INSTRUCTIONS FOR

MODEL DS-2

COMPOUND BIOLOGICAL MICROSCOPE
WITH DIGITAL CAMERA

(For microscope operation only. Camera operation covered in separate supplement on disc.)

HOW TO USE YOUR MICROSCOPE SERIAL NUMBERS

1. Microscope serial number: This number (located on a silver sticker on the bottom of microscope) is the number under which your warranty is registered.

2. Microscope DM number: This number (located 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

Your new digital microscope incorporates a built-in camera with data transmission made possible through a simple plug and play USB cable. In order to achieve optimum results, it is important that you carefully read both this and the software instructions before operating your microscope or camera.

UNPACKING

1. The microscope and accessories have been carefully packed to assure that they reach you in the best possible condition. Carefully remove all components and check against this list.
   
   A. Microscope and built-in camera with attached USB cable, WF10x eyepiece, 2x objective lens, stand with cordless LED incidental illumination, rechargeable batteries, stage clips, and reversible black and white stage plate.
   
   B. Auxiliary 2X objective lens.
   
   C. Recharger
   
   D. Motic Images software
   
   E. Two instruction manuals: this one and separate supplement documentation
   
   F. Calibration slide
   
   G. Dustcover
   
   H. Warranty card

2. Save packing container in case it becomes necessary to ship the microscope for any reason. Repack in the styrofoam container, and then pack the styrofoam in other corrugated shipping container for optimum protection. Use of the styrofoam alone will not provide adequate protection in transit, and will void your warranty.

DESCRIPTION OF COMPONENTS

1. LED INDICATOR LIGHT: Indicates if camera is on. The LED lamp is illuminated after microscope is connected to computer with USB 2.0 cable. Camera is turned on and off by software commands.

2. WIDEFIELD 10X EYEPIECES: Lens closest to the eye, magnifies the primary image formed by the objective lens.


4. HEAD LOCKING SCREW: Locks head of microscope in a fixed position.

5. OBJECTIVE LENS: Lens closest to the objective being viewed, forms first magnified image of the specimen.

6. KNURLED TRIM RING: Trim ring, protecting threads for auxiliary lens, is removable to facilitate installation of the 2X auxiliary objective lens.

7. FOCUSING KNOBS: For focusing image seen through microscope and camera.

8. TENSION ADJUSTMENT COLLAR: Located between knob on one side and arm of microscope.

9. POST LOCKING KNOB: Permits microscope to be raised or lowered on post.

10. TOP LIGHT: Cordless LED incidental (top) light illumination. Powered by 3 rechargeable AA nickel metal hydride batteries, no power outlet or electrical cord is needed.
11. STAGE PLATE: Reversible black and white 60mm stage plate.

12. STAGE CLIPS: Two locked-on clips hold specimen slide in place on stage.

13. POWER SWITCH: Turns power to incidental illuminator on and off.

14. RECHARGER: Automatic switching charger accepts 100v-240v, 50H/60H input and supplies 12VDC power to the microscope for recharging batteries.

15. USB CABLE: USB 2.0 cable with connector.

OPERATION

1. Place microscope directly in front of you in a manner, which permits you to comfortably look into the eyepiece.

   A. Your microscope has special LED illumination that is powered by 3 rechargeable AA nickel metal hydride batteries (supplied). These batteries may be recharged, as required, using the recharger (supplied). Each set of batteries may be recharged approximately 500 times before replacing, and each charge will provide up to 50 hours of microscope operation.

   WARNING

   DO NOT USE regular AA alkaline batteries. Use of other than rechargeable AA nickel metal hydride batteries could result in batteries exploding during recharge. ONLY USE THE SUPPLIED SWITCHING BATTERY RECHARGER WITH AUTOMATIC “TRICKLE CHARGE”.

