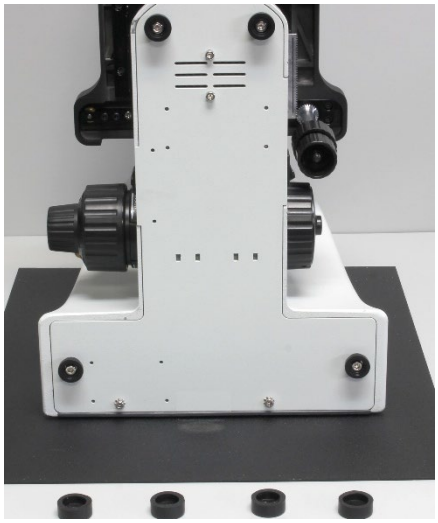


Fig. 31

Remove the rubber feet covers by pulling off. This exposes the feet underneath (Fig. 31). Do not discard the rubber covers.

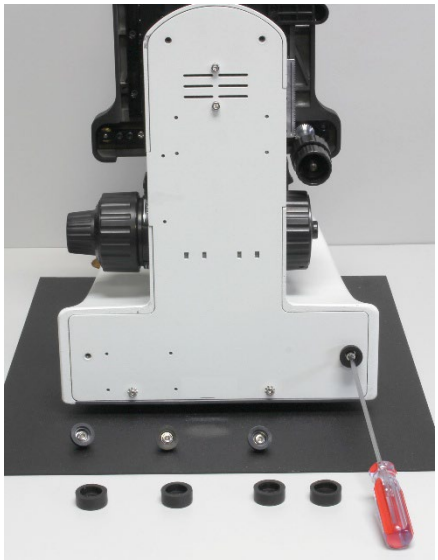


Fig. 32

Remove the feet using a 3mm hex wrench (Fig. 32).

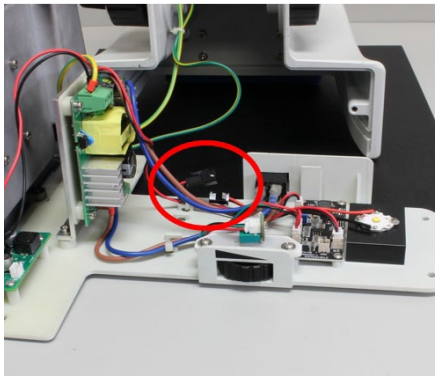


Fig. 33

Remove the bottom plate and disconnect the LED module at the make-break connector (Fig. 33).

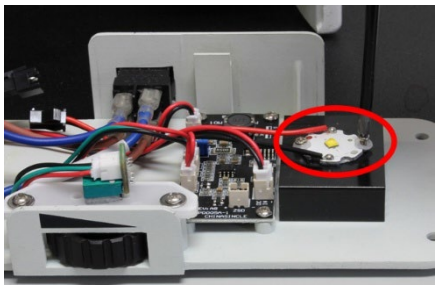


Fig. 34

Note the orientation of the LED module on the heat sink. Using a Phillips head “+” screwdriver, remove the two Phillips head ⊕ screws that hold the LED module to the heat sink. (Fig. 34).

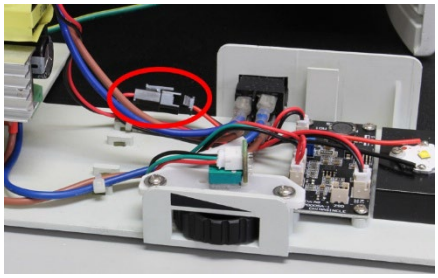


Fig. 35

In the same orientation as the original, replace the LED module with the new one and secure with the two Phillips head ⊕ screws. Reconnect the make-break connector (Fig. 35).

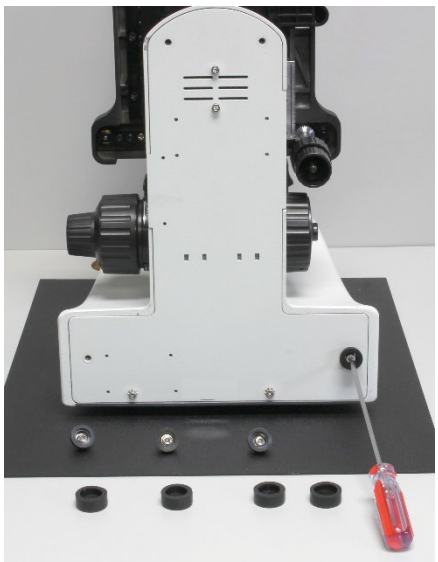


Fig. 36

Slide the bottom plate back onto the bottom of the frame and secure with the 4 feet and 3mm hex screws (Fig. 36).

