



National Optical & Scientific Instruments Inc.
6508 Tri-County Parkway
Schertz, Texas 78154
Phone (210) 590-9010 Fax (210) 590-1104

INSTRUCTIONS FOR
425/425T SERIES
STEREOSCOPIC ZOOM MICROSCOPES

JOIN OUR SOCIAL NETWORK TO WIN!



Like us on Facebook to enter a drawing for a **FREE** Swift Optical Instruments Lab Manual.*



Follow us on Twitter for a chance to win a **FREE** Motic digital camera.*



Join our blog to discover what's happening in the science education industry and enter to win a Starbucks gift card.*

A smart (phone) way to see us on the web



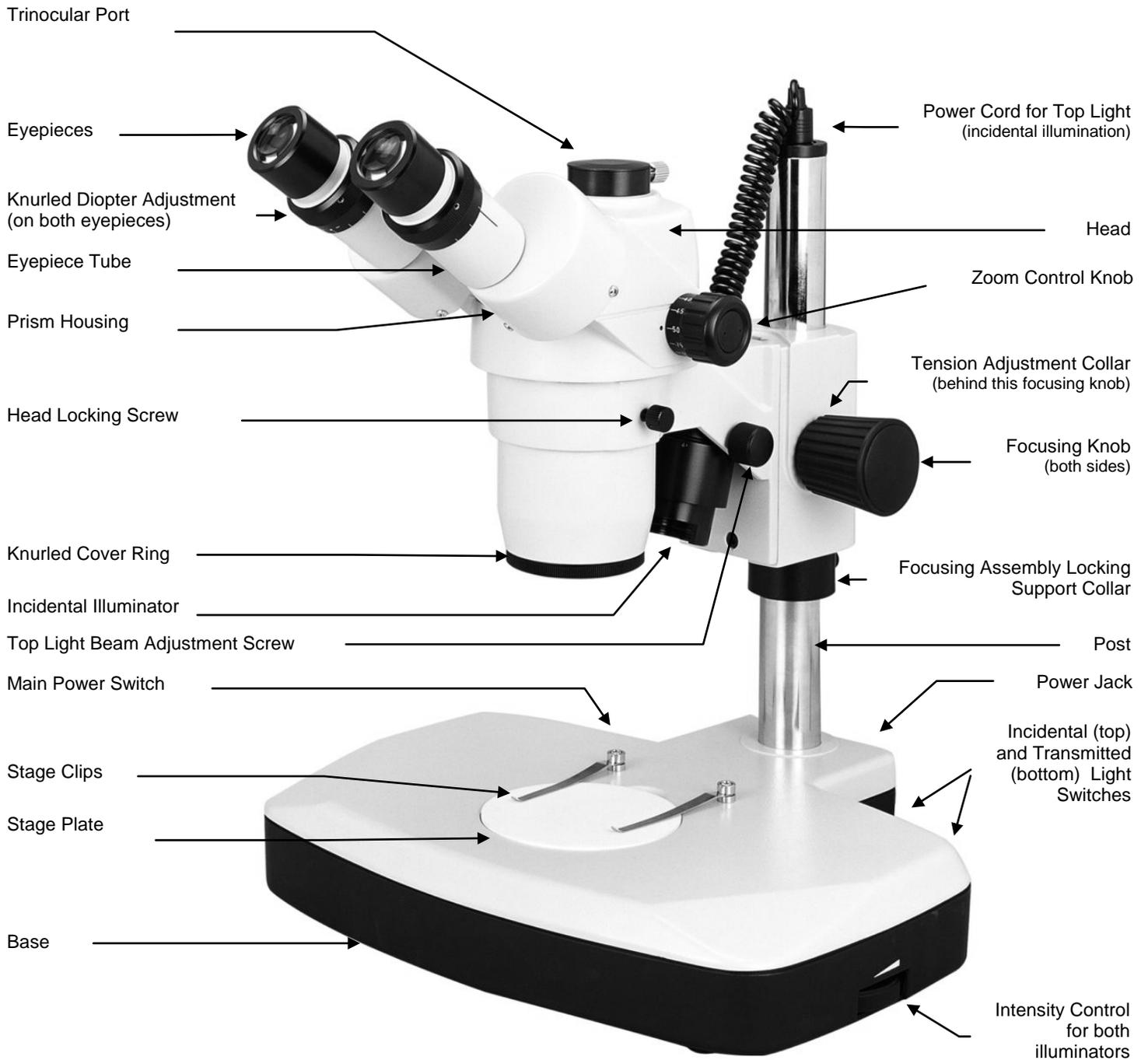
*Drawings done monthly, winners will be posted on our website



