ACCU-SCOPE®

MANUAL

3019

FLUORESCENCE MICROSCOPE SYSTEM

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CONTENTS

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.
8. For fluorescence versions: to prevent damage to your eyes, ***do not stare directly at the fluorescence light.***
9. The mercury bulb should be installed in the mercury lamphouse in a vertical position with an inclined angle less than 15°. If the bulb is installed at an angle greater than this, there is an increased risk of the mercury bulb bursting.

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.

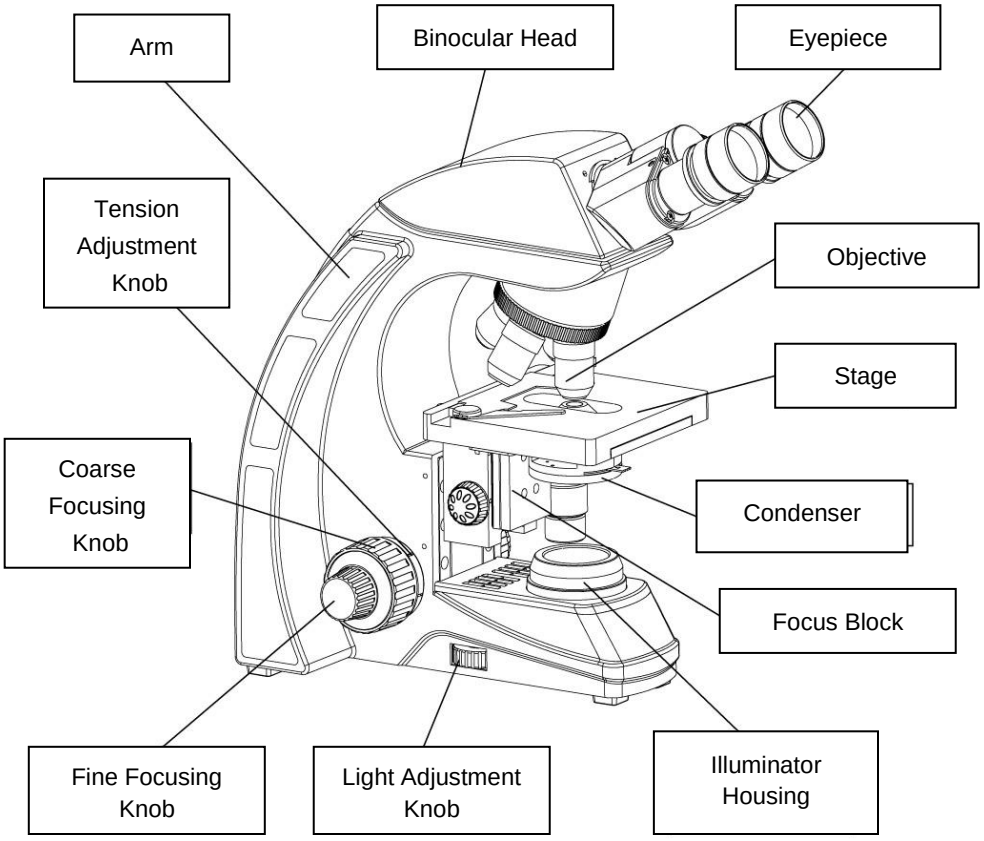
INTRODUCTION

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.