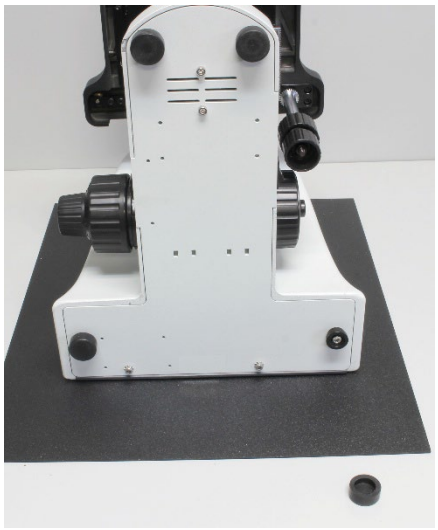


Fig. 37

Reattach the rubber feet covers by pushing over the feet (Fig. 37).

TECHNICAL SPECIFICATIONS

Optical system	Infinity optical system, f = 180
Head	Siedentopf binocular viewing head, inclined 30º
Eyepiece	PL10X/20mm diopter adjustable eyepiece, 20mm field of view
Nosepiece	Reversed quadruple nosepiece
Objective	Plan Achromat objective (4X, 10X, 40X, 100X)
Focusing system	Coaxial coarse & fine focusing system, with stop limit & tension adjustment. Travel range: 25mm. Fine focusing precision: 0.002mm
Stage	Built in low position coaxial control mechanical stage, area 140x132mm, moving range 76x50mm
Condenser	Built-in Koehler illuminator systems, Pre-centered. Iris diaphragm Koehler illuminator condenser and mirror optional.
Illuminator	Universal power supply 90~240V voltage, 5W LED light with variable intensity control
Operation Environment	● Indoor use ● Altitude: max. 2000m ● Environment temperature: 5℃-40℃ (41ºF-109ºF) ● Max. relative humidity: 80% at 31℃ (88ºF), and then declined linearly. 70% at 34℃ (93ºF), 60% at 37℃ (99ºF), 50% at 40℃ (104ºF). ● Degree of pollution: 2 (refer to IEC664)

Objectives

Type	Objective	Numerical aperture (N.A.)	Conjugate distance (mm)	Parfocal distance (mm)	Thickness of the cover slip	Magnification market (color ring)
Infinity Plan achromatic objective	4X	0.10	∞	45	0.17	Red
	10X	0.25	∞	45	0.17	Yellow
	40X(S)	0.65	∞	45	0.17	Light Blue
	100X(S) oil	1.25	∞	45	0.17	White

TROUBLESHOOTING

Under certain conditions, performance of this unit may be adversely affected by factors other than defects. If a problem occurs, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact your local dealer for assistance.

OPTICAL

Problem	Cause	Corrective Measure
The LED light is bright, but it's dark in the field of view.	Field diaphragm is open enough. Condenser is too low.	Open the field diaphragm. Adjust the height of the condenser.
Darkness at the periphery or uneven brightness of view field	Revolving nosepiece not in click stop position	Revolve the nosepiece to click stop position by swinging the objective correctly into the optical path
Dirt or dust on the view field	Dirt or dust on the lens - eyepiece, condenser, objective, collector lens or specimen	Clean the lens
Poor image quality	No cover glass attached to the slide Cover glass is too thick or thin Slide maybe upside down Immersion oil is on a dry objective (especially the 40xR) No immersion oil used with100xR objective Air bubbles in immersion oil Condenser aperture is closed or open too much Condenser is positioned too low	Attach a 0.17mm cover glass Use a cover glass of the appropriate thickness (0.17mm) Turn slide over so the cover glass faces up Check the objectives, clean if necessary Use immersion oil Remove bubbles Open or close properly Position the condenser slightly lower than the upper limit

