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INSTRUCTIONS FOR STEREOSCOPIC MICROSCOPES

MODEL NUMBERS

400
400TL
400TBL
405TBL

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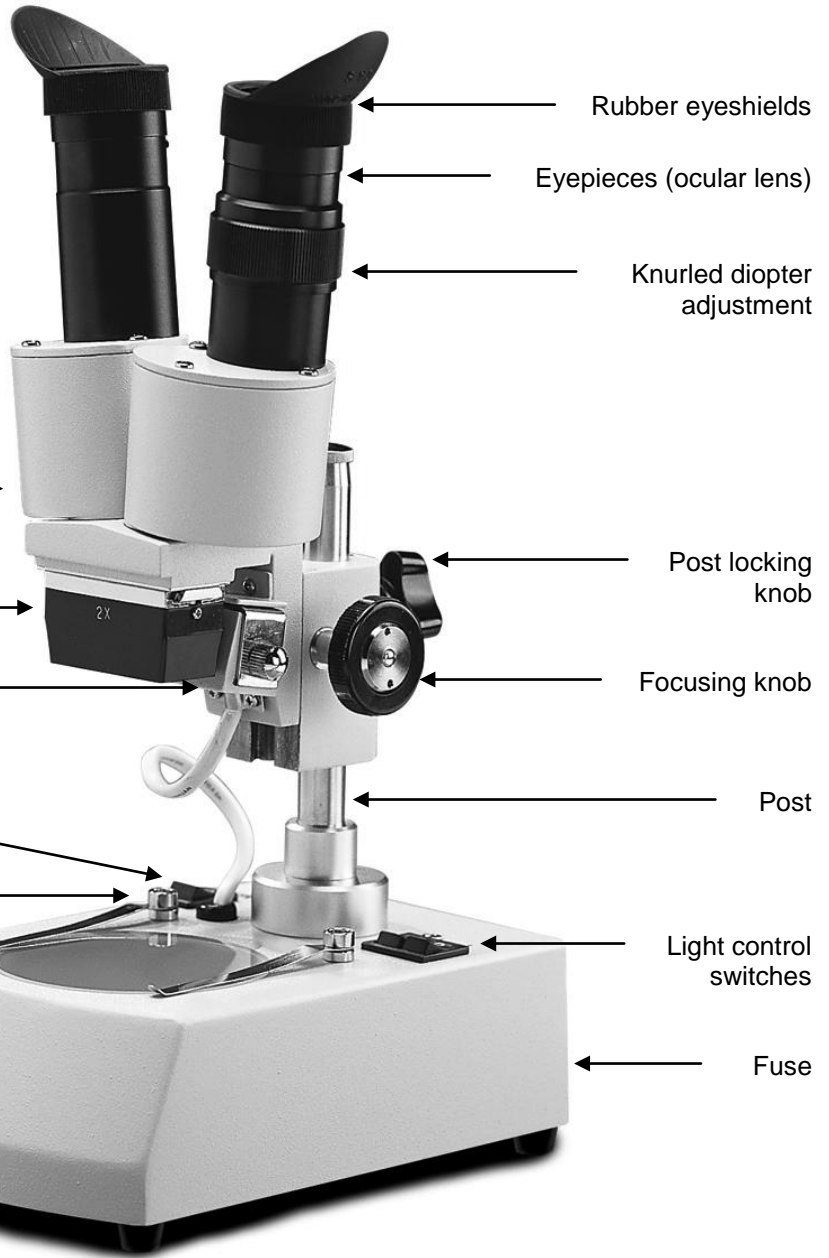
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405TBL series has 45° inclined head



Head of microscope

Objective lens

Incidental (top) illumination
(included on all models except #400)

Power switch

Stage clips

Stage plate

Base
(Illustrated is #400TBL
having both incidental
(top) and transmitted
(bottom) illumination)

Rubber eyeshields

Eyepieces (ocular lens)