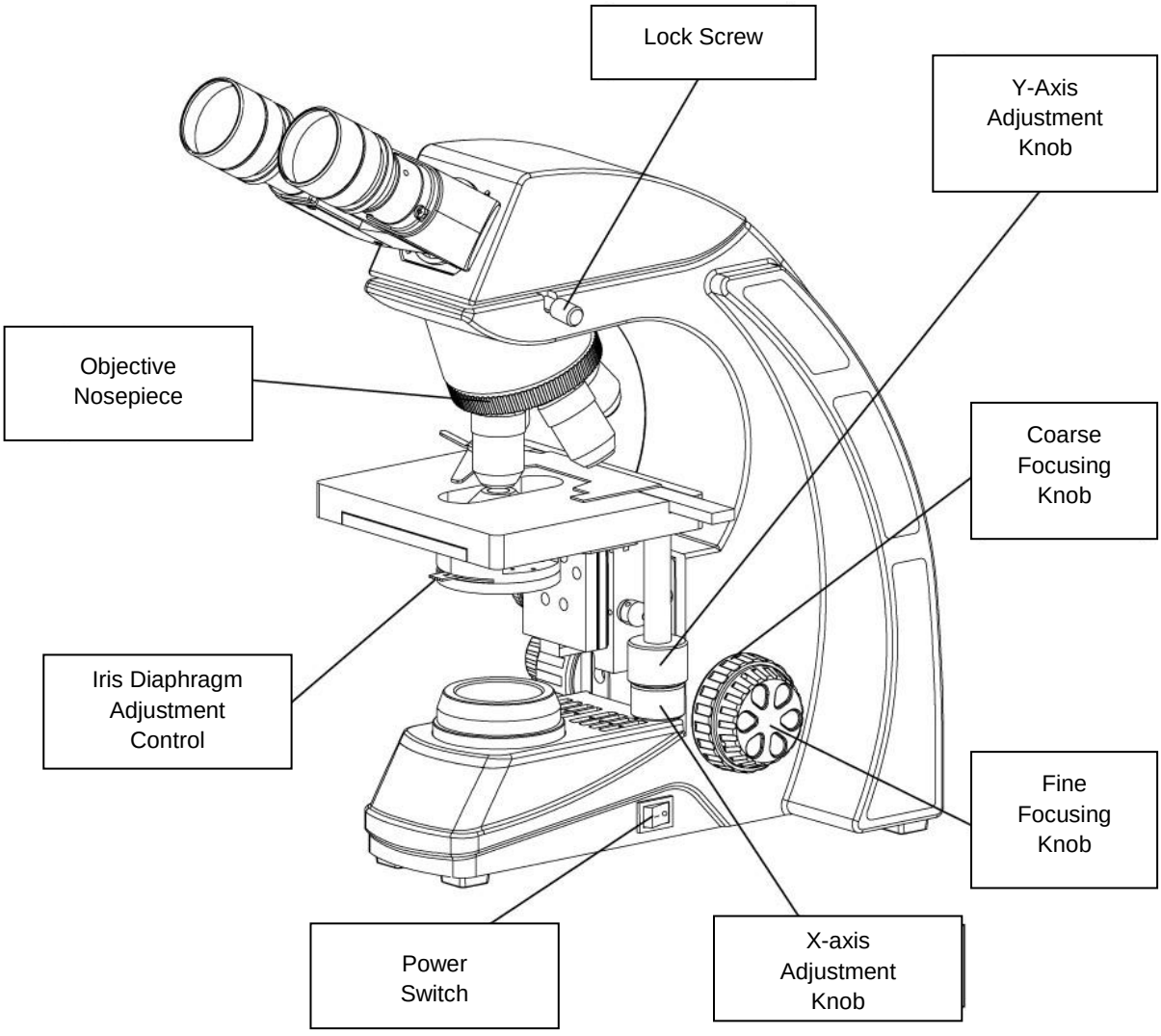
UNPACKING AND COMPONENTS

Your microscope arrived packed in a molded Styrofoam container. ***Do not discard the container*****:** the 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.

