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INSTRUCTIONS FOR STEREOSCOPIC ZOOM MICROSCOPE MODELS

440-440PLL (Binocular Head)
440-440P (Binocular Head)

440T-440PLL (Trinocular Head)
440T-440P (Trinocular Head)

Notice: The first three digits of the model number, for example 440- or 440T-, represent the optical portion of your microscope. Thus, all models starting with 440 have the same binocular head, and all models starting with 440T have the same trinocular head. Procedures for use of the head are the same, regardless of the stand supplied with your specific model.

The digits following the first – (dash) represent the stand portion of your microscope. The different stands available have features and functions unique to each.

You made your selection of stands when you originally purchased your microscope. The above explanation is provided so that when ordering and installing replacement bulbs you use the correct bulb for your particular model number.

Models with PLL have the dual LED base
Models with P have the Plain base

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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

1. Carefully remove microscope stand and head assembly from cartons. Remove rubber eye shields, eyepieces, frosted stage plate, dustcover, and "L" hex key wrench (used for changing stage plates). The black/white contrast plate (80mm diameter) is already mounted in the microscope base. (Models with – P do not include frosted stage plate, "L" hex key wrench.)
2. Make certain not to touch any of the lens surfaces while handling the microscope. Dust, dirt, fingerprints can damage the delicate lens surfaces or adversely affect image quality.
3. 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

1. Mounting the stereo zoom head to stand
 - A. Loosen head locking screw and head retaining screw.
 - B. Insert head into the stand (do not force), positioning head to face either forward or backward, whichever suits your preference or needs.
 - C. Tighten head retaining screw and head locking screw.
2. Install rubber eyepiece shields over top of eyepieces.

OPERATION

1. ILLUMINATION (only for models with illuminators)
 - A. Before operating microscope, adjust intensity control located on side of base to the minimum position. This should be done prior to each time light is turned on or off. Failure to do so will significantly shorten bulb life.
 - B. Make certain that the main voltage of your microscope corresponds to the voltage of your power outlet, either 120v or 220v. Insert microscope plug into matching voltage outlet.
 - C. The microscope 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.) The plastic black/white contrast plate can be used when viewing opaque objects or for dissecting. Choose side of plate providing best contrast with specimen.
 - D. There are two rocker type light controls located on top surface of microscope base.

"I" = Turns incidental light on (top illumination)
"T" = Turns transmitted light on (substage illumination)

NOTE: USE TRANSMITTED ILLUMINATION ONLY WITH FROSTED GLASS STAGE PLATE IN PLACE. HEAT GENERATED IN BASE FROM BOTTOM LIGHT WILL WARP OR DAMAGE THE PLASTIC BLACK/WHITE PLATE. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY.

Remove black/white stage plate by loosening locking set screw located on front of base with supplied "L" wrench. Install frosted glass stage plate. Tighten locking set screw.

Incidental illumination can be used with either frosted glass plate or black/white plastic stage plate. The top light has an intensity control located on side of base. When using incidental light, always set intensity control at its lowest level before turning lamp on or off. This measure will extend bulb life. The top light can also be centered on specimen by using the top light beam adjustment screw. This allows user to select the best spot illumination required for specimen being viewed.

Transmitted and incidental illumination combined can provide extra illumination for certain objects where additional top illumination will enhance the object being viewed.

2. INTERPUPILLARY ADJUSTMENT

This permits each user to adjust spacing between eyepieces in order to accommodate distance between their eyes. While looking through the microscope eyepieces with both eyes, grasp eyepiece tube housings with both hands and rotate them on their axis, moving eyepieces apart or together until a full field of view is observed and images blend into one. Interpupillary distance is now corrected for your own inter-ocular distance and does not require further adjustment later unless another user changes this adjustment.

3. FOCUSING

- A. Adjust zoom control knobs (located on both sides of head) so that the lowest magnification number "1" is positioned at the black index dot on head. Lower magnifications have larger fields of view, making it easier to position and locate area to be viewed.
- B. Place a flat object or specimen slide (cover glass up), on stage plate.
- C. Position focusing knobs in the center of focusing range.
- D. On post mounted models, the height of viewing head can be adjusted up or down on the post in order to focus on difference sized objects. Loosen the locking knob located on the locking support collar, allowing the support collar to slide down to bottom of post. While firmly holding viewing head with one hand, loosen locking knob located on back of focusing assembly so that head can move freely up or down on post.

While looking through microscope, move viewing head up or down on post until object can be seen in approximate focus. Tighten focusing assembly locking knob. Position the support collar under the focusing block and tighten locking knob on support collar. It is not necessary to make this adjustment every time you change objects to be viewed, so long as the different objects are of similar thickness or height.

- E. Both eyepieces have knurled diopter adjustment rings. Rotate both left and right diopters in a clockwise direction to the lowest position.
- F. Adjust zoom control to the highest magnification by aligning the number "4" on knob to the black index dot on head.
- G. While looking through right eyepiece with one eye, rotate focusing control knob until specimen comes into sharp focus through right eyepiece.
- H. Adjust zoom control knob to the lowest magnification.
- I. Adjust the right diopter until the image is sharp. Do not change the focusing knob position.
- J. Without changing the position of the focusing knob, adjust the left eyepiece diopter until you obtain a sharp image in left eyepiece. the image should now be sharp throughout the zoom power range.