Knurled diopter
adjustment

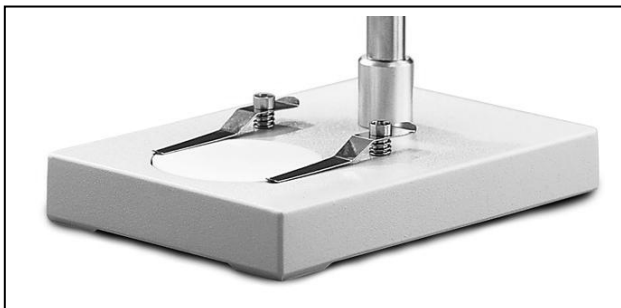
Post locking
knob

Focusing knob

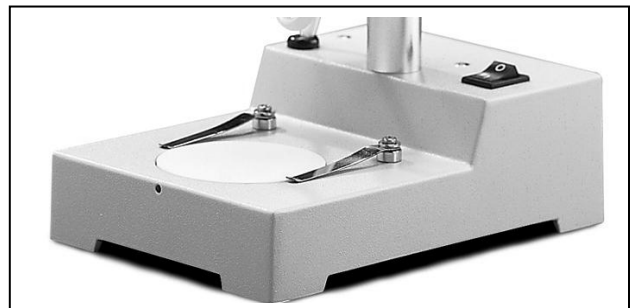
Post

Light control
switches

Fuse



Plain base on non-illuminated #400



Base on top illuminated #400TL

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.

Carefully read this manual and familiarize yourself with the components and controls identified in the diagram provided.

UNPACKING & ASSEMBLY

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, dustcover and warranty card. Remove "L hex wrench" (used to remove locking set screw on stage plates), and "pin spanner wrench" (used to adjust focusing tension).

Microscope models having both incidental (top) and transmitted (bottom) illumination are supplied with a frosted glass stage plate (80mm diameter) already mounted in the microscope base. They are also supplied with an accessory black/white contrast plate packed in the styrofoam container. 405 Series purchased after 1/1/10 will be supplied with contrast plates, one black and one white.

Models with no illumination, or top illumination only, are supplied only with a black/white plastic contrast plate (60mm diameter) already mounted in the base of microscope.

Install rubber eyepiece shields over top of eyepieces with the flared portion of the shields positioned at the outside edge of eyepieces.

Observe that the main voltage of your microscope is labeled on the back of the base. Make certain that the main voltage of your microscope corresponds to the voltage of your power outlet.

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.

OPERATION

The 400 and 405 series have the same features, function and procedures for operation. The only difference is that the 400 series has a vertical viewing head (eyepieces are straight up and down) and the 405 series has a 45° inclined viewing head. The inclined viewing head permits more comfortable viewing angle when user is seated.

Microscope magnification is determined by multiplying the number on the eyepiece times the number on the objective lens. These numbers are incorporated in the model number of your particular microscope purchase. For example, 400TBL-10-2 has 10x eyepieces and 2x objectives, which provide 20x magnification.

Model 400-10-2 (no illumination) is available only with the 2x objective option, and since the 2x objective is fixed permanently in place, there is no 2x marking on the objective.

Magnification Chart (illuminated models)						
Objective	Eyepiece				Working Distance	Maximum Specimen Height
	WF10X (supplied)		WF15X (optional)			
	Total Magnification	Field Size	Total Magnification	Field Size		
2X	20X	10mm	30X	6.5mm	65mm	58mm
3X	30X	6.7mm	45X	4.3mm	55mm	60mm
4X	40X	5mm	60X	3.3mm	40mm	60mm
Magnification Chart (non-illuminated models)						
2X	20X	10mm	30X	6.5mm	75mm	57mm

ILLUMINATION

1. If your model is not supplied with built-in illumination, it should be used where adequate natural or overhead light is available.
2. If your model is supplied with a port to accept an optional penlight illuminator, you can operate your microscope without this penlight illuminator, or you may elect to purchase optional #903 penlight illuminator (requires 2 each AAA batteries, not included).

To install optional #903 penlight illuminator:

- a. Remove chrome lamp holder and lamp assembly from body of penlight by rotating lamp holder in a counter-clockwise direction. Remove white plastic tube from penlight (discard white tube) and insert 2 each AAA batteries into body of penlight (positive terminals facing up toward lamp). Replace chrome lamp holder and lamp by screwing tip in a clockwise direction.
 - b. Insert penlight into black rubber-lined friction mounting port located immediately behind head of microscope.
3. Determine whether the black or white side of the stage plate will provide best contrast with the specimen to be viewed. The white side will be used for most viewing. It will always be required when viewing transparent specimen slides because it better reflects light through specimen slide.

To reverse black/white plate, loosen locking set screw located at front of base with "L" hex wrench provided. Insert plate with selected surface facing up. Tighten locking set screw.

4. If your model has top (incidental) illumination only, select and position plastic stage plate as described under "3" above.
5. If your model has both top (incidental) and bottom (transmitted) illumination:

Three switches are on top of base: (1) main power on/off, (2) "I" switch controls incident (top) light, (3) "T" switch controls transmitted (bottom) light.

This model is furnished with two 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.). On this model, locking set screw is located on one side of base.

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.