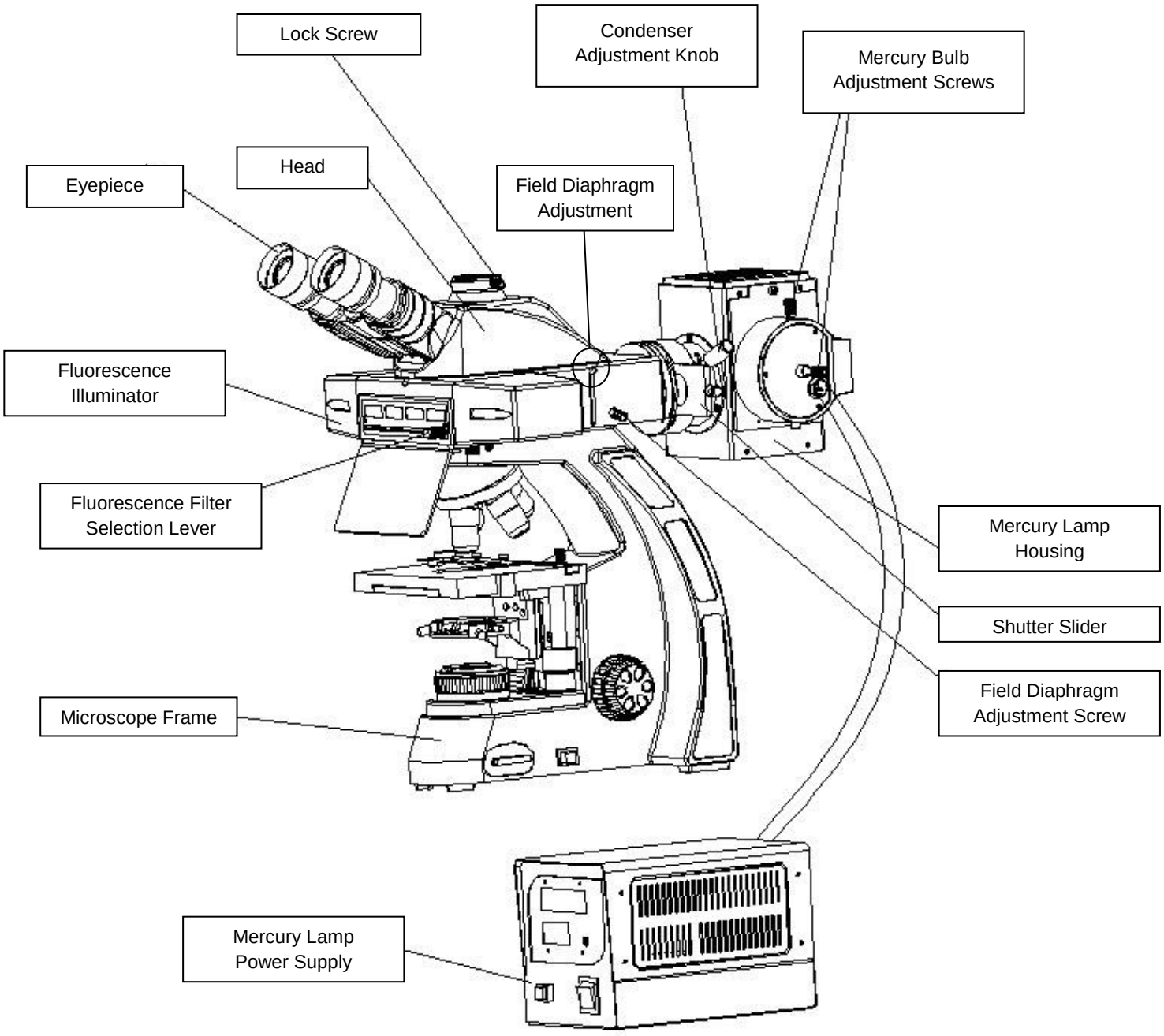
COMPONENTS DIAGRAM



COMPONENTS DIAGRAM



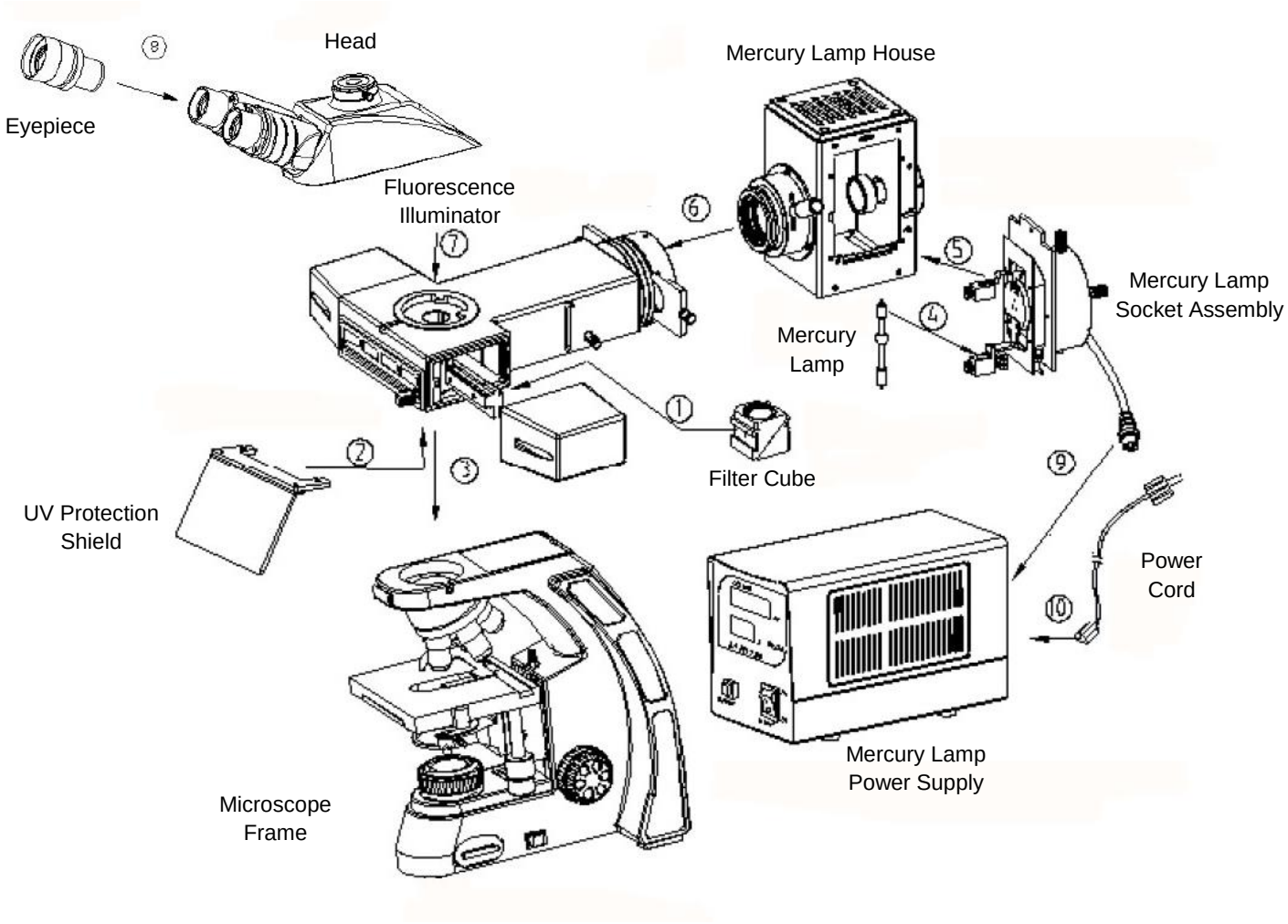
FLUORESCENCE COMPONENTS DIAGRAM



ASSEMBLY DIAGRAM

The diagram below shows how to assemble the various modules. The numbers indicate the order of assembly. 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.