MICROSCOPES & DIGITAL IMAGING PRODUCTS

Find out more at: www.nationaloptical.com

Illustrated: Model 425T-440PLL-10



Stereoscopic microscopes are designed for viewing 3-dimensional objects, inspection or assembly of small parts, and for dissection of biological specimen at low magnification. The 35° inclined viewing head provides an upright, unreversed image which permits easy manipulation of object being viewed while looking through the microscope. The incidental and transmitted illuminators incorporate high intensity Lambertian, 5500K color temperature 3 watt LED lamps.

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

Remove and unpack box A containing the head holder/focusing block mechanism. Remove and unpack box B containing one pair of eyepieces, 2 each rubber eyeshields, 0.90mm and 2mm "L" hex key wrench, "pin spanner wrench" (used to adjust focusing tension), 95mm frosted stage plate and dust cover. Remove and unpack box C containing zoom head assembly. Remove corrugated stand retainer C and carefully remove microscope post stand with 90mm diameter black/white contrast plate installed from master carton. Remove and unpack box D containing AC power cord, 12 volt switching power adaptor.

1. 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.
2. Examine packing material before you discard it. Retain the packing boxes 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 original boxes and then pack these boxes in outer corrugated shipping container for optimum protection. Use of the inadequate packing will not provide adequate protection in transit, and will void your warranty.

ASSEMBLY

Place the microscope post stand on a flat stable and clean surface.

1. Mounting the focusing assembly to the microscope post stand.
 - A. Tighten support collar locking screw located on post stand.
 - B. Loosen focusing block locking screw locate on back of focusing block
 - C. Slide focusing block over 32mm diameter vertical post of stand
 - D. Tighten focusing block locking screw
2. Mounting stereo zoom head to stand.
 - A. Loosen head locking 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 locking screw.
3. Remove the black dust caps from the eyepiece tubes and carefully insert the eyepieces.
4. Install rubber eyepiece shields over top of eyepieces.
5. Connect the coaxial plug, from incidental illuminator, into power jack located on top of 32mm diameter post.
6. Plug the 2 pin connector located at one end of AC power cord into receptacle on side of power adapter. Plug other end of AC cord into appropriate 100 to 240 volt AC outlet (Adaptor automatically adjusts to 12 volt output). Plug the 12 volt DC coaxial plug into power jack located on rear of microscope base.

OPERATION

1. ILLUMINATION
 - A. 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.

To change plates, remove black/white stage plate by putting finger in relief and press edge of stage plate to the front of base and remove plate. Install frosted glass stage plate by inserting into opening and pressing forward and down into base.

- B. There are three rocker type light controls located on the rear surface of microscope base.
 - MAIN = Turns power ON and OFF
 - "I" = Turns incidental light ON and OFF (top illumination)
 - "II" = Turns transmitted light ON and OFF (sub stage illumination)
- C. Light intensity control located on side of base. This control varies the light intensity of either the transmitted or incidental LED illuminators.
- D. Turn main power switch to ON position.
- E. Select and push appropriate rocker switch to ON position to turn desired incidental or transmitted illuminators on.
- F. Adjust brightness of LED illuminator with intensity control knob located on side of microscope, rotating control varies intensity of both transmitted and incidental illuminators.