   B. It is recommended that you charge the batteries before initial use and after prolonged storage as the batteries may have discharged. Plug output cord from battery charger into DC recharging socket located on back of microscope base. Your automatic switching recharger operates on 100 to 240 volts AC 50/60 Hz. Plug recharger into your AC wall outlet. Battery recharger is also equipped with an automatic “trickle charge” feature; the red LED indicator lamp located on recharger will be illuminated when batteries are receiving maximum charge. After batteries are charged, the red LED indicator lamp will turn to green and charger automatically switches to “trickle charge”. The charger can be left plugged in, but for safety reasons it is a good idea to disconnect the charger from the AC wall outlet and the output cord from recharging socket after 12 hours. Batteries and charger may feel warm when charging, and unplugging the recharger is a safety precaution. Note that your microscope can be used during recharging.

2. Place specimen to be viewed on stage, centered under objective lens. If viewing a prepared slide, make certain slide is positioned so side with cover slip is facing up.

3. Push On/Off switch to on position.

4. Position the top incidental top LED illuminator so that it will illuminate your specimen evenly.

5. Position focusing knobs in the center of focusing range.

6. 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. 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.

7. 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. 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. The distance between specimen and objective lens will be about 85mm when microscope is in focus. This is called the “working distance”.

8. The “depth of field” of a microscope is very small, or narrow. When focused sharply on one feature of a specimen, any feature slightly below or above will appear slightly out of focus. This is normal. For example,
when looking at a flower, you can focus of the upper surfaces of the petals. Then, slowly turn the focusing knob to bring into sharp focus other features at difference levels of the specimen.

9. Change magnification by installing 2x auxiliary lens on microscope as follows:

A. First remove the knurled black trim ring from bottom of the fixed 2x objective lens.

B. Carefully thread the 2x auxiliary lens onto threads located at the bottom of 2x fixed objective lens by rotating lens in a clockwise direction.

C. Holding viewing head with one hand, loosen locking knob located on back of focusing assembly so that head can move freely down on post.

D. Looking through microscope, move viewing head down on post until object can be seen in approximate focus. Tighten focusing assembly locking knob. The distance between specimen and objective lens will be about 40mm when microscope is in focus.

**Microscope Specification Chart**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Field of View</th>
<th>Working Distance</th>
<th>Magnification with WF10X eyepiece</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Built in 2X</td>
<td>9mm</td>
<td>85mm</td>
<td>20X</td>
</tr>
<tr>
<td>Auxiliary Lens 2X</td>
<td>4.5mm</td>
<td>40mm</td>
<td>40X</td>
</tr>
</tbody>
</table>

**MAINTENANCE**

**WARNING**: For your own safety, make certain that battery recharger is unplugged and cord removed from microscope jack before maintaining your microscope.

1. **OPTICAL MAINTENANCE**

Prior to cleaning any lens surface, brush dust or dirt off lens surfaces using a camel hairbrush. Or use air to blow dust and lint off surfaces. Use of compressed air in a can, available at any computer supply store, is a good source of clean air.

Do not remove eyepieces or objective lenses to clean. 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.

Do not attempt to disassemble any lens components. Consult a microscope service technician when any repairs not covered by instructions are needed.

**NOTE**: Fingerprints or other matter on the front lens element of the objective lens is the single most common reason that you will have difficulty in focusing the microscope. Before having costly servicing done, or before returning to National for “warranty repair”, make certain to examine the front lens element with a magnifying glass or eye loupe for the presence of such contaminants. If a microscope is returned to National for warranty repair, and it is determined that such contaminants are the problem, this is not covered under warranty and National will submit a cost estimate for cleaning.

2. **MECHANICAL MAINTENANCE**

A. Coarse focus tension adjustment:

Coarse focus tension adjustment prevents the head from drifting down from its own weight and causing the image to move out of focus. The tension adjustment has been adjusted to appropriate tension at the factory. However, after some period of use, tension can loosen, and the stage will “sink” from its own weight or from
any slight pressure applied to the stage. This will cause the microscope image to move out of focus, and you will need to readjust the tension control.

When looking at the back of microscope base (facing on/off switch), the tension adjustment wheel is the small wheel immediately inside the large, coarse focusing knob on the left side of microscope. Insert small jewelers screwdriver into small hole on edge of tension adjustment wheel, engage blade into set screw and turn counter-clockwise to loosen. Do not remove setscrew from tension adjustment collar. Loosen setscrew enough to permit tension adjustment wheel to turn freely. Turn adjustment wheel clockwise to tighten tension and counter-clockwise to loosen tension. When desired tension is obtained, retighten setscrew to prevent wheel from moving from desired tension.