DETAILED ASSEMBLY

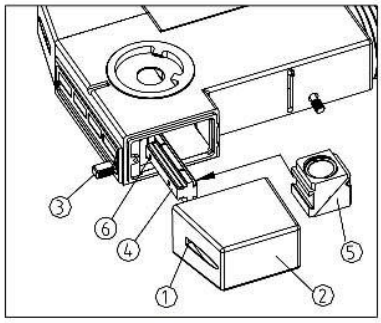


Fig. 1

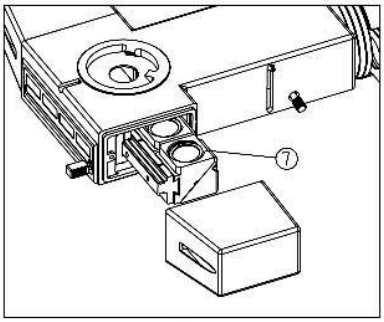


Fig. 2

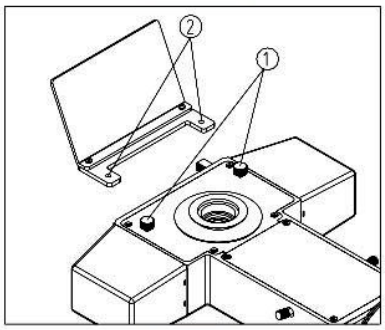


Fig. 3

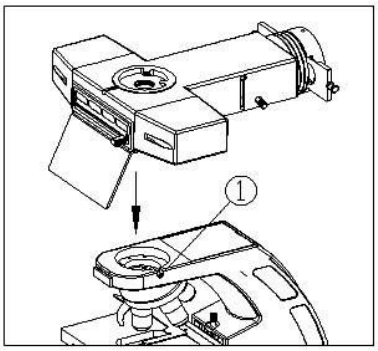


Fig. 4

Fluorescence Filter Sets (Fig. 1 & 2)

On the right side of the fluorescence illuminator, loosen the screw ① using the M4 Allen key and remove the cover ②.

Move the fluorescence filter selection lever ③ to the right to move the filter slider track out ④ for filter cube installation.

Match the dovetail of the first filter cube ⑤ to the groove of the filter slider channel on the track ④ and push the filter cube onto the slider channel. Tighten the lock screw for the filter cube with the M4 Allen key.

To install a second filter cube, follow the instructions above. Fig. 2 shows the filter cubes correctly installed.

> **NOTE:** *the filter cubes can be installed in any order according to user preference. You can install up to four (4) filter cubes – two (2) on the right side, and two (2) on the left side of the fluorescence illuminator.*

When you are finished installing two blocks on either the right or left side, slide the filter track back in, replace the cover, and tighten the screw.

> **IMPORTANT:** *if the lock screw of a filter cube is not tightened, the filter track will not slide back into position.*

The UV Protection Shield (Fig. 3)

Remove the lock screws ① located on the bottom of the fluorescence illuminator (Fig. 3). Match up the holes ② on the UV protection shield to the lock screw holes then install and tighten the screws.

The Fluorescence Illuminator (Fig. 4)

Loosen the lock screw completely using the M4 Allen key.

Match the dovetail on the bottom of the fluorescence illuminator to the dovetail mount on the microscope frame, set it on top and tighten the lock screw.

DETAILED ASSEMBLY *(continued)*

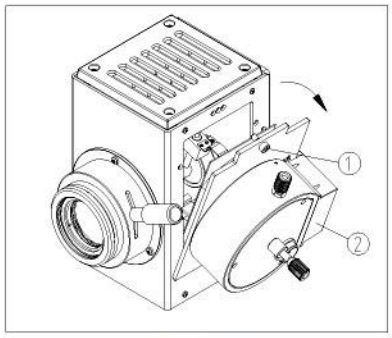


Fig. 5

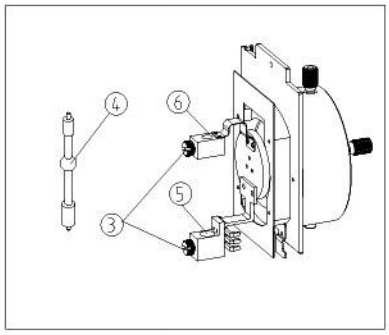


Fig. 6

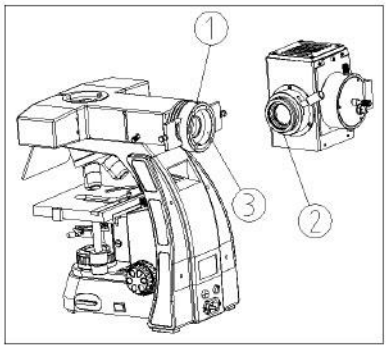


Fig. 7

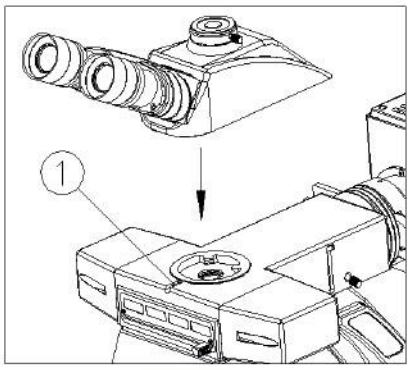


Fig. 8

Mercury Lamp (Fig. 5 & 6)

Loosen the lock screw ① of the mercury lamp socket assembly ② on the mercury lamp housing using the M4 Allen key, and remove the socket assembly (Fig.5).

Remove the bulb holder by loosening the lock screws ③. Using a soft tissue to hold the mercury lamp, insert lamp into the (positive) "+" pole (the wide head) of the mercury burner ⑤ to the lower terminal first and then the (negative) "–" pole (the thin head) to the upper terminal ⑥, then tighten the two socket lock screws ③.

Slide the lamp housing cover back on, and tighten the housing clamping screw ①.