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 ".75" (magnification markings are located on right knob) 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. The height of viewing head can be adjusted up or down on the post in order to focus on different 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.

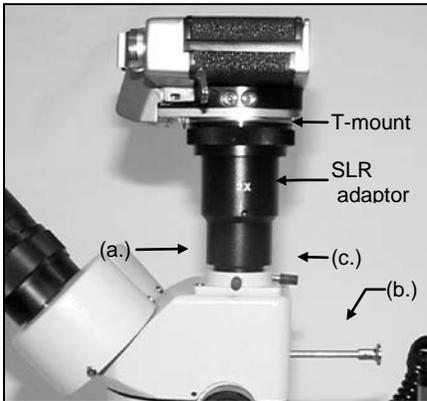
While looking through microscope, move viewing head up or down on post until object can be seen in approximate focus. Tighten focusing assembly locking knob. Position the support collar under the focusing block and tighten locking knob on support collar. It is not necessary to make this adjustment every 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 diopter so that the crossline on adjustable diopter aligns with vertical lines located on ocular tube.
- F. Adjust zoom control to the highest magnification by aligning the number "5" (magnification markings located on right hand zoom 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 (.75).
- 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

Eyepieces	Zoom Objective Position	Standard Objective (supplied)		Auxiliary Objective 0.5X (Optional) # 705-425		Auxiliary Objective 1.5X (Optional) # 715-425	
		Working Distance 113mm		Working Distance 192mm		Working Distance 50mm	
		Total Magnification	Field Size	Total Magnification	Field Size	Total Magnification	Field Size
WF5X Field No.23 (Optional) # 605-425 Does Not Accept Reticle Interpupillary Distance 52~77	.75X	3.8X	30.7	1.9X	61.3MM	5.6X	20.4mm
	1X	5X	23mm	2.5X	46mm	7.5X	15.3mm
	2X	10X	11.5mm	5X	23mm	15X	7.7mm
	3X	15X	7.7mm	7.5X	15.3mm	22.5X	5.1mm
	4X	20X	5.8mm	10X	11.5mm	30X	3.8mm
	5X	25X	4.6mm	12.5X	9.2mm	37.5X	3.1mm
WF10X Field No. 23 (Supplied) # 610-425 Accepts Reticle 24.95mm O.D. Interpupillary Distance 49~74mm	.75	7.5X	30.7	3.8X	61.3	11.3X	20.4mm
	1X	10X	23mm	5X	46mm	15X	15.3mm
	2X	20X	11.5mm	10X	23mm	30X	7.7mm
	3X	30X	7.7mm	15X	15.3mm	45X	5.1mm
	4X	40X	5.8mm	20X	11.5mm	60X	3.8mm
	5X	50X	4.6mm	25X	9.2mm	75X	3.1mm
WF15X Field No. 17 (Optional) # 615-425 Does Not Accept Reticle Interpupillary Distance 47~72mm	.75X	11.3	22.7mm	5.6X	45.3	16.9X	15.1mm
	1X	15X	17mm	7.5X	35mm	22.5X	11.3mm
	2X	30X	8.5mm	15X	17mm	45X	5.7mm
	3X	45X	5.7mm	22.5X	11.3mm	67.5X	3.8mm
	4X	60X	4.3mm	30X	8.5mm	90X	2.8mm
	5X	75X	3.4mm	37.5X	6.8mm	112.5X	2.3mm
WF20X Field No. 13 (Optional) # 620-425 Does Not Accept Reticle Interpupillary Distance 46~71mm	.75X	15X	17.3mm	7.5X	34.7mm	22.5X	11.6mm
	1X	20X	13mm	10X	26mm	30X	8.7mm
	2X	40X	6.5mm	20X	13mm	60X	4.3mm
	3X	60X	4.3mm	30X	8.7mm	90X	2.9mm
	4X	80X	3.3mm	40X	6.5mm	120X	2.2mm
	5X	100X	2.6mm	50X	5.2mm	150X	1.7mm

4. ADAPTING CCTV VIDEO CAMERA OR SLR CAMERA to microscope (Trinocular Model Only)



- A. Trinocular model #425T is equipped with a port (a.) on top of binocular head. By using optional accessory adaptors, either CCTV video or 35mm SLR cameras can be mounted onto the microscope.

