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INSTRUCTIONS FOR
MODELS #446TBL, #447TBL AND #448TBL
STEREOSCOPIC MICROSCOPES

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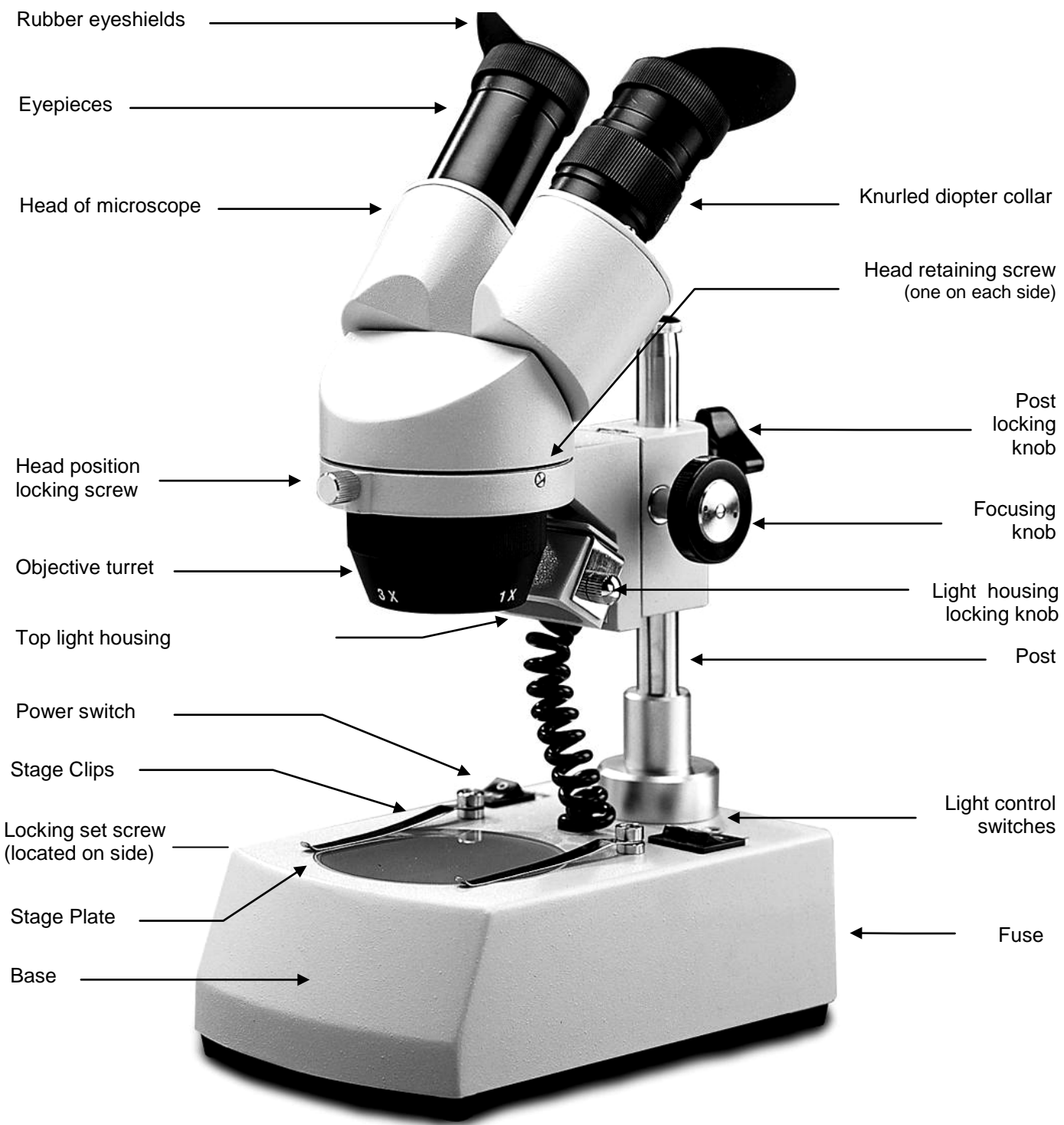
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Stereoscopic microscopes are used for viewing 3-dimensional objects, inspection or assembly of small parts, and for dissection of biological specimen. They provide an upright, unreversed image which permits easy manipulation of the object being viewed while looking through the microscope. They are designed for viewing solid objects at low magnification, but they will also permit viewing of some transparent specimen slides.

For optimum viewing satisfaction, follow these simple procedures. Nomenclature used to describe components and controls can be identified by referring to the diagram at left.

UNPACKING

Do not touch any of the lens surfaces while handling the microscope. Dust, dirt, fingerprints can damage the delicate lens surfaces or adversely affect image quality.

Remove microscope stand and head assembly from carton. Remove rubber eyeshields and dustcover. Remove "pin spanner wrench" (used to adjust focusing tension), "L hex wrench" (used to remove locking set screw on stage plates), and plastic black/white contrast plate (80mm diameter). Your microscope is also supplied with a frosted glass stage plate (80mm diameter), which is already mounted in the microscope base.