IMPORTANT NOTES

- Be sure to ONLY use a 100 watt mercury lamp.
- Be sure to mount the positive "+" pole (the wide head) before the negative "–" pole, or damage to the lamp may occur.
- Never use excessive force when mounting the mercury lamp.
- Avoid touching or soiling the mercury lamp. If this happens, gently wipe it with lens tissue or a soft, clean cloth.
- To prevent hazard, always turn the main switch on the power supply unit to "O" (OFF) position, unplug the power cord plug from the main outlet, and wait for a minimum of 10 minutes before replacing the lamp.

Mercury Lamp House (Fig. 7)

Loosen the lock screw on the back of the fluorescence illuminator ①. Align and insert the connector ② of the mercury lamp house in the port ③ of the fluorescence illuminator and tighten the lock screw.

The Head (Fig. 8)

Loosen the lock screw on the front of the fluorescence illuminator ①. Align the head with the eyepieces facing toward the front of the illuminator and stand, and insert into the dovetail on the top of the illuminator. Tighten the lock screw.

DETAILED ASSEMBLY *(continued)*

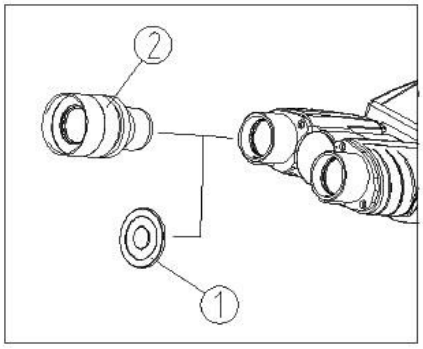


Fig. 9

Eyepieces (Fig. 9)

Remove the eyepiece cap ① and insert the eyepiece ② into the eyepiece tube.

Mercury Lamp Power Supply (Fig. 10)

Make sure the main switch to the microscope and mercury power supply are in the off (O) position.

Connect one side of the plug ① to the port on the mercury lamp house and tighten the lock screw ②.

Connect the other side of the plug ① to the port on the mercury lamp power supply ③.

Connect the one side of the power cord ④ to the socket ⑤ on the mercury power supply and the other to an electrical outlet that is well grounded.

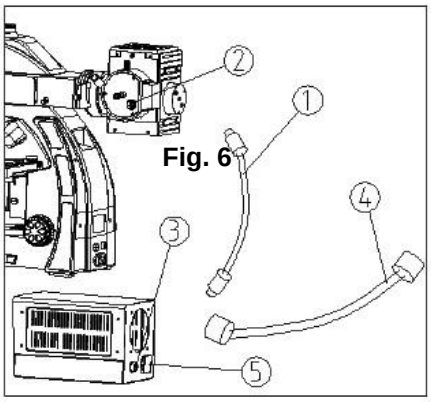


Fig. 6

Fig. 10

The Fuse (Fig. 11)

Make sure the main switch to the microscope and mercury power supply are in the off (O) position.

Remove the plug ②.

Fasten the flute ① of the fuse set ② by fingers, take out the fuse set ② from holder. Remove the fuse ④ from the flute ③ and change a new one. Re-insert the flute back into the main power supply.

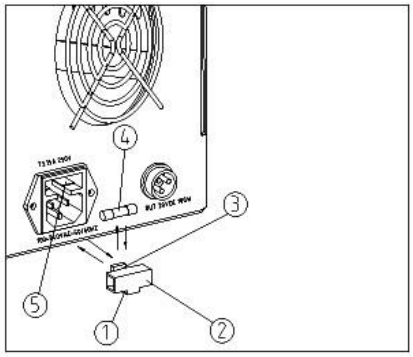


Fig. 11

ADJUSTMENT & OPERATION

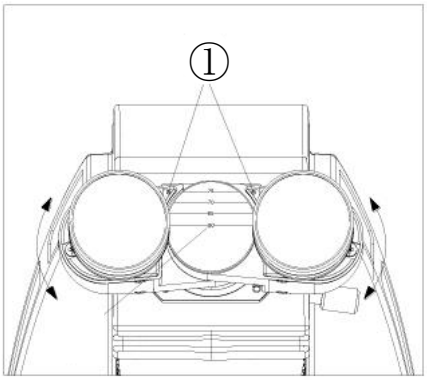


Fig. 12

Adjusting the Interpupillary Distance

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.

Where **"·"** ① on the eyepiece tube lines up, then that is the number for the interpupillary distance. Range：50～75mm. (Fig. 12).

Remember your interpupillary for future operation.

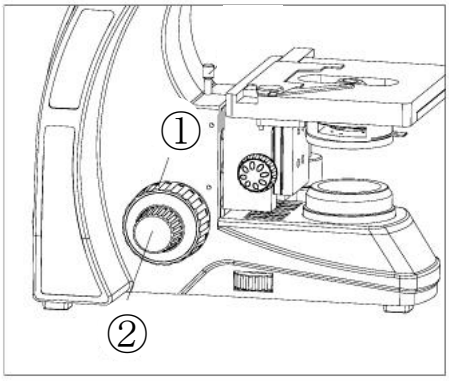


Fig. 13

Adjusting the Focus

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: set both diopter collars to "0". Using your left eye only and the 10X objective, focus your specimen by adjusting the coarse adjustment knob ①. When the image is in view, refine the image to its sharpest focus by turning the fine adjustment knob ②. Rotate the diopter collar to obtain the sharpest focus. 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. Repeat several times to check.