These models are also equipped with a sliding rod (b.) located on the backside of the head. When this rod is pushed completely into the head, the microscope image is directed 100% into both eyepieces of the microscope. When this rod is pulled as far as possible away from the head, the microscope image is directed into the trinocular post. You will still be able to observe image through right eyepiece, but no image will be visible through left eyepiece.

- B. To mount SLR camera, the accessory #930-425 SLR adaptor (not included) is required, along with a T-mount available from any camera store. This accessory has a 2.0x photo lens incorporated within the adaptor.

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 knurled screw (c.) located at the front of trinocular port on head. Loosen knurled locking screw 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 screw at front of port until adaptor tube drops into port and is firmly seated. Retighten knurled screw 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 manufacturer's directions.

- C. To mount CCTV or digital camera, the accessory #930-426 video adaptor (not included) is required. This adaptor has a 0.45x lens that includes an adjustable diopter which assures image parfocality when viewed through a video monitor.

Observe that video adapter has two black knurled rings. If your CCTV camera has a 1/2 inch chip, leave both knurled rings in place, thereby creating a "CS" type mount. If your CCTV camera has a 1/3 inch chip, remove only the top black knurled ring from CS-mount by turning counter-clockwise. The remaining video adaptor is a "C" type adaptor.

Remove front lens from CCTV camera. Thread front of camera onto threads of video adaptor.

Locate knurled screw (c.) located at the front of trinocular port on head. Turn knurled locking screw in a counter clockwise direction to loosen screw and to permit removal of black plastic disk covering trinocular port.

Insert video adaptor tube into trinocular port. If adapter does not insert easily, further loosen knurled screws at side of port until adaptor tube drops into port and is firmly seated. Retighten knurled screw 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 video camera and TV monitor according to manufacturer's directions. If microscope image, as viewed through TV monitor does not remain in focus when microscope magnification is changed, recheck CCTV camera chip size. Perhaps it will be necessary to either replace or remove the top black knurled ring in order for the video adaptor to be compatible with the chip size of your CCTV camera.

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 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. The tension adjustment collar (chrome ring with 8 holes) is located between arm and focus knob on left and right sides of microscope. With the supplied 0.90 "L" hex key wrench, locate and loosen the hex socket set screw located in one of the 8 holes of the tension adjustment collar. . Your microscope was supplied with a pin spanner wrench having one prong. Insert pin of the wrench into one of the holes located in adjustment collar, turn collar clockwise to tighten tension, counter-clockwise to loosen tension. After adjusting tension tighten the small hex socket 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

To replace the extra long life LED transmitted (bottom) illuminator bulb.

- A. Using a 3mm "L" hex key wrench, remove the 6 hex head cap screws securing black plastic illuminator base to the microscope pole -base.
- B. Carefully unplug the LED top light connector (attached to socket marked LED) from circuit board.
- C. Carefully unplug the LED bottom light connector (attached to socket marked LED) from circuit board.
- D. Using a 5.5mm hex nut driver remove two nuts from the 3mm screws securing light bracket to black base tray.
- E. Using a Phillips screw driver remove three each 3mm Phillips head screws securing light housing to lamp bracket.
- F. Using a Phillips screw driver remove two 3mm Phillips head screws securing LED bulb assembly to lamp bracket
- G. Remove LED bulb and replace assembly with #800-425 LED bulb.
- H. Replace lamp mounting screws (2 ea), light housing screws (3ea), lamp bracket mounting screws and nuts (2ea)
- I. Carefully plug the LED top light connector into socket marked LED on circuit board.
- J. Carefully plug the LED bottom light connector into socket marked LED on circuit board.

