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INSTRUCTIONS FOR

MODEL DC3-420TH

STEREOSCOPIC ZOOM MICROSCOPE WITH DIGITAL CAMERA

(For microscope operation only. Camera operation covered in separate
Motic Image 2000 manual included with your microscope)

HOW TO USE YOUR MICROSCOPE SERIAL NUMBERS

1. Microscope serial number: This number (etched on the post base) is the number under which your warranty is registered.
2. Microscope DM number: This number (found on a white sticker on the bottom of the microscope) is used for logging on the Motic web site, which gives you the ability to download free software upgrades.
3. Motic CD DM number: This number is to be used to register the software when loaded on the computer for the first time.

About the Digital Microscope

The manual for your new digital microscope is in two parts. This first part describes the basic nomenclature and functions of the microscope, which can be used as a fully functional microscope, independent of the camera. The second part is the **Motic Images 2000 User's Manual**, which provides detailed documentation for installation and operation of the **Motic Images 2000** software. In order to achieve optimum results, it is important that you carefully read both this and the documentation manuals before operating your microscope or camera.

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.

UNPACKING

1. Your microscope is packed with the following components, all of which have been checked at the factory. Carefully remove all components and check against this list. Retain styrofoam container in case microscope must be transported or returned to factory for any reason.

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

- A. Microscope, with WF10x eyepieces (pair)
 - B. Two instruction manuals (this and separate software documentation)
 - C. CD Motic Images 2000
 - D. Calibration slide
 - E. 12VDC switching power supply, operates on 100v-240v, 50H/60H
 - F. Power cord
 - G. USB cable (for connecting to computer)
 - H. S cable (for connecting to high resolution video monitor)
 - I. RCA cable (for connecting to standard resolution video or projector)
 - J. Rubber eyecups (pair)
 - K. Frosted glass stage plate
 - L. Frosted blue filter
 - M. Plastic black/white contrast plate (inserted in microscope stage)
 - N. "L" hex wrench (for changing stage plates)
 - O. Dustcover
 - P. Warranty card
2. 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

The microscope is packed full assembled, except minor parts.

1. Install the rubber eyecups over the top edge of the eyepieces.
2. Attach female cable connector to male connector located on top of post.
 - A. Align the key-way slot located on the 7-pin female cable connector to the key located in the male connector on the post.

- B. Lock connector into position by pressing down on the black strain relief until the connector snaps into locked position.
3. Use "L" hex key wrench to loosen locking set screw below front edge of stage, to permit removal of plastic stage plate.
4. At this point, you may insert either the plastic contrast plate, or the frosted glass stage plate (see Notice under operation instructions below), following instructions listed under "operation" below.

OPERATION

Your microscope is fully functional as a standard microscope. The following instructions apply only to operation of the microscope. Refer to the **Motic Images 2000 User's Manual** for instructions for installation of the software and operation of the camera. Some steps for microscope operation are altered slightly in the software documentation, in order to utilize some of the unique features provided by the digital camera and software.

1. ILLUMINATION

- 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, in order to extend bulb life.
- B. Supplied is a 12VDC switching power converter and separate power cord. Note that the switching power converter will operate on either 120v or 240v current, 50hertz or 60 hertz.

Plug one end of power cord into 12VDC power converter and other end into power outlet. Plug 12VDC power converter into power jack on base of microscope.

- 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 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)

NOTE: USE TRANSMITTED ILLUMINATION ONLY WITH FROSTED GLASS STAGE PLATE AND BLUE FILTER 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. Insert daylight blue filter into machined groove provided in center of base. 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.

- E. Camera is turned on by separate on/off switch located on back of microscope base. Always remember that for the digital microscope to function, the camera must be turned on, in addition to turning on microscope illumination.

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. Viewing head is mounted on a post. 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.
- E. 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.
- F. Both eyepieces have knurled diopter adjustment rings. Rotate both left and right diopters in a clockwise direction to the lowest position.
- G. Adjust zoom control to the highest magnification by aligning the number "4" on knob to the black index dot on head.
- H. While looking through right eyepiece with one eye, rotate focusing control knob until specimen comes into sharp focus through right eyepiece.
- I. Adjust zoom control knob to the lowest magnification.
- J. Adjust the right diopter until the image is sharp. Do not change the focusing knob position.
- K. 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.

SPECIFICATIONS

Use of eyepieces other than WF10x will affect microscope magnification according to the chart below. However, the digital camera uses a constant eyepiece factor of 10x. Therefore, regardless of eyepieces used in microscope, use of auxiliary objectives will affect camera image on computer or video monitor only to the extent listed in the second segment below, that following “WF10 eyepieces.” Any reticle installed in eyepiece will be visible only when viewing through microscope, and will not be visible on computer or video monitor.