NOTE: *do not counter rotate the focusing knob as this will cause severe problems and damage to the focusing system. (Fig. 13)*

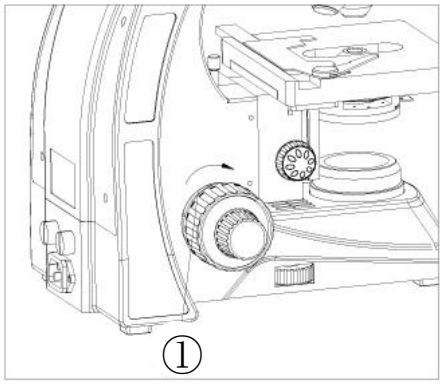


Fig. 14

Adjusting the Focusing Tension

If the handle is very heavy when focusing or the specimen leaves the focus plane after focusing or the stage lowers by itself, please adjust the tension adjustment ring ①. Located on the left side of the stand between the coarse adjustment knob and the vertical arm is an adjustable tension control dial that is preset at our facility. This allows the user to adjust the coarse control tension to their individual preference. (Fig. 14).

ADJUSTMENT & OPERATION *(continued)*

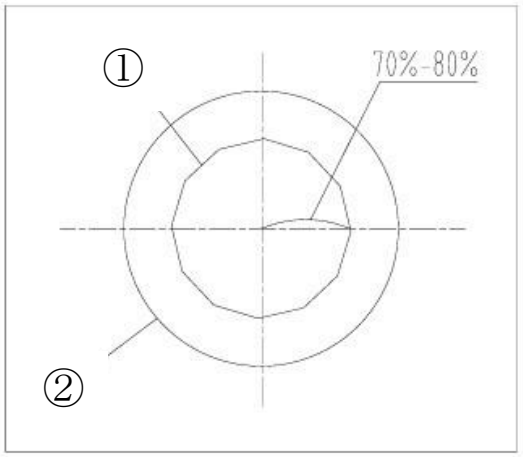


Fig. 15

Adjusting the Field Diaphragm (Optional)

By limiting the diameter of the light entering the condenser, the field diaphragm can prevent other light and strengthen the image contrast. When the image is just on the edge of the field of view, the objective can show the best performance and obtain the clearest image
(Fig. 15).

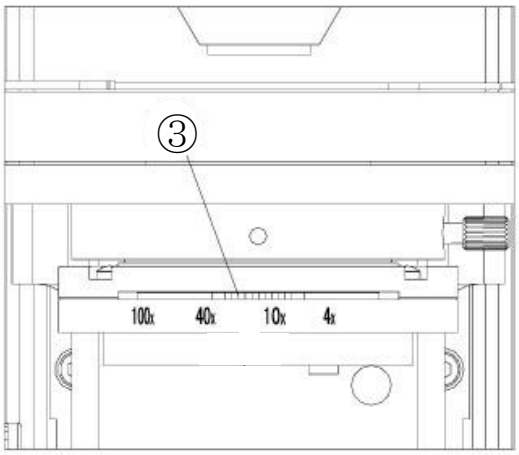


Fig. 16

Adjusting the Aperture Diaphragm

The aperture size is increased or decreased 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 (Fig. 16).

ADJUSTMENT & OPERATION *(continued)*

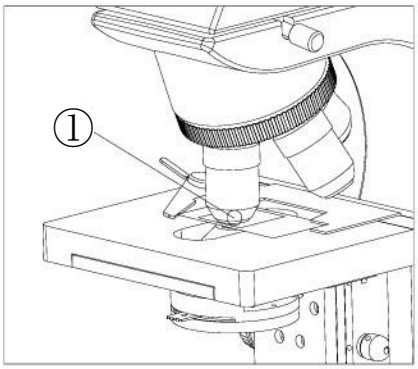


Fig. 17

Using the Oil Objective (100x)

The procedure for examining a specimen using an oil immersion objective is as follows:

Rotate the nosepiece so the low power objective is in the optical path.

Place one drop of immersion oil on the lighted area of the specimen slide ① (Fig 17). 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.

Rotate the nosepiece so the 100xR oil immersion objective is in the light path.

With your eye at the level of the stage, use the coarse focus knob to raise the stage with the specimen cover glass. When you see a flash of light at this location the objective lens has made contact with the immersion oil and the microscope can now be focused using the fine focus knob.

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 clean soft cloth. Cleaning after each use will prevent oil from contaminating the high dry objective (40xR) and deforming its optical performance, prevent dust and dirt from accumulating on the lens of the objective and degrading its optical performance, and will keep the slide clean to work with.

FLUORESCENCE OPERATION

Preparation

Verify that the voltage and the frequency of the AC main outlet match the setting of the voltage switch and the frequency switch on the rear of the power supply unit.

Make sure the cord is connected firmly.

When transmitted light observation is required, pull out the filter system and rotate the blank opening into the light path.

Adjust the field diaphragm to match the field edge. If it is not centered, use the Allen wrench to adjust the screw.

When it is required to interrupt observation for a short period, use the shutter mechanism on the fluorescence illuminator to block the light accessorial excitation filter part. (Repeated on-off of the mercury lamp will shorten its service life considerably).