The black/white contrast plate can be used when viewing opaque objects or for dissecting. Choose side of plate providing best contrast with specimen. Remember, do not use bottom light with this plate in place.

INTERPUPILLARY ADJUSTMENT

This permits each user to adjust spacing between eyepieces in order to accommodate distance between their eyes. Observe that each eyepiece tube on each side of microscope head is mounted on its own gray metal housing. While looking through microscope, use both hands to firmly grasp gray metal housing and gently pull or push the sides in a horizontal path until images viewed through both eyepieces appear as one and field of view appears as one circle of light.

FOCUSING

1. Place object or specimen slide in center of stage plate.
2. The viewing head is mounted on a post, and height of head can be adjusted up or down on post in order to focus on difference sized specimen. Loosen the post locking knob located on back of focus block so that viewing head can move freely up or down on post.
3. While looking through microscope, move head up or down on post until image is in approximate focus. 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.
4. Rotate focusing knobs with both hands until specimen comes into sharp focus in right side of microscope.
5. Because most people have some difference in vision between the left and right eye, your microscope is equipped with a diopter adjustment on the left eyepiece to compensate for this difference and assure that you will see one corrected image when looking through microscope.

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, 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.

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.

OPTICAL MAINTENANCE

1. Do not attempt to disassemble any lens components. Consult a microscope service technician when any repairs not covered by instructions are needed.
2. Prior to cleaning any lens surface, brush dust or lint off lens surface using a camel hair brush. You can also use an ear syringe or canned compressed air, such as that sold by most computer stores.
3. To clean eyepiece lenses, do not remove from eyepiece tube. Clean only the outer lens surface. Breath on lens to dampen surface, then wipe with lens paper or tissue. Avoid wiping dry lens surface as lenses are scratched easily. If excessive dirt or grease gets on lens surface, a small amount of 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.

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.

To clean metal parts, use a clean, damp cloth to remove dust or dirt from surfaces. Then, completely dry surfaces with a dry cloth.

ELECTRICAL MAINTENANCE

WARNING: For your safety, turn switch off and remove plug from power source before maintaining your microscope. Wiring and transformer contained in base of illuminated models should be repaired only by qualified technicians.

1. To replace top light (TL & TBL models only), you will require National part #800-400, 12v 10 watt tubular bulb, or bulb of exact same specifications from other microscope manufacturers.

Remove knurled lamp retaining screw, located on side of top lamp cover, and remove cover from lamp. Remove lamp from pressure clips by pulling straight out. Holding new lamp with tissue or cloth to avoid getting body oil on lamp, push into pressure clips. Replace lamp cover and secure with knurled lamp retaining screw.

- To replace bottom light (TBL models only), you will require National part #800-400, same as above.

Remove stage plate and observe lamp held in place by pressure clips in base. Carefully grasp bulb and remove from clips by pulling straight out. Holding new bulb with tissue or cloth to avoid getting body oil on lamp, push into pressure clips. Replace stage plate.

- Replacement of fuse (TL & TBL models only).

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 holder.

TROUBLESHOOTING

PROBLEM	REASON FOR PROBLEM	SOLUTION
Light fails to operate. (TL & TBL models only)	Outlet inoperative. AC power cord not connected. Lamp burned out. Fuse blown.	Have qualified service technician repair outlet. Plug into outlet. Replace lamp. Replace fuse.
Unable to focus.	Head of microscope drops from its own weight.	Adjust tension control.
Poor resolution (image not sharp)	Objective lenses dirty. Eyepiece lens dirty.	Clean objective lenses. 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:

This series is designed to provide optimum optical and mechanical performance at minimum cost. Therefore, the design is “complete”. It does not incorporate provisions for changes or additions (which would increase manufacturing cost without increasing the basic good quality performance for which it is designed). The only optional accessory available is WF15x eyepieces, which serve to increase magnification by 50%.

#615-400	WF15X Eyepieces (pair)
#800-400	Replacement bulb, 12v 10w, for all illuminated models
#801-050	Replacement fuse, 0.50 amp, for 400TL 120v version
#801-100	Replacement fuse, 1.0 amp, for 400TBL 120v version
#903	Penlight illuminator (for 400-10-2 non-illuminated model only). Requires 2 each AAA batteries (not included).
#940-410	Replacement frosted glass stage plate, 80mm dia. (405 Series only)
#941-410	Replacement black/white plastic contrast plate, 80mm dia. (405 Series only)
#941-460B	Replacement black plastic contrast plate, 80mm dia. (405 Series only)
#941-460W	Replacement white plastic contrast plate, 80mm dia. (405 Series only)

WARRANTY - 5 YEAR LIMITED WARRANTY

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



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