Examine packing material before you discard it. Retain the styrofoam container in case you need to transport, store, or return the microscope for service. If it becomes necessary to ship the microscope for any reason, pack it in the styrofoam container, and then pack the styrofoam in another corrugated shipping container for optimum protection. Use of the styrofoam alone will not provide adequate protection in transit, and will void your warranty.

ASSEMBLY & OPERATION

1. Install rubber eyepiece shields over top of eyepieces, with the flared portion of the shields positioned at the outside edge of eyepieces. These help block out undesired light reflections, and to position your eyes at the proper point above the eyepieces.
2. Please observe that the head rotates 360 degrees. To position the binocular head in stand, loosen knurled head locking screw. Rotate head to face either forward or backward, whichever suits your preference or needs. Then, tighten knurled head locking screw.
3. This model is furnished with stage plates. The frosted glass plate is used when viewing transparent specimen slides or for viewing some specimen thin enough through which light can pass (insect wings, etc.). The black/white contrast plate can be used when viewing opaque objects or for dissecting. Choose side of plate providing best contrast with specimen.

FROSTED GLASS PLATE MUST BE USED IF USING BOTTOM ILLUMINATION. HEAT GENERATED IN BASE FROM BOTTOM LIGHT WILL WARP OR DAMAGE THE PLASTIC BLACK/WHITE PLATE. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY. It is acceptable to leave the glass plate in place for most viewing purposes.

To switch plates or to reverse sides of contrast plate, use the "L hex wrench" to loosen set screw at side of base, only enough to permit removal of plate. Replace plate and tighten set screw.

4. Plug cord into a standard 120 volt AC three-wire grounded outlet.

5. There are three rocker type light controls located on top surface of microscope base.

- MAIN = Turns power on and off
- “I” = Turns incidental light on (top illumination)
- “T” = Turns transmitted light on (substage illumination)

REMEMBER to never operate bottom (transmitted) light with plastic stage plate in use.

6. Place object to be viewed on center of stage surface.
7. Turn objective turret until smaller number (lowest magnification) is towards front of microscope (away from post), making certain that turret “clicks” into indexed position.

Magnification is determined by multiplying the number on the eyepieces times the number on the objective turret. For example, if your microscope is equipped with 10x eyepieces and the turret is positioned so that a 3 is indexed at the front of the microscope, the magnification resulting will be 30 times.

To change magnification, turn objective turret 90° until it “clicks” into position with another number on turret facing to the front of the microscope. Your microscope is parfocalled, and only slight adjustment of the focusing knobs may be required after changing from one magnification to the other.

Specification Chart

Objective	Eyepiece				Working Distance	Maximum Specimen Height
	WF10X (supplied)		WF15X (optional)			
	Total Magnification	Field Size	Total Magnification	Field Size		
1X	10X	20mm	15X	13mm	75mm	60mm
3X	30X	6.6mm	45X	4.3mm		
2X	20X	10mm	30X	6.5mm	75mm	60mm
4X	40X	5mm	60X	3.2mm		
1X	10X	20mm	15X	13mm	75mm	60mm
2X	20X	10mm	30X	4.5mm		

8. Before making close observations, the following steps should be taken to adjust the microscope for your particular eyesight and for specimen size. Note that all stereo microscopes permit you to examine opaque, 3-dimensional objectives. Stereo models having substage (transmitted) illumination permit you to also view transparent specimen or prepared slides when the glass stage plate is in place.
- A. Turn the focusing knobs until they are positioned in the middle of their range of travel.
 - B. Holding the microscope head with one hand, loosen locking knob at back of post to permit the head to move up and down on post until specimen comes into approximate focus. Retighten locking knob.
 - C. Looking through microscope with both eyes, grasp both sides of microscope head and gently push eyepiece tubes together or pull apart until the two images blend together into one image. This adjusts the interpupillary distance between eyepieces to match that of your own eyes.
 - D. Looking through right side of microscope with right eye, adjust image sharpness by turning the focusing knobs.

- E. Looking through left side of microscope with left eye, turn diopter adjustment collar located on left eyepiece until left image is sharp. Note the scale on the diopter collar and its position in relationship to the index mark on the eyepiece tube.

You have now adjusted the microscope for your personal vision. When viewing other objects of various sizes, you should not have to make further adjustment of the diopter, and will need only to adjust the focus knobs. If other users change the diopter setting for their vision, you need only to return the diopter scale to your setting in order for it to once again be adjusted for your vision.

9. For optimum sharpness of image in the entire field of view, it is important to position your eyes at the correct point above the eyepieces. Looking through both eyepieces, slowly move your eyes towards eyepieces to a level where clarity of the entire field of view is achieved. After a brief period of viewing, you will easily find the best point for your vision.

MAINTENANCE

WARNING: For your own safety, turn switch off and remove plug from power source before maintaining your microscope. If the power cord is worn, cut or damaged in any way, have it replaced immediately to avoid shock or fire hazard.