Precautions on the specimen color fading:

The system employs high-intensity excitation light to enable bright observation of dark fluorescence specimens. As a result, if high-power objectives are used frequently, color fading of the specimen occurs early, degrading the view (contrast) of fluorescence images. So it is effective to use the shutter frequently to avoid illuminating the specimen for a longer period than required.

A ND (neutral density) filter and small aperture diaphragm can help weaken the intensity of the excitation light. Also, it is useful to use the light shutter to reduce the specimen color fading.

Color fading of the specimen can also be delayed using commercially available color fading preventing agent (DABCO, etc). The use of color fading preventing agent is recommended when you perform high-magnification observation frequently.

NOTE: color fading preventing agent cannot be used with certain specimens

FLUORESCENCE OPERATION *(continued)*

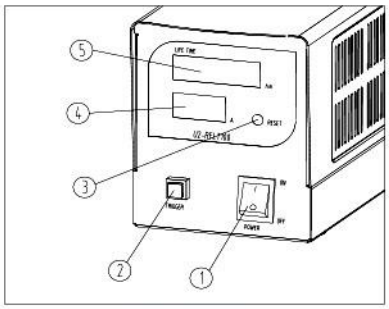


Fig. 18

Illumination (Fig. 18)

After connecting with the main power supply, please set the switch ① on fluorescence power supply at "—" (ON), then touch the trigger button (TRIGGER) ②, the mercury lamp will light. It takes 5 minutes to warm up mercury lamp. (Fig. 18)

The timer (LIFE TIME) ⑤ shows hours, minutes, seconds up to 5 values from left to right. If the numbers' order of units is more than 5, it will show first 5 of the hours, minutes, and seconds and hide the rest. To see the rest of the numbers, touch the reset button (RESET) ③, and the remaining numbers will be shown for 6 seconds.

If a new mercury lamp is installed or to clear the numbers from the timer (LIFE TIME) ⑤, press and hold the reset button (RESET) ③ for more than 5 seconds.

The indicating range of the current (CURRENT) ④ is 0~9.99A.

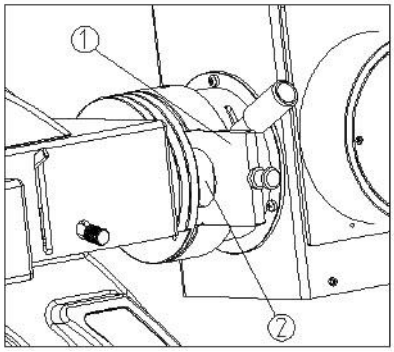


Fig. 19

- **No need to switch on for transmitted illumination when using fluorescence illumination.**
- **Do not cut off power supply within 15 minutes after mercury bulb is triggered to avoid damage to the bulb.**
- **In order to prolong the life of mercury bulb, please do not re-light it within 3 minutes after it is turned off.**
- **When the timer ⑤ indicates "200.00", it means the mercury bulb has been lit for 200 hours and it needs to be replaced immediately.**
- **Don't stare at the fluorescence light directly.**

Use the Filter Flashboard (Fig. 19)

Pull the filter flashboard ① to the left most position to block the fluorescence light from passing through the specimen. Place the slider in the middle ② position to allow the light to pass through the specimen. A ϕ32 filter can be installed in the last position to filter the light if desired.

FLUORESCENCE OPERATION *(continued)*

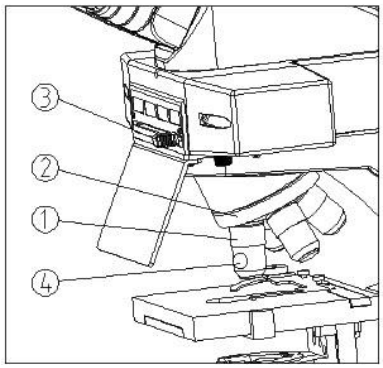


Fig. 20

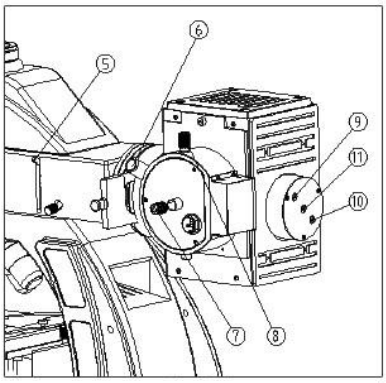


Fig. 21

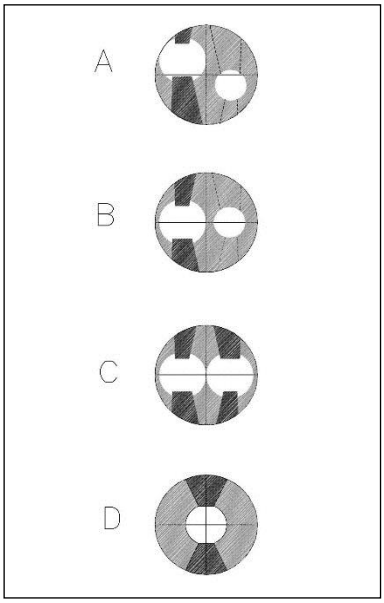


Fig. 22

Centering the Mercury Bulb (Fig. 20-22)

Rotate the nosepiece to the 10x objective ④.

Slide the fluorescence filter selection lever ③ to move the fluorescence filter cube B1 into the light path.

Slide the field diaphragm adjustment lever ⑤ (Fig. 21) to the top position. This opens the field diaphragm to its maximum position.