The extra long life LED incidental (top) illuminator bulb must be replaced at the factory. Remove the incidental top illuminator assembly from the microscope focusing block by loosening the two black knurled knobs located on each side of illuminator and unplug the power cord from the vertical post. Return the illuminator to National for replacement of the LED bulb.

TROUBLESHOOTING

PROBLEM	REASON FOR PROBLEM	SOLUTION
A light fails to operate.	Items not properly connected	Check all electrical connections from AC wall outlet to microscope input.
	Switches not in proper position.	Check switches and intensity controls.
	Transmitted LED bulb burned out.	Replace LED bulb
	Incidental LED bulb burned out.	Send lamp assembly to National for bulb replacement.
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.		

OPTIONAL ACCESSORIES AND PARTS:

#600-425	Eyepiece shields, rubber, pair
#605-425	WF5X Eyepieces
#610-425	WF10X Eyepieces
#615-425	WF15X Eyepieces
#620-425	WF20X Eyepieces
#705-425	Auxiliary 0.5x objective lens
#715-425	Auxiliary 1.5x objective lens
#800-425	LED bulb transmitted illuminator. 5500K color temperature, 3 watt Lambertain
#907	Fluorescent ring light illumination, 110v, 12w (Requires 931-425 adaptor to mount to 425/425T microscope)
#930-425	SLR adaptor with 2.0 photo lens
#930-426	Video "C" mount focusable camera adaptor with 0.45x lens for 1/3" CCD
#931-425	Ring light adaptor used to adapt #907 Fluorescent ring light illuminator to 425/425T microscopes.
#940-425	Frosted glass stage plate, 95mm
#941-425	Black/White plastic contrast plate, 95mm
#965-425-05	Eyepiece reticle, 5mm scale/100, 1 division 0.05mm, 24.95mm diameter.
#965-425-10	Eyepiece reticle, 10mm scale/100, 1 division 0.1mm, 24.95mm diameter

LIMITED LIFETIME WARRANTY

National warrants this microscope to be free from defects in material and workmanship under normal use and service for the life of the instrument. This limited lifetime warranty excludes all internal electrical components which are only warranted for a period of one year. The warranty does not cover damage resulting from abuse or misuse, repairs or alterations performed by other than authorized repair technicians, or damage occurring in transit. The warranty does not cover bulbs, power supplies, rechargers, batteries, fuses, cords, or add-on accessories such as mechanical specimen holders that are not built into the microscope stage as an integral part of original manufacture. Warranty does not cover lenses that have become inoperable due to excessive dirtiness as a result of misuse or lack of normal maintenance.

Any cameras and software supplied with this microscope are warranted from date of purchase as follows:

Camera, 1-year limited warranty: Manufacturer warrants camera to be free from defects in material and workmanship under normal use and service for 1 year from date of purchase. It does not cover damage resulting from abuse or misuse, repairs or alterations performed by other than the manufacturer, or damage occurring in transit.

Software, 90-day limited warranty: Manufacturer warrants software to be free from defects in material and workmanship under normal use and service for 90 days from date of purchase.

Other than set forth above, National hereby disclaims all warranties, express or implied, of fitness for a particular purpose.

While it is not necessary to register your purchase of a microscope, any camera or software must be registered by completing and mailing the warranty registration card enclosed with such product.

For warranty service, instrument should be well packed to avoid damage in transit, accompanied by a description of the difficulty and return instructions, and shipped postage prepaid to National at the address below. National will repair or replace at no charge and return postage prepaid. *For customers living outside the United States, National will provide standard warranty service. However, inbound & outbound shipping cost is the responsibility of the consumer.* If failure was caused by misuse, alterations, accident or abnormal conditions of operation, an estimate for repairs will be submitted for approval prior to work being performed.

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state. If you have questions concerning this product or warranty, contact the dealer from which it was purchased. You may also contact National at the following address and ask for warranty assistance.

If you have questions concerning this product or warranty, contact dealer from which it was purchased. Or contact National, asking for warranty assistance.