Specification Chart

Eyepieces	Zoom Objective Position	Standard Objective 1X (supplied)		Auxiliary Objective 0.5X (Optional)		Auxiliary Objective 0.75X (Optional)		Auxiliary Objective 1.5X (Optional)	
		Working Distance – 79mm		Working Distance - 137mm		Working Distance – 90mm		Working Distance - 34mm	
		Total Magnification	Field Size	Total Magnification	Field Size	Total Magnification	Field Size	Total Magnification	Field Size
WF5X Field No.22 (Optional) (No Reticle Holder) Interpupillary Distance 59~83	1X	5X	22mm	2.5X	44mm	3.75X	29.3mm	7.5X	14.7mm
	2X	10X	11mm	5X	22mm	7.5X	14.6mm	15X	7.3mm
	3X	15X	7.3mm	7.5X	14.7mm	11.25X	9.8mm	22.5X	4.9mm
	4x	20X	5.5mm	10X	11mm	15X	7.3mm	30X	3.7mm
WF10X Field No. 20 (Supplied) Accepts Reticle 22.8mm O.D. Interpupillary Distance 54~78	1X	10X	20mm	5X	40mm	7.5X	26.7mm	15X	13.3mm
	2X	20X	10mm	10X	20mm	15X	13.3mm	30X	6.7mm
	3X	30X	6.7mm	15X	13.3mm	22.5X	8.9mm	45X	4.4mm
	4x	40X	5mm	20X	10mm	30X	6.7mm	60X	3.3mm
WF15X Field No. 13 (optional) (No Reticle Holder) Interpupillary Distance 50.5~74.5	1X	15X	13mm	7.5X	26mm	11.25X	17.3mm	22.5X	8.7mm
	2X	30X	6.5mm	15X	13mm	22.5X	8.7mm	45X	4.3mm
	3X	45X	4.3mm	22.5X	8.7mm	33.75X	5.8mm	67.5X	2.9mm
	4x	60X	3.25mm	30X	6.5mm	45X	4.3mm	90X	2.2mm
WF20X Field No. 10 (optional) (No Reticle Holder) Interpupillary Distance 52~76	1X	20X	10mm	10X	20mm	15X	13.3mm	30X	6.7mm
	2X	40X	5mm	20X	10mm	30X	6.7mm	60X	3.3mm
	3X	60X	3.3mm	30X	6.7mm	45X	4.4mm	90X	2.2mm
	4x	80X	2.5mm	40X	5mm	60X	3.3mm	120X	1.7mm
Model		Specimen Height		Specimen Height		Specimen Height		Specimen Height	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
DC3-420T		0.0mm	93mm	0.0mm	19mm	0.0mm	66mm	0.0mm	120mm

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 xylene 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 is located between arm and focus knob on left side of microscope. With a jewelers type screwdriver, loosen slotted set screw located on knurled surface of the tension adjustment collar. Turn collar clockwise to tighten tension, counter-clockwise to loosen tension. After adjusting, tighten the 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 replacement. **BE CERTAIN TO TURN SWITCHES OFF AND REMOVE PLUG FROM POWER SOURCE OUTLET BEFORE CHANGING BULBS.**

- A. To replace top bulb (factory #800-422 12v 15 watt halogen), remove light shade by rotating in a counter-clockwise direction. Remove light housing by rotating in a counter-clockwise 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. To replace bottom bulb (factory #800-170) remove cover plate located on bottom of base by removing four rubber feet that secure cover to base. Holding lamp with a cloth, gently pull lamp straight out from socket. Push new lamp into place in same manner and replace cover plate.

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.
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:

#605-400	WF5X Eyepieces
#615-400	WF15X Eyepieces
#620-400	WF20X Eyepieces
#705-420	Auxiliary 0.5x objective lens
#775-420	Auxiliary 0.75x objective lens
#715-420	Auxiliary 1.5x objective lens
#800-170	Replacement bulb, bottom light, 12v 10 watt halogen bi-pin
#800-422	Replacement bulb, top light, 12v 15 watt halogen bi-pin
#931-420	Ring light adapter, O.D. 54.5mm (permits mounting auxiliary ring light on objective pod)
#965-400-05	Eyepiece reticle, 5mm/100 divisions, O.D. 22.8mm (for use only with WF10x eyepieces)
#965-400-10	Eyepiece reticle, 10mm/100 divisions, O.D. 22.8mm (for use only with WF10x eyepieces)

WARRANTY

Microscope, 5-year limited warranty: Manufacturer warrants this instrument to be free from defects in material and workmanship under normal use and service for 5 years from date of purchase. It does not cover damage resulting from abuse or misuse, repairs or alterations performed by other than authorized repair technicians or damage occurring in transit. Warranty does not cover bulbs or fuses.

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.

For warranty service, instrument should be well packed to avoid damage in transit, including a description of the difficulty, and shipped postage prepaid to National at the address on front. National will repair or replace at no charge and return postage prepaid. If failure was caused by misuse, alterations, accident, or abnormal conditions of operation, an estimate for repairs will be submitted for your approval prior to work being performed.

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