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

B. Metal parts: Use a clean, damp cloth to remove dust or dirt from metal parts, followed by a dry cloth.

3. ELECTRICAL MAINTENANCE

The extent of electrical maintenance, by other than qualified technician should be charging the batteries. Only qualified technicians should replace LED Lamp assembly and wiring contained in base.

A. Recharging batteries: Plug output cord from battery charger into DC recharging socket located on back of microscope base. Your automatic switching recharger operates on 100 to 240 volts AC 50/60 Hz, plug recharger into your AC wall outlet. The red LED indicator lamp located on recharger will be illuminated when batteries are receiving maximum charge. After batteries are charged, the red LED indicator lamp will turn to green and charger automatically switches to “trickle charge”. The charger can be left plugged in, but for safety reasons it is a good idea to disconnect the charger from the AC wall outlet and the output cord from recharging socket after 12 hours. Batteries and charger may feel warm when charging, and unplugging the recharger is a safety precaution. You may operate the microscope light even while it is being recharged. Simply flip light switch to “on” position and continue using microscope while the recharger is fully engaged.

B. Replacing batteries: Your microscope includes 3 rechargeable AA nickel metal hydride batteries. These may be recharged up to 1000 times, but if you observe that a recharge is providing significantly less than 40 hours of operation. It is probably time to replace to batteries.

IMPORTANT WARNING: DO NOT USE REGULAR ALKALINE BATTERIES IN THIS MICROSCOPE. ANY ATTEMPT TO RECHARGE ALKALINE TYPE BATTERIES COULD RESULT IN BATTERIES EXPLODING.

Gently lay microscope on its side or back. Gently pull out the four rubber feet from bottom of base. Using a crosshead screwdriver remove the four cross head screws located in each of the rubber feet recesses. Carefully remove black base from microscope stand and observe battery case mounted on the bottom. Using small Phillips screwdriver, carefully remove Phillips screw that holds battery case together. Slide lid of case straight out to remove and expose batteries. Remove all 3 batteries and replace with new rechargeable AA nickel metal hydride batteries, making certain to insert with correct polarity according to markings on battery holder. Replace lid, close and secure door.

Follow instructions on new battery packaging to determine if they are already charged, or if they should be charged before initial use. If recharging is required, following directions in “3.a” above.
# TROUBLESHOOTING

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>REASON FOR PROBLEM</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light fails to operate.</td>
<td>Batteries fully discharged.</td>
<td>Recharge batteries.</td>
</tr>
<tr>
<td></td>
<td>Light switch in off position.</td>
<td>Turn light switch on.</td>
</tr>
<tr>
<td>Image does not remain in focus</td>
<td>Head of microscope drops from its own weight.</td>
<td>Adjust tension control.</td>
</tr>
<tr>
<td>Image does not focus</td>
<td>Viewing head improperly positioned on post.</td>
<td>Raise or lower viewing head by adjusting focusing mechanism.</td>
</tr>
<tr>
<td>Poor resolution</td>
<td>Objective lenses dirty.</td>
<td>Clean objective lenses.</td>
</tr>
<tr>
<td>(Image not sharp)</td>
<td>Eyepiece lens dirty.</td>
<td>Clean eyepiece lenses.</td>
</tr>
<tr>
<td>Spots in field of view.</td>
<td>Eyepiece or condenser lens dirty.</td>
<td>Clean lens. ***</td>
</tr>
<tr>
<td></td>
<td>Specimen slide dirty.</td>
<td>Clean slide.</td>
</tr>
</tbody>
</table>

***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:

- #610-045 W10x eyepiece w/pointer
- #802-003 Replacement auto Cut-off recharger.
- #950 Dustcover, 13” tall x 11”, heavy vinyl with stitched seams.

# WARRANTY - 5 YEAR LIMITED WARRANTY

Please see our website, [www.nationaloptical.com](http://www.nationaloptical.com), for complete warranty details and exclusions.