Adjust the condenser focusing knob ⑥ (Fig. 21), the vertical adjusting knob ⑦ of mercury bulb, and the horizontal adjusting knob ⑧ of mercury bulb to make the bulb image on the "+" scale of the slide ①. (Fig. 22 A)

Adjust the knob ⑪ of the parabolic mirror to focus, the horizontal centering knob ⑨, and the vertical centering knob ⑩ to make the bulb mirror image on the "+" scale of the slide ①. (Fig. 22 B)

Adjust the knob ⑨ and ⑩ to make the bulb image and bulb mirror image symmetrical to the "+" scale of the centering slide ①. Adjust the knob ⑪ to make both images the same size. (Fig. 22 C)

Adjust the screw ⑦ and ⑧ to make the two images superpose on the center of "+" scale. (Fig. 22 D)

- **Centering the bulb after it warmed up will be more precise.**
- **After replacing the mercury bulb (usually 200 hours), it should be re-centered.**

FLUORESCENCE OPERATION *(continued)*

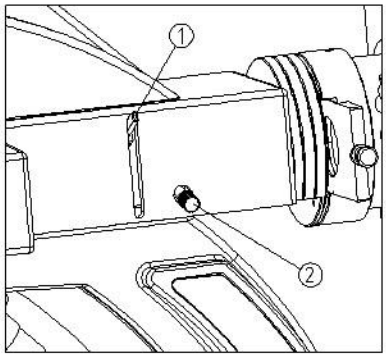


Fig. 23

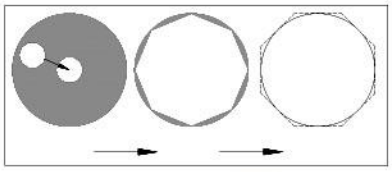


Fig. 24

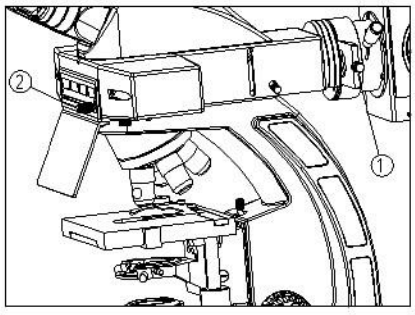


Fig. 25

Centering the Field Iris Diaphragm (Fig. 23-25)

Switch the light shutter to "●" closed position.

Turn filter block turret to engage the B-excitation mirror in the light path.

Switch the light shutter ① to "O" open position.
Rotate the 10× objective in the light path, and place the specimen on the stage and bring into approximate focus.

Pull the field iris diaphragm lever out until the diaphragm comes into the smallest state.

Use the two centering screws ② to adjust the two field iris diaphragm centering screws alternately to move the image of the diaphragm to the center. Fig. 24 shows the adjustment of diaphragm.

Move the field diaphragm lever to open the diaphragm. As this makes slight deviation noticeable, adjust the centering precisely.

Enlarge the diaphragm until it just circumscribes the field of view.

Select the Fluorescence Filter Cube (Fig. 25)

The filter block should be accordance with the specimen.

Pull the filter flashboard ① to the most right position.
(See Fig. 25)

Use the filter selecting lever ② to select the needed filter cube.

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.

Optics

PROBLEM	CAUSE	SOLUTION
Although the mercury lamp illumination is on, the field of view is invisible or dark.	The light shutter closes the light path	Switch the light shutter to “O” open position
	The ND filter is engaged in the light path.	Pull out ND filter to open the position
	The fluorescence mirror block is improperly engaged in the light path	Engage it properly
	The aperture iris diaphragm and field iris diaphragm are not open enough	Open the aperture iris diaphragm fully; adjust the field iris diaphragm to circumscribes the field of view
Visibility is poor. Image is not sharp. Contrast is poor.	The objective or filter is dirty	Clean them thoroughly
	The aperture iris diaphragm and field iris diaphragm are adjusted improperly	Open these iris diaphragms fully
	The fluorescence mirror block is not proper for the specimen	Use proper mirror block
The edge of the field of view is obscured or not evenly illuminated	The objective is improperly engaged in the light path	Make sure the nosepiece clicks properly into place
	The fluorescence mirror block is improperly engaged in the light path	Engage it properly in the light path
	The field of view doesn’t open fully	Open it fully
	ND filter is stopped in halfway in the light path	Pull in the filter slider until it clicks into place
	The mercury lamp is not centered.	Center it
	The collector focus position is not correct	Adjust it to an optimum position
Shadow exists in the field of view	The burner or collector is dusty or stained	Clean them thoroughly

Electrical System

The main switch cannot supply power to the system	The power cord is connected improperly	Connect it properly
	A fuse is blown	Replace the fuses
The main switch can be set to ON but the burner doesn’t ignite	The lamp housing connecting cord is connected improperly	Connect it properly to the connectors
	The mercury lamp is not mounted	Attach a mercury lamp
	The auto ignition system is malfunctioning	Set the main switch of the power supply unit to OFF then on again. (Repeated ON-OFF is possible in this case)
The mercury lamp flickers or the brightness is low	The phenomenon is observed in a short period after ignition	Wait for 10 minutes or more after ignition
	The lamp life has expired	Replace the mercury lamp

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 is 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 mercury power supply 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.