IMAGE PROBLEMS

Problem	Cause	Corrective Measures
Image moves while focusing	Specimen rises from stage surface Revolving nosepiece is not in the click-stop position	Secure the specimen in the slide holder Revolve the nosepiece to the click-stop position
Image tinged yellow	Lamp intensity is too low Blue filter not used	Adjust the light intensity by rotating the intensity control dial and/or iris diaphragm Use daylight blue filter
Image is too bright	Lamp intensity is too high	Adjust the light intensity by rotating the intensity control dial and/or iris diaphragm
Insufficient brightness	Lamp intensity is too low Aperture diaphragm closed too far Condenser position too low	Adjust the light intensity by rotating the intensity control dial and/or iris diaphragm Open to the proper setting Position the condenser slightly lower than the upper limit

MECHANICAL PROBLEMS

Image will not focus with high power objectives	Slide upside down Cover glass is to thick	Turn the slide over so the cover glass faces up Use a 0.17mm cover glass
High power objective contacts slide when changed from low power objective	Slide upside down Cover glass is too thick Diopter adjustment is not set properly	Turn the slide over so the cover glass faces up Use a 0.17mm (No. 1½) cover glass Readjust the diopter settings as outlined in section 4.3

MECHANICAL PROBLEMS *(continued)*

Problem	Cause	Corrective Measures
Lamp does not light when switched on	No electrical power	Check power cord connection
	Lamp bulb burnt out	Replace bulb
	Fuse blown out	Replace fuse
Slippage of focus when using the coarse focusing knob	Tension adjustment is set too low	Increase the tension on the focusing knobs
Fine focus is ineffective	Tension adjustment is set too high	Loosen the tension on the focusing knobs

MAINTENANCE

Please remember to ***never*** leave the microscope with any of the objectives or eyepieces removed and always protect the microscope with the dust cover when not in use.

SERVICE

ACCU-SCOPE® microscopes are precision instruments which require periodic servicing to keep them performing properly and to compensate for normal wear. A regular schedule of preventative maintenance by qualified personnel is highly recommended. Your authorized ACCU-SCOPE distributor can arrange for this service. Should unexpected problems be experienced with your instrument, proceed as follows:

1. Contact the ACCU-SCOPE distributor from whom you purchased the microscope. Some problems can be resolved simply over the telephone.

2. If it is determined that the microscope should be returned to your ACCU-SCOPE distributor or to ACCU-SCOPE for warranty repair, pack the instrument in its original Styrofoam shipping carton. If you no longer have this carton, pack the microscope in a crush-resistant carton with a minimum of three inches of a shock absorbing material surrounding it to prevent in-transit damage. The microscope should be wrapped in a plastic bag to prevent Styrofoam dust from damaging the microscope. Always ship the microscope in an upright position; ***NEVER SHIP A MICROSCOPE ON ITS SIDE***. The microscope or component should be shipped prepaid and insured.

LIMITED MICROSCOPE WARRANTY

This microscope and its electronic components are warranted to be free from defects in material and workmanship for a period of five years from the date of invoice to the original (end user) purchaser. The LED lamp is warranted for a period of one year from the date of invoice to the original (end user) purchaser. This warranty does not cover damage caused in-transit, misuse, neglect, abuse or damage resulting from improper servicing or modification by other then ACCU-SCOPE approved service personnel. This warranty does not cover any routine maintenance work or any other work, which is reasonably expected to be performed by the purchaser. Normal wear is excluded from this warranty. No responsibility is assumed for unsatisfactory operating performance due to environmental conditions such as humidity, dust, corrosive chemicals, deposition of oil or other foreign matter, spillage or other conditions beyond the control of ACCU-SCOPE INC. This warranty expressly excludes any liability by ACCU-SCOPE INC. for consequential loss or damage on any grounds, such as (but not limited to) the non-availability to the End User of the product(s) under warranty or the need to repair work processes. Should any defect in material, workmanship or electronic component occur under this warranty contact your ACCU-SCOPE distributor or ACCU-SCOPE at (631) 864-1000. This warranty is limited to the continental United States of America. All items returned for warranty repair must be sent freight prepaid and insured to ACCU-SCOPE INC., 73 Mall Drive, Commack, NY 11725 – USA. All warranty repairs will be returned freight prepaid to any destination within the continental United States of America, for all foreign warranty repairs return freight charges are the responsibility of the individual/company who returned the merchandise for repair.