Specification Chart

Eyepiece	Magnification (X)	Standard Objectives		Auxiliary Objectives									
				0.3X		0.5X		0.7X		1.5X		2X	
		WD 100mm		WD 287mm		WD 165mm		WD 120mm		WD 47mm		WD 30mm	
		Mag. (X)	F.N. (mm)	Mag. (X)	F.N. (mm)	Mag. (X)	F.N. (mm)	Mag. (X)	F.N. (mm)	Mag. (X)	F.N. (mm)	Mag. (X)	F.N. (mm)
10X/20	0.75	7.5	26.67	2.25	88.89	3.75	53.33	5.625	38.10	11.25	17.78	15	13.33
	1	10	20	3	66.67	5	40.00	7.5	28.57	15	13.33	20	10.00
	2	20	10	6	33.33	10	20.00	15	14.29	30	6.67	40	5.00
	3	30	6.67	9	22.22	15	13.33	22.5	9.52	45	4.44	60	3.33
	4	40	5	12	16.67	20	10.00	30	7.14	60	3.33	80	2.50
	4.5	45	4.44	13.5	14.81	22.5	8.89	33.75	6.35	67.5	2.96	90	2.22
15X/16	0.75	11.25	21.33	3.375	71.11	5.625	42.67	8.4375	28.44	16.875	14.22	22.5	10.67
	1	15	16	4.5	53.33	7.5	32	11.25	21.33	22.5	10.67	30	8
	2	30	8	9	26.67	15	16	22.5	10.67	45	5.33	60	4
	3	45	5.33	13.5	17.78	22.5	10.67	33.75	7.11	67.5	3.56	90	2.67
	4	60	4	18	13.33	30	8	45	5.33	90	2.67	120	2
	4.5	67.5	3.56	20.25	11.85	33.75	7.11	50.625	4.74	101.25	2.37	135	1.78

4. ADAPTING SLR OR C-MOUNT CAMERA (to trinocular model only)

(c.)

- A. Trinocular model #440T is equipped with a port (a.) on top of binocular head. By using the included C-mount camera, cameras can be mounted onto the microscope.

This is a 50/50 fixed trinocular head SLR adaptor

- B. To mount SLR camera, the accessory #930-420 SLR adaptor is required (not included).

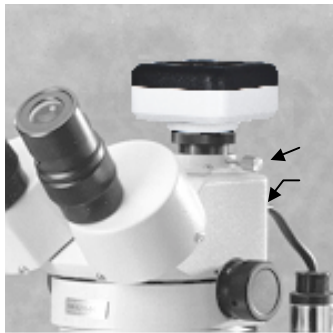
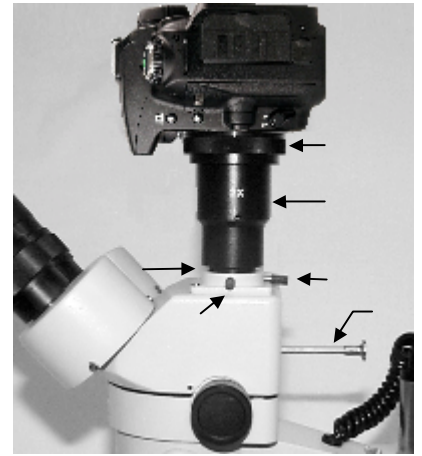
(c.) (b.)
Remove front lens of SLR camera. Attach appropriate T-mount in place of front camera lens. Screw threaded end of T-mount onto threaded end of SLR adaptor.

Locate two knurled screws (c.) located on side of trinocular port on microscope. Turn both screws counter-clockwise to permit removal of black plastic disk covering trinocular port.

Insert SLR adaptor tube, with camera already mounted to adaptor, into trinocular port. If adaptor does not insert easily, further loosen knurled screws at side of port until adaptor tube drops into port and is firmly seated. Retighten knurled screws to secure adaptor and camera in place. Pull sliding rod (b.) until fully extended, to direct microscope image to trinocular port.

Proceed with operation of camera according to manufacturers directions.

- C. To mount C-mount ready camera use the included C-mount adapter. This adaptor has a 0.5x lens which assures image parfocality when viewed through a video monitor.



Thread the front of the camera onto threads of C-mount adapter.

Locate two knurled screws (c.) located on side of trinocular port on microscope. Turn both screws counter-clockwise to permit removal of black plastic disk covering trinocular port.

Insert C-mount adapter into trinocular port.

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, replace it 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 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.
- C. 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 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 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 the microscope might 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.

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 (only for models with illumination)

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

- A. To replace top bulb (National bulb #800-422) remove light shade by rotating in a counterclockwise direction. Remove light housing by rotating in a counterclockwise direction. Remove light bulb by firmly grasping and pulling straight out from bi-pin socket. Note that this socket holds bulb securely, so you might have to pull rather firmly. Using a cloth, hold new bulb and gently push new bulb into bi-pin socket. Replace light housing and light shade.
- B. Replacement of fuse.
The fuse is located on the bottom 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.
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.		

LIMITED LIFETIME WARRANTY

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

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