1. OPTICAL MAINTENANCE

- A. Do not attempt to disassemble any lens components. Consult a microscope service technician when any repairs not covered by instructions are needed.
- B. Prior to cleaning any lens surface, brush dust or dirt off lens surfaces using a camel hair brush. Or use air to blow dust and lint off surfaces. Use of compressed air in a can available at any computer store, is good source of air.
- C. To clean eyepiece lenses, do not remove from eyepiece tube. Clean only the outer lens surface. Breathe on lens to dampen surface, then wipe with lens paper or tissue or use a cotton swab moistened with distilled water. Wipe lenses with a circular motion, applying as little pressure as possible. Avoid wiping dry lens surface as lenses are scratched easily. If excessive dirt or grease gets on lens surfaces, a small amount of distilled water or Windex can be used on a cotton swab or lens tissue. To clean objective lenses, do not remove objectives from microscope. Clean front lens element only, following same procedure.

2. MECHANICAL MAINTENANCE

The only mechanical adjustment you might ever require is the tension of the focusing mechanism. This has been adjusted at the factory, but over the course of time it may loosen and cause the head of the microscope to slip downward on the focusing block.

To adjust, observe that stem of focus knob on one side of microscope has a tension adjustment collar with four small holes. Only one of these holes contains a small set screw. Using a small jewelers screwdriver, loosen this set screw. Your microscope was supplied with a small pin spanner wrench having one prong. Insert pin of the wrench into one of the holes, turn collar clockwise to tighten tension, counter-clockwise to loosen tension. In the event you have misplaced the wrench, a large rubberband placed around the collar will permit you to grip the collar and turn it by hand in order to accomplish the same adjustment. After adjusting, tighten the small set screw to lock collar in place.

NOTE: It is recommended that you leave the tension as loose as possible for ease of focusing, yet not so loose that it permits the head of microscope to drift downward from its own weight and cause the microscope to "drift" out of focus.

3. ELECTRICAL MAINTENANCE

The extent of electrical maintenance, by other than a qualified technician, should be bulb or fuse replacement. **BE CERTAIN TO TURN SWITCHES OFF AND REMOVE PLUG FROM POWER SOURCE OUTLET BEFORE CHANGING BULBS.**

Both top and bottom lights use the same 12 volt 10 watt tubular type bulb, National #800-400.

- A. To replace top light bulb loosen light housing locking knob to permit removal of light housing. This knob might be very tight, requiring careful use of pliers for removal. Making certain bulb is cool, grasp and pull bulb from two tension clips which hold bulb in place. Holding new bulb with tissue (to avoid getting body oil on surface of bulb), push bulb into tension clips until it slips into position. Replace light housing and secure in place with locking knob.
- B. To replace bottom light bulb use the "L" hex wrench to loosen set screw at side of base in order to remove stage plate. This will expose bottom bulb, which is removed and replaced exactly the same as top light bulb. Replace stage plate and tighten set screw.
- C. Replacement of fuse
 The fuse is located at rear left side of microscope base. To remove fuse from holder, insert a 6mm screwdriver blade into slot located in rear of fuse holder cap. Slightly depress and rotate screwdriver ¼ turn in direction of arrow, release pressure on screwdriver to release the fuse. Pull cap and fuse out of fuse holder. Insert proper fuse into fuse cap. Insert fuse cap into fuse holder. Using screwdriver, rotate fuse cap assembly in opposite direction of arrow until guide slot engages, depress fuse cap and rotate ¼ turn to lock into fuse holder.

TROUBLESHOOTING

PROBLEM	REASON FOR PROBLEM	SOLUTION
Light fails to operate.	Outlet inoperative.	Have qualified service technician repair outlet.
	AC power cord not connected.	Plug into outlet.
	Lamp burned out.	Replace lamp.
	Fuse blown.	Replace fuse.
Image does not remain in focus	Head of microscope drops from its own weight.	Adjust tension control.
Image will not focus	Objective turret not positioned correctly.	Turn turret until "clicks" into index position.
Poor resolution (image not sharp)	Objective lenses dirty.	Clean objective lenses.
	Eyepiece lens dirty.	Clean eyepiece lenses.
Spots in field of view.	Eyepiece lens dirty.	Clean eyepiece lenses. ***
***Spots in field of view can also result from dirt on inside of eyepiece. It is recommended that you have service technician clean inside of lens.		

OPTIONAL ACCESSORIES AND PARTS:

- #615-400 WF15X Eyepieces (pair), increases magnification 50%
- #800-400 12v 10w Replacement Bulb
- #801-050 Replacement fuse for 220v version, 0.5 amp
- #801-100 Replacement fuse for 117v version, 1.0 amp
- #940-410 Frosted glass stage plate, 80mm
- #941-460B Black plastic stage plate, 80mm
- #941-460W White plastic stage plate, 80mm
- #941-410 Black/White plastic contrast plate, 80mm
- #965-400-05 Eyepiece reticle, 5mm/100 div., 22.8 mm diameter (for WF10x eyepiece only)
- #965-400-10 Eyepiece reticle, 10mm/100 div., 22.8 mm diameter (for WF10x eyepiece only)

LIMITED LIFETIME WARRANTY

Please see our website, www.nationaloptical.com, for complete warranty